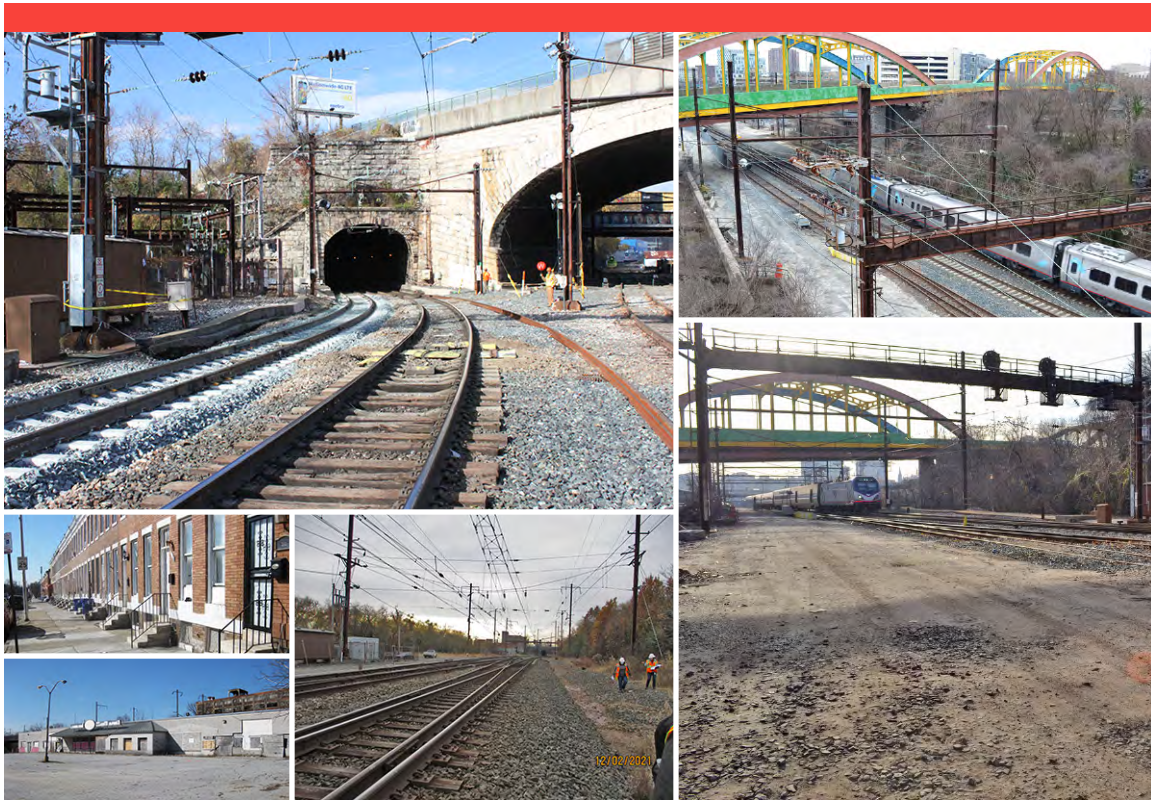


ADDENDUM 1: SUPPLEMENTAL PHASE IA ARCHAEOLOGICAL STUDY

FREDERICK DOUGLASS TUNNEL B&P TUNNEL REPLACEMENT PROGRAM INTERMEDIATE VENTILATION FACILITY

Baltimore, Maryland



Prepared for:



Amtrak Headquarters
1 Massachusetts Avenue, N.W.
Washington, DC 20001

Prepared by:



WSP USA Inc.
1 East Pratt Street, Suite 300
Baltimore, Maryland 21202

January 30, 2024

ADDENDUM 1: SUPPLEMENTAL PHASE IA ARCHAEOLOGICAL STUDY

FREDERICK DOUGLASS TUNNEL B&P TUNNEL REPLACEMENT PROGRAM

INTERMEDIATE VENTILATION FACILITY

Baltimore, Maryland

REPORT MAPPING AND TEXT REDACTED TO PROTECT
SENSITIVE ARCHAEOLOGICAL SITE INFORMATION

Prepared for:

Amtrak

1 Massachusetts Avenue, N.W.
Washington, DC 20001

Prepared by:

Jason Shellenhamer and Henry Ward

WSP USA Inc.

1 East Pratt Street, Suite 300
Baltimore, Maryland 21202

January 30, 2024

ABSTRACT

On behalf of Amtrak, WSP USA Inc. (WSP) has prepared an addendum to the supplemental Phase IA archaeological study for the Frederick Douglass Tunnel, B&P Tunnel Replacement Program (Program) in Baltimore, Maryland. This addendum has been prepared to assess the archaeological sensitivity of additional areas that have been added to the program limits of disturbance (LOD) since the completion of the supplemental Phase IA archaeological study in 2023. This addendum report focuses on the construction of belowground utilities located outside the Program's previously defined Archaeological Area of Potential Effects (APE-Archaeology) in the vicinity of the Intermediate Ventilation Facility.

The proposed Program will replace the 1.4-mile-long rail tunnel located along the Northeast Corridor in Baltimore. The B&P (Baltimore & Potomac) Tunnel is owned by Amtrak and used for regional and Acela intercity passenger trains, Maryland Area Rail Commuter passenger trains, and Norfolk Southern Railway freight trains. The Program extends between and does not include Baltimore Pennsylvania Station (B-3727) and North Franklintown Road and consists of a tunnel extending along a gradual arc for approximately 2 miles.

To satisfy its responsibilities for the Program under Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations (36 C.F.R. Part 800), including completing archaeological historic property identification and resolution of adverse effects on historic properties, the Federal Railroad Administration, in consultation with the other signatories and consulting parties, executed a Programmatic Agreement (PA) on March 2, 2017—*Project Programmatic Agreement Among the Federal Railroad Administration, Maryland State Historic Preservation Officer, National Railroad Passenger Corporation, and Preservation Maryland Regarding the Baltimore & Potomac Tunnel Program, Baltimore City, Maryland*—that requires identification and assessment of Program effects on archaeological historic properties.

The initial Phase IA archaeological study was completed in 2015; however, the Project designs had not been sufficiently developed at that time to establish an APE-Archaeology. That study was therefore limited to the centerline of the alignments of each of the design alternatives. The 2015 Phase IA study concluded that although large portions of the alignment alternatives have been disturbed, there was the potential for the presence of both precontact and historic archaeological sites within the alignments of each of the build alternatives. The 2015 study recommended that a supplemental Phase IA archaeological study be conducted once the Preferred Alternative was determined and the extent of anticipated ground-disturbing activities ascertained.

In accordance with Program PA stipulations VI.B, VI.C.1 and VI.C.2, WSP completed a supplemental Phase IA archaeological study to determine the sensitivity for the presence of precontact and historic archaeological resources in the APE-Archaeology for the Selected Alternative for the Program. In addition, the supplemental Phase IA study included recommendations for further survey to identify archaeological resources in the APE-Archaeology. The supplemental Phase IA archaeological study was submitted to the Maryland Historical Trust (MHT) and the consulting parties for review on October 19, 2023. In an email dated November 20, 2023, the MHT concurred with the report's findings and recommendations.

Since the submission of the supplemental Phase IA archaeological study, the Project design continues to advance and certain new elements that require ground-disturbing activities extend outside the previously defined APE-Archaeology. For the purpose of this addendum to the supplemental Phase IA archaeological study, the LOD has been expanded in the vicinity of the proposed Intermediate Ventilation Facility by approximately 2 acres along North Avenue, Jordan Street, and Ducatel Street. WSP completed this addendum to the supplemental Phase IA archaeological study to incorporate the expanded APE-Archaeology and assess the sensitivity for the presence of precontact and historic archaeological resources in this expanded APE-Archaeology, i.e., the additional areas where additional ground-disturbing activities are now proposed in the vicinity of the Intermediate Ventilation Facility.

The review of available environmental and soil data, historical background research, the results of the Geographic Information System topographical analysis, and geotechnical survey data indicates that there is a low sensitivity for encountering precontact and/or historic archaeological resources in the expanded APE-Archaeology. The prior modification of the landscape within the expanded APE-Archaeology at the Intermediate Ventilation Facility consisted of substantial ground disturbance associated with urban development, transportation improvements, and construction of buried utilities. As a result of the extent of previous ground disturbance, there is a low potential for the presence of intact archaeological resources. No further archaeological survey is recommended for the expanded APE-Archaeology at the Intermediate Ventilation Facility.

TABLE OF CONTENTS

<i>Section</i>	<i>Page</i>
Abstract	i
List of Figures	iv
List of Tables	iv
 I. Introduction.....	 1
A. Project Background.....	1
B. Update to the Area of Potential Effects	3
C. Personnel.....	5
II. Methodology.....	6
A. Documentary Research	6
B. Topographic Analysis	6
C. Review of Geotechnical Data	7
III. Environmental Setting	8
A. Physiography and Geology	8
B. Soils.....	8
C. Hydrology	13
IV. Previous Archaeological Investigations and Historic Properties.....	14
A. Previous Archaeological Studies	14
B. Previously Identified Archaeological Sites.....	16
1. Previously Identified Historic Architectural Resources.....	17
V. Study Results	19
A. Cartographic Review	19
B. GIS Topographic Analysis.....	22
C. Review of Geotechnical Data	22
D. Sensitivity Assessment.....	27
1. Precontact Archaeological Site Sensitivity	28
2. Historic Archaeological Site Sensitivity	28
VI. Recommendations.....	30
VII. References Cited.....	31
VIII. List of Abbreviations and Acronyms.....	34
 APPENDIX A: Qualifications of the Investigators	 A-1
APPENDIX B: 2017 B&P Tunnel Preliminary Engineering Geotechnical Data Boring Logs	 B-1

LIST OF FIGURES

<i>Figure</i>	<i>Page</i>
1	Boundaries of Expanded APE-Archaeology at Intermediate Ventilation Facility 2
2	Update to the APE-Archaeology Showing Proposed Project Elements 4
3	Expanded APE-Archaeology in Relation to the Maryland Physiographic Provinces..... 9
4	Maryland Archaeological Research Units 10
5	Expanded APE-Archaeology in Relation to Geological Formations 11
6	Soil Series in Expanded APE-Archaeology..... 12
7	Previous Archaeological Studies Within 1-Mile Radius of APE-Archaeology for the Program 15
8	Historic Architectural Resources in Expanded APE-Archaeology 18
9	Expanded APE-Archaeology in 1849..... 20
10	Expanded APE-Archaeology in 1876..... 21
11	Expanded APE-Archaeology in 1897..... 23
12	Expanded APE-Archaeology in 1914..... 24
13	Projected Depth of Fill and Grading in Expanded APE-Archaeology at Intermediate Ventilation Facility 25
14	Geotechnical Boring Locations in Expanded APE-Archaeology at Intermediate Ventilation Facility 26
15	Archaeological Sensitivity Assessment of Expanded APE-Archaeology at Intermediate Ventilation Facility 29

LIST OF TABLES

<i>Table</i>	<i>Page</i>
1	Previous Archaeological Investigations Within 1-Mile Radius of Program APE-Archaeology 14
2	Archaeological Sites Within 1.6-Kilometer (1-Mile) Radius of Expanded APE-Archaeology at Intermediate Ventilation Facility..... 16

I. INTRODUCTION

A. PROJECT BACKGROUND

On behalf of Amtrak, WSP USA Inc. (WSP) prepared an addendum to the supplemental Phase IA archaeological study for the Frederick Douglass Tunnel, B&P Tunnel Replacement Program (Program) in Baltimore, Maryland.¹ This addendum has been prepared to assess the archaeological sensitivity of additional areas that have been added to the Program limits of disturbance (LOD) since the completion of the supplemental Phase IA archaeological study. This addendum report focuses on the construction of belowground utilities located outside the Program's previously defined Archaeological Area of Potential Effects (APE-Archaeology) in the vicinity of the Intermediate Ventilation Facility (Figure 1).

In accordance with National Environmental Policy Act (NEPA), the Federal Railroad Administration (FRA), as the lead federal agency, issued a Draft Environmental Impact Statement (DEIS) in December 2015 that evaluated the environmental impacts of three build alternatives (Alternatives 3A, 3B, and 3C) in comparison with the No-Build Alternative. The FRA issued a Final Environmental Impact Statement (FEIS) on November 25, 2016. A Phase IA archaeological study for the B&P Tunnel Replacement Program's three build alternatives was completed in 2015 in support of the DEIS (Shellenhamer and Kodlick 2015). The study found that areas with potential for both precontact and historic archaeological resources are present in the approximate alignments of each of the three alternatives but that the designs were not sufficiently advanced at that time to identify specific areas for archaeological survey or determine the effects on archaeological resources as a result of the undertaking.

Based on the analysis of the Program's potential environmental effects in the DEIS and public and agency comments, the FRA and the Maryland Department of Transportation (MDOT) identified Alternative 3B as the Preferred Alternative for the Program in the FEIS. The FRA issued the Record of Decision (ROD) in March 2017 for the Program, in which the FRA determined that the Preferred Alternative is the Selected Alternative for the B&P Tunnel Replacement Program. The FRA found that the Preferred Alternative, including the preferred Intermediate Ventilation Facility site, best fulfills the Purpose and Need for the Program while balancing impacts on the natural and human environment. In reaching this decision, the FRA considered the physical and operational characteristics and potential environmental consequences associated with the alternatives.

To satisfy its responsibilities for the Program under Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations (36 C.F.R. Part 800), the FRA

¹ B&P = Baltimore & Potomac. Since the execution on March 2, 2017, of the *Project Programmatic Agreement Among the Federal Railroad Administration, Maryland State Historic Preservation Officer, National Railroad Passenger Corporation, and Preservation Maryland Regarding the Baltimore & Potomac Tunnel Project, Baltimore City, Maryland*, Amtrak has renamed the project the "B&P Tunnel Replacement Program." The change to the term *Program* reflects that the undertaking requires execution of multiple individual projects throughout the approximately 4-mile corridor to complete the envisioned scope of improvements. Therefore, the term *Program* will be used in future correspondence. Individual projects under the Program will be referred to as projects. This does not affect the validity of the Programmatic Agreement.

CONFIDENTIAL INFORMATION - NOT FOR PUBLIC DISTRIBUTION

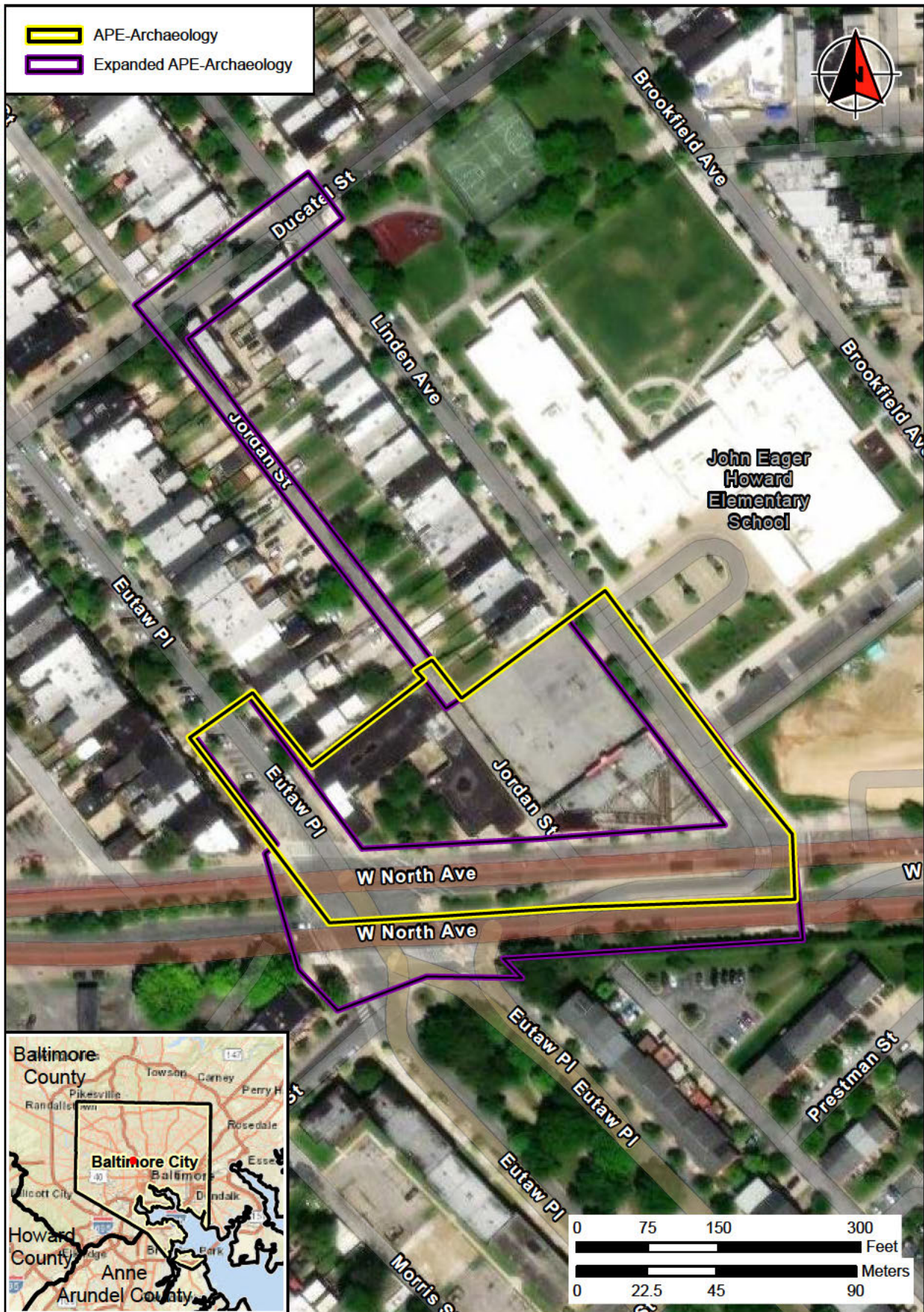


FIGURE 1: Boundaries of Expanded APE-Archaeology at Intermediate Ventilation Facility
 (ESRI World Imagery 2023)

executed a legally binding Section 106 Programmatic Agreement (PA) for this Program on March 2, 2017, entitled *Project Programmatic Agreement Among the Federal Railroad Administration, Maryland State Historic Preservation Officer, National Railroad Passenger Corporation, and Preservation Maryland Regarding the Baltimore & Potomac Tunnel Program, Baltimore City, Maryland*. The Program PA documents the detailed compliance process agreed upon by the signatories and invited signatories—the FRA, Amtrak, the Maryland State Historic Preservation Officer (Maryland Historical Trust or MHT), and Preservation Maryland—to satisfy the FRA’s responsibilities under Section 106 and to resolve adverse effects on historic properties in accordance with Section 106 for the Program. In accordance with the Program PA, Amtrak, in consultation with the signatories and other consulting parties, is required to identify and assess Program effects on archaeological historic properties.

In accordance with Program PA stipulations VI.B, VI.C.1, and VI.C.2, WSP completed a supplemental Phase IA archaeological study to determine the sensitivity for the presence of precontact and historic archaeological resources in the APE-Archaeology for the Selected Alternative for the Program (Shellenhamer and Ward 2023). In addition, the supplemental Phase IA study included recommendations for further survey to identify archaeological resources in the APE-Archaeology. The supplemental Phase IA archaeological study was submitted to the MHT and the Consulting Parties for review on October 19, 2023. In an email dated November 20, 2023, the MHT concurred with the report’s findings and recommendations for the completion of a geomorphology study in the vicinity of the south approach and a Phase IB/II archaeological study in the defined section of the proposed Intermediate Ventilation Facility.

Since the submission of the supplemental Phase IA archaeological study, the Project design continues to advance, and certain new elements that require ground-disturbing activities extend outside the previously defined APE-Archaeology. WSP completed this addendum to the supplemental Phase IA archaeological study to determine the sensitivity for the presence of precontact and historic archaeological resources in the expanded APE-Archaeology located in the vicinity of the Intermediate Ventilation Facility, described below (see Figure 1; Figure 2).

B. UPDATE TO THE AREA OF POTENTIAL EFFECTS

During the supplemental Phase IA archaeological study, the APE-Archaeology was defined as approximately 150 acres comprising discontinuous areas of the proposed LOD, in which Program activities include open-cut excavation, construction staging areas, temporary access roads, and utility and stormwater management sites (Shellenhamer and Ward 2023). This included approximately 6 acres at 900-940 West North Avenue, where the construction of the Intermediate Ventilation Facility is proposed (see Figure 1). For a summary of the Program description, please refer to Chapters I and II of the supplemental Phase IA archaeological study report (Shellenhamer and Ward 2023).

The LOD within the roadway right-of-way (ROW) surrounding the Intermediate Ventilation Facility’s proposed location will be expanded for electric and storm sewer utility relocations and roadway improvements. The proposed streets in the expanded LOD include the following.

- Ducatel Street (from Linden Avenue to Jordan Street);
- Jordan Street (from Ducatel Street to West North Avenue);
- West North Avenue (from Eutaw Place to Linden Avenue); and
- Linden Avenue (from West North Avenue to 2014 Linden Avenue).

CONFIDENTIAL INFORMATION - NOT FOR PUBLIC DISTRIBUTION

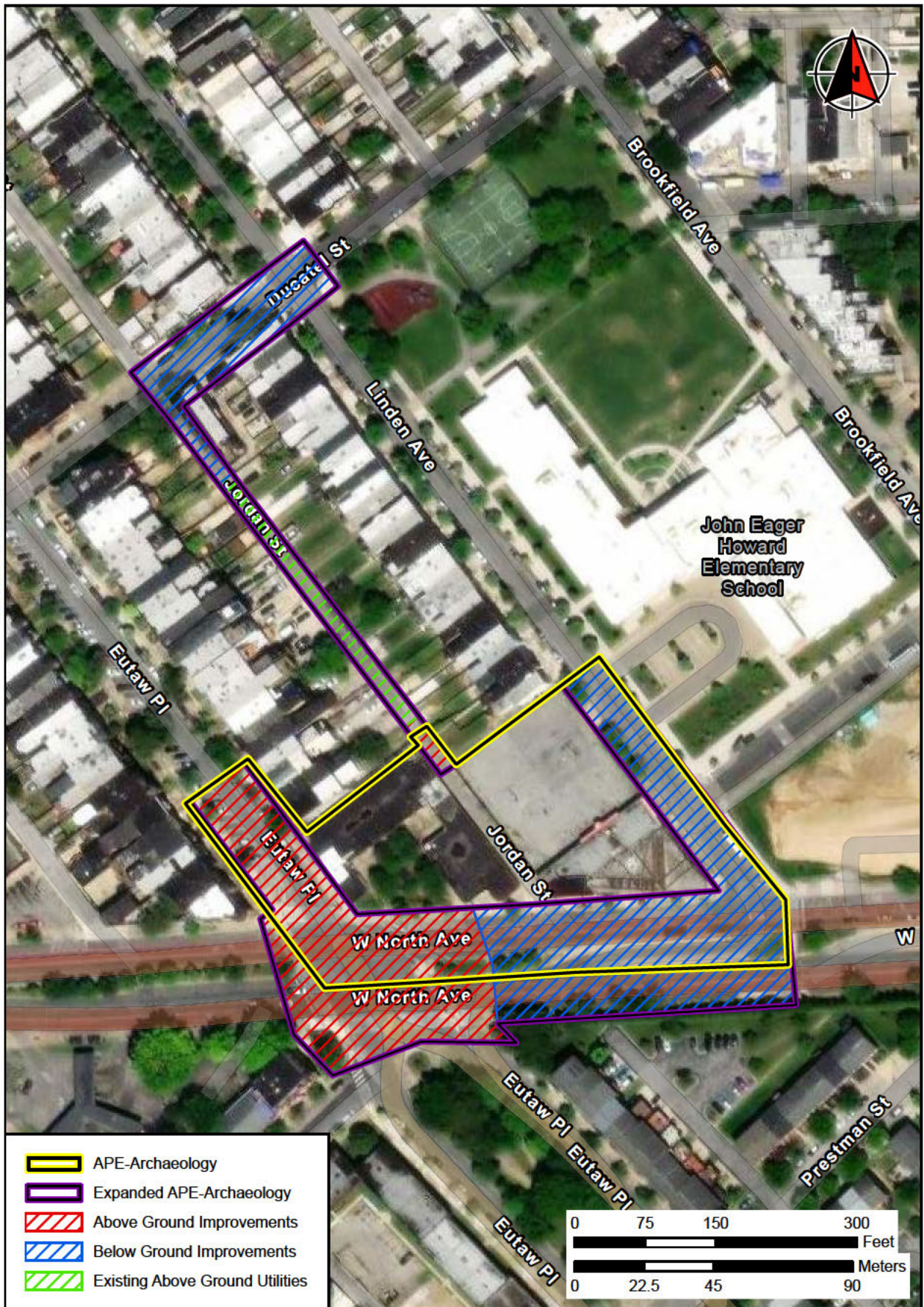


FIGURE 2: Update to the APE-Archaeology Showing Proposed Project Elements (ESRI World Imagery 2023)

At the intersection of Eutaw Place and West North Avenue, the proposed work includes utility relocations for storm sewer, sanitary sewer, and electric as well as intersection upgrades. The proposed upgrades at this intersection consist of the installation of new Maryland State Highway Administration standard mast arm traffic signals and a standard traffic signal box installed at grade, sidewalk and crosswalk improvements, new accessible pedestrian signal poles, new traffic signage, and modifications to the island within W. North Avenue.

Elsewhere within the expanded LOD, storm sewer relocations are proposed on Linden Avenue and in the remainder of West North Avenue, and electric utility relocations on Ducatel and Jordan streets. The majority of the relocations on Jordan Street will be aboveground on newly constructed utility poles or will use existing poles. Buried electric utilities are proposed within the ROW of Ducatel Street and underneath approximately 150 feet of Jordan Street starting at its intersection with Ducatel Street.

The areas located within Linden Avenue and portions of West North Avenue and Jordan Street were previously assessed as part of the APE-Archaeology in the supplemental Phase IA study; however, approximately 2 acres are situated outside the previously delineated APE-Archaeology. These areas where additional ground-disturbing activities are now proposed constitute the expanded APE-Archaeology for this addendum report.

C. PERSONNEL

The Principal Investigator for the addendum study was Jason Shellenhamer (Registered Professional Archaeologist [RPA] 17875). Henry Ward (RPA 12205) served as Project Manager (see Appendix A). Historical research was carried out by Mr. Shellenhamer, and the Geographic Information System (GIS) cut-and-fill analysis and graphics production were performed by Jacqueline Horsford and Rose Micke. Mr. Shellenhamer prepared this document with assistance from Mr. Ward. Anne Moiseev served as technical editor. Mr. Shellenhamer and Mr. Ward meet the standards set out in the Secretary of the Interior's Professional Qualification Standards for Archaeology (48 *Federal Register* 44738-44739, 36 C.F.R. Part 61) (United States Department of the Interior 1983).

II. METHODOLOGY

This addendum to the supplemental Phase IA archaeological study serves to examine the expanded APE-Archaeology, which incorporates the expanded LOD that has been identified as the design of the Program has progressed. The study assesses the sensitivity for the presence of significant precontact and/or historic archaeological historic properties in the expanded APE-Archaeology and provides recommendations for further survey, if appropriate.

A. DOCUMENTARY RESEARCH

As part of the supplemental Phase IA archaeological study, research was conducted to establish precontact and historic contexts for the APE-Archaeology and to determine the existence of any previously recorded archaeological sites or historic properties in or adjacent to the APE-Archaeology. Files available through the MHT's Cultural Resource Information System (Medusa) were checked for the presence of recorded archaeological sites and historic properties within a 1.6-kilometer (1-mile) radius around the APE-Archaeology. Additional background research for this addendum consisted of a review of pertinent primary and secondary sources, including land records, historical maps and atlases, and local and county histories available online and at the Maryland State Archives in Annapolis. Previous survey reports for archaeological investigations conducted in or near the APE-Archaeology were also obtained from the MHT Library, including Shellenhamer and Kodlick (2015), Ward et al. (2006), and Ward et al. (2013). Additional archival research was carried out at the Library of Congress in Washington, DC, and the Sheridan Libraries at Johns Hopkins University in Baltimore. The review of historical maps was a key component of the analysis of historic archaeological potential.

This report does not include a historic context. The goal of this study was not to develop a historical and cultural synthesis of the APE-Archaeology but to provide an addendum planning document as the Program design advances. The reader is referred to the historical synthesis of the entire Program in WSP's supplemental Phase IA archaeological study (Shellenhamer and Ward 2023).

B. TOPOGRAPHIC ANALYSIS

An updated elevation change analysis was conducted to include the expanded APE-Archaeology at the proposed location of the Intermediate Ventilation Facility. As in the supplemental Phase IA study, the analysis of the historical elevation in the APE was obtained from the *Atlas of the City of Baltimore* (Duncan 1897). The 1897 map was created by the Topographical Survey Commission of the City of Baltimore and consists of 39 separate topographic maps, with 5-foot contours, covering individual quadrants of a pre-defined grid system covering all the areas within the boundaries of the City of Baltimore prior to the city's expansion in 1918. Each map was drawn based on individual surveys conducted over the five-year period from 1893 to 1897.

By digitizing the contour lines from the 1897 atlas in the APE-Archaeology, the data were used to create a triangulated irregular network (TIN). The TIN was then used to create a digital elevation model (DEM) of the ground surface elevation in the APE-Archaeology prior to 1900. To account for the vertical datum shift since the creation of the atlas, 1.6 feet were subtracted from the 1897 elevation values. A similar procedure was used for the modern (2021) elevation data, which are available through Baltimore City GIS Open Data as 2-foot interval contours. The difference

between the two DEMs was calculated, highlighting the topographic changes between the historical and modern maps. The modern elevations used in the analysis were an elevation dataset from the Baltimore City Department of Planning (Open Baltimore), published in 2021. The 2021 dataset was derived using light detection and ranging (LiDAR) to support 2-foot contours and has an accuracy under 1.0 foot. The results of the comparative analysis of historic and modern elevation change was depicted on color-coded mapping and served as an aid in determining the likelihood of encountering intact cultural deposits within the expanded APE-Archaeology at the Intermediate Ventilation Facility.

C. REVIEW OF GEOTECHNICAL DATA

Boring logs from the 2017 *B&P Tunnel Preliminary Engineering Geotechnical Data Report* were reviewed to assess the potential subsurface integrity of the expanded APE-Archaeology (Appendix B). The geotechnical borings were completed as part of the Phase 1 and Phase 2 Preliminary Design Subsurface Investigation Program conducted by WSP/Parsons Brinckerhoff/Parsons Joint Venture (PB/P JV). All borings were drilled vertically using truck-mounted drill rigs as well as all-terrain vehicle drill rigs. All borings were soft dug to a minimum depth of about 6 feet and a maximum depth of 10.5 feet to clear existing utilities by means of vacuum extraction. Phase 1 borings were typically advanced through overburden by means of 8-inch outside diameter (OD) hollow-stem augers. Phase 2 borings were typically advanced first with 7.6-inch or 8.25-inch OD hollow-stem augers to a depth less than or equal to 30 feet, then 6.5-inch OD steel casing was installed and drilling continued using the mud rotary method. Borings conducted during both Phase 1 and Phase 2 were sampled at 5-foot intervals between the ground surface and top of rock using a standard split-barrel sampler with 2-inch OD and 1-3/8-inch inside diameter.

As continuous samples were not taken, the data presented in the boring logs were not sufficient to determine accurately whether buried ground surfaces are present in the APE-Archaeology that have potential for containing intact archaeological resources. The data presented in the boring logs do provide useful information to ascertain the location and approximate depth of fill and other ground disturbance in the APE-Archaeology.

III. ENVIRONMENTAL SETTING

A. PHYSIOGRAPHY AND GEOLOGY

The expanded APE-Archaeology at the Intermediate Ventilation Facility is located in the Piedmont Plateau 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 the Maryland Archaeology Research Units 7 and 14 (Figure 4). At the point where rivers and streams cross the Fall Line, falls and rapids are typically encountered.

The expanded APE-Archaeology lies within the Potomac Group (Kp) formation (Figure 5). 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 meters (0 to 800 feet).

B. SOILS

General soil mapping for Baltimore City (Figure 6) places the expanded APE-Archaeology at the Intermediate Ventilation Facility within the Urban Land Association (44UC) and Urban Land-Joppa-Sassafras Association (14UB, 31UB) (Levin and Griffin 1998; United States Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS] 2021).

Urban Land Association soils 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 ranges from 2 to more than 1,000 acres in size. Typically, large areas are mostly composed 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.

Urban Land-Joppa-Sassafras Association soils are very deep and excessively to well-drained soils that overlie sandy and/or gravelly sediments on the uplands of the city's Coastal Plain. This association consists of 40 percent Urban Land, 15 percent Joppa soils, 10 percent Sassafras soils, and 35 percent minor soils. Joppa soils are excessively well drained, very deep, gravelly soils. Sassafras soils are very deep, well-drained, loamy soils. Both are generally found on rolling or hilly dissected sideslopes. The minor soils in this association include somewhat excessively drained Brandywine and Manot soils on steep sideslopes 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.

CONFIDENTIAL INFORMATION - NOT FOR PUBLIC DISTRIBUTION

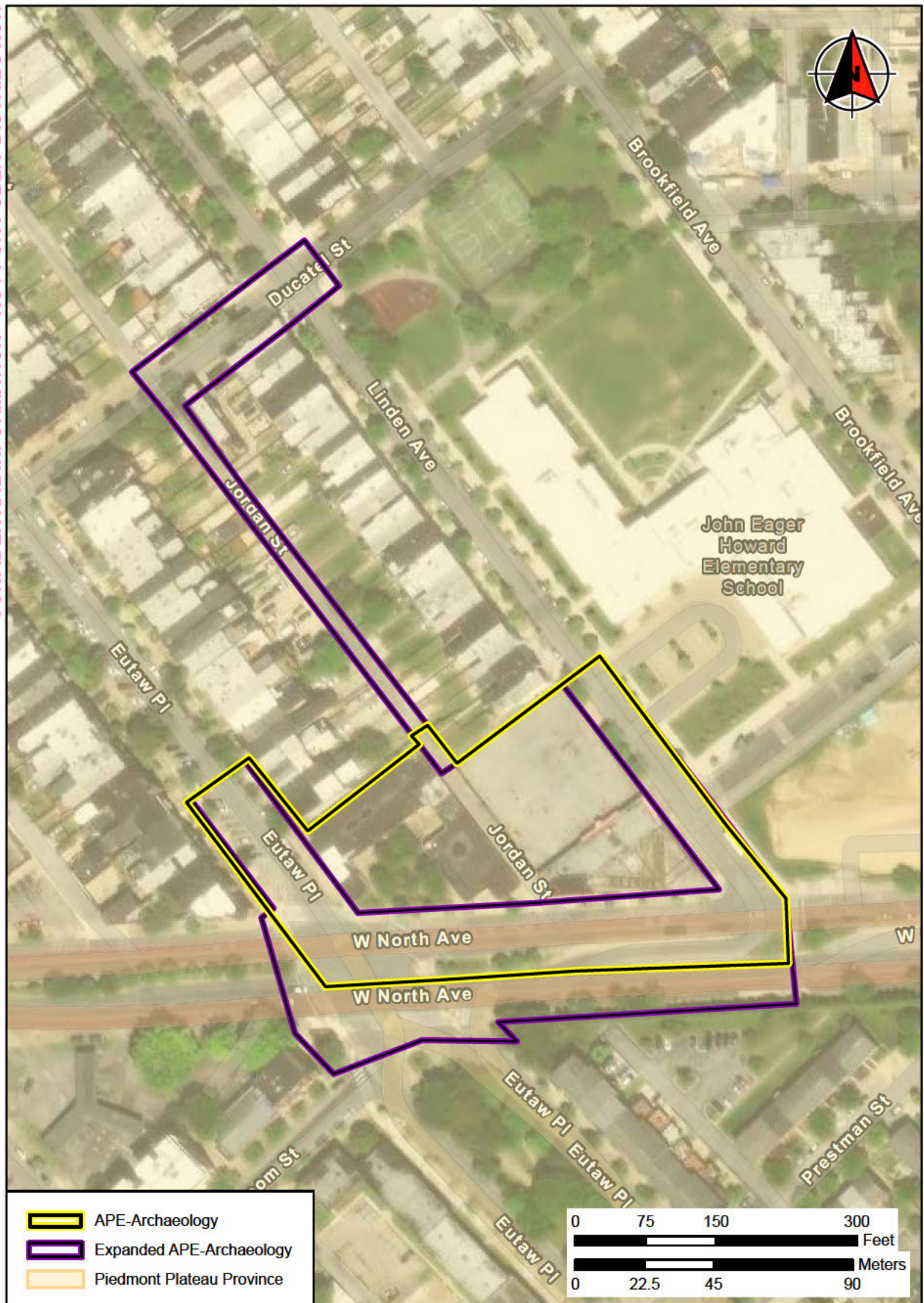


FIGURE 3: Expanded APE-Archaeology in Relation to the Maryland Physiographic Provinces (ESRI World Imagery 2023)

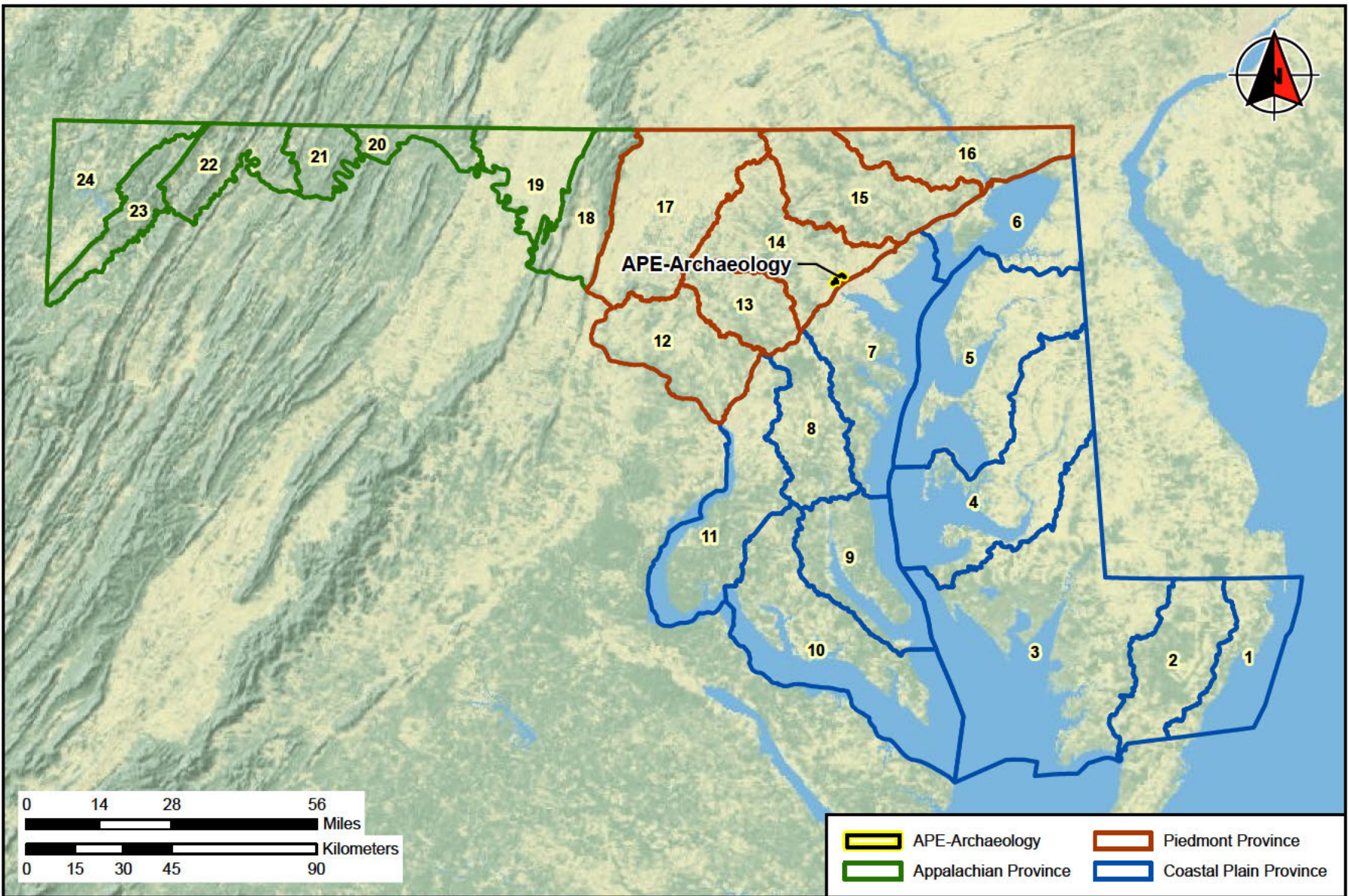


FIGURE 4: Maryland Archaeological Research Units (ESRI USA Topo Maps 2019; Shaffer and Cole 1994)



FIGURE 5: Expanded APE-Archaeology in Relation to Geological Formations (ESRI World Imagery 2020)

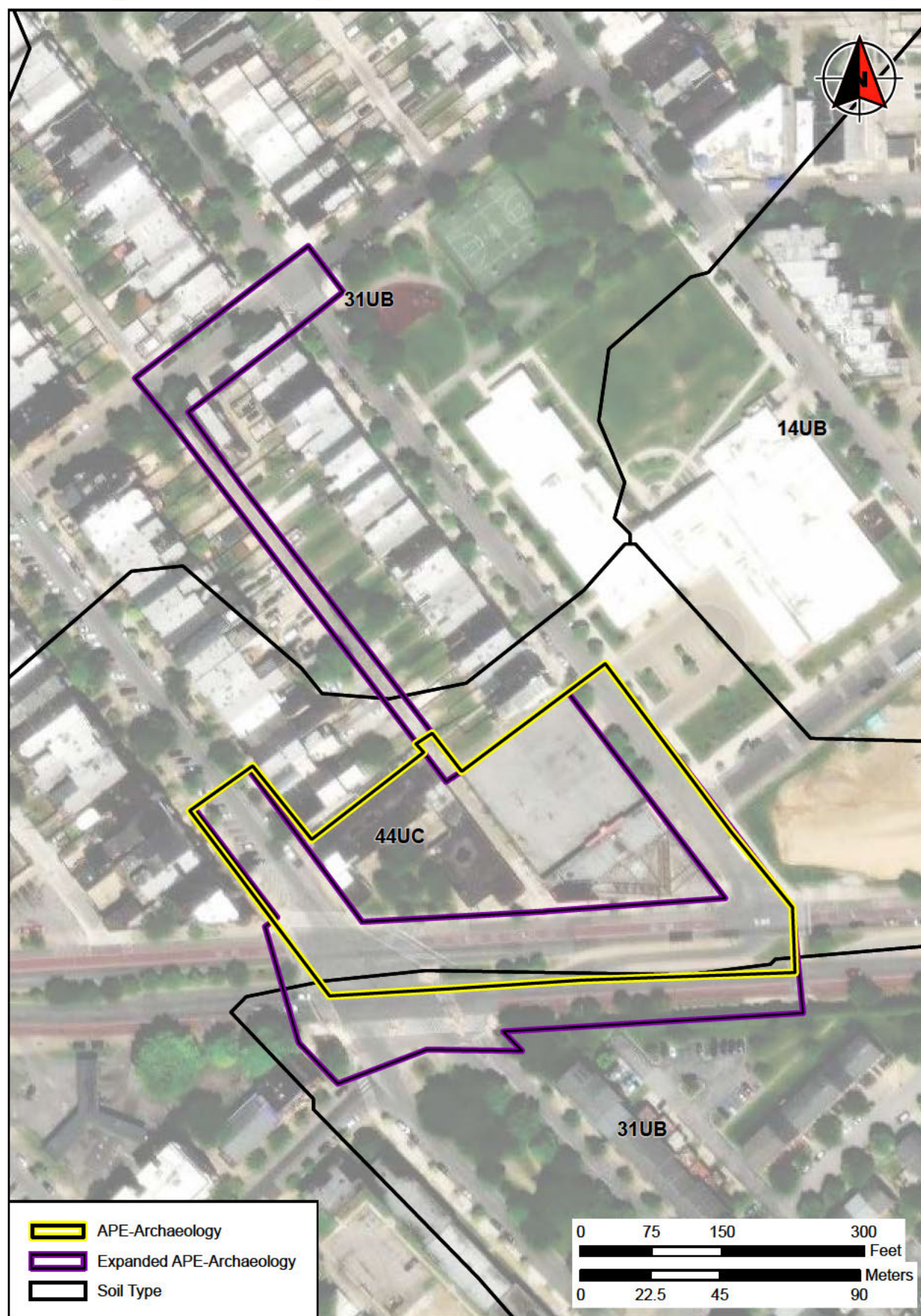


FIGURE 6: Soil Series in Expanded APE-Archaeology (ESRI World Imagery, 2020; NRCS 2020)

C. HYDROLOGY

The expanded APE-Archaeology for the Intermediate Ventilation Facility is located in the Jones Falls watershed. Until the mid-nineteenth century a branch of an unnamed tributary of the Jones Falls was located south of the APE-Archaeology. The tributary extended east from that location, along the approximate alignment of present-day West North Avenue, and emptied into the Jones Falls in the vicinity of where the North Avenue Bridge crosses the stream. The Jones Falls stream is 28.8 kilometers (17.9 miles) in length (Baltimore County n.d.b.). It flows aboveground through Baltimore County but is channelized through much of the city in either a concrete-lined streambed or tunnel. The stream 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 Street and President Street. The Patapsco River has a watershed of 1,760 square kilometers (679 square miles). The last 16 kilometers (10 miles) of the river is a tidal estuary inlet of the Chesapeake Bay. The tidal area of the river is composed of the Northwest Harbor and Middle Branch of the Patapsco River (Baltimore County n.d.a).

IV. PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS AND HISTORIC PROPERTIES

A. PREVIOUS ARCHAEOLOGICAL STUDIES

Review of cultural resources survey data maintained by the MHT on Medusa revealed that 13 previous archaeological studies have been conducted within a 1.6-kilometer (1-mile) radius of the APE-Archaeology of the full Program (Figure 7; Table 1). Of those, five studies were located close to or within the expanded APE-Archaeology at the Intermediate Ventilation Facility.

TABLE 1: PREVIOUS ARCHAEOLOGICAL INVESTIGATIONS
WITHIN 1-MILE RADIUS OF PROGRAM APE-ARCHAEOLOGY

STUDY	No.	REFERENCE
Phase I Reconnaissance Survey of the Archeological Resources in the Proposed I-595 Corridor Between I-95 and I-170, Baltimore City, Maryland	BC 6	Dinnel 1982*
Preliminary Reconnaissance Survey of the Archeological Resources in the Proposed I-70 Alignment Through Leakin and Gwynns Falls Park	BC 26	Harrison 1977
Orchard Street Church Archeological Monitoring	BC 33	Weber 1984a
Phase I/Phase II Archeological Reconnaissance Survey for the Gwynns Falls Sewer Interceptor, Baltimore, Maryland	BC 34C	Weber 1984b
Phase I Archeological Survey of the Proposed 3.03-mile Phase 2 Gwynn Fall's Pathway	BC 126	Hill 2000
Phase I Archeological Investigations of the proposed UMAB† Health Sciences Research Park, 800-900 West Baltimore Street, Baltimore, Maryland	BC 151	Williams 2005
Stage 1 Phase IB Archeology Technical Report, Red Line Light Rail Transit Project, City of Baltimore and Baltimore County, Maryland	BC 184	Ward et al. 2013*
Stage 1 Phase IB Archeology Interim Technical Report, Red Line Light Rail Transit Project, City of Baltimore and Baltimore County, Maryland	BC 194	Ward et al. 2015*
Phase IA Archeological Study, B&P Tunnel Project, Baltimore, Maryland [note: no location data available on Medusa, not shown on Figure 7]	BC 195	Shellenhamer and Kodlick 2015*
Phase I Archaeological Survey for the Remington Avenue Bridge Replacement Project, City of Baltimore, Maryland	BC 209	Hatch et al. 2018
Supplemental Phase IA Archaeological Study Baltimore & Potomac Tunnel Replacement Program, Baltimore, Maryland [no location data available on Medusa, not shown on Figure 7]	Number Pending	Shellenhamer and Ward 2023*

* Study includes portions of the APE-Archaeology

†University of Maryland, Baltimore

An initial Phase IA archaeological study for the B&P Tunnel Replacement Program was completed in 2015 in support of the DEIS. At that time several alignment alternatives were under consideration. As designs had not been sufficiently developed at the time of the Phase IA study, the APE at that time was limited to the centerline of the alignments of each of the design alternatives. Given their cumulative linear extent and the stage of the Program at the time of the survey, it was deemed prudent to conduct an archaeological assessment study to acquire a comprehensive understanding of the archaeological sensitivity of all the proposed alternatives. The high-level survey was also performed

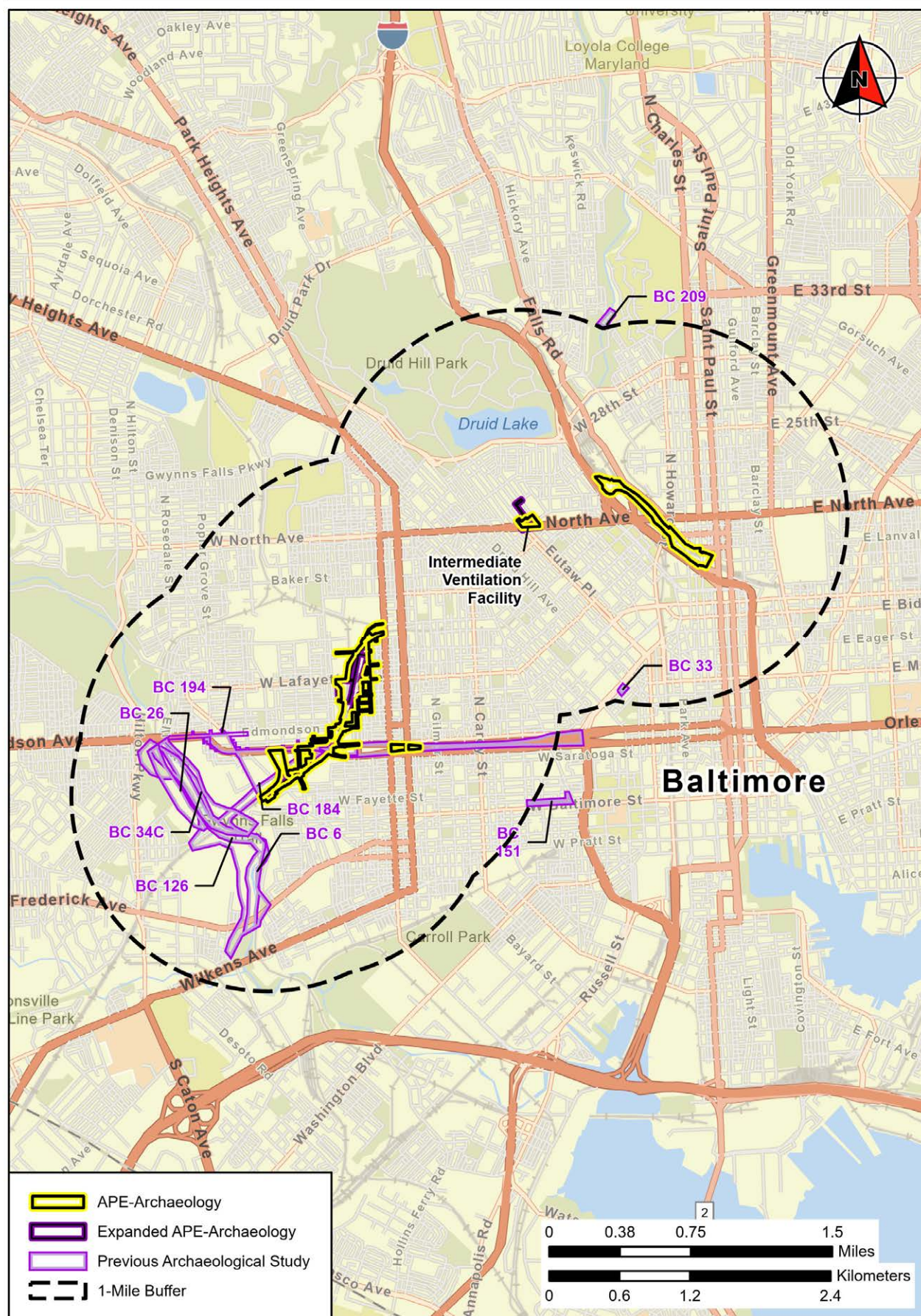


FIGURE 7: Previous Archaeological Studies Within 1-Mile Radius of APE-Archaeology for the Program
(ESRI World Street Map 2021)

to provide information that could assist with planning activities. The Phase IA study concluded that although large portions of the alignment alternatives have been disturbed, potential remained for the presence of both precontact and historic archaeological sites within the alignments of each of the build alternatives. The study recommended that a supplemental Phase IA archaeological study be conducted once the Preferred Alternative was determined and the extent of anticipated ground-disturbing activities ascertained.

The supplemental Phase IA archaeological study completed for the B&P Tunnel Replacement Program included the approximately 6-acre area at 900-940 West North Avenue where the Intermediate Ventilation Facility is proposed (Shellenhamer and Ward 2023). The APE-Archaeology defined for the Intermediate Ventilation Facility at that time was assessed as having a low sensitivity for the presence of precontact archaeological resources. The majority of the APE-Archaeology was also assessed as having low sensitivity for the presence of historic archaeological resources; the exception was the parking lot along Linden Avenue. That area was assessed with a moderate to high sensitivity for the presence of historic archaeological resources dating from the late nineteenth century and a Phase IB/II archaeological survey was recommended.

B. PREVIOUSLY IDENTIFIED ARCHAEOLOGICAL SITES

According to the archaeological site files maintained by the MHT, no previously recorded archaeological sites are situated within the expanded APE-Archaeology for the Intermediate Ventilation Facility. [REDACTED] Eight of the sites date from the eighteenth to twentieth centuries. [REDACTED]

[REDACTED] Two others are associated with mill workers' housing and date to the nineteenth century. Four additional sites represent domestic residences (two brick mansions and two brick rowhouses). Another site, dating from the mid-nineteenth century, [REDACTED] consists of a Civil War encampment that included barracks and a hospital. The final site is a multi-component resource consisting of a precontact-period lithic scatter of unknown temporal affiliation and a historic domestic artifact scatter associated with a mid-nineteenth-century mill worker's house. None of the nine recorded archaeological sites has been evaluated for the NRHP.

[REDACTED]				
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

1. Previously Identified Historic Architectural Resources

A review of the Maryland Inventory of Historic Properties (MIHP) forms on file at the MHT indicates that the expanded APE-Archaeology for the Intermediate Ventilation Facility primarily lies within the southwest corner of the Reservoir Hill Historic District (B-1379) (Figure 8). The Reservoir Hill Historic District (B-1379) was listed in the NRHP on December 23, 2004, and consists of 32 city blocks bounded by North Avenue, Mount Royal Avenue, Druid Park Lake Drive, and Madison Avenue. The majority of the properties are late nineteenth to early twentieth-century rowhouses. The district includes other building types, such as mansions, multi-story apartment buildings, religious and commercial buildings, and public monuments.

In addition to the historic district, the expanded APE-Archaeology extends within the boundaries of the Madison Park Medical Center (B-1379-6). Although the medical center building was constructed after the period of significance for the Reservoir Hill Historic District (1790 to 1941), it was determined individually eligible for listing in the NRHP on March 31, 2022.

The expanded APE-Archaeology for the Intermediate Ventilation Facility also extends south of the original delineated APE boundary and crosses West North Avenue. As a result the new southern boundary of the expanded APE-Archaeology extends into the Bolton Hill Historic District (B-64). Listed in the NRHP on September 17, 1971, the Bolton Hill Historic District (B-64) comprises 20 blocks bound by North Avenue, Mount Royal Avenue, Cathedral Street, Dolphin Street, and Madison Avenue. The historic district primarily consists of three-story brick rowhouses as well as several detached houses and religious buildings dating from the mid-nineteenth century to the years preceding World War I.

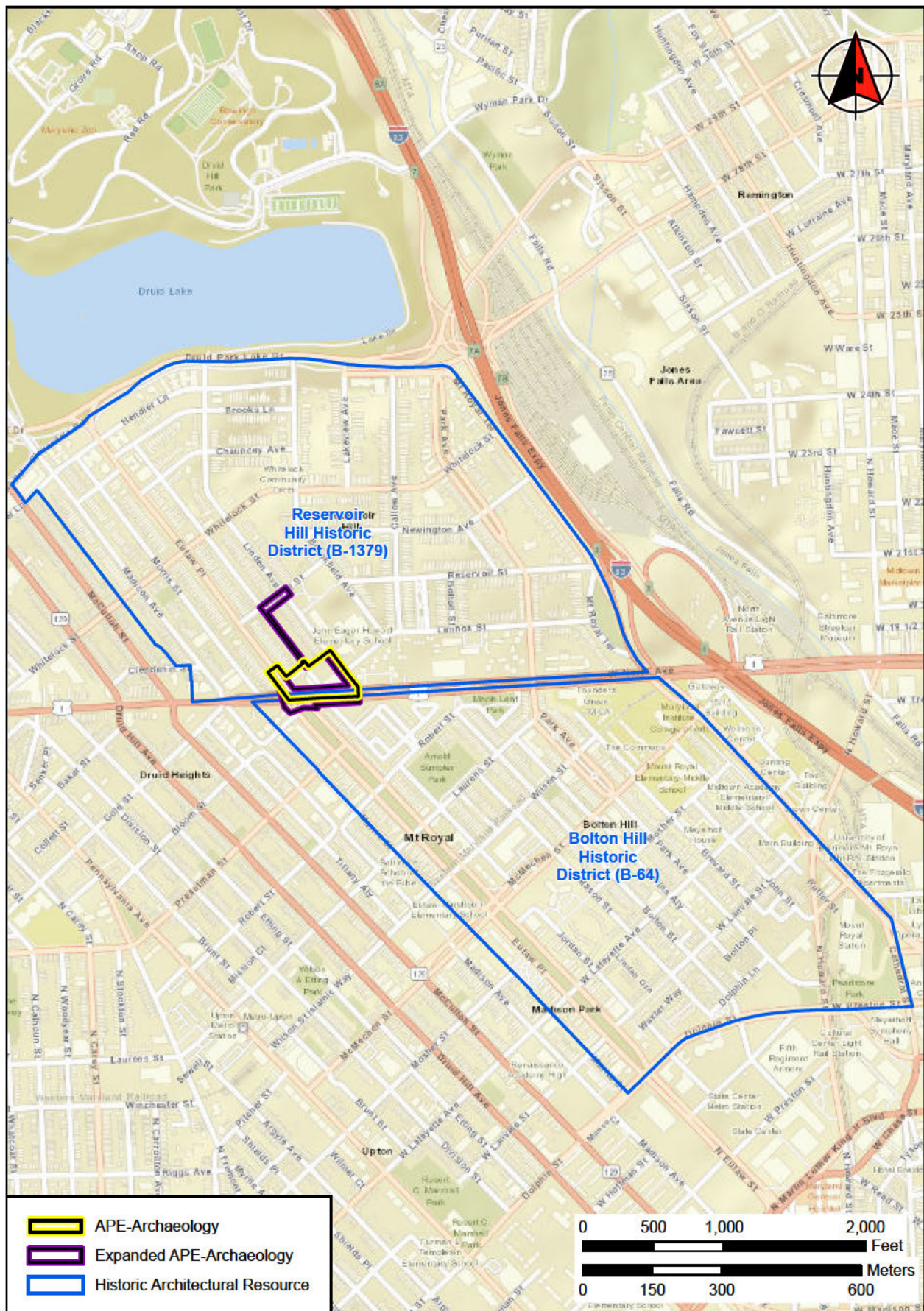


FIGURE 8: Historic Architectural Resources in Expanded APE-Archaeology (ESRI World Street Map 2021)

V. STUDY RESULTS

A. CARTOGRAPHIC REVIEW

Maps of Baltimore spanning the nineteenth and early twentieth centuries were selected to understand the history of development in the area and to assess the APE's archaeological sensitivity. For the purposes of this study, the selected historical maps were imported and georeferenced into GIS. The locations of buildings, roads, and other improvements are approximate because historical maps are imprecise relative to modern coordinate systems; however, the historical information presented on the maps is useful in identifying the likelihood that historic archaeological resources may be present.

Maps consulted include those listed below, 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 in the APE-Archaeology.

- *Approaches to Baltimore, Maryland* (Bache 1849/1865)
- *City Atlas of Baltimore, Maryland and Environs* (Hopkins 1876)
- *Atlas of the City of Baltimore, MD* (Duncan 1897)
- *Atlas of the City of Baltimore, Maryland* (Topographical Survey Commission 1914)

The cartographic review indicates that the area comprising the expanded APE-Archaeology at the Intermediate Ventilation Facility consisted of an undeveloped woodlot and pastureland outside the City of Baltimore until the early nineteenth century. The first evidence of development in the area does not appear on until the mid-nineteenth century. In 1849 three buildings are mapped within the boundary of the original APE-Archaeology at the Intermediate Ventilation Facility (Figure 9). In addition, an unnamed road is depicted extending northeast to southwest through the expanded APE-Archaeology along the approximate alignment of present-day Bloom Street. All three buildings are depicted in the southeast corner of the original APE-Archaeology, with the footprint of the largest extending into the expanded portion of the APE-Archaeology to the south, within present-day North Avenue. No additional buildings depicted on the 1849 map are located in the expanded APE-Archaeology.

The vicinity of the proposed location of the Intermediate Ventilation Facility was part of the Reservoir Hill neighborhood by 1876 (Figure 10). The part of Bloom Street that previously bisected this portion of the APE-Archaeology was replaced by a city block owned by E. Whitman and is bound by North Avenue, Garden Street (now Lindon Avenue), Eutaw Street (now Eutaw Place) and Ducatel Street. Jordan Street, which currently bisects the city block, had not been constructed by 1876. The Hopkins map depicts a single wood-frame building in the APE-Archaeology near the corner of Eutaw Street and North Avenue. The southern segment of the expanded portion of the APE-Archaeology was located entirely within North Avenue. The northern segment of the expanded APE-Archaeology extends through the center of the former Whitman block, bisecting a circular driveway and a portion of one small building that was present at the center of the block. The only area depicted as developed by 1876 is in the northernmost portion of the expanded APE-Archaeology at Ducatel Street. A portion of a building belonging to George W. Grail is depicted as extending into the APE-Archaeology within Ducatel Street;

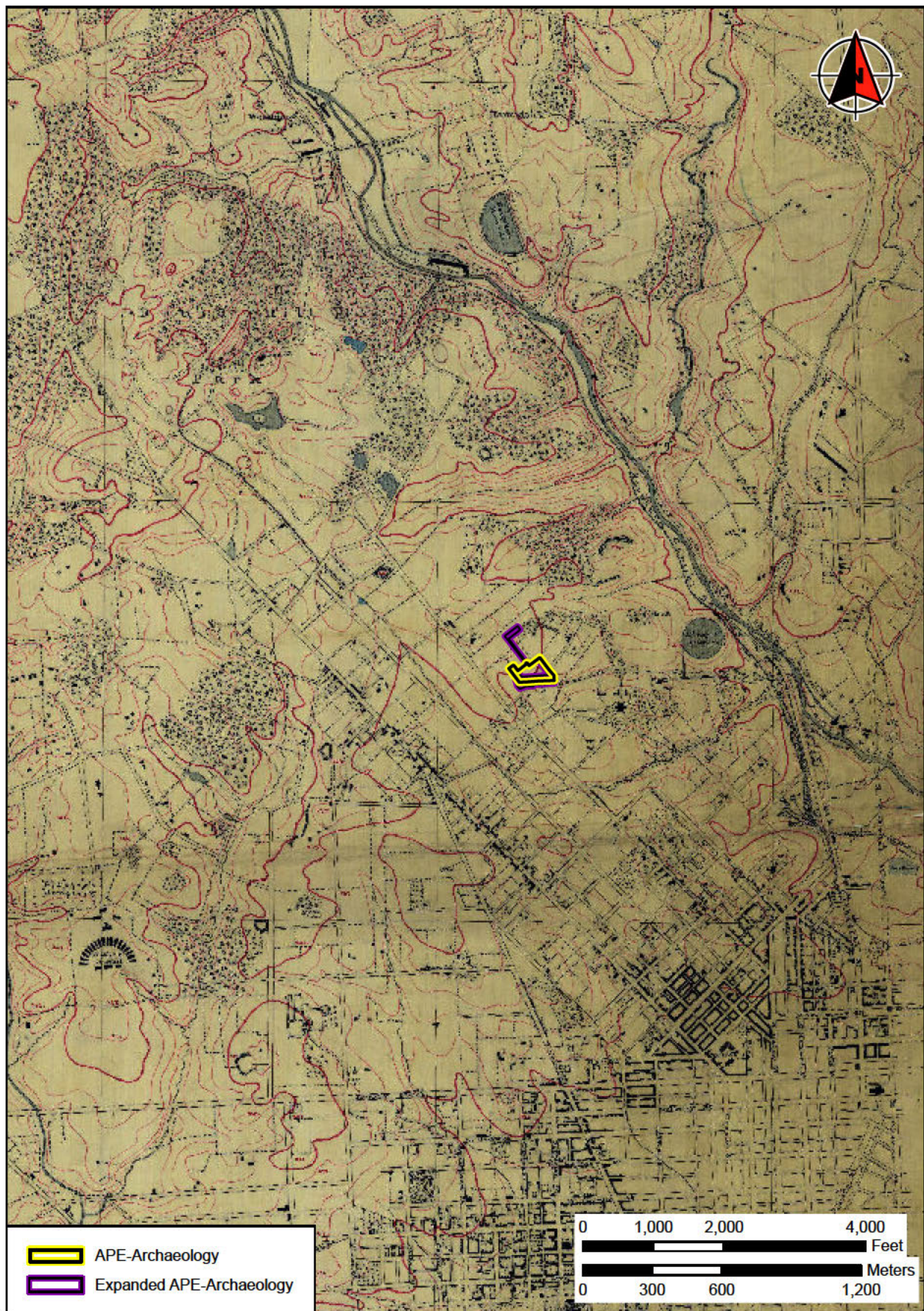
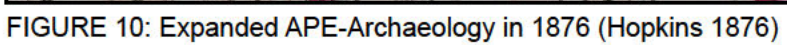


FIGURE 9: Expanded APE-Archaeology in 1849 (Bache 1849/1865)



however, its presence may be an unavoidable georeferencing error resulting from the level of accuracy inherent in historical maps. As currently planned, the expanded APE-Archaeology at Ducatel Street does not extend beyond the street ROW.

Jordan Street was constructed by the time of the Duncan (1897) atlas (Figure 11). On the atlas map, the northern portion of the expanded APE-Archaeology extends north along Jordan Street and turns east where it meets Ducatel Street. The southern portion of the expanded APE-Archaeology remains within North Avenue and its intersection with Eutaw Place. The atlas depicts the rail line for the city omnibus line extending through the center of North Avenue, and a wide landscaped median with gardens and pedestrian walkways in Eutaw Street, south of North Avenue. No buildings or other structures are shown in the expanded portion of the APE-Archaeology; however, four outbuildings are located adjacent to the alignment on Jordan Street.

The Topographical Survey Commission (1914) map shows the expanded APE-Archaeology as unchanged from its depiction in 1897 (Figure 12). The expanded area to the north consisted of the paved Jordan and Ducatel streets. To the south, the expanded APE-Archaeology remains within the ROW for North Avenue, and portions of Eutaw Place with both the rail line and landscaped medians are still depicted. No additional improvements are shown in the expanded APE-Archaeology in 1914.

B. GIS TOPOGRAPHIC ANALYSIS

The APE-Archaeology comprising the Intermediate Ventilation Facility was previously subjected to GIS topographic analysis as part of the Supplemental Phase IA study (Shellenhamer and Ward 2023). The analysis was enlarged to the north and south for this addendum study to include the expanded APE-Archaeology. The analysis was conducted using 1897 and 2021 elevation data (see Chapter II.B).

Figure 13 shows the results of the analysis. As the supplemental Phase IA archaeological study indicated, the model shows the modern elevation within the previously delineated APE-Archaeology at the Intermediate Ventilation Facility as 3 or more feet lower in elevation than it was in 1897 (Shellenhamer and Ward 2023). The same decrease in elevation is present in the expanded APE-Archaeology to the south within North Avenue and its intersection with Eutaw Place, suggesting that this area was graded as the result of construction that occurred throughout the twentieth century. The expanded APE-Archaeology to the north along Jordan and Ducatel streets is depicted at the same or slightly higher elevation as in 1897. Although the model depicts some change in elevation in the expanded APE-Archaeology, the changes are within the margin of error in any cartographic analysis of this type.

The analysis shows that the modern elevation has likely varied little since 1897, during which time the Reservoir Hill neighborhood was already well established.

C. REVIEW OF GEOTECHNICAL DATA

The logs for two previous geotechnical borings in the vicinity of the proposed expanded APE-Archaeology at the Intermediate Ventilation Facility (Figure 14) were reviewed. Boring IVF-P2-4 was located at approximately 920 West North Avenue, just west of Jordan Street. Boring IVF-P2-6 was located on Ducatel Street, just east of its intersection with Jordan Street.

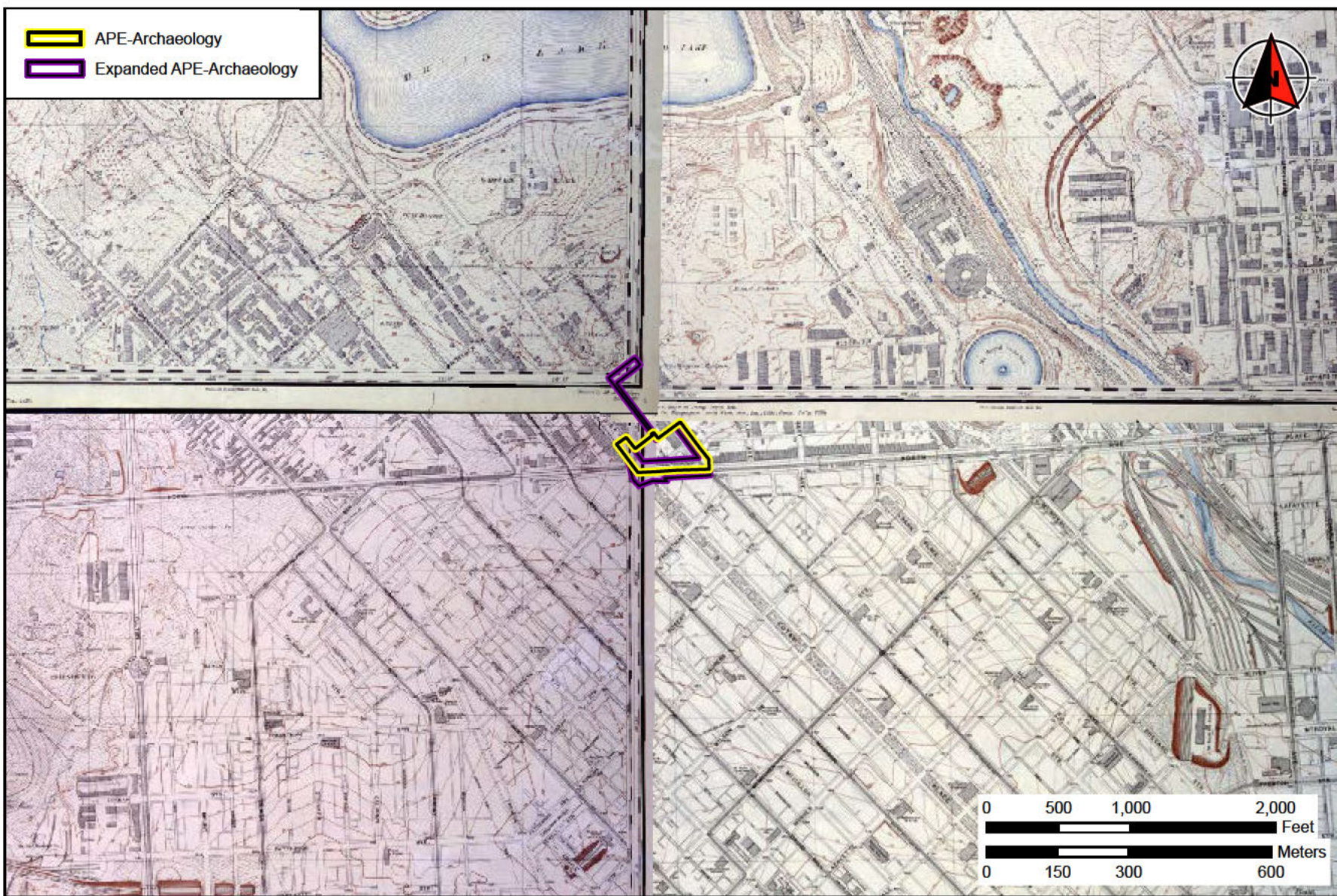


FIGURE 11: Expanded APE-Archaeology in 1897 (Duncan 1897)

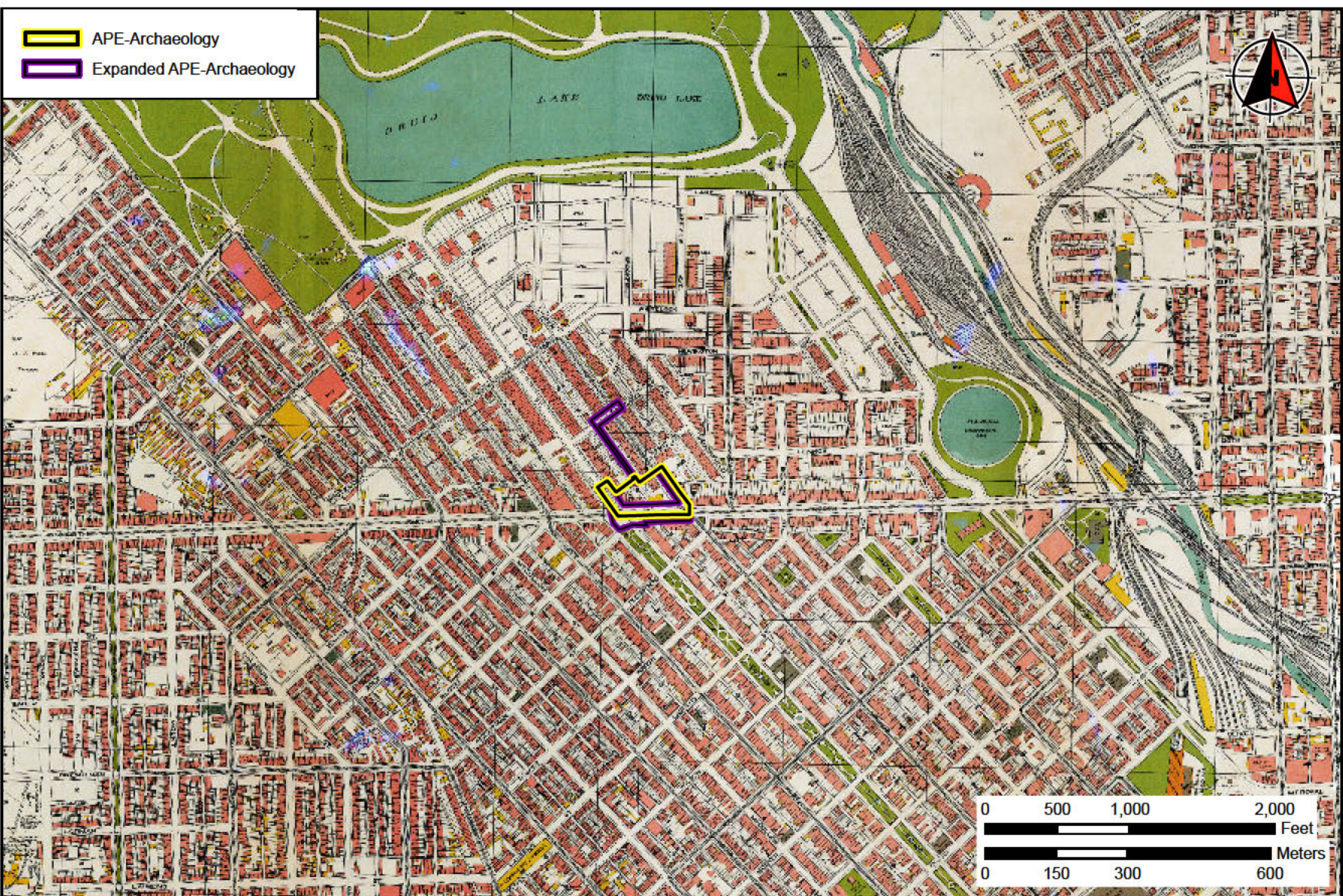


FIGURE 12: Expanded APE-Archaeology in 1914 (Topographic Survey Commission 1914)

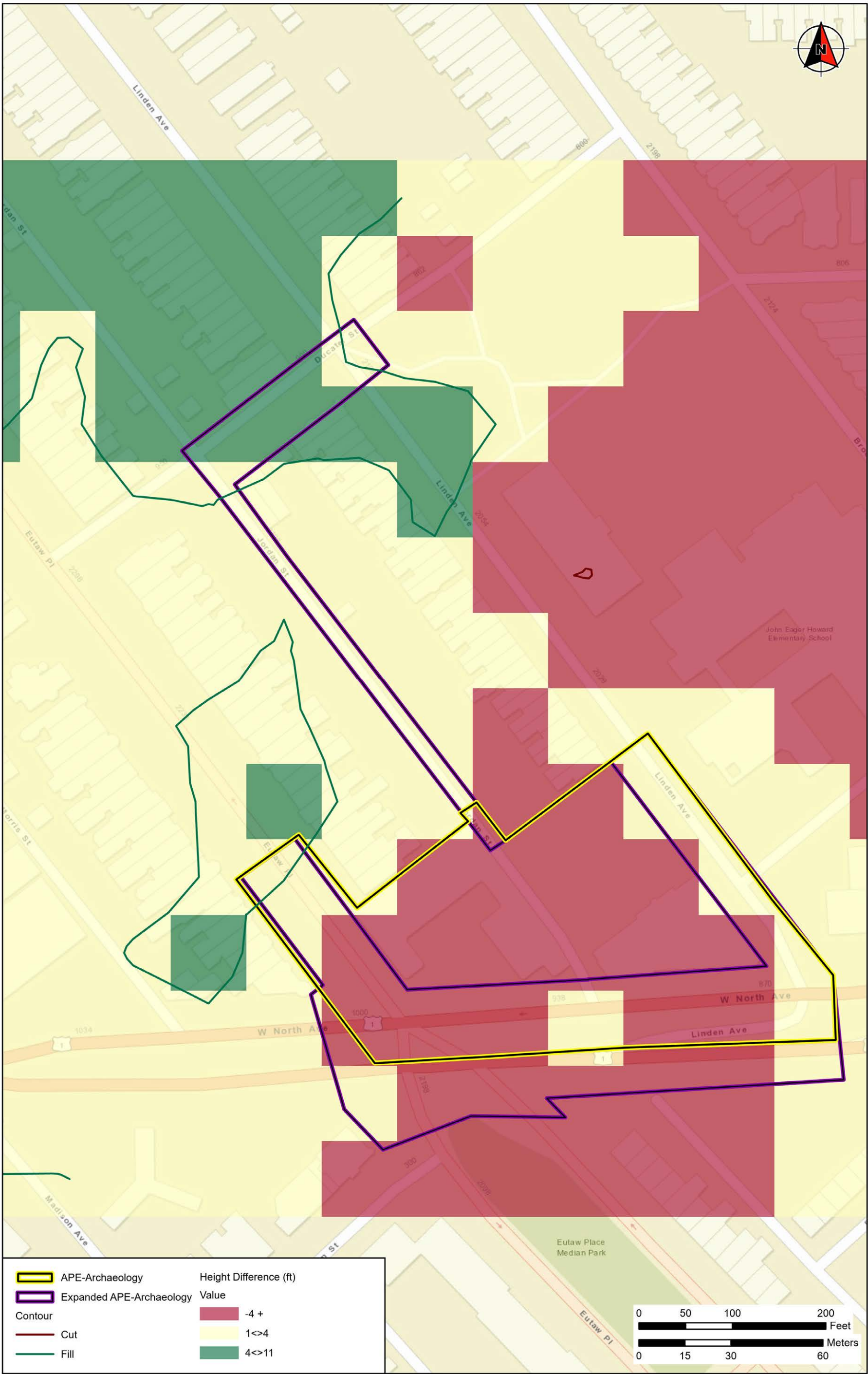


FIGURE 13: Projected Depth of Fill and Grading in Expanded APE-Archaeology at Intermediate Ventilation Facility (ESRI World Street Map 2021)

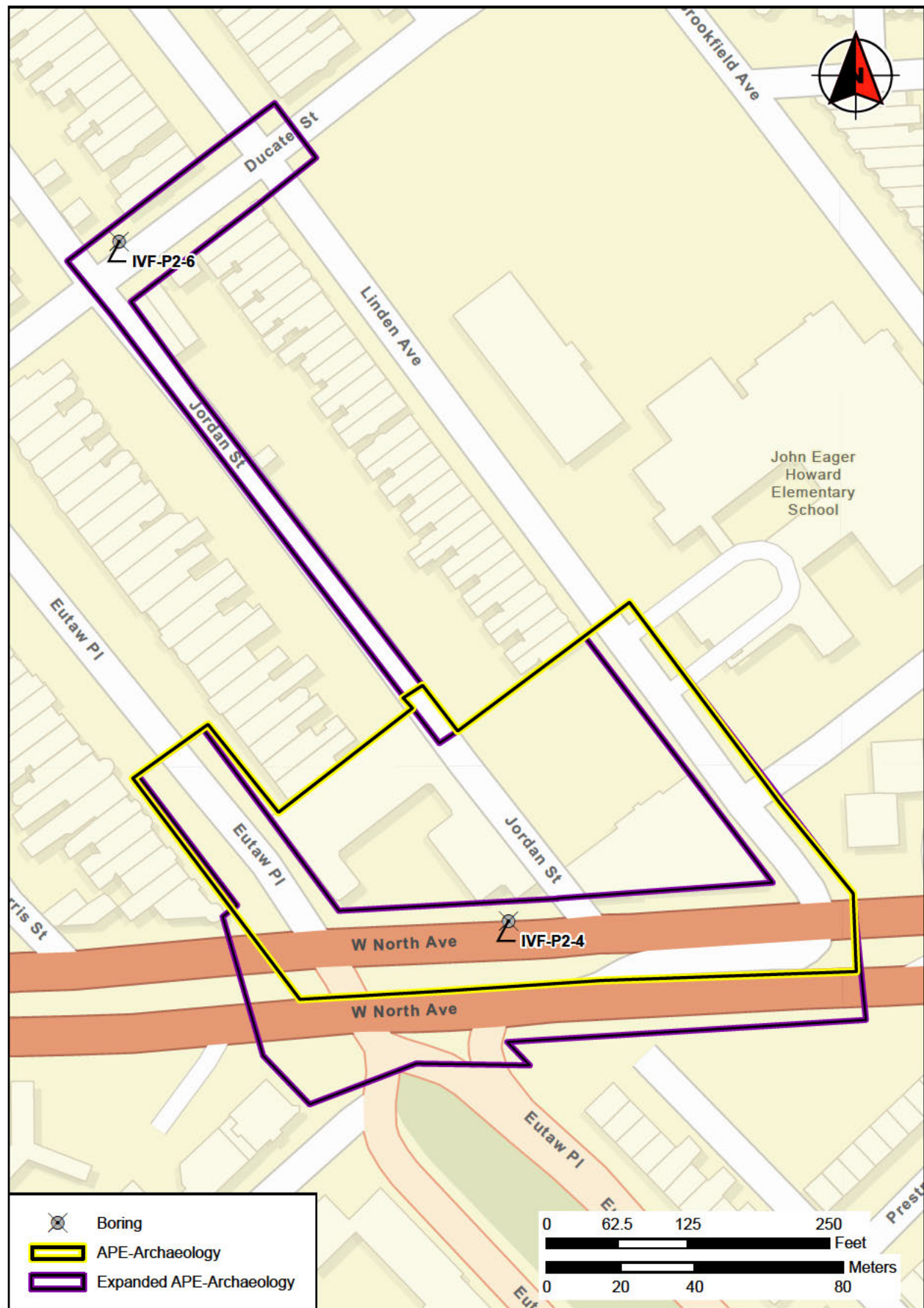


FIGURE 14: Geotechnical Boring Locations in Expanded APE-Archaeology at Intermediate Ventilation Facility (ESRI World Street Map 2021)

The logs indicate that beneath the top 2 feet of pavement and roadway base material, Boring IVF-P2-4 encountered fine sand and silt to approximately 10 feet below ground surface (bgs), at which point the sand and silt became dense and mixed with gravel.

Boring IVF-P2-6 encountered a similar mix of fine sand and silt soil to approximately 6.5 feet bgs. Below that point, clay subsoil with small amounts of silt were encountered to 12.5 feet bgs. The underlying soils were similar to those encountered at the same depth for Boring IVF-P2-4 and consisted of dense sand and silt with mixed gravels. The boring log documents no brick fragments or trace amounts of any other cultural material.

D. SENSITIVITY ASSESSMENT

Archaeological sensitivity is ranked as high, moderate, or low based on the correlation of a location with various favorable environmental characteristics and documented factors. From an environmental perspective, the factors contributing to precontact archaeological sensitivity often also apply to early historic archaeological sensitivity.

In general, analysis of precontact site sensitivity for the Program considers landscape characteristics in or near the APE-Archaeology that are associated with documented precontact sites in the region and locally. Variables can include topography, proximity to water and resource catchment areas over time, soil characteristics, proximity to documented Native American trails or other areas of local and regional communication and exchange (e.g., navigable waterways), presence of natural landscape features (e.g., prominent ridges or hilltops), and proximity to lithic or clay source areas.

High-sensitivity zones for precontact archaeological resources include level to gently sloping, well-drained, upland areas within 500 feet of surface water or wetlands and areas within 500 feet of previously recorded archaeological sites. Moderate-sensitivity zones for precontact archaeological resources are generally more than 500 feet from a freshwater source and characterized by moderately sloping topography and/or somewhat poorly drained soils. Poorly drained soils and steeply sloping topography are negatively correlated with precontact habitation and indicate low sensitivity for precontact archaeological resources. Previous ground disturbance, such as that related to construction, ground clearing, and grading, also lowers the sensitivity for archaeological resources.

Historic site sensitivity depends on the relationship of the APE-Archaeology to local community development over time; historic transportation routes (e.g., roads, railroads, canals, rivers, etc.); the documentary record of residential, commercial, and institutional buildings; and the proximity to target historic resource areas (e.g., fall lines on rivers and streams where mills were established, quarry locations).

Historic archaeological sensitivity is ranked as high in areas near the location of documented historic development and within 300 feet of early transportation routes and as low in areas with little record of historic land development. The presence of standing historic structures indicates a high probability for associated historic archaeological sites. Information obtained from cartographic evidence also contributes to assessments of historic archaeological sensitivity. Although early historical maps do not depict historic structures with accuracy, nineteenth-century

maps often record accurate details of settlement pattern, ownership, and occupation. The likelihood for historic archaeological resources to exist within the APE-Archaeology is high in areas that are in proximity to historic houses and outbuildings or in areas near early roads.

1. Precontact Archaeological Site Sensitivity

As discussed in the supplemental Phase IA study report, the APE-Archaeology at the Intermediate Ventilation Facility was assessed as having a low sensitivity for the presence of precontact archaeological resources (Figure 15). Although the geographical setting of this location near a springhead of the Jones Falls may have been an attractive location for Native Americans prior to the period of European colonization, the development of the Reservoir Hill neighborhood during the late nineteenth and twentieth centuries dramatically altered the former landscape and reduced the likelihood for the presence of intact precontact-period archaeological resources. Furthermore, the expanded APE-Archaeology lies entirely within the road ROW, and these locations were subjected to successive ground-disturbing activities since their construction in the nineteenth century. The construction of underground utilities, installation and removal of street car rail systems, and annual road and utility maintenance resulted in further ground disturbance. These disturbances were illustrated by the fill soils encountered during prior geotechnical testing in the area. As a result, the expanded APE-Archaeology at North Avenue, Ducatel Street, and Jordan Street is assessed as having a low sensitivity for precontact archaeological resources.

2. Historic Archaeological Site Sensitivity

Historical maps and atlases indicate that portions of the APE-Archaeology, including the expanded portion, were occupied by at least the mid-nineteenth century. Three buildings were mapped in this area in 1849 but were razed years later as a result of the construction of North Avenue. By 1876 a new structure was located within the current alignment of Jordan Street, but it was also razed as urban development extended above North Avenue and new streets and alleyways were constructed to support the growth of the Reservoir Hill neighborhood. In the decades that followed, the areas in the expanded APE-Archaeology have remained paved roadways. The construction and maintenance of the roadways along with the construction of buried utilities in the ROW likely diminished any potential to encounter intact cultural deposits or features associated with the early to mid-nineteenth-century residences that were once located in these areas. As a result, the expanded APE-Archaeology at the Intermediate Ventilation Facility is assessed as having a low sensitivity for historic archaeological resources (see Figure 15).

Figure 15 has been redacted

VI. RECOMMENDATIONS

The review of available environmental and soil data, historical background research, the results of the GIS topographical analysis, and geotechnical survey data indicates that there is a low sensitivity for encountering precontact and historic archaeological resources in the expanded APE-Archaeology. The prior modification of the landscape within the expanded APE-Archaeology at the Intermediate Ventilation Facility resulted in substantial ground disturbance associated with urban development, transportation improvements, and construction of buried utilities. As a result of the extent of previous ground disturbance, there is a low potential for the presence of intact archaeological resources. No further archaeological survey is recommended for the expanded APE-Archaeology at the Intermediate Ventilation Facility.

VII. REFERENCES CITED

Bache, A.D.

1865 *Approaches to Baltimore, Maryland: Western Sheet*. U.S. Coast Survey, Washington, DC.
<https://historicalcharts.noaa.gov/>.

Baltimore County, Maryland

n.d.a *Patapsco River Watershed*. Accessed April 6, 2022, http://www.baltimorecountymd.gov/Agencies/environment/watersheds/ep_patapmain.html.

n.d.b *Jones Falls Watershed*. Accessed October 31, 2022, <http://www.baltimorecountymd.gov/Agencies/environment/watersheds/jonesmain.html>.

Dinnel, Katherine J.

1982 *A Phase I Reconnaissance Survey of the Archeological Resources in the Proposed I-595 Corridor Between I-95 and I-170, Baltimore City, Maryland*. Prepared for the City of Baltimore, Department of Public Works by the Division of Archeology, Maryland Geological Survey, Baltimore.

Duncan, Frank K.

1897 *Atlas of the City of Baltimore, MD*. On file, Sheridan Libraries, Johns Hopkins University, Baltimore. <http://jhir.library.jhu.edu/handle/1774.2/36509>.

Environmental Systems Research Institute, Inc. [ESRI]

2019 *USA Topo Maps*. ArcGIS map server accessed January 2024 via ArcPro 3.1, http://services.arcgisonline.com/arcgis/rest/services/USA_Topo_Maps/MapServer.

2020 *World Imagery*. ArcGIS map server accessed January 2024 via ArcPro 3.1, http://services.arcgisonline.com/arcgis/rest/services/World_Imagery/MapServer.

2021 *World Street Map*. ArcGIS map server accessed January 2024 via ArcPro 3.1, https://services.arcgisonline.com/ArcGIS/rest/services/World_Street_Map/MapServer.

2023 *World Imagery*. ArcGIS map server accessed January 2024 via ArcPro 3.1, http://services.arcgisonline.com/arcgis/rest/services/World_Imagery/MapServer.

Goodwin, R. Christopher & Associates [Goodwin]

1991 *Phase IA Historical Background Study and Phase IB Archeological Investigation of the Maryland Library for the Blind and Physically Handicapped, Baltimore, Maryland*. Prepared by R. Christopher Goodwin & Associates, Inc., Frederick, Maryland.

Harrison, Deborah W.

1977 *Preliminary Site Examination of Three Sites in the City Boulevard Corridor*. Prepared by the Baltimore Center for Urban Archaeology, Baltimore.

Hatch, D. Brad, Kerry Gonzalez and Melissa Butler

2018 *Phase I Archaeological Survey for the Remington Avenue Bridge Replacement Project, City of Baltimore, Maryland*. Prepared by Dovetail Cultural Resource Group, Fredericksburg, Virginia.

Hill, Phillip J.

2000 *Phase I Archeological Survey of the Proposed 3.03-mile Phase 2 Gwynn Fall's Pathway*. Prepared by Archeological Testing and Consulting, Inc., Silver Spring, Maryland.

Hopkins, G.M.

1876 *City Atlas of Baltimore Maryland and Environs*. On file, Sheridan Libraries, Johns Hopkins University, Baltimore. <http://jhir.library.jhu.edu/handle/1774.2/32648>.

Levin, Maxine J., and Thomas M. Griffin

1998 *Soil survey of City of Baltimore, Maryland*. United States Department of Agriculture-Natural Resources Conservation Service, Washington, DC, in cooperation with City of Baltimore and Maryland Agricultural Experiment Station.

Parish, Preston

1971 Bolton Hill Historic District. National Register of Historic Places Nomination Form. United States Department of the Interior, National Park Service, Washington, DC. On file, Maryland Historical Trust, Crownsville.

Shaffer, Gary, and Elizabeth Cole

1994 *Standards and Guidelines for Archeological Investigations in Maryland*. Maryland Historical Trust Technical Report Number 2. Maryland Historical Trust, Department of Housing and Community Development, Crownsville.

Shellenhamer, Jason, and James Kodlick

2015 *Phase 1A Archeological Study, B&P Tunnel Project, Baltimore, Maryland*. Prepared for the Federal Railroad Administration by Rummel, Klepper & Kahl, LLP, Baltimore.

Shellenhamer, Jason, and Henry Ward

2023 *Supplemental Phase 1A Archaeological Study Baltimore & Potomac Tunnel Replacement Program, Baltimore, Maryland*. Prepared for Amtrak by WSP USA Inc., Baltimore.

Shoken, Fred B.

2004 Reservoir Hill Historic District. National Register of Historic Places Nomination Form. United States Department of the Interior, National Park Service, Washington, DC. On file, Maryland Historical Trust, Crownsville.

Topographical Survey Commission

1914 *Atlas of the City of Baltimore, Maryland*. On file, Sheridan Libraries, Johns Hopkins University, Baltimore. <http://jhir.library.jhu.edu/handle/1774.2/33744>.

United States Department of Agriculture-Natural Resources Conservation Service [USDA-NRCS]
2021 *Baltimore County, Maryland*. Web Soil Survey, Soil Survey Geographic (SSURGO) Database. United States Department of Agriculture-Natural Resources Conservation Service, Washington, DC. Accessed May 2023, <https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.

United States Department of the Interior

1983 Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines. *Federal Register*, Part IV, 48(2):44716-44742. Annotated version showing later technical and officially adopted revisions available from the National Park Service's preservation laws, regulations, and standards webpage, https://archives.federalregister.gov/issue_slice/1983/9/29/44695-44744.pdf#page=22.

Ward, Henry, Scott Emory, Esther Doyle Read, and Robert Wanner

2013 *Stage 1 Phase IB Archeology Technical Report, Red Line Light Rail Transit Project, City of Baltimore and Baltimore County, Maryland*. Prepared for the Maryland Transit Administration by PB Americas, Inc. and Rummel, Klepper & Kahl, LLP, Baltimore.

2015 *Stage 1 Phase IB Archeology Interim Report, Baltimore Red Line Light Rail Project, City of Baltimore and Baltimore County, Maryland*. Prepared for the Maryland Transit Administration by PB Americas, Inc. and Rummel, Klepper & Kahl, LLP, Baltimore.

Ward, Henry, Barbara Silber, Ester Doyle Read, and Kate Farnham

2006 *Phase IA Archeological Assessment Technical Report, Red Line Corridor Transit Study, Baltimore City and Baltimore County, Maryland*. Prepared for U.S. Department of Transportation Federal Transit Administration by Maryland Transit Administration, Baltimore.

Weber, Carmen A.

1984a *Orchard Street Church Archeological Monitoring*. Prepared by the Baltimore Center for Urban Archaeology, Baltimore.

1984b *Phase I/Phase II Archeological Reconnaissance Survey for the Gwynns Falls Sewer Interceptor, Baltimore, Maryland*. Prepared by the Baltimore Center for Urban Archaeology, Baltimore.

Williams, Martha R.

2005 *Phase I Archeological Investigations of the proposed UMAB Health Sciences Research Park, 800-900 West Baltimore Street, Baltimore, Maryland*. Prepared by R. Christopher Goodwin & Associates, Inc., Frederick, Maryland.

Williams, Martha R, Ellen Saint Onge, Andrew Madsen, Justine W. McKnight, Nora B. Sheehan, Suzanne L. Sanders, Kathleen M. Child, Charlene Keck, and Brian Clevon

2000 *Archeological Investigations at the Juvenile Justice Center, Baltimore, Maryland*. Prepared by R. Christopher Goodwin & Associates, Inc., Frederick, Maryland.

VIII. LIST OF ABBREVIATIONS AND ACRONYMS

APE	Area of Potential Effects
APE-Archaeology	Archaeological Area of Potential Effects
B&P	Baltimore & Potomac
DEIS	Draft Environmental Impact Statement
DEM	Digital Elevation Model
GIS	Geographic Information System
FEIS	Final Environmental Impact Statement
FRA	Federal Railroad Administration
LiDAR	Light Detection and Ranging
LOD	Limits of Disturbance
MDOT	Maryland Department of Transportation
MHT	Maryland Historical Trust
MIHP	Maryland Inventory of Historic Properties
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OD	Outside diameter
PA	Programmatic Agreement
PB/P JV	Parsons Brinckerhoff/Parsons Joint Venture
Program	Frederick Douglass Tunnel, B&P Tunnel Replacement Program
RPA	Register of Professional Archaeologists
ROD	Record of Decision
ROW	Right-of-way
Section 106	Section 106 of the National Historic Preservation Act, as amended
TIN	Triangulated Irregular Network
USDA	United States Department of Agriculture
UMAB	University of Maryland, Baltimore
WSP	WSP USA Inc.

APPENDIX A: QUALIFICATIONS OF THE INVESTIGATORS

QUALIFICATIONS OF THE INVESTIGATORS

JASON SHELLENHAMER

Master of Applied Archaeology, Historical Archaeology, University of Maryland, 2004
B.A., Anthropology, Minor in History, Franklin and Marshall College, 2001

Mr. Shellenhamer is a senior archaeologist with the Heritage Resource Practice in WSP's Southeast Region. His experience includes management of a wide range of cultural resource studies for federal, state, and municipal clients in the Middle Atlantic, Southeast and Northeast regions. His experience includes the design and direction of Phase I through Phase III studies, development of alternative mitigation strategies, consultation and agency coordination, National Register of Historic Places evaluations, historic property reviews, preservation easement property evaluations, and design and implementation of public outreach programs.

HENRY WARD

M.S.A., Graduate Fellowship, Department of Anthropology, University of Delaware, Newark, 1985
B.A., Department of Anthropology/Sociology, Ohio Wesleyan/Ohio State University, Delaware, Ohio, 1981

Mr. Ward is the cultural resources project manager and WSP archaeologist with over 42 years of experience as a professional archaeologist and cultural resources manager and he exceeds the Secretary of the Interior's Professional Qualification Standards for Archaeology. Mr. Ward possesses specific technical knowledge with the archaeological resources of the Chesapeake Region and has also had over a decade's general experience in overseeing comprehensive cultural resources programs that integrate the full range of archaeology and historic architectural disciplines.

**APPENDIX B: 2017 B&P TUNNEL PRELIMINARY ENGINEERING GEOTECHNICAL
DATA BORING LOGS**



BORING LOG

BORING NUMBER: **NP-1**

SHEET NUMBER: **1** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **HSA; Diamond Coring**

RIG TYPE: **CME-75, Truck Mounted**

LOCATION: **I-83 North Avenue Exit Ramp**

COORD.: **N: 599,868.3 E: 1,418,464.9**

SURFACE ELEV.: **112.8 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **4/21/15** TIME: **10:15 pm**

FINISH DATE: **4/24/15** TIME: **12:15 am**

Type/Symbol	Auger	Split Spoon	Casing	Dennison	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	D □	G ⊗	C ▨	Date	Time	Water Depth (ft)	Auger Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	n/a	4/22/15	8:20 pm	13.6	21.0	35.0
Length	8.25"	2"	3.50"	n/a	3.375"	n/a	4/27/15	2:00 am	27.4	26.0	116.4
Hammer Wt.	60"	24"	60"	n/a	6"	n/a	5/4/15	8:20 pm	40.0	26.0	116.4
Hammer Fall	n/a	140lbs	Drill Rod Size		AW (SPT sampling)						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
					0.0 - 0.6							0.0'	2" Asphalt and 5" concrete slab	
													0.6'	
			G	1	⊗	2.0 - 2.5	G	R	A	B	6		112.2'	Note: Hand excavated for utility clearance, depth 0.0'-7.2'
														Light brown CLAY, some coarse to fine Sand, some coarse to fine Gravel, bricks, stone fragments, dry (FILL)
			G	2	⊗	4.0 - 4.5	G	R	A	B	6			Light brown coarse to fine SAND, some Clay, little coarse to fine Gravel, dry (SC, possible FILL)
5														
			G	3	⊗	6.0 - 6.5	G	R	A	B	6			Light brown coarse to fine SAND, trace to little fine to medium Gravel (SC, possible FILL)
			S	1	■	8.0 - 10.0	11	11	12	18	15			Light brown fine GRAVEL, some Clay, some medium to fine Sand, medium dense, dry (GC, possible fill)
10														
													11.5'	
													101.3'	
			S	2	■	13.0 - 15.0	12	14	17	19	7			Light brown CLAY, some medium to fine Sand, little coarse to fine Gravel, hard, dry (CL)
15														
													16.0'	
													96.8'	
			S	3	■	18.0 - 19.9	17	26	38	50/5"	6			Light brown coarse to fine Gravel, some Clay, some medium to fine Sand, very dense, dry (GC)

Note:

Boring No. **NP-1** Sheet **1** of **2**

B&P BORING LOG (FINAL) B&P TUNNEL PHASE 1 160531 PH1.GPJ B&P TUNNEL - 150528 WITHOUT LOGO PH1.GLB 1/19/17



BORING LOG

(continued)

BORING NUMBER: **NP-1**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **I-83 North Avenue Exit Ramp**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
												21.0'
												91.8' (Auger refusal at 21 ft bgs, see Coring Log)

Note:



BORING LOG

BORING NUMBER: **NP-2**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **HSA; Diamond Coring**

RIG TYPE: **CME-75, Truck Mounted**

LOCATION: **McMechen Street**

COORD.: **N: 599,652.6 E: 1,418,879.1**

SURFACE ELEV.: **97.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **5/6/15** TIME: **1:15 am**

FINISH DATE: **5/7/15** TIME: **4:01 am**

Type/Symbol	Auger	Split Spoon	Casing	Dennison	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	D □	G ⊗	C ▨	Date	Time	Water Depth (ft)	Auger Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	n/a	5/7/15	9:05 pm	21.4	33.0	56.1
Length	60"	24"	60"	n/a	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		AW (SPT sampling)						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
5			G	1	⊗	2.0 - 2.5	G	R	A	B	6	0.0' 0.5' 6" Asphalt	
			S	1	■	4.0 - 5.5	24	33	50/6"		18	Note: Hand excavated for utility clearance, depth 0.0'-2.5'. Soil very dense, unable to progress beyond 2.5 ft bgs. Dark yellow-brown coarse to fine SAND, little coarse to fine Gravel, stone fragments, dry (FILL)	
													Yellow-brown coarse to fine SAND and SILT, little coarse to fine Gravel, very dense, dry (SM, possible FILL)
													7.3'
10			S	2	■	9.0 - 11.0	5	13	13	13	24	90.2'	
													Light yellow, yellow, brown and white SILT and medium to fine SAND, very stiff, dry (ML, Residual Soil)
15			S	3	■	14.0 - 15.0	21	50/5.5"			11.5	Light yellow, yellow, brown and white SILT and medium to fine SAND, hard, dry (ML, Residual Soil)	
			S	4	■	19.0 - 20.4	25	41	50/5"		17	Light yellow, yellow, brown and white SILT and medium to fine SAND, hard, drv (ML, Residual Soil)	

Note:

Boring No. **NP-2** Sheet **1** of **2**

B&P BORING LOG (FINAL) B&P TUNNEL PHASE 1, 160531 PH1.GPJ B&P TUNNEL - 150528 WITHOUT LOGO PH1.GLB 1/19/17



BORING LOG

BORING NUMBER: **NP-3 OW**

SHEET NUMBER: **1** of **1**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **HSA; Diamond Coring**

RIG TYPE: **CME-75, Truck Mounted**

LOCATION: **McMechen Street**

COORD.: **N: 599,382.2 E: 1,418,980.0**

SURFACE ELEV.: **101.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **5/11/15** TIME: **11:30 pm**

FINISH DATE: **5/13/15** TIME: **4:25 am**

Type/Symbol	Auger	Split Spoon	Casing	Dennison	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	D □	G ⊠	C ▨	Date	Time	Water Depth (ft)	Auger Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	n/a	5/13/15	1:40 am	11.8	12.0	84.3
Length	8.25"	2"	3.50"	n/a	3.375"	n/a	5/14/15	9:00 pm	12.2	12.0	84.3
Hammer Wt.	60"	24"	60"	n/a	6"	n/a					
Hammer Fall	n/a	140lbs	Drill Rod Size		AW (SPT sampling)						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
5					0.0 - 0.8							0.0' 0.8'	10" Asphalt slab	
												100.7'		
	G	1	⊗	2.0 - 2.5 2.5 - 4.0	G	R	A	B						Yellow-brown coarse to fine SAND, some coarse to fine Gravel, some Clay (SC, possible FILL) Note: Hand excavated for utility clearance, depth 0.00'-2.75'. Soil very dense, unable to progress beyond 2.75 ft bgs.
	S	1		4.0 - 5.8	38	33	34	50/4"	22			3.4' 98.1'		S-1A: 4.0'-4.75': Light yellow-brown fine to medium SAND, trace Silt, very dense, dry (SP)
												4.8' 96.8'		S-1B: 4.75'-5.8': Light-yellow brown, white and brown medium to fine SAND and SILT, little coarse Gravel, dry, very dense (SM, Decomposed Rock)
	S	2		8.0 - 9.3	26	43	50/3"		15					Light-yellow brown, white and brown SILT and coarse to fine SAND, trace to little coarse Gravel, hard, dry (ML, Decomposed Rock)
	S	3		9.3 - 9.3	50/0					0				
10														
15												12.0'		
												89.5'	(Auger refusal at 12 ft bgs, see Coring Log)	

Note:

Boring No. **NP-3** Sheet **1** of **1**

B&P BORING LOG (FINAL) B&P TUNNEL PHASE 1 160531 PH1.GPJ B&P TUNNEL - 150528 WITHOUT LOGO PH1.GLB 1/19/17



BORING LOG

BORING NUMBER: **SP-1**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **HSA: Diamond Coring**

RIG TYPE: **CME-75, Truck Mounted**

LOCATION: **1938 Riggs Avenue**

COORD.: **N: 595,370.7 E: 1,411,553.2**

SURFACE ELEV.: **162.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **4/6/15** TIME: **9:50 am**

FINISH DATE: **4/9/15** TIME: **9:40 am**

Type/Symbol	Auger	Split Spoon	Casing	Dennison	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S ■	NW	D □	G ⊠	C ▨			Water Depth (ft)	Auger Depth (ft)	Hole Depth (ft)
I.D.	4.25"	1.375"	3.00"	n/a	3.25"	n/a	Date	Time			
O.D.	8.25"	2"	3.50"	n/a	3.375"	n/a	4/6/15	2:25 pm	10.0	10.0	10.0
Length	60"	24"	60"	n/a	6"	n/a	4/9/15	9:10 am	9.2	33.0	91.0
Hammer Wt.	n/a	140lbs	Drill Rod Size		AW (SPT sampling)		4/10/15	9:00 am	9.0	33.0	96.2
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")		4/13/15	10:00 am	10.1	33.0	96.2

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
5			G	1	⊗	2.5 - 3.0	G	R	A	B	6	10" Layer of asphalt, brick and concrete	
			G	2	⊗	5.0 - 5.5	G	R	A	B	6	Light brown fine to coarse SAND, trace to little coarse Gravel, trace to little Silt, brick, coal, stone fragments, dry (SP-SM, FILL)	
			G	3	⊗	7.0 - 7.5	G	R	A	B	6	Light brown fine to coarse SAND, trace to little coarse Gravel, Silt, brick, coal, stone fragments dry (FILL)	
			S	1	■	10.0 - 12.0	1	1	WOH	1	0	Note: Probed with air knife to ~9 ft depth for utility clearance No recovery	
			S	2	■	13.5 - 15.5	WOH	2	2	1	10	Light brown coarse to fine SAND, some Silt, some coarse Gravel, brick, coal, stone fragments, very loose to loose, moist (SM, FILL)	
15			S	3	■	18.5 - 20.5	1	WOH	1	WOH	16	Dark gray Clayey SILT, some fine Sand, occasional plant fibers, micaceous, very soft, moist (OL)	

Note:

Boring No. **SP-1** Sheet **1** of **2**

B&P BORING LOG (FINAL) B&P TUNNEL PHASE 1 160531 PH1.GPJ B&P TUNNEL - 150528 WITHOUT LOGO PH1.GLB 1/19/17



BORING LOG

(continued)

BORING NUMBER: **SP-1**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **1938 Riggs Avenue**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4		23.5 - 25.5	6	11	23	16	14	22.0'
												140.1'
30			S	5		28.5 - 29.2	46	50/2"			8	S-4A (23.5'-25.0' and 25.3'-25.5'): Reddish brown fine to medium SAND, some Silt, trace decomposed medium to fine Gravel, micaceous, dense, moist (SM, Residual Soil) S-4B (25.0'-25.3'): Light gray and black medium to fine SAND, some Silt, trace medium to fine Gravel, micaceous, dense, moist (SM, Decomposed Rock) Dark green-gray medium to fine SAND, some Silt, little medium to fine Gravel (bedrock fragments), very dense, moist (SM, Decomposed Rock)
35												33.0'
40												129.1' (Auger refusal at 33 ft bgs, see Coring Log)

Note:

Boring No. SP-1 Sheet 2 of 2



BORING LOG

BORING NUMBER: **CSX-A**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **CME-55, Rubber Track, Automatic Hammer**

LOCATION: **AMTRAK 1800 Falls Rd.; Charles Interlock; Under CSX bridge**

COORD.: **N: 599,153.0 E: 1,419,498.4**

SURFACE ELEV.: **64.3 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **6/16/16** TIME: **10:20 am**

FINISH DATE: **6/16/16** TIME: **12:00 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	n/a	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	n/a	1.375"	3.00"	n/a	3.25"	1.875"					
Length	n/a	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	n/a	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'	Note: Hand excavated for utility clearance, depth 0.0'-10.5'
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Dark gray and yellowish brown coarse to fine GRAVEL (up to 2") and coarse to fine Sand, trace Clayey Silt, trace cinders, moist (GP, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Gray and yellowish brown coarse to fine SAND, little coarse to fine Gravel, trace Clayey Silt, trace cinders, moist (SP, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Light brown coarse to fine SAND, some coarse to fine Gravel, trace Silt, trace mica, trace shell, trace roots, moist (SP, Fill)
			G	5	☒	10.0 - 10.5	G	R	A	B	6		Brown, black and orange CLAY & SILT, little coarse to fine Sand, trace mica, moist, slight organic odor (ML, Fill)
10			S	1	■	10.5 - 12.5	G	R	A	B	6	10.5'	Black coarse to fine SAND, trace medium to fine Gravel, trace Silty Clay (in pockets), trace organics, trace glass fragments, moist, slight organic odor (CL, Fill)
							6	4	3	3	11.5	53.8'	Brown, dark green-gray and white coarse to fine SAND, some Silt, trace to little coarse to fine Gravel, loose, moist (SM)

Note:

Boring No. **CSX-A** Sheet 1 of 2

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 3/2/17



BORING LOG

(continued)

BORING NUMBER: **CSX-A**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
20			S	2		15.5 - 17.5	4	2	1	2	4	Brown coarse to fine SAND and coarse to fine Gravel, some Silt, very loose, wet (SM)	
			S	3		18.0 - 18.2	100/2"				2		17.8'
			C	1		18.2 - 19.2	12	12	100	5.0	42		48.3'
			C	2		19.2 - 24.2	60	60	100	36.6	61		46.1'
25			C	3		24.2 - 28.2	48	48	100	20.6	43	24.20'-25.00': Dark, bluish gray with streaks of white AMPHIBOLITE; medium to fine grains of amphibole and feldspar; close to very close fracture spacing; slightly weathered; strong to medium strong; foliation not discernable at core scale.	
												25.0'	
												39.3'	
30												36.1'	
												(End of boring at 28.2 ft bgs)	

Note:

Boring No. **CSX-A** Sheet **2** of **2**



BORING LOG

BORING NUMBER: **CSX-P**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **CME-55, Rubber Track, Automatic Hammer**

LOCATION: **AMTRAK 1800 Falls Rd.; Charles Interlock; Between CSX and North Avenue bridges**

COORD.: **N: 599,300.5 E: 1,419,462.3**

SURFACE ELEV.: **66.0 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **6/16/16** TIME: **7:00 am**

FINISH DATE: **6/16/16** TIME: **9:20 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	n/a	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	n/a	1.375"	3.00"	n/a	3.25"	1.875"					
Length	n/a	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	n/a	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'	Note: Hand excavated for utility clearance, depth 0.0'-10.25'
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Black medium to fine GRAVEL (some gravel pieces are porous and lightweight) and coarse to fine Sand, trace Silt, trace cinders, moist (GP, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Dark gray, light gray and orange coarse to fine SAND, little medium to fine Gravel, trace Silt, trace cinders, moist (SP, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Black, orangish brown and light gray coarse to fine SAND, little Silty Clay, trace medium to fine Gravel, trace cinders, moist (SM, Fill)
			G	5	☒	9.5 - 10.0	G	R	A	B	6		Grayish brown, orange and black, coarse to fine SAND, trace coarse to fine Gravel, trace Silt, trace cinders, trace glass fragments (not in jar), moist (SP, Fill)
10			S	1	■	10.0 - 12.0	3	4	3	4	16	10.3' 55.7'	Grayish brown, orange and black, coarse to fine SAND, little coarse to fine Gravel, trace Silt, trace cinders, trace glass fragments, trace brick fragments (up to 1.5"), moist (SP, Fill) S-1A: 10.00'-10.25': Brown coarse to fine SAND; some Silt, trace fine Gravel, trace brick fragments, loose, moist (Fill) S-1B: 10.25'-11.35': Light brown and brown SILT, trace to little medium to fine Gravel, trace medium to fine Sand, medium stiff, moist; PP = 1.0-2.5 tsf (ML)

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **CSX-P** Sheet 1 of 2

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 3/2/17



BORING LOG

(continued)

BORING NUMBER: **CSX-P**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS			
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)				
							CORING								
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %				
20			S	2		15.0 - 17.0	6	11	11	12	24	Brown, light brown and light gray Clayey SILT, little to some medium to fine Sand, trace to little fine Gravel, very stiff, moist; PP = 3.75-4.00 tsf (ML)			
25		0.5 0.4 0.7	S	3		20.0 - 22.0	13	15	13	29	14	Reddish brown and gray medium to fine SAND, some Silt, trace medium to fine Gravel, medium dense, wet (SM, Decomposed Rock)			
30		0.1 0.1 0.1 0.1 0.6 0.9 0.0 0.0	S	4		22.3 - 22.4	50/1"	32	89	4.0	1	Dark gray and reddish brown coarse to fine GRAVEL (bedrock fragments), very dense, moist (GP, Decomposed Rock)			
			C	1		22.4 - 25.4	36				11			22.40'-22.75': Assumed recovery loss. Dark, bluish gray amphibole SCHIST; medium to fine grains of amphibole and feldspar; close to very close fractures spacing; except extremely close at 22.75'-22.95'; slightly weathered; medium strong; foliation dips ~50°; GRANITIC GNEISS band at 25.20'-25.40'. 28.55'-29.25': Assumed recovery loss. Dark, bluish gray amphibole SCHIST, interlayered with GRANITIC GNEISS; medium to fine grains of amphibole and feldspar; close to extremely close fracture spacing; moderately weathered; medium strong to strong; except weak at 25.75'-26.08'; foliation dips ~40°.	
35		0.1 0.1 0.1 0.1 0.6 0.9 0.0 0.0	C	2		25.4 - 30.4	60	52	87	20.0	33	Dark, bluish gray amphibole SCHIST, interlayered with GRANITIC GNEISS; medium to fine grains of amphibole and feldspar; close to extremely close fracture spacing; moderately weathered; medium strong to strong; except weak at 25.75'-26.08'; foliation dips ~40°.			
40		0.1 0.1 0.1 0.1 0.6 0.9 0.0 0.0	C	3		30.4 - 33.4	36	36	100	11.0	31	Dark, bluish gray amphibole SCHIST with quartz-feldspar and PEGMATITE bands up to 5" thick; coarse to fine grains of amphibole, feldspar, mica and minor garnet; close to extremely close fracture spacing; moderately weathered; medium strong to strong; foliation dips ~40°-45°.			
(End of boring at 33.4 ft bgs)															

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **CSX-P** Sheet **2** of **2**

BORING LOG

BORING NUMBER: IVF-P2-7A

SHEET NUMBER: 1 of 3

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: **AMTRAK**

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: L. Sepulveda

DRILLING METHOD: Hollow Stem Augers; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted, Automatic Hammer

LOCATION: 2018 Linden Avenue

COORD.: N: 599,203.9 E: 1,416,101.4

SURFACE ELEV.: 185.1 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 11/14/16 TIME: 12:10 pm

FINISH DATE: 11/17/16 TIME: 2:00 pm

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S 	NW	L 	G 	C 	Date	Time	Water Depth (ft)	Auger Depth (ft)	Hole Depth (ft)
I.D.	4.25"	1.375"	n/a	n/a	3.25"	n/a					
O.D.	8.25"	2"	n/a	n/a	3.375"	n/a	11/15/16	11:50 am	18.0	-	20.0
Length	60"	24"	n/a	n/a	6"	n/a	11/16/16	8:06 am	17.2	-	54.1
Hammer Wt.	n/a	140lbs	Drill Rod Size		A		11/17/16	7:47 am	17.6	-	125.4
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'	3" Asphalt; 9" Subbase (Gravel)	
												1.0'	
			G	1	⊗	2.0 - 2.5	G	R	A	B	6	184.1'	Note: Hand excavated for utility clearance, depth 0.0'-10.0' Light brown and reddish brown Silty CLAY, trace medium to fine Gravel, trace medium to fine Sand, moist (CL, Fill)
			G	2	⊗	4.0 - 4.5	G	R	A	B	6		Note: Cobbles at 2.5'-3.6' depth. Utility at 3.6' depth and 3.1' from curb. Offset hole 1' North and to 1.5' from the curb.
5			G	3	⊗	6.0 - 6.5	G	R	A	B	6		Brown and tan coarse to fine SAND, trace medium to fine Gravel, trace Silt, wet (SP, Fill)
			G	4	⊗	8.0 - 8.5	G	R	A	B	6		Brown and tan coarse to fine SAND, little medium to fine Gravel, trace Silt, wet (SP, Fill)
													Brown and tan coarse to fine SAND, trace coarse to fine Gravel, trace Silt, wet (SP, Fill)
10			S	1	■	10.5 - 12.5	11	11	11	15	17		Note: Could not take a sample at 9.5'-10.0' due to high Gravel content. Probed to 10.0' depth with air knife. End of soft dig at 10.0'. Light brown medium to fine SAND, trace to little medium Gravel, trace Silt, asphalt fragments, medium dense, dry (SP, Fill)
			S	2	■	13.5 - 15.5	8	11	12	14	17		Light brown coarse to fine SAND, some coarse to fine Gravel, little Silt, medium dense, dry (SM, possible Fill)
15													Note: Encountered obstruction at 15.5' depth bgs. Hole abandoned. The samples below are from offset location IVF-P2-7A.
												16.8'	
			S	1	■	18.0 - 20.0	13	12	10	10	14	168.3'	Light brown coarse to fine SAND and coarse to fine Gravel, little Silt, medium dense, wet (SM)

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P2-7A**

SHEET NUMBER: **2** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

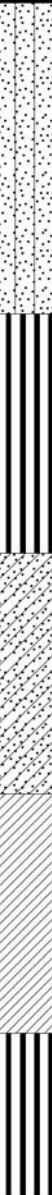
LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	2		23.0 - 25.0	8	13	11	8	16	Light brown coarse to fine SAND and coarse to fine Gravel, little Silt, medium dense, wet (SM)	
												26.5'	
30			S	3		28.0 - 30.0	9	7	9	10	14	Light yellow, orange and brown Clayey SILT, little coarse to medium Sand, very stiff, moist (MH, Residual Soil)	
												31.5'	
35			S	4		33.0 - 35.0	8	8	9	9	7	Light gray medium to fine SAND and Silty Clay trace coarse to fine Gravel, very stiff, moist (SC, Residual Soil)	
												36.5'	
40			S	5		38.0 - 40.0	6	6	8	7	18	Light gray and gray Silty CLAY and medium to fine Sand, trace medium Gravel, stiff, moist (CL, Residual Soil)	
												41.5'	
			S	6		43.0 - 45.0	6	8	10	10	24	Light gray-green and green Clayey SILT, little to some medium to fine Sand, very stiff, moist, subhorizontal relict fractures observed, no discernable relict foliation (MH, Decomposed Rock)	
												143.6'	

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P2-7A**

SHEET NUMBER: **3** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
50			S	7		48.0 - 50.0	13	25	23	20	24	46.5' 138.6' Light gray and light green with speckles of dark and white medium to fine SAND, some Clayey Silt, trace medium to fine Gravel (quartz), dense, moist, no discernable relict foliation (SM, Decomposed Rock)
			S	8		53.0 - 53.1	50/1"				1	52.5' 132.6'
55			S	9		54.0 - 54.0	50/0.5"				0.5	54.1' 131.0' Light gray and light green with speckles of black and white medium to fine SAND, some Silt, trace fine Gravel, very dense, moist (SM, Decomposed Rock) White and light gray medium to fine SAND, little medium to fine Gravel, trace Silt, very dense, moist (SP, Decomposed Rock) (Spoon refusal at 54.1 ft bgs, see Coring Log)
60												
65												

Note:



BORING LOG

BORING NUMBER: **NA-P2-1 OW**
 SHEET NUMBER: **1** of **3**
 PROJECT NUMBER: **185615A**
 LOCATION: **AMTRAK 1800 Falls Rd.; Charles Interlock; Next to equipment shed**
 COORD.: **N: 599,418.2 E: 1,419,296.0**
 SURFACE ELEV.: **68.8 feet**
 DATUM: **Horizontal: NAD 83/91**
Vertical: NAVD 88
 START DATE: **6/15/16** TIME: **7:30 am**
 FINISH DATE: **6/15/16** TIME: **11:30 am**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**
 CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**
 INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Rubber Track, Automatic Hammer**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	n/a	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	n/a	1.375"	3.00"	n/a	3.25"	1.875"					
Length	n/a	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	n/a	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'	Note: Hand excavated for utility clearance, depth 0.0'-10.0'
			G	2	☒	5.0 - 5.5	G	R	A	B	6		
			G	3	☒	6.0 - 6.5	G	R	A	B	6	5.8'	Light brown and gray, medium to fine SAND, little Clayey Silt, trace coarse to fine Gravel, trace cinders, moist (SM, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6	63.0'	Brown and gray coarse to fine SAND, little Silty Clay, trace fine Gravel, moist (SC)
			G	5	☒	9.5 - 10.0	G	R	A	B	6	8.0'	Brown and orangish brown Silty CLAY, little medium to fine Sand, trace medium to fine Gravel, moist (CL)
10			S	1	■	10.0 - 12.0	15	26	33	54	14	9.5'	Brown coarse to fine GRAVEL, some coarse to fine Sand, trace Silty Clay, moist (GP)
													58.8'

Note:



BORING LOG

(continued)

BORING NUMBER: **NA-P2-1 OW**
 SHEET NUMBER: **2** of **3**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
			S	2		15.0 - 15.8	72	100/3.5"			9.5	Light gray, gray and yellow-brown coarse to fine SAND, some Silt, trace fine Gravel, very dense, moist (SM, Decomposed Rock)
			S	3		18.0 - 18.1	100/1"					18.1' 50.7' Light gray, gray and yellow-brown coarse to fine SAND, some Silt, some coarse to fine Gravel, very dense, moist (SM, Decomposed Rock) 18.10'-18.25': Rock fragments; possibly wash. 18.25'-20.10': Gray and yellow-brown SCHISTOSE GNEISS; medium to fine grains of feldspar, quartz, amphibole and mica; close fracture spacing; slightly weathered; medium strong; gneissic banding dips ~50°. 20.1'-25.1': Gray and yellow-brown SCHISTOSE GNEISS; medium to fine grains of feldspar, quartz, amphibole and mica; moderate to close fracture spacing; slightly weathered; strong to medium strong; gneissic banding dips ~50°; quartz-feldspar rich band at 23.80'-24.60'.
		2.3	C	1		18.1 - 20.1	24	24	100	15.0	1 63	
		2.1										
		2.7	C	2		20.1 - 25.1	60	60	100	57.5	96	
		1.4										25.1' 43.7' Light gray and white with streaks of black GNEISS; medium to fine grains of feldspar, quartz and amphibole; moderate to close fracture spacing; unweathered; strong; gneissic banding, where visible, dips ~45°. 27.5' 41.4' PEGMATITE band at 27.45'-28.96'. 29.0' 39.8'
		2.3										
		3.7										
		3.7	C	3		25.1 - 30.1	60	60	100	60.0	100	
		3.0										Light gray and white with streaks of black GNEISS; medium to fine grains of feldspar, quartz and amphibole; moderate to very close fracture spacing; except extremely close fracture spacing at 31.10'-31.30'; slightly weathered; strong to medium strong; gneissic banding, where visible, dips ~50°; PEGMATITE band at 31.45'-31.95'.
		4.0										
		2.1										
		0.2										
		0.8										
		0.1	C	4		30.1 - 35.2	61.2	61	100	49.0	80	
		0.8										
		0.8										
		0.5										

Note:



BORING LOG

(continued)

BORING NUMBER: **NA-P2-1 OW**
 SHEET NUMBER: **3** of **3**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**
 DRILLER: **J. Scribellito Jr.**
 INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
35		0.5	C	5	35.2 - 40.1	59	59	100	44.5	75	Light gray and white with streaks of black GNEISS; medium to fine grains of feldspar, quartz and amphibole; unweathered to slightly weathered; strong; gneissic banding dips ~45°; amphibole-rich band at 38.95'-40.10'.		
0.4													
0.5													
2.5													
2.7													
40		3.0	C	6	40.1 - 45.1	60	60	100	44.5	74		Light gray and white with black streaks GRANITIC GNEISS; medium to fine grains of feldspar, quartz, amphibole and minor magnetite and garnet; moderate to close fracture spacing; unweathered; strong; except very close fracture spacing; slightly weathered; medium strong at 40.40'-41.10'; gneissic banding dips ~40°; amphibole-rich band at 40.10'-41.10'; quartz vein at 44.85'-45.10'.	
2.0													
1.9													
2.9													
3.0													
45		3.7	C	7	45.1 - 48.2	37.2	37	99	27.0	73			Light gray and white with black streaks GRANITIC GNEISS; medium to fine grains of feldspar, quartz, amphibole and minor magnetite and garnet; moderate to close fracture spacing; except very close fracture spacing at 47.30'-47.65'; slightly weathered; strong to medium strong.
3.3													
4.2													
2.6													

Note:



BORING LOG

BORING NUMBER: SA-P2-1 OW
SHEET NUMBER: 1 of 2
PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project
LOCATION: Baltimore, MD
CLIENT: AMTRAK
CONTRACTOR: FSD, Inc.

LOCATION: Mosher Street and N Payson Street
COORD.: N: 594,925.9 E: 1,411,165.6
SURFACE ELEV.: 163.3 feet
DATUM: Horizontal: NAD 83/91
Vertical: NAVD 88

DRILLER: J. Scribellito Jr.
INSPECTOR: L. Sepulveda

START DATE: 2/17/16 TIME: 9:00 am
FINISH DATE: 2/26/16 TIME: 12:00 pm

DRILLING METHOD: Rotary Wash; Diamond Coring
RIG TYPE: CME-55, Truck Mounted Automatic Hammer

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S	HW	L	G	C	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	4.00"	n/a	3.25"	n/a	2/17/16	9:00 am	10.0	-	10.0
Length	7.25"	2"	4.50"	n/a	3.375"	n/a	2/25/16	7:27 am	7.3	23.0	28.3
Hammer Wt.	60"	24"	60"	n/a	6"	n/a	2/26/16	7:40 am	13.5	29.0	57.0
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
						0.0 - 0.4						0.0'	
5			G	1		2.0 - 2.5	G	R	A	B	6	0.4'	Asphalt slab 5"
			G	2		4.0 - 4.5	G	R	A	B	6	162.9'	Note: Hand excavated for utility clearance, depth 0.0'-10.0'
			G	3		6.0 - 6.5	G	R	A	B	6		White and green Clayey SILT, trace coarse to fine Sand, trace asphalt fragments, moist (Fill)
			G	4		8.0 - 8.5	G	R	A	B	6		Light brown coarse to fine SAND, some Clayey Silt, some coarse to fine Gravel, moist (SM, Fill)
			G	5		9.5 - 10.0	G	R	A	B	6		Light brown coarse to fine SAND, some Clayey Silt, some coarse to fine Gravel, moist (SM, Fill)
10			S	1		10.0 - 12.0	G 3	R 6	A 7	B 7	6 24	10.0'	Light brown coarse to fine SAND, some Clayey Silt, some coarse to fine Gravel, moist (SM, Fill)
												153.3'	Reddish brown and light gray CLAY, trace lignite, stiff, moist (CH)
			S	2		13.0 - 15.0	4	7	9	8	24		S-2A: 13.0'-14.5': Reddish brown and light gray CLAY, stiff, moist (CH)
												14.5'	
15												148.8'	S-2B: 14.5'-15.0': Light green CLAY & SILT, trace medium to fine Sand, very stiff, moist (CL, Residual Soil)
												16.5'	
												146.8'	
			S	3A		18.0 - 20.0	10	7	5	8	20	18.5'	S-3A: 18.0'-18.5': Light brown and reddish brown SILT & CLAY, trace coarse to fine Sand, stiff, moist (MH, Residual Soil)
												144.8'	
													S-3B: 18.5'-20.0': Green to olive green Clayey SILT

Note: * 3 inch spoon



BORING LOG

(continued)

BORING NUMBER: **SA-P2-1 OW**
 SHEET NUMBER: **2** of **2**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**
 DRILLER: **J. Scribellito Jr.**
 INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4*		23.0 - 25.0	37	54	74	91	0	21.5'
												141.8'
				S	5		27.7 - 28.0	100/3"				
30												135.3'
35												
40												

and medium to fine Sand, medium dense, moist (ML, Decomposed Rock)

Note: No recovery with 2" split spoon, sample recovered using 3" split spoon.

Olive green, dark green and light green fine SAND, some Silt, trace fine Gravel, very dense, moist, relict gneissic banding dips ~30°-50° (SM, Decomposed Rock)

Black to dark green fine SAND and Clayey Silt, very dense, moist (SC-SM, Decomposed Rock) (Spoon refusal at 28 ft bgs, see Coring Log)

Note: * 3 inch spoon



BORING LOG

BORING NUMBER: **S-P2-B3A**

SHEET NUMBER: **1** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

LOCATION: **Lafayette Avenue and Brince Street**

COORD.: **N: 594,509.4 E: 1,411,399.7**

SURFACE ELEV.: **150.2 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **7/22/16** TIME: **7:45 am**

FINISH DATE: **7/22/16** TIME: **10:15 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	1.875"					
Length	8.25"	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	60"	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'	Concrete/Asphalt 11"	
			G	2	☒	4.0 - 4.5	G	R	A	B	6	0.9'	Note: Hand excavated for utility clearance, depth 0.0'-10.5'	
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Brown, gray and light gray coarse to fine SAND, little medium to fine Gravel, trace Silty Clay, moist (SP, Fill)	
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Brown coarse to fine SAND, trace Silty Clay, trace coarse to fine Gravel, moist (SP, Fill)	
			G	5	☒	10.0 - 10.5	G	R	A	B	6		Note: utility encountered at depth 6.0'. Hole offset 12.7' WEST.	
			S	1	■	10.5 - 12.5	4	3	3	4	1		Brown coarse to fine SAND, trace Silty Clay, trace coarse to fine Gravel, moist (SP, Fill)	
			S	2	■	12.5 - 14.5	3	2	1	1	14		Note: groundwater encountered at depth 8.0'. Yellowish-brown coarse to fine SAND and Silty Clay, trace medium to fine Gravel, wet (SC, Fill)	
													10.5'	Reddish-brown Silty CLAY, trace medium to fine Sand, wet (CL)
													139.7'	Light brown coarse to fine SAND, some Silt, trace coarse Gravel, loose, wet (SM)
													12.5'	Gray and light brown coarse to fine SAND, some Silty Clay, trace coarse to fine Gravel, very loose, wet (SC)

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P2-B3A**

SHEET NUMBER: **2** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
20		1.7	S	3		15.5 - 17.5	4	8	8	6	15	Gray medium to fine SAND and Silty Clay, medium dense, wet (SC)	
25		1.5	S	4		20.5 - 22.5	10	22	18	74	15	S-4A: 20.5'-21.5': Reddish brown fine SAND, some Silt, trace medium to fine Gravel, dense, moist (SM) S-4B: 21.5'-21.75": Gray-green medium to fine SAND, some clayey Silt, thin reddish brown Silty Sand layers, dense, moist (SM)	
30		1.5	S	5		24.1 - 24.2	50/1"				1	24.2'	
			C	1		24.2 - 25.7	18	18	100	18.0	100	126.0'	Green-gray medium to fine SAND, little to some Silt, trace medium Gravel, very dense, moist (SM)
35		1.5	C	2		25.7 - 30.7	60	57	95	57.0	95	25.7'	
40		1.9											
45		1.9	C	3		30.7 - 35.7	60	60	100	56.5	94	30.7'	
50		4.1											
55		2.3											
60		2.8											

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P2-B3A**

SHEET NUMBER: 3 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)
							CORING					
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %
35		2.8 2.4										
40												
45												
50												
										114.5' (End of boring at 35.7 ft bgs)		

Note:



BORING LOG

BORING NUMBER: **S-P2-B4**

SHEET NUMBER: **1** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Rubber Track Mounted, Automatic Hammer**

LOCATION: **Pulaski Street and W Lanvale Street**

COORD.: **N: 594,120.6 E: 1,411,177.1**

SURFACE ELEV.: **148.6 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **7/25/16** TIME: **7:30 am**

FINISH DATE: **7/25/16** TIME: **12:15 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	1.875"					
Length	8.25"	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	60"	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS			
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)	
							CORING						
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %	
												0.0'	Concrete/Asphalt 12"
												1.0'	Note: Hand excavated for utility clearance, depth 0.0'-10.5'
			G	1	☒	2.0 - 2.5	G	R	A	B	6		Brown, black and gray coarse to fine SAND, little Clayey Silt, trace coarse to fine Gravel, moist (SM, Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Gray Silty CLAY, trace medium to fine Sand, moist (CL, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Dark gray coarse to fine GRAVEL (cinders) and coarse to fine Sand, trace Silt, wood fragments, bone fragments, moist (GP, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Dark gray Silty CLAY, little coarse to fine Sand, trace Gravel (cinders), geotextile fragment, wet (CL, Fill)
			G	5	☒	10.0 - 10.5	G	R	A	B	6		Note: groundwater level at 10.0' depth.
			S	1	■	10.5 - 12.5	4	5	4	7	18	10.5'	Grayish-brown coarse to fine GRAVEL, some Clayey SILT, little coarse to fine Sand, wet (GM, Fill)
					■							138.1'	Orangish-brown, Silty CLAY, little coarse to fine Sand, trace coarse to fine Gravel, stiff, wet (CL, Residual Soil); PP = 1.25 tsf
					■							13.3'	
			S	2	■	14.0 - 16.0	3	8	9	7	19	135.4'	Orangish-brown and grayish-brown SILT, little coarse to fine Sand, little coarse to fine Gravel, very

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B4** Sheet **1** of **3**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17



BORING LOG

(continued)

BORING NUMBER: **S-P2-B4**

SHEET NUMBER: **2** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **A. Daniyarov**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
													stiff, moist, slightly micaceous (ML, Residual Soil); PP = 2.0 tsf
													17.5'
													131.1'
20			S	3		19.0 - 21.0	7	10	14	22	24		S-3A: 19.0'-20.5': Light gray and light orangish-brown coarse to fine SAND, little Silt, medium dense, dry, relict foliation dips ~45° (SM, Decomposed Rock).
													20.5'
													128.1'
													S-3B: 20.5'-21.0': Gray, dark orangish brown and black coarse to fine SAND, trace Silt, medium dense, dry, relict foliation dips ~30° (SP, Decomposed Rock)
25			S	4		24.0 - 24.5	100/6"				6		Light yellowish-brown, brown and dark gray coarse to fine SAND, trace Silt, trace medium to fine Gravel, very dense, dry, slightly micaceous (SP, Decomposed Rock)
													No recovery. Spoon refusal.
													26.7'
			S	5		26.7 - 26.7	100/0"				0		121.9'
		1.7	C	1		26.7 - 28.7	24	18	75	5.5	23		Light gray, dark gray and light yellow-brown, GRANITIC GNEISS; coarse to fine grains of quartz and feldspar; close to extremely close fracture spacing; slightly to moderately weathered; medium strong to weak; gneissic banding dips ~30°-40°; where visible.
		2.3											28.20'-28.70': Assumed recovery loss.
		2.1											28.70'-29.50': Assumed recovery loss.
30		1.9	C	2		28.7 - 33.7	60	52	87	11.0	18		29.50'-31.45': Light gray, dark gray and light yellow-brown, GRANITIC GNEISS; coarse to fine grains of quartz and feldspar; slightly to locally moderately weathered, medium strong to locally weak; amphibole-rich at 31.45'-33.70'; gneissic banding, where visible, dips ~30°-40°.
		2.4											
		2.2											
		2.2											

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)



BORING LOG

(continued)

BORING NUMBER: **S-P2-B4**

SHEET NUMBER: **3** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
35		2.1	C	3	33.7 - 38.7	60	58	97	19.8	33	33.70'-33.90': Assumed recovery loss. Light gray, dark gray and light yellow-brown, GRANITIC GNEISS; coarse to fine grains of quartz and feldspar; slightly to locally moderately weathered, medium strong to locally weak; amphibole-rich at 33.90'-34.50'; gneissic banding, where visible, dips ~30°-40°.	
		2.2										
		2.2										
		1.7										
		2.5										
40		2.6	C	4	38.7 - 43.7	60	60	100	30.5	51	Light gray, dark gray and light yellow-brown, GRANITIC GNEISS; coarse to fine grains of quartz and feldspar; moderately close to very close fracture spacing; except extremely close fracture spacing at 39.67'-39.73'; slightly weathered; medium strong to locally weak; amphibole-rich at 38.70'-40.15' and 41.65'-42.30'; quartz-feldspar band, 2.5" thick, at 42.35'; gneissic banding, where visible, dips ~30°-40°.	
		1.9										
		1.9										
		2.4										
		2.4										
45		2.1	C	5	43.7 - 48.9	62.4	62.4	100	37.0	60	Light gray, dark gray and light yellow-brown, GRANITIC GNEISS; coarse to fine grains of quartz and feldspar; moderately close to extremely close fracture spacing; slightly weathered; strong to locally weak; amphibole-rich at 44.95'-45.45'; PEGMATITE band, 4" thick, at 44.10'; gneissic banding dips ~30°.	
		1.9										
		2.3										
		2.5										
		2.1										
50											99.7' (End of boring at 48.9 ft bgs)	

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B4** Sheet **3** of **3**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17



BORING LOG

BORING NUMBER: **S-P2-B5**

SHEET NUMBER: **1** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

LOCATION: **Harlem Avenue and N Pulaski Street**

COORD.: **N: 593,676.8 E: 1,411,123.4**

SURFACE ELEV.: **146.2 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **10/5/16** TIME: **7:00 am**

FINISH DATE: **10/5/16** TIME: **10:32 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	3.00"	n/a	3.25"	1.875"					
Length	7.25"	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	60"	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS			
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)	
							CORING						
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %	
												0.0'	13.5" Asphalt/Concrete
												1.1'	Note: Hand excavated for utility clearance, depth 0.0'-11.0'
												145.1'	
			G	1	☒	2.0 - 2.5	G	R	A	B	6		Black and gray coarse to fine SAND and medium to fine Gravel, trace Silt, wire and shell fragments, dry (SP, Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Light orangish brown and dark gray coarse to fine SAND, little coarse to fine Gravel (quartz), little Silty Clay, shell fragments, moist (SC, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Gray, light gray and white coarse to fine SAND, some coarse to fine Gravel, little Silt, shell and glass fragments, dry (SP, Fill) Note: Groundwater at depth ~8'.
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Gray, light gray and white coarse to fine SAND, some coarse to fine Gravel, little Silt, frequent shell fragments, wet (SM, Fill)
			G	5	☒	10.5 - 11.0	G	R	A	B	6		Gray, light gray and white coarse to fine SAND, some coarse to fine Gravel, little Silt, frequent shell fragments, wet (SM, Fill)
			S	1	■	11.0 - 13.0	1	1	1	WOH	10		S-1A: 11.0'-11.7': Black and light brown coarse to fine SAND, some Silt, some coarse to fine Gravel, rubber, metal, shell and brick fragments, very loose, wet (SM, Fill)
			S	2	■	13.0 - 15.0	2	1	3	4	17		S-1B: 11.7'-11.8' Light gray medium to fine SAND, some Silty Clay, very loose, wet (SC) Light gray-brown and brown Silty CLAY, trace to little fine Sand (brown partings), soft, moist (CL)

Note:

Boring No. **S-P2-B5** Sheet **1** of **4**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17



BORING LOG

(continued)

BORING NUMBER: **S-P2-B5**

SHEET NUMBER: **2** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
			S	3		18.0 - 20.0	3	4	7	5	11.5	Light reddish-brown and light gray Silty CLAY, trace to little fine Sand, trace fine Gravel (quartz nodules), stiff, moist (CL, Residual Soil)	
20													21.5'
			S	4		23.0 - 25.0	17	14	16	22	21	Reddish-brown and dark greenish-gray medium to fine SAND, some Silt, trace medium to fine Gravel, medium to dense, moist, subhorizontal relict layering (SM, Decomposed Rock)	124.7'
25													
			S	5		28.0 - 29.4	32	51	73/5"		13	Dark greenish-gray and reddish-brown medium to fine SAND, some Silt, trace fine Gravel, very dense, moist; subhorizontal relict layering (SM, Decomposed Rock)	
30													
		2.0	S	6		32.9 - 32.9	10/0"				0	32.9'	
			C	1		32.9 - 35.9	36	27	75	0.0	0	113.3'	Spoon refusal. No recovery
													32.90'-33.78': Dark gray with white streaks

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P2-B5**

SHEET NUMBER: **3** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
35		1.2	C	2	35.9 - 40.9	60	59	98	17.5	29	amphibole GNEISS; coarse to fine grains of amphibole, feldspar and minor mica and quartz; close to very close fracture spacing; slightly weathered; medium strong; gneissic banding dips ~20°.	
	1.2	33.78'-35.90': Light gray, light green-gray and light reddish-brown GRANITIC GNEISS; coarse to fine grains of feldspar, quartz, mica and minor amphibole; close to extremely close fracture spacing; moderately weathered; weak to extremely weak; gneissic banding dips ~20°-25°.										
	1.7	34.15'-34.90': Assumed recovery loss.										
	1.8											
		1.3	C	3	40.9 - 45.9	60	42.5	71	6.0	30	Light gray, light green-gray and light reddish-brown GRANITIC GNEISS with thin amphibole-rich bands; coarse to fine grains of feldspar, quartz, mica and minor amphibole; close to extremely close fracture spacing; slightly weathered; medium strong to weak; gneissic banding dips ~20°-25°.	
40		1.2									36.65'-36.75': Assumed recovery loss.	
	1.6											
	1.2											
		1.5	C	4	45.9 - 50.9	60	60	100	18.0	30	Light gray, light green-gray and light reddish-brown GRANITIC GNEISS interlayered with GNEISS; coarse to fine grains of feldspar, quartz, mica and minor amphibole; close to extremely close fracture spacing; moderately weathered; strong to extremely weak; gneissic banding dips ~20°-25°.	
	1.3	42.10'-43.50': Assumed recovery loss.										
	1.4											
	1.8											
45		1.7	C	5	50.9 - 56.0	61.2	61	100	52.0	85	Dark greenish gray to black with few white streaks AMPHIBOLITE; medium to fine grains of amphibole, feldspar, and minor mica; close to extremely close fracture spacing; slightly weathered; strong to locally weak; faint foliation dips ~25°; quartz-feldspar band at 45.90'-46.10'.	
	1.6											
	1.6											
	1.6											
50		1.6	C	5	50.9 - 56.0	61.2	61	100	52.0	85	Dark greenish gray to black with few white streaks AMPHIBOLITE interlayered with amphibole GNEISS; medium to fine grains of amphibole, feldspar, and minor mica; moderate to close fracture	
	2.3											

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P2-B5**

SHEET NUMBER: **4** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
55		2.3 2.1 2.3 2.1									spacing; except very close fracture spacing at 51.10'-51.25'; unweathered; strong; faint foliation dips ~20°.	
60											90.2' (End of boring at 56 ft bgs)	
65												
70												

Note:



BORING LOG

BORING NUMBER: **S-P2-B6**

SHEET NUMBER: **1** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **L. Sepulveda**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Rubber Track Mounted, Automatic Hammer**

LOCATION: **2140 Edmondson Avenue**

COORD.: **N: 593,190.8 E: 1,410,708.3**

SURFACE ELEV.: **171.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **7/26/16** TIME: **7:45 am**

FINISH DATE: **7/26/16** TIME: **12:15 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.00"	n/a	3.25"	1.875"					
Length	8.25"	2"	3.50"	n/a	3.375"	2.980"					
Hammer Wt.	60"	24"	60"	n/a	6"	60"					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'	Concrete/Asphalt 10"	
			G	2	☒	4.0 - 4.5	G	R	A	B	6	0.8'	Note: Hand excavated for utility clearance, depth 0.0'-10.5'. Rock fragments at 1.0'-2.0' depth.	
			G	3	☒	6.0 - 6.5	G	R	A	B	6	170.7'		
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Brown and dark gray coarse to fine SAND, little Silty Clay, little coarse to fine Gravel, dry (SC, Fill)	
			G	5	☒	10.0 - 10.5	G	R	A	B	6		Brown coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, dry (SC, Fill)	
			S	1	■	10.5 - 12.5	1	1	3	2	17		Brown, coarse to fine GRAVEL and coarse to fine Sand, trace Silty Clay, moist (GP, Fill)	
													8.0'	Tan and yellowish-brown medium to fine SAND, trace Silt, moist (SP)
													163.5'	
													10.0'	Light brown coarse to fine SAND, some Silty Clay, moist (SC)
													161.0'	Reddish-brown to brown Silty CLAY, some medium to fine Sand, trace medium to fine Gravel, soft, moist (CL); PP = 1.75-3.0 tsf
			S	2	■	14.0 - 16.0	2	2	1	2	19	13.3'	Light brown and dark brown medium to fine SAND, some Silt, trace fine Gravel, very loose, wet (SM)	
													158.3'	

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B6** Sheet **1** of **4**

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6**

SHEET NUMBER: **2** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)
							CORING					
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %
20			S	3		19.0 - 21.0	9	8	13	10	14	17.5'
												154.0'
												22.5'
												149.0'
25			S	4		24.0 - 26.0	2	2	3	3	16	Light yellow-brown and light gray with streaks of brown coarse to fine SAND, some Clayey Silt, loose, moist (SM, Residual Soil)
												27.5'
												144.0'
												32.5'
30			S	5		29.0 - 31.0	3	4	5	6	24	Light yellow-brown with streaks of brown Clayey SILT and coarse to fine Sand, stiff, moist (ML, Residual Soil)
												139.0'

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B6** Sheet **2** of **4**



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6**

SHEET NUMBER: **3** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
35		S	6	34.0 - 36.0	8	9	11	14	24	Light gray and light yellow-brown coarse to fine SAND and Clayey Silt, medium dense, wet (SM, Residual Soil)		
40		S	7	39.0 - 41.0	6	10	10	11	24	Brown and light gray coarse to fine SAND and Clayey Silt, medium dense, moist (SM, Residual Soil)		
45		S	8	44.0 - 45.2	76	80	100/2"		14	Light green-gray and reddish-brown with gray bands medium to fine SAND, some Silt, very dense, moist, relict foliation dips subhorizontally (SM, Decomposed Rock)		
50		S	9	49.0 - 49.1	60/1.5"	58.5	98	40.5	1.5	49.1' 122.4' Green-gray with speckles of black and white medium to fine SAND, little Silt, very dense, moist (SM, Decomposed Rock) 49.10'-49.22': Assumed recovery loss. Light green and dark green with streaks of white AMPHIBOLE GNEISS; medium to fine grains of feldspar, amphibole, chlorite and quartz; moderate to very close fracture spacing; except extremely close fracture spacing at 51.60'-51.85'; slightly weathered;		
		C	1	49.1 - 54.1	60				98			
												

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B6** Sheet **3** of **4**



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6**

SHEET NUMBER: **4** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **R. Stidham**

INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
55		3.0 3.0 2.4 2.2 2.1 2.3 1.5	C	2		54.1 - 59.1	60	60	100	43.0	72	medium strong to strong; except moderately weathered; extremely weak at 49.22'-49.37'; gneissic banding dips ~35°. Light green and dark green with streaks of white AMPHIBOLE GNEISS; medium to fine grains of feldspar, amphibole, chlorite and quartz; moderate to very close fracture spacing; slightly weathered; strong to medium strong; except extremely close fracture spacing; moderately weathered; extremely weak at 56.14'-56.20' and 57.97'-58.10'; gneissic banding dips ~30°.
60												112.4' (End of boring at 59.1 ft bgs)
65												
70												

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)

Boring No. **S-P2-B6** Sheet **4** of **4**



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6A OW**

SHEET NUMBER: **2** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
							CORING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)
PID = Photoionization Detector test reading, in parts per million (ppm)



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6A OW**
 SHEET NUMBER: **3** of **4**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
35												Orangish-brown interlayered with white, Silty CLAY, little coarse to fine Sand, stiff, dry (CL, Residual Soil)
40			S	7		38.5 - 40.5	8	12	14	19	24	Orangish-brown interlayered with white, Silty CLAY, some coarse to fine Sand, very stiff, dry, relict foliation dips subhorizontally (CL, Decomposed Rock); PP = 3.5 tsf
												42.0'
			S	8		43.5 - 45.5	22	30	36	47	24	Interlayered dark gray, orangish brown, black and white, coarse to fine SAND, trace fine Gravel, trace Silt (SP, Decomposed Rock)
45												
			S	9		48.5 - 48.5	100/0"				0	48.5'
			C	1		49.2 - 50.2	12	12	100	0.0	0	122.7'
50		3.4	C	2		50.2 - 55.2	60	60	100	47.0	78	Spoon refusal. No recovery
		5.5										
		5.5										
												Light greenish gray and light reddish brown GRANITE; medium to fine grains of quartz, feldspar and amphibole; very close fracture spacing; except extremely close fracture spacing at 49.40'-49.70'; slightly weathered; medium strong. Light greenish-gray, light gray and dark gray GRANITE; medium to fine grains of quartz, feldspar, amphibole and minor mica and garnet; moderate to very close fracture spacing; slightly weathered;

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)
 PID = Photoionization Detector test reading, in parts per million (ppm)



BORING LOG

(continued)

BORING NUMBER: **S-P2-B6A OW**

SHEET NUMBER: **4** of **4**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
55		4.1 4.6 3.6 1.7 2.1 2.6 1.8 1.3	C	3	55.2 - 60.2	60	60	100	38.0	63	strong to locally medium strong; PEGMATITE band, 0.75" thick, at 53.35'; several healed fractures observed dipping at 0°-60°.	
60											55.5' 115.7'	55.20'-55.50': Light greenish-gray, light gray and dark gray GRANITE; medium to fine grains of quartz, feldspar, amphibole and minor mica and garnet; moderate to very close fracture spacing; slightly weathered; strong to locally medium strong; 55.50'-60.20': Light greenish gray, dark greenish gray and gray-light yellow AMPHIBOLE GNEISS; medium to fine grains of quartz, feldspar, amphibole and minor garnet; moderate to close fracture spacing; slightly weathered; strong to medium strong; except extremely close fracture spacing; moderately weathered; extremely weak at 57.40'-57.50', 58.65'-58.83' and 59.40'-59.53'; gneissic banding dips 30°; subvertical healed fractures at 59.40'-60.20'. (End of boring at 60.2 ft bgs)
65												
70												

Note:

PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)
PID = Photoionization Detector test reading, in parts per million (ppm)

B&P BORING ONLY (SOIL AND ROCK COMB) B&P TUNNEL 8-16-16 PH2.GPJ B&P TUNNEL - 8-16-16 AD.GLB 1/19/17

BORING LOG

BORING NUMBER: S-P2-B8

SHEET NUMBER: 1 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: J. Scribellito Jr.

INSPECTOR: A. Daniyarov

DRILLING METHOD: Hollow Stem Augers; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted Automatic Hammer

LOCATION: MARC Station - West Baltimore;
W Franklin Street

COORD.: N: 592,709.4 E: 1,410,433.1

SURFACE ELEV.: 128.1 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 10/11/16 TIME: 9:30 am

FINISH DATE: 10/11/16 TIME: 12:15 pm

Type/Symbol I.D. O.D. Length Hammer Wt. Hammer Fall	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA					
	HSA	S 	NW	L 	G 	C 	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)	
	3.25"	1.375"	3.00"	n/a	3.25"	1.875"						
	7.25"	2"	3.50"	n/a	3.375"	2.980"						
	60"	24"	60"	n/a	6"	60"						
	n/a	140lbs	Drill Rod Size			A						
	n/a	30"	I.D. (O.D.)			1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS				
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)		
							CORING							
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %		
5											0.0'	13" Asphalt/Concrete		
												1.1'	Note: Hand excavated for utility clearance, depth 0.0'- 9.5'. Soft dig terminated at 9.5' bgs, possible bedrock encountered.	
		G	1	⊗	2.0 - 2.5	G	R	A	B	6				Grayish brown and dark gray coarse to fine SAND, some Silty Clay, little coarse to fine Gravel, moist, faint petrochemical odor, cobbles around sample (Fill)
		G	2	⊗	4.0 - 4.5	G	R	A	B	6				Yellowish brown and light gray Silty CLAY, trace coarse to fine Sand, trace medium to fine Gravel, moist (Fill) Note: Groundwater at depth ~6'.
10		G	3	⊗	6.0 - 6.5	G	R	A	B	6		6.0'		
		G	4	⊗	7.5 - 8.0	G	R	A	B	6		122.1'	Brown SILT, little coarse to fine Gravel, little coarse to fine Sand, trace Clay, wet (ML)	
													Brown and grayish brown SILT, little coarse to fine Sand, trace Clay, wet (ML)	
												9.0'		
	S	1	■	9.7 - 9.9	50/2.5"					2.5	119.1'			
	C	1	▨	10.0 - 11.0	12	12	100	0.0	0		10.0'	Light gray, reddish brown and gray coarse to fine SAND, little Silt, very dense, moist (Decomposed Rock, SM)		
	C	2	▨	11.0 - 16.0	60	60	100	40.0	67		118.1'	Note: Auger refusal at 10.0', possible bedrock encountered.		
													Light gray, dark gray, reddish brown and white GRANITIC GNEISS; medium to fine grains of quartz, feldspar, biotite and minor garnet; close to very close fracture spacing; slightly weathered; medium strong.	
													Light gray, dark gray, reddish brown and white GRANITIC GNEISS with few quartz-feldspar bands up to 1.25" thick; medium to fine grains of quartz, feldspar, biotite and minor garnet; moderate to close	

Note:

Boring No. **S-P2-B8** Sheet **1** of **2**



BORING LOG

(continued)

BORING NUMBER: **S-P2-B8**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**

DRILLER: **J. Scribellito Jr.**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
20		1.7 1.7 2.2 1.5 2.5 2.5	C	3		16.0 - 21.0	60	54	90	34.0	57	fracture spacing; slightly weathered; strong to medium strong; except close to extremely close fracture spacing; moderately weathered; medium strong to weak at 11.00'-12.00' and 14.65'-14.90'. Light gray, dark gray, reddish brown and white GRANITIC GNEISS; medium to fine grains of quartz, feldspar, biotite and minor garnet; moderate to extremely close fracture spacing; slightly weathered; medium strong to weak; except completely weathered; extremely weak at 20.50'-20.60'. 20.10'-20.60': Assumed recovery loss.
25												107.1' (End of boring at 21 ft bgs)
30												

Note:

Boring No. **S-P2-B8** Sheet **2** of **2**



BORING LOG

BORING NUMBER: **TA-P2-1 OW**
 SHEET NUMBER: **1** of **2**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**
 CONTRACTOR: **FSD, Inc.**

LOCATION: **Prestman Street and N Monroe Street**
 COORD.: **N: 596,862.9 E: 1,411,991.1**
 SURFACE ELEV.: **172.1 feet**
 DATUM: **Horizontal: NAD 83/91**
Vertical: NAVD 88

DRILLER: **J. Scribellito Jr.**
 INSPECTOR: **L. Sepulveda**

START DATE: **7/12/16** TIME: **9:40 am**
 FINISH DATE: **7/14/16** TIME: **8:10 am**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
 RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S ■	NW	L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
I.D.	3.25"	1.375"	3.00"	n/a	3.25"	n/a	7/13/16	7:34 am	7.7	43.2	43.0
O.D.	7.25"	2"	3.50"	n/a	3.375"	n/a	7/14/16	7:30 am	2.7	43.2	119.5
Length	60"	24"	60"	n/a	6"	n/a	7/15/16	7:30 am	7.6	43.2	126.8
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
						0.0 - 0.3						0.0'	
						0.3' - 171.8'							4" Asphalt/Concrete Note: Hand excavated for utility clearance, depth 0.0'-10.5'
			G	1	☒	2.0 - 2.5	G	R	A	B	6		Light brown, gray and light gray medium to fine SAND, little Clayey Silt, trace medium to fine Gravel, moist (Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Light gray, gray, brown and black Silty CLAY, trace medium to fine Sand, trace Gravel (cinders), moist (Fill)
5			G	3	☒	6.0 - 6.5	G	R	A	B	6		Yellow-brown, gray and brown SILT (mica grains), little coarse to fine Sand, trace coarse to fine Gravel, moist; coarse to fine sand and gravel size mica grains (Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6		Dark gray coarse to fine GRAVEL and coarse to fine Sand, trace Silt, moist; slightly micaceous (Fill)
10			G	5	☒	10.0 - 10.5	G	R	A	B	6		Dark gray, brown and black coarse to fine GRAVEL (pure quartz and feldspar), little coarse to fine Sand, trace Clayey Silt, moist (Fill) Dark gray, brown medium to fine SAND and Clayey Silt, little coarse to fine Gravel; brick and plastic fragments, very loose, wet (Fill)
			S	1*	■	10.5 - 12.5	3	1	1	2	8		
			S	2*	■	14.0 - 16.0	4	2	2	1	20		Note: No recovery with 2" split spoon, sample recovered using 3" split spoon. Dark gray, brown and light brown medium to fine SAND and Clayey Silt, little coarse to fine Gravel, brick and plastic fragments, very loose, wet (Fill)
15													Note: No recovery with 2" split spoon, sample recovered using 3" split spoon.
			S	3*	■	19.0 - 21.0	3	4	5	6	16		Olive-green coarse to fine SAND (mica grains), some Silt, trace Clay, trace coarse Gravel, loose, moist

Note: * 3 inch spoon
 PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)



BORING LOG

(continued)

BORING NUMBER: **TA-P2-1 OW**
 SHEET NUMBER: **2** of **2**
 PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**

CONTRACTOR: **FSD, Inc.**
 DRILLER: **J. Scribellito Jr.**
 INSPECTOR: **L. Sepulveda**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4		24.0 - 26.0	7	8	8	13	14	(SM, Residual Soil) Note: 1" recovery with 2" split spoon, sample recovered using 3" split spoon. Note: Switched from Augers to Rotary Wash at depth 24.0'. Dark gray, green-gray and reddish brown coarse to fine SAND (predominantly mica grains), little Clayey Silt, medium dense, moist (SM, Residual Soil)
			S	5		28.0 - 30.0	7	8	10	15	10	Bluish-green and brown coarse to fine SAND (mica rich) and Silt, trace Clay, trace fine Gravel, very dense, moist (SM, Residual Soil)
			S	6		33.0 - 35.0	10	19	49	84	17	Green-gray and yellow-white coarse to fine SAND (mica rich), some Silt, very dense, moist (SM, Residual Soil)
			S	7		38.0 - 38.3	100/3"				2.5	Gray with speckles of white, medium to fine SAND (feldspar, quartz and garnet grains), some Silt, trace Clay, very dense, moist, no apparent foliation (SM, Decomposed Rock)
			S	8		43.0 - 43.1	70/1"				1	43.1' 129.0' Black with speckles of white coarse to fine SAND (predominantly mica), little Silt, very dense, moist (SM, Decomposed Rock) (Spoon refusal at 43.1 ft bgs, see Coring Log)

Note: * 3 inch spoon
 PP = Pocket Penetrometer field test reading, in tons per square foot (tsf)



BORING LOG

BORING NUMBER: **IVF-P3-4**

SHEET NUMBER: 1 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

LOCATION: **2205 Eutaw Place**

COORD.: **N: 599,014.0 E: 1,415,806.1**

SURFACE ELEV.: **186.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **1/16/18** TIME: **10:45 am**

FINISH DATE: **2/21/18** TIME: **8:15 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25	1.375"	3.0"	2.86	3.25"	n/a	2/14/18	7:52 am	17.0	39.0	39.0
Length	7.625	2"	3.5"	3	3.375"	n/a	2/15/18	7:49 am	16.5	49.0	80.0
Hammer Wt.	60	24"	60"	24	6"	n/a	2/20/18	9:45 am	17.5	49.0	125.0
Hammer Fall	n/a	140lbs	Drill Rod Size		A		2/21/18	7:50 am	16.0	49.0	160.2
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
												0.0'	
												0.4'	5" Asphalt; 8" Concrete
												188.7'	
			G	1	☒	2.0 - 2.5	G	R	A	B	6	185.0'	Note: Hand excavated for utility clearance, depth 0.0'-8.0'
													Brown Silty CLAY, trace medium to fine Sand, moist (CL, Fill)
5			G	2	☒	4.0 - 4.5	G	R	A	B	6		Brown Silty CLAY, trace medium to fine Sand, moist (CL, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6		Brown coarse to fine SAND, little Clayey Silt, moist (SM, Fill)
			G	4	☒	7.5 - 8.0	G	R	A	B	6		Brown coarse to fine SAND, little Clayey Silt, moist (SM, Fill)
			S	1	■	9.0 - 11.0	19	11	11	13	24	9.0'	
10												177.1'	Orange-brown coarse to fine SAND, little Silt, medium dense, dry (SM)
			S	2	■	14.0 - 16.0	3	2	2	3	14		Orange-brown coarse to fine SAND, little Silt, trace coarse to fine Gravel, very loose, wet (SM)
15													
			S	3	■	19.0 - 21.0	3	5	8	7	24		Orange-brown and tan coarse to fine SAND, little Silt, medium dense, wet (SM)

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P3-4**

SHEET NUMBER: **2** of **3**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4	24.0 - 26.0	8	6	2	12	11	24.0' 24.5' 162.1' 161.6'	24.00'-24.50': Tan and light brown coarse to fine Quartz GRAVEL, little coarse to fine Sand, trace Silt, loose, wet (GP) 24.50'-24.92': Light orange-brown and white coarse to fine SAND, little Silty Clay, trace coarse to fine Gravel, loose, dry (SC, Residual Soil)
			S	5	29.0 - 31.0	9	10	8	7	24	29.0' 157.1'	Orange and green-white, tan and yellow Clayey SILT, trace coarse to fine Gravel (mica and quartz), trace Sand, very stiff, dry, slightly micaceous (ML, Residual Soil); PP = 2.0 tsf
			S	6	34.0 - 36.0	5	6	7	7	24	34.0' 152.1'	White, gray and yellow-brown Silty CLAY, and coarse to fine Sand, stiff, dry, relict layering observed (CL, Residual Soil); PP = 2.0 tsf
			S	7	39.0 - 41.0	6	7	7	9	24		Light gray-white Silty CLAY, little coarse to fine Sand, stiff, dry (CL, Residual Soil); PP = 3.5 tsf
40			S	8	44.0 - 46.0	10	18	20	36	24	44.0' 142.1'	Dark green and light green-gray medium to fine SAND, and Silt, dense, dry, relict foliation observed

Note:



BORING LOG

BORING NUMBER: **JFW-1**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

LOCATION: **AMTRAK 1800 Falls Road;
Charles Interlock; 620' W from
storage shed**

COORD.: **N: 599,885.6 E: 1,418,833.1**

SURFACE ELEV.: **75.8 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/1/17** TIME: **12:30 pm**

FINISH DATE: **8/2/17** TIME: **11:38 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	n/a	n/a	3.25"	n/a	8/2/17	9:36 am	27.4	29.0	30.0
Length	6.625"	2"	n/a	n/a	3.375"	n/a					
Hammer Wt.	60"	24"	n/a	n/a	6"	n/a					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'		
			G	1	☒	2.0 - 2.5	G	R	A	B	6		Note: Hand excavated for utility clearance, depth 0.0'-7.5'
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Black, coarse to fine GRAVEL, and coarse to fine Sand, little Silt, dry (GM, Fill)
5			G	3	☒	6.0 - 6.5	G	R	A	B	6		Black, coarse to fine SAND, some coarse to fine Gravel, little Silt, moist (SM, Fill)
			G	4	☒	7.0 - 7.5	G	R	A	B	6		Black and tan, coarse to fine SAND, little coarse to fine Gravel, little Silt, moist (SM, Fill)
			S	1	■	8.0 - 10.0	4	1	2	2	8		Black and tan, coarse to fine SAND, little coarse to fine Gravel, little Silt, moist (SM, Fill) Black, gray, and light gray, coarse to fine GRAVEL, little coarse to fine Sand, trace Silt, very loose, dry (GP, Fill)
10													
			S	2	■	13.0 - 15.0	7	2	1	5	12		Light gray, medium to fine GRAVEL, and coarse to fine Sand, trace Silt, root fragments, very loose, dry (GP, Fill)
15													
			S	3	■	18.0 - 20.0	2	1	1	1	16		Black and gray, coarse to fine SAND, little medium to fine Gravel, trace Silt, very loose, dry (SP-SM, Fill)

Note:



BORING LOG

(continued)

BORING NUMBER: **JFW-1**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4	23.0 - 24.8	8	5	5	50/3"	21	S-4A: 23.0'-24.4': Black and brown, coarse to fine SAND, little Clayey Silt, little medium to fine Gravel, loose to medium dense, moist (SM, Fill) S-4B: 24.4'-24.8': Brown, gray, and white, coarse to fine GRAVEL, little coarse to fine Sand, trace Silt, loose to medium dense, moist (GP, Fill) S-5: Gray, coarse to fine GRAVEL, some coarse to fine Sand, trace Clayey Silt, medium dense, wet (GP, Fill)	
			S	5	25.0 - 27.0	5	8	13	24	14		
			S	6	28.0 - 28.0	50/0"				0		
30											27.5'	
											48.3'	
											No Recovery. Spoon refusal at 28' bgs.; start coring at 29' bgs. (Spoon refusal at 29 ft bgs, see Coring Log)	
35												
40												

Note:



BORING LOG

BORING NUMBER: **JFW-2**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

LOCATION: **AMTRAK 1800 Falls Road;
Charles Interlock; 103' E from
storage shed**

COORD.: **N: 599,616.1 E: 1,419,202.3**

SURFACE ELEV.: **69.9 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/2/17** TIME: **12:17 pm**

FINISH DATE: **8/3/17** TIME: **9:14 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	n/a	n/a	3.25"	n/a	8/3/17	8:45 am	19.9	30.0	50.0
Length	60"	24"	n/a	n/a	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'		
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	Note: Hand excavated for utility clearance, depth 0.0'-10.0'.	
			G	2	☒	4.0 - 4.5	G	R	A	B	6	Brown, tan, gray, coarse to fine SAND, some Silt, little coarse to fine Gravel, moist (SM, Fill)	
			G	3	☒	6.0 - 6.5	G	R	A	B	6	Tan, brown, yellow, Silty CLAY, some coarse to fine Sand, dry (CL, Fill)	
			G	4	☒	8.0 - 8.5	G	R	A	B	6	Tan, brown and orange, coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, dry (SC, Fill)	
10			G	5	☒	9.5 - 10.0	G	R	A	B	6	Black, coarse to fine SAND, and coarse to fine Gravel, trace Silt, dry, root fragments (SP-SM, Fill)	
			S	1	■	10.0 - 12.0	8	9	10	13	16	10.0' 59.9'	Black, coarse to fine SAND, and coarse to fine Gravel, trace Silt, dry, root fragments (SP-SM, Fill)
15												Orange brown and gray, coarse to fine GRAVEL, little coarse to fine Sand, trace Silty Clay, medium dense, dry, slightly micaceous (GP, Residual Soil)	
			S	2	■	13.0 - 15.0	4	8	7	6	14	12.5' 57.4'	Orange brown, coarse to fine SAND, little medium to fine Gravel, little Silt, medium dense, dry, slightly micaceous (SM, Residual Soil)
													16.5'
			S	3	■	18.0 - 20.0	3	9	3	9	17	53.4'	Orange brown, coarse to fine GRAVEL, and coarse to fine Sand, trace Silty Clay, medium dense, moist, slightly micaceous (GP, Residual Soil)

Note:



BORING LOG

(continued)

BORING NUMBER: **JFW-2**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	4		23.0 - 25.0	4	9	13	28	24	Dark brown and gray, GRAVEL, little coarse to fine Sand, trace Silt, medium dense, wet, slightly micaceous (GP, Decomposed Rock)	
			S	5		28.0 - 28.5	50/6"				6		Dark brown and gray, GRAVEL, little coarse to fine Sand, trace Silt, very dense, dry, slightly micaceous (GP, Decomposed Rock)
30			S	6		30.0 - 30.0	50/0"				0		30.0' 39.9' No recovery (Spoon refusal at 30 ft bgs, see Coring Log)
35													
40													

Note:



BORING LOG

BORING NUMBER: **JFW-3**
 SHEET NUMBER: 1 of 2
 PROJECT NUMBER: **185615A**
 LOCATION: **AMTRAK 1800 Falls Road; Charles Interlock; next to NE abutment of North Avenue bridge**
 COORD.: **N: 599,135.9 E: 1,419,646.6**
 SURFACE ELEV.: **64.4 feet**
 DATUM: **Horizontal: NAD 83/91 Vertical: NAVD 88**
 START DATE: **8/4/17** TIME: **1:00 pm**
 FINISH DATE: **8/10/17** TIME: **12:15 pm**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**
 CONTRACTOR: **E2CR, Inc.**
 DRILLER: **E. Hill**
 INSPECTOR: **B. Godfrey**
 DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**
 RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S ■	NW	L ■	G ☒	C ▤	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
I.D.	3.25"	1.375"	n/a	n/a	3.25"	n/a					
O.D.	6.625"	2"	n/a	n/a	3.375"	n/a					
Length	60"	24"	n/a	n/a	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1		2.0 - 2.5	G	R	A	B	6	Note: Hand excavated for utility clearance, depth 0.0'-8.0'
			G	2		4.0 - 4.5	G	R	A	B	6	Black, coarse to fine SAND, and coarse to fine Gravel (cinder), little Silt, moist (SM, Fill)
			G	3		6.0 - 6.5	G	R	A	B	6	Gray brown and gray, coarse to fine SAND, little medium to fine Gravel, little Silty Clay, moist (SC, Fill)
			G	4		7.5 - 8.0	G	R	A	B	6	Brown and orange, coarse to fine SAND, some medium to fine Gravel, little Silt, moist (SM, Fill)
10			S	1		8.0 - 8.3	G 50/3"	R	A	B	6 2	Brown, coarse to fine SAND, little medium to fine Gravel, little Silt, moist (SM, Fill) Gray, coarse to fine GRAVEL (boulder fragments), little Sand, trace Silt, very dense, dry (GM, Fill) Note: Rig chattering at ~8.0'-9.0'.
			S	2		13.0 - 15.0	4	2	1	1	8	Brown, black, CLAY, little coarse to fine Sand, trace fine Gravel, soft, moist (CL, Fill)
15												16.5'
			S	3		18.0 - 20.0	4	7	5	5	6	47.9'
												Tan, coarse to fine SAND, and Silt, medium dense, moist (SM, Residual Soil)

Note:

B&P BORING LOG (FINAL) B&P TUNNEL PH3.GPJ B&P TUNNEL - LIBRARY.GLB 3/14/22



BORING LOG

(continued)

BORING NUMBER: **JFW-3**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **B. Godfrey**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4		23.0 - 23.9	15	50/5"			10	Tan, coarse to fine SAND, some Silt, very dense, moist (SM, Residual Soil)
			S	5		26.5 - 26.7	50/2"				2	Light gray, tan, coarse to fine GRAVEL, little coarse to fine Sand, little Silt, very dense, moist (GM, Decomposed Rock) (Spoon refusal at 26.67 ft bgs, see Coring Log)
30												
35												
40												

Note:



BORING LOG

BORING NUMBER: **JFW-4**

SHEET NUMBER: **1** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **D-50, Truck Mounted, Automatic Hammer**

LOCATION: **AMTRAK 1800 Falls Road;
Charles Interlock; in front of
burned down structure**

COORD.: **N: 598,992.3 E: 1,419,725.2**

SURFACE ELEV.: **64.0 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/3/17** TIME: **10:30 am**

FINISH DATE: **8/3/17** TIME: **2:30 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	n/a	n/a	3.25"	n/a	8/3/17	11:00 am	13.3	13.0	13.0
Length	6.625"	2"	n/a	n/a	3.375"	n/a					
Hammer Wt.	60"	24"	n/a	n/a	6"	n/a					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	Note: Hand excavated for utility clearance, depth 0.0'-6.0' Tan, brown, black, coarse to fine GRAVEL, and coarse to fine Sand, little Silt, moist (GM, Fill) Tan, light brown, red, coarse to fine SAND, little Silt, little coarse to fine rounded to subrounded Gravel, moist (SM, Fill) Note: Assumed boulder from 4.5' to 6.0' below ground surface; difficult to drill. Tan, coarse to fine SAND, some Silt, little coarse to fine Gravel, moist (SM, Fill) Orange and tan, coarse to fine GRAVEL, and coarse to fine Sand, trace Silt, medium dense, dry (GP, Fill) No Recovery
			G	2	☒	4.0 - 4.5	G	R	A	B	6	
			G	3	☒	5.5 - 6.0	G	R	A	B	6	
			S	1	■	6.0 - 8.0	9	6	9	6	16	
			S	2	■	8.0 - 10.0	2	4	5	5	0	
10											11.5'	
												52.5'
			S	3	■	13.0 - 13.9	20	50/5"			11	13.3'
15											50.7'	
			S	4	■	18.0 - 20.0	2	2	3	4	10	S-3A: 13.0'-13.3': Orange brown and gray, coarse to fine SAND, little Clayey Silt, trace coarse to fine Gravel, very dense, dry (SM, Residual Soil) S-3B: 13.3'-13.9': Gray, coarse to fine Silty CLAY, and coarse to fine Sand, hard, wet (CL, Residual Soil)
												Gray and brown, coarse to fine Silty CLAY, and coarse to fine Sand, trace medium to fine Gravel, medium stiff, wet (CL, Residual Soil)

Note:



BORING LOG

(continued)

BORING NUMBER: **JFW-4**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	5		23.0 - 25.0	8	13	18	31	22	23.2' 40.8' S-5A: 23.0'-23.2': Gray and brown, coarse to fine Silty CLAY, and coarse to fine Sand, hard, wet (CL, Residual Soil) S-5B: 23.2'-24.8': Light gray and gray, coarse to fine SAND, little Silt, trace medium to fine Gravel, dense, dry, micaceous (SM, Decomposed Rock) Yellow gray and light gray, coarse to fine SAND, little Silt, trace fine Gravel, very dense, dry, micaceous (SM, Decomposed Rock) Yellow gray, light gray, and orange, coarse to fine SAND, little Silt, trace fine Gravel, very dense, dry, micaceous (SM, Decomposed Rock) No recovery (Spoon refusal at 34.3 ft bgs, see Coring Log)
30			S	6		28.0 - 28.9	20	50/5"			11	
			S	7		33.0 - 33.8	33	50/3"			9	
			S	8		33.8 - 33.8	50/0"				0	
35												
40												

Note:



BORING LOG

(continued)

BORING NUMBER: **SA-P3-1**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4		23.0 - 25.0	11	13	13	10	14	21.5' 137.1' Dark gray and orange-brown coarse to fine GRAVEL (pure quartz), little medium to fine Sand, little Silt, medium dense, moist (GM)
30			S	5		28.0 - 28.4	100/5"				5	26.5' 132.1' Gray and light gray with speckles of black medium to fine SAND, little Silt, very dense, moist (SM, Decomposed Rock)
35			S	6		33.0 - 33.1	100/1"				1	Gray and light gray with speckles of black medium to fine SAND, little Silt, very dense, moist (SM, Decomposed Rock)
40			S	7		37.5 - 37.5	100/0"				0	37.5' 121.1' No recovery, spoon refusal. (Spoon refusal at 37.5 ft bgs, see Coring Log)

Note:



BORING LOG

BORING NUMBER: SA-P3-3

SHEET NUMBER: 1 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Daniyarov

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted, Automatic Hammer

LOCATION: Alley of 1030 N. Payson Street

COORD.: N: 595,215.7 E: 1,411,524.5

SURFACE ELEV.: 160.0 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 1/10/18 TIME: 7:45 am

FINISH DATE: 1/11/18 TIME: 9:15 am

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.0"	2.86	3.25"	n/a	1/11/18	7:45 am	10.3	31.0	60.0
Length	60"	24"	60"	24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0'-2' Brick Fragments Note: Hand excavated for utility clearance, depth 0.0'-10'
			G	2	☒	4.0 - 4.5	G	R	A	B	6	Brown coarse to fine SAND, some coarse to fine Gravel, trace Silty Clay, brick fragments, dry (SP, Fill) Note: Timber fragments at 3.5' bgs. Brown and light gray coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, brick fragments and cinders, dry (SC, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6	Brown and light gray coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, brick fragments and cinders, moist (SC, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6	Brown, light gray and black coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, brick fragments and cinders, moist (SC, Fill)
10			S	1	■	10.0 - 12.0	3	1	2	2	11	Dark gray and black coarse to fine SAND, and coarse to fine Gravel, little Silty Clay, very loose, moist, brick, cinder, and glass fragments (SC, Fill)
15			S	2	■	14.0 - 16.0	3	WOH	1	1	1	Black and light gray medium to fine GRAVEL, little medium to fine Sand, trace Silt, very loose, wet, brick, cinder, wood and glass fragments (GP, Fill)
			S	3	■	19.0 - 21.0	WOH	1	3	1	1	Dark gray and black coarse to fine SAND, little medium to fine Gravel, little Silt, very loose, wet,

Note:



BORING LOG

(continued)

BORING NUMBER: SA-P3-3

SHEET NUMBER: 2 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Daniyarov

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
													cinder and brick fragments (SM, Fill)
			S	4		24.0 - 26.0	10	14	24	63	9	24.0'	
25												136.0'	Orange-brown and light orange-brown medium to fine SAND, some coarse to fine Quartz Gravel, some Silt, dense, dry, relict layering observed, slightly micaceous (SM, Residual Soil)
			S	5		29.0 - 29.2	100/2"				2		
30													
			S	6		31.0 - 31.0	100/0"					31.0'	Gray and light gray with speckles of black and dark red coarse to fine SAND, some coarse to fine Quartz Gravel, little Silt, very dense, wet, relict layering observed, slightly micaceous (SM, Decomposed Rock)
												129.0'	No recovery, spoon refusal. (Spoon refusal at 31 ft bgs, see Coring Log)
35													
40													

Note:



BORING LOG

BORING NUMBER: **S-P3-B12**

SHEET NUMBER: **1** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Daniyarov**

DRILLING METHOD: **Hollow Stem Augers; Diamond Coring.**

RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

LOCATION: **Across from 227 N. Warwick Ave.**

COORD.: **N: 591,824.1 E: 1,409,641.0**

SURFACE ELEV.: **113.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **9/21/17** TIME: **8:00 am**

FINISH DATE: **9/21/17** TIME: **12:22 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25"	1.375"	n/a	n/a	3.25"	n/a	9/21/17	8:30 am	14.0	14.0	14.0
Length	6.625"	2"	n/a	n/a	3.375"	n/a					
Hammer Wt.	60"	24"	n/a	n/a	6"	n/a					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'		
												1.2'	7" Asphalt; 7" Concrete
			G	1	☒	2.0 - 2.5	G	R	A	B	6	112.3'	Note: Hand excavated for utility clearance, depth 0.0'-4.0'
			G	2	☒	3.5 - 4.0	G	R	A	B	6	3.3'	Tan, green and orange coarse to fine SAND, some Silt, trace coarse to fine Gravel, moist (SM, Fill)
5			S	1	■	4.0 - 6.0	8	5	5	6	12	110.3'	Brown and black, coarse to fine SAND, some Silt, little coarse to fine Gravel (rock fragments), moist (SM, Residual Soil) Note: soft dig terminated at 4.0' bgs. - possible bedrock encountered Light orange-brown, tan and light gray coarse to fine SAND, little coarse to fine Gravel (rock fragments), little Silt, loose to medium dense, dry, relict layering observed (SM, Residual Soil)
10			S	2	■	9.0 - 11.0	4	5	6	7	10		Light orange-brown, tan and light gray coarse to fine SAND, little coarse to fine Gravel (rock fragments), little Silt, medium dense, dry, relict layering observed (SM, Residual Soil)
15			S	3	■	14.0 - 16.0	1	1	1	1	24		Brown and dark brown coarse to fine SAND, little Silt, trace medium to fine Gravel, very loose, wet (SM, Residual Soil)
			S	4	■	19.0 - 21.0	1	1	2	2	24	17.5'	
												96.0'	Dark gray Silty CLAY, soft, dry (CL, Residual Soil)

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P3-B12**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Daniyarov**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	5		24.0 - 24.8	21	100/4"			10	22.5' 91.0' Orange-brown and tan coarse to fine SAND, little Silt, trace fine Gravel, slightly micaceous, very dense, dry, relict layering observed (SM, Residual Soil)
			S	6		26.5 - 26.5	100/0"				0	26.5' 87.0' No recovery; spoon refusal; rock fragments in spoon tip (Spoon refusal at 26.5 ft bgs, see Coring Log)
30												
35												
40												

Note:



BORING LOG

BORING NUMBER: TA-P3-1

SHEET NUMBER: 1 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Daniyarov

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted, Automatic Hammer

LOCATION: NE corner of 2099 Mosher St.

COORD.: N: 595,079.5 E: 1,411,363.0

SURFACE ELEV.: 160.8 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 9/27/17 TIME: 10:15 am

FINISH DATE: 9/28/17 TIME: 10:25 am

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.0"	n/a	3.25"	n/a	9/28/17	8:09 am	10.2	30.5	50.0
Length	60"	24"	60"	n/a	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	0.0'-2.0': Dark gray and light gray coarse to fine GRAVEL, little coarse to fine Sand, little Silt, dry (GM, Fill) Note: 10" cobble at ~1.0' depth; Hand excavated for utility clearance, depth 0.0'-10.0' Dark gray coarse to fine SAND and coarse to fine Gravel (cinders), little Silt, dry (SM, Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6	Gray, black and orange-brown Silty CLAY and coarse to fine Sand, trace medium to fine, moist, slight organic odor (CL, Fill)
			G	3	☒	6.0 - 6.5	G	R	A	B	6	6.0'-6.3': Dark gray and light gray Silty CLAY, some coarse to fine Sand, little coarse to fine Gravel, dry (CL, Fill); 6.3'-6.5': White and light brown Silty CLAY, dry (CL, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6	Beige, orange-brown and black Silty CLAY, little coarse to fine Sand, dry (CL, Fill)
			G	5	☒	9.5 - 10.0	G	R	A	B	6	Brown coarse to fine SAND, little Silty Clay, trace coarse to fine Gravel, wet (SC, Fill)
10			S	1	☒	10.0 - 12.0	1	1	1	2	19	10.0'-11.5': Black coarse to fine SAND, little Silt, very loose, wet (SM, Fill); 11.5'-12.0': Brown coarse to fine SAND, little Silt, very loose, wet, relict layering observed (SM, Fill)
15			S	2	☒	14.0 - 16.0	1	1	2	1	4	Black and white coarse to fine GRAVEL, little Silty Clay, little coarse to fine Sand, wood fragments and screw, very loose, wet (SM, Fill)
			S	3	☒	19.0 - 19.8	8	100/3"			9	19.0'-19.2': Black and white coarse to fine GRAVEL, little Silty Clay, little coarse to fine Sand, very dense,

Note:



BORING LOG

(continued)

BORING NUMBER: TA-P3-1

SHEET NUMBER: 2 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Daniyarov

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	4		24.0 - 24.8	12	100/4"			7	dry (SM, Fill) 19.2'-19.8': Gray and orange-brown coarse to fine SAND, little Silt, very dense, dry, relict layering observed (SM, Decomposed Rock)	
30			S	5		29.0 - 29.2	100/2"				2	Orange, light orange and light gray coarse to fine SAND, some Silt, little coarse to fine Gravel (rock fragments), very dense, dry, relict layering observed (SM, Decomposed Rock)	
30.5'			S	6		30.5 - 30.5	100/0"				0	Gray with speckles of black coarse to fine SAND, some coarse to fine Gravel, little Silt, very dense, dry (SM, Decomposed Rock)	
130.3'													No recovery, spoon refusal. Material from the spoon tip: Light gray, gray and white with speckles of black coarse to fine SAND and medium to fine Gravel, little silt, very dense, dry (SM, Decomposed Rock) (Spoon refusal at 30.5 ft bgs, see Coring Log)
35													
40													

Note:



BORING LOG

BORING NUMBER: TA-P3-3

SHEET NUMBER: 1 of 1

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Daniyarov

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted, Automatic Hammer

LOCATION: MTA Maryland, Central Light Rail Operations

COORD.: N: 599,979.6 E: 1,418,398.4

SURFACE ELEV.: 100.7 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 11/27/17 TIME: 8:00 am

FINISH DATE: 11/29/17 TIME: 11:40 am

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.0"	n/a	3.25"	n/a	11/28/17	7:38 am	19.4	10.5	45.0
Length	7.625"	2"	3.5"	n/a	3.375"	n/a	11/29/17	11:40 am	19.4	10.5	115.0
Hammer Wt.	60"	24"	60"	n/a	6"	n/a					
Hammer Fall	n/a	140lbs	Drill Rod Size		A						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
											0.0'			
5			G	1		2.0 - 2.5	G	R	A	B	6		Note: Hand excavated for utility clearance, depth 0.0'-6.5'	
			G	1		4.0 - 4.5	G	R	A	B	6		Brown and tan, coarse to fine SAND, and coarse to fine Gravel, little Silt, moist (SM, Fill)	
			G	2		6.0 - 6.5	G	R	A	B	6		Note: utility encountered at 3' bgs; offset boring north. Tan and orange, coarse to fine SAND, little coarse to fine Gravel, little Silt, moist (SM, Fill)	
			S	1		7.0 - 8.3	40	32	100/4"		16	6.8'	Tan and orange, coarse to fine SAND, some coarse to fine Gravel, little Silt, moist (SM, Fill)	
			S	2		9.0 - 9.0	100/0"					0	94.0'	Note: Soft dig terminated at 6.5' bgs due to dense, natural, material encountered.
10												9.0'	Gray, tan and orange-brown with speckles of black medium to fine SAND, little Silt, trace fine Gravel, very dense, dry, relict layering observed (SM, Decomposed Rock)	
15												91.7'	Note: rig chattering at ~7.5-9.0'.	
													10.5'	Note: spoon refusal at 9.0'. Material from the tip: Brown, white and gray coarse to fine GRAVEL, little medium to fine Sand, little Silt, very dense, dry, rock fragments (GM, Decomposed Rock)
													90.2'	Note: advance casing to 10.5' bgs.
														(Casing refusal at 10.5 ft bgs, see Coring Log)

Note:



BORING LOG

BORING NUMBER: **T-P3-1**

SHEET NUMBER: **1** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **B. Godfrey**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **D-50, Truck Mounted, Automatic Hammer**

LOCATION: **Riggs Avenue and N. Payson Street**

COORD.: **N: 595,438.7 E: 1,411,541.8**

SURFACE ELEV.: **162.3 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **2/8/18** TIME: **8:30 am**

FINISH DATE: **2/8/18** TIME: **2:40 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■	NW	L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	4.25"	1.375"	3.0"	n/a	3.25"	n/a	2/9/18	8:00 am	13.1	33.0	85.0
Length	60"	24"	60"	n/a	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		A						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'		
			G	1	☒	2.0 - 2.5	G	R	A	B	6		Note: Hand excavated for utility clearance, depth 0.0'-8.5'
			G	2	☒	4.0 - 4.5	G	R	A	B	6		Black, white, tan, coarse to fine SAND, some Silty Clay, trace medium to fine Gravel, moist (SM, Fill)
5			G	3	☒	6.0 - 6.5	G	R	A	B	6		Black, white, tan, coarse to fine SAND, some Silty Clay, little coarse to fine Gravel, moist (SM, Fill)
			G	4	☒	7.5 - 8.0	G	R	A	B	6		Orange-tan, brown, coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, moist (SM, Fill)
			S	1	■	8.0 - 10.0	G 2	R 2	A 1	B 2	6 0		Black, white, orange, coarse to fine SAND, some coarse to fine Gravel, little Silty Clay, trace glass fragments, moist (SM, Fill) No recovery; piece of gravel and glass in spoon tip (Fill)
10													
			S	2	■	13.0 - 15.0	1	1	1	2	13		Brown, coarse to fine SAND, and Silty Clay, trace coarse to fine Gravel, very loose, wet, trace roots (SM, Fill)
15													
			S	3	■	18.0 - 20.0	4	4	7	6	15		Brown, black, red, coarse to fine SAND, some coarse to fine Gravel, little Silt, medium dense, wet (SM, Fill)

Note:



BORING LOG

(continued)

BORING NUMBER: **T-P3-1**

SHEET NUMBER: 2 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **B. Godfrey**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	4		23.0 - 25.0	5	3	5	6	14	23.0'	
												139.3'	Red-brown, gray, SILT, some medium to fine Sand, medium stiff, moist, relict layering (MH, Residual Soil)
30			S	5		28.0 - 30.0	18	28	57	50	17	28.0'	
												134.3'	Dark gray, streaks of orange, medium to fine SAND, some Clayey Silt, very dense, moist, relict layering (SM, Decomposed Rock)
			S	6		33.0 - 33.0	100	0.5"			0		Dark gray, streaks of orange, medium to fine SAND, and Clayey Silt, very dense, moist, relict layering (SM, Decomposed Rock) (Spoon refusal at 33.1 ft bgs, see Coring Log)
35													
40													

Note:



BORING LOG

BORING NUMBER: SA-P4-01

SHEET NUMBER: 1 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Fragoso

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: D-50

LOCATION: 2020 Mosher St

COORD.: N: 594,950.7 E: 1,411,219.8

SURFACE ELEV.: 161.9 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 7/19/18 TIME: 10:30 am

FINISH DATE: 7/23/18 TIME: 3:00 pm

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S		L	G	C	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	7/18/18	1:45 pm	9.6	0.0	10.0
Length	6.625	2"	3.5"	3	3.375"	n/a	7/20/18	7:30 am	9.4	25.5	45.5
Hammer Wt.	60	24"	60"	24	6"	n/a	7/23/18	7:48 am	7.2	-	86.0
Hammer Fall	n/a	140lbs	Drill Rod Size		"A"						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1	2.0 - 2.5	G	R	A	B	6	0.8' 9" asphalt	
			G	2	4.0 - 4.5	G	R	A	B	6	161.2'	
			G	3	6.0 - 6.5	G	R	A	B	6	Orange, brown coarse to fine SAND, and Silty Clay, trace coarse to fine Gravel, moist (SC, Fill)	
			G	4	8.0 - 8.5	G	R	A	B	6	Red-brown coarse to fine SAND, and Silty Clay, trace coarse to fine Gravel, moist (SC, Fill)	
			G	5	9.0 - 9.5	G	R	A	B	6	6.0'	
10		S	1	10.0 - 12.0	7	4	7	8	17	155.9'	Orange, light brown, and white coarse to fine SAND, some Silt & Clay, trace coarse to fine Gravel, moist, (SM)	
											Green-gray, and tan medium to fine SAND, and Clayey Silt, moist (SM)	
											Orange, and tan coarse to fine SAND, some Silt & Clay, trace coarse to fine Gravel, moist (SM)	
15		S	2	14.0 - 16.0	7	11	9	10	19	10.0'	151.9'	
											Brown, orange, gray, white coarse to fine SAND, some Silty Clay, little coarse to fine Gravel, medium dense, moist (SC, Residual)	
											14.0'	
											147.9'	
			S	3	19.0 - 21.0	5	5	13	15	24	Note: falling head test at 14' 14'-15': Orange, white and brown coarse to fine SAND, and Clayey Silt, little coarse Gravel, medium dense, moist (SM, Residual) 15'-16': Brown, orange coarse to fine SAND, some Clayey Silt, medium dense, moist (SM, Residual)	
											Green-gray coarse to fine SAND, some Clayey Silt, medium dense, moist, micaceous (SM, Residual)	

Note:



BORING LOG

(continued)

BORING NUMBER: SA-P4-01

SHEET NUMBER: 2 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Fragoso

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	4		24.0 - 24.1	75/1"					1	Note: falling head test at 24' Gray and white coarse to fine SAND, and Clayey Silt, little fine Gravel, very dense, moist (SM, Decomposed Rock) (Spoon refusal at 25.5 ft bgs, see Coring Log)
30													
35													
40													

Note:



BORING LOG

BORING NUMBER: SA-P4-02

SHEET NUMBER: 1 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Fragoso

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: D-50

LOCATION: Inside 2020 Mosher St property (NE corner)

COORD.: N: 595,176.0 E: 1,411,347.8

SURFACE ELEV.: 160.6 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 7/26/18 TIME: 8:00 am

FINISH DATE: 7/27/18 TIME: 1:30 pm

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	7/27/18	10:00 am	7.8	-	65.8
Length	6.625	2"	3.5"	3	3.375"	n/a	7/30/18	7:30 am	7.7	-	86.1
Hammer Wt.	60	24"	60"	24	6"	n/a	7/31/18	7:50 am	7.4	-	86.1
Hammer Fall	n/a	140lbs	Drill Rod Size		"A"						
	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1		2.0 - 2.5	G	R	A	B	6	Brown, tan, and beige coarse to fine SAND, and Clayey Silt, some coarse to fine Gravel, moist, trace glass (SM, Fill)
			G	2		4.0 - 4.5	G	R	A	B	6	Brown, black, tan coarse to fine SAND, and medium to fine Gravel, some Clayey Silt, wet, trace glass (SM, Fill)
			G	3		6.0 - 6.5	G	R	A	B	6	Brown, tan, orange Clayey SILT, some coarse to fine Sand, little coarse to fine Gravel, wet (SM, Fill)
			G	4		8.0 - 8.5	G	R	A	B	6	Brown, black Clayey SILT, some fine to coarse Sand, little fine to coarse Gravel, wet, trace oranges (SM, Fill)
10			S	1		9.0 - 11.0	2	7	7	3	18	Dark brown, black, tan Clayey SILT, some coarse to fine Sand, little coarse to fine Gravel, stiff, wet (ML, Fill)
			S	2		14.0 - 16.0	WOH	WOH	WOH	WOH	7	Tan Clayey SILT, little coarse to fine Sand, very soft, wet (ML, Fill)
15			S	3		19.0 - 21.0	6	11	40	53	19	
												19.0'
												141.6'

Note:



BORING LOG

(continued)

BORING NUMBER: SA-P4-02

SHEET NUMBER: 2 of 2

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: S. Lyons

INSPECTOR: A. Fragoso

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS			
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)				
							CORING								
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %				
25			S	4		24.0 - 24.2	100/2"					2	24.0'	Brown, orange, gray coarse to fine SAND, some Silt & Clay, little fine Gravel, very dense, wet (SM, Residual)	
														136.6'	Gray, black, tan coarse to fine GRAVEL, little Clayey Silt, trace fine Sand, wet (GM, Decomposed rock)
			S	5		29.0 - 29.2	100/2"						2	29.8'	Gray coarse to fine GRAVEL, little coarse to fine Sand, trace Clayey Silt, very dense, wet (GM, Decomposed rock)
30													130.8'	(Spoon refusal at 29.8 ft bgs, see Coring Log)	
35															
40															

Note:



BORING LOG

BORING NUMBER: **S-P4-01**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **B. Godfrey**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-55, Truck**

LOCATION: **N. Pulaski St**

COORD.: **N: 594,537.2 E: 1,411,220.9**

SURFACE ELEV.: **155.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/14/18** TIME: **8:00 am**

FINISH DATE: **8/14/18** TIME: **12:15 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S ■		L ■	G ☒	C ■			Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
I.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	Date	Time			
O.D.	6.625	2"	3.5"	3	3.375"	n/a	8/14/18	10:38 am	20.6	24.0	24.0
Length	60	24"		24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
											0.0'			
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	Orange, brown coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM, FILL)		
			G	2	☒	4.0 - 4.5	G	R	A	B	6	Orange, brown coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM, FILL)		
			G	3	☒	6.0 - 6.5	G	R	A	B	6	Orange, brown coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM, FILL)		
10			G	3	☒	8.0 - 8.5	G	R	A	B	6	8.0'		
			S	1	■	9.0 - 11.0	3	3	6	12	24	147.1' 9.0'	Greenish gray, brown coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM)	
													146.1'	Tan orange-brown coarse to fine SAND, little Gravel (quartz pieces), some Clay, loose, moist (SC)
			S	2	■	14.0 - 16.0	5	6	8	11	24		Bands of tan and orange medium to fine SAND, some Silty Clay, medium dense, moist (SC)	
15			S	3	■	19.0 - 21.0	32	57	27	39	24	19.0'		
													136.1'	Tan, red-brown orange medium to fine SAND, little Silt & Clay, very dense, moist, relict layering.

Note:



CORING LOG

BORING NUMBER: S-P4-03

SHEET NUMBER: 1 of 1

PROJECT NUMBER: 185615A

PROJECT: B&P Tunnel Replacement Project

LOCATION: Baltimore, MD

CLIENT: AMTRAK

CONTRACTOR: E2CR, Inc.

DRILLER: Darrel

INSPECTOR: B. Godfrey

DRILLING METHOD: Hollow Stem Augers; Rotary Wash; Diamond Coring.

RIG TYPE: CME-55, Truck Mounted, Automatic Hammer

LOCATION: In front of 2124 Edmonson Ave

COORD.: N: 593,226.2 E: 1,410,991.4

SURFACE ELEV. 165.8 feet

DATUM: Horizontal: NAD 83/91

Vertical: NAVD 88

START DATE: 7/31/18 TIME: 8:45 am

FINISH DATE: 7/31/18 TIME: 3:50 pm

CORE BARREL DATA:

NOTES:

TYPE: Double Tube/ Swivel

Structure boring, discontinuity data is not obtained

CORE SIZE: NQ2

O.D.: 2.980

I.D.: 1.875

AUGER SIZE I.D. (O.D.): 3.25 (6.625)

CASING SIZE I.D. (O.D.): 3.0" (3.5")

GROUNDWATER DATA

Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
7/31/18	11:13 am	26.7	-	51.0

DEPTH (feet)	GRAPHIC LOG	CORING RATE (min/ft)	CORE RUN NO. AND DEPTH (ft)	RECOVERY (in)	RECOVERY (%)	RQD (%)	DESCRIPTION AND REMARKS (Color, Lithology, Grain Size, Fracturing, Weathering, Strength, Structure)	WEATHERING	STRENGTH	DISCONTINUITY DATA			
										ANGLE (deg)	Jr	Ja	DEPTH (feet)
51.00'-51.70'			C-1 51.0 - 54.6	35	80	72	51.00'-51.70': Assume recovery loss 51.70'-54.60': Light gray, gray, white, tan with speckles of black amphibole GNEISS; medium to fine grains of amphibole, quartz, feldspar, minor mica and garnet; close to extremely close fracture spacing; slightly to moderately weathered; medium strong; banding dips ~20-25°	II/III	R3				
54.60'-57.30'		2.7	C-2 54.6 - 59.6	54	90	32	57.30'-57.80': Assume recovery loss; completely weathered; extremely weak Light gray, gray, white, tan with speckles of black amphibole GNEISS; medium to fine grains of amphibole, quartz, feldspar, minor mica and garnet; close to extremely close fracture spacing; slightly to moderately weathered; medium strong; banding dips ~20-25° Few feldspar bands less than 0.5" thick	II/III	R3				
57.30'-59.60'		2.7											
59.60'-60.67'		2.7						V	R0				
60.67'-61.00'		2.7											
61.00'-61.67'		2.7	C-3 59.6 - 61.0	13	76	0	60.67'-61.00': Assume recovery loss; completely weathered; extremely weak Light gray, gray, white, tan with speckles of black amphibole GNEISS; medium to fine grains of amphibole, quartz, feldspar, and minor mica; close to extremely close fracture spacing; slightly to moderately weathered; medium strong; banding dips ~20-25° End of Boring at 61 ft bgs.	II/III	R3				
61.67'-65.00'								V	R0				

Note: * foliation joint

Boring No. S-P4-03 Sheet 1 of 1



BORING LOG

BORING NUMBER: **S-P4-04**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Fragoso**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **D-50**

LOCATION: **In front of 2135 Edmonson Ave**

COORD.: **N: 593,173.6 E: 1,410,997.0**

SURFACE ELEV.: **166.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **7/17/18** TIME: **2:00 pm**

FINISH DATE: **7/18/18** TIME: **11:53 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	7/18/18	8:45 am	36.0	-	45.0
Length	60	24"		24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
											0.8'	9" Asphalt
											165.3'	
			G	1	☒	2.0 - 2.5	G	R	A	B	6	Brown, black, tan, coarse to fine SAND, some coarse to fine Gravel, little Clayey Silt, moist (SM, Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6	Brown CLAY & SILT, some coarse to fine Sand, little coarse to fine Gravel, moist, trace brick fragments (CL, Fill)
5			G	3	☒	6.0 - 6.5	G	R	A	B	6	Brown, tan, white, coarse to fine SAND, some Clay & Silt, trace coarse to fine Gravel, moist (SC, Fill)
			G	4	☒	8.0 - 8.5	G	R	A	B	6	Brown, tan, white, coarse to fine SAND, some Clay & Silt, trace coarse to fine Gravel, moist (SC, Fill)
			S	1	■	9.0 - 11.0	2	WOH	1	1	16	End soft dig at 8.5' Brown, gray Clayey SILT, trace fine to medium Sand, trace coarse Gravel, very soft, moist (ML, Fill)
10												
			S	2	■	14.0 - 16.0	1	2	2	2	13	Brown corase to fine SAND, some Clayey Silt, trace coarse to fine Gravel, moist, soft, little brick fragments (ML, Fill)
15												
			S	3	■	19.0 - 21.0	1	2	2	2	14	Brown, gray Clayey SILT, some coarse to fine Sand, some coarse to fine Gravel, soft, moist, little brick

Note:



BORING LOG

(continued)

BORING NUMBER: **S-P4-04**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

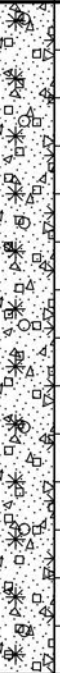
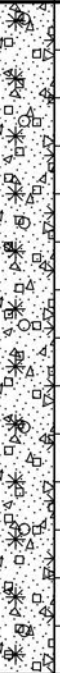
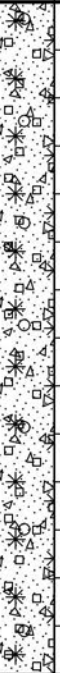
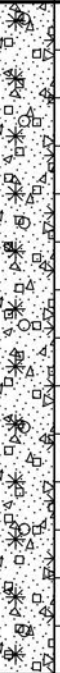
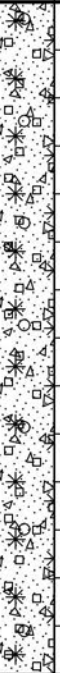
LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Frago**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
25			S	4	                       	24.0 - 26.0	2	1	2	3	20	(ML, Fill) Black, gray coarse to fine SAND, some Silt, little coarse to fine Gravel, soft, moist, trace burnt fragments (SM, Fill)
30			S	5	               	29.0 - 31.0	2	2	2	2	23	Brown, gray Clayey SILT, some coarse to fine Sand, little coarse Gravel, soft, moist, trace burnt fragments (ML, Fill)
35	 		S	6	          	34.0 - 36.0	WOH	WOH	WOH	29	20	34.0' 132.1' Brown Silty CLAY, trace fine Sand, very soft, moist (CL)
40	 		S	7	     	39.8 - 40.5	6	50/3"			9	39.0' 127.1' Brown, orange, gray coarse to fine SAND, little Clayey Silt, little coarse to fine Gravel, very dense, moist (SM, decomposed rock)
	 		S	8	 	44.0 - 44.3	50/4"				4	45.0' Brown, orange, gray coarse to fine SAND, little Clayey Silt, little coarse to fine Gravel, very dense, moist (SM, decomposed rock)

Note:

(Auger refusal at 45 ft bgs, see Coring Log)



BORING LOG

BORING NUMBER: **S-P4-05a**

SHEET NUMBER: 1 of 1

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Fragoso**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

LOCATION: **MARC West Baltimore Transfer Center on Franklin St**

COORD.: **N: 592,706.1 E: 1,410,643.4**

SURFACE ELEV.: **125.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/17/18** TIME: **12:30 pm**

FINISH DATE: **8/20/18** TIME: **11:22 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	8/20/18	9:45 am	3.5	-	20.4
Length	60	24"		24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
												0.0'	
												0.4'	5" Asphalt; 8" concrete
												124.7'	
												124.0'	
			G	1	⊗	2.0 - 2.5	G	R	A	B	6		Brown, gray Clayey SILT, and coarse to fine Sand, trace coarse to fine Gravel (ML)
													Very dense material, begin rock coring at 7.1 feet.
5													

Note:



BORING LOG

BORING NUMBER: **S-P4-06 OW**
 SHEET NUMBER: 1 of 2
 PROJECT NUMBER: **185615A**
 LOCATION: **MARC southbound entrance, on W Franklin St**
 COORD.: **N: 592,692.0 E: 1,410,402.9**
 SURFACE ELEV.: **128.8 feet**
 DATUM: **Horizontal: NAD 83/91**
Vertical: NAVD 88
 START DATE: **8/1/18** TIME: **9:00 am**
 FINISH DATE: **8/1/18** TIME: **12:30 pm**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**
 CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**
 INSPECTOR: **B. Godfrey**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
 RIG TYPE: **CME-55, Truck Mounted**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ▨	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	8/1/18	10:45 am	8.9	-	23.0
Length	60	24"	60"	24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
												0.0'	
												0.8'	9" asphalt; 9" concrete
												128.0'	
			G	1	☒	2.0 - 2.5	G	R	A	B	6	127.3'	Dark gray coarse to fine SAND, some coarse to fine Gravel, little Clayey Silt, moist (SM, FILL)
			G	2	☒	4.0 - 4.5	G	R	A	B	6	4.0'	
5			G	3	☒	5.5 - 6.0	G	R	A	B	6	124.8'	Tan, orange, and brown coarse to fine SAND, some Clayey Silt, moist (SM)
													Tan, orange, and brown SILT & CLAY, some coarse to fine Sand, wet (ML)
			S	1	■	8.0 - 10.0	9	7	9	9	19		Note: Terminate soft dig at 6' Note: Water on spoon at 8' Tan, brown, and red coarse to fine SAND, some Clayey Silt, little coarse to fine Gravel, medium dense, moist (SM)
10													
			S	2	■	13.5 - 15.0	25	32	34		18		Tan, orange, and red coarse to fine SAND, and Clayey Silt, trace fine Gravel, very dense, moist, relict layering (SM, Residual)
15													
			S	3	■	18.5 - 19.8	74	69	100/4"		16		Tan, orange, and red coarse to fine SAND, some Clayey Silt, very dense, moist, relict layering, micaceous (SM, Decomposed Rock)
			S	4	■	19.8 - 20.1	100/3"				3		

Note:



BORING LOG

BORING NUMBER: **S-P4-07**

SHEET NUMBER: 1 of 1

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **Joey**

INSPECTOR: **A. Fragoso**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

LOCATION: **On W. Franklin St, approx. 40 ft E of building #2335**

COORD.: **N: 592,556.4 E: 1,410,211.1**

SURFACE ELEV.: **132.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/15/18** TIME: **10:30 am**

FINISH DATE: **8/15/18** TIME: **2:40 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ▤	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	8/15/18	1:00 pm	14.0	-	14.0
Length	60	24"	60"	24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
							CORING																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
											0.0'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
5												0.3'	4" Asphalt; 7" concrete																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
													0.3'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
													131.9'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		G	1		2.0 - 2.5	G	R	A	B	6					Brown, orange, gray and white coarse to fine SAND and Clayey Silt, trace fine Gravel, moist (SM, Fill)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		G	2		4.0 - 4.5	G	R	A	B	6				4.0'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
10		G	3		6.0 - 6.5	G	R	A	B	6			128.5'	Gray, green-gray coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		G	4		8.0 - 8.5	G	R	A	B	6					Gray, green-gray coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
		S	1		9.0 - 11.0	4	7	9	11	24			9.0'	Dark, gray-green coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
													123.5'																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
15																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		S	2		14.0 - 16.0	13	25	33	60	20			14.0'		Green-gray Clayey SILT, and coarse to fine Sand, very stiff, moist, micaceous (ML, Residual)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
													118.5'	Green-gray coarse to fine SAND, little Clayey Silt, very dense, moist (SM, Decomposed Rock)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

Note:



BORING LOG

BORING NUMBER: **UT-02**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Fragoso**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **D-50**

LOCATION: **Behind 700 N. Pulaski St building**

COORD.: **N: 593,774.1 E: 1,411,034.7**

SURFACE ELEV.: **153.1 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/28/18** TIME: **12:10 pm**

FINISH DATE: **8/29/18** TIME: **11:33 am**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	8/29/18	8:45 am	13.6	-	26.0
Length	60	24"		24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE		SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18		18/24	REC. (in.)
							CORING					
							RUN (in.)	REC. (in.)	REC. %		L>4" (in.)	RQD %
											0.0'	
5			G		2.0 - 2.5	G	R	A	B	6	Brown coarse to fine SAND, little coarse to fine Gravel, little Clayey Silt, dry (SM, Fill)	
		G		4.0 - 4.5	G	R	A	B	6	Brown coarse to fine GRAVEL, some Clayey Silt, little coarse to fine Sand, dry (GM, Fill)		
10			S	1	9.0 - 11.0	2	4	5	7	11	Brown, gray, black coarse to fine SAND, and Clayey Silt, little coarse to fine Gravel, loose, moist, trace brick fragments (SM, Fill)	
			S	2	14.0 - 16.0	2	2	2	1	7	14.0'	
15											139.1'	Dark gray coarse to fine GRAVEL, some Clayey Silt, little coarse to fine Sand, very loose, wet (GM)
			S	3	19.0 - 21.0	2	2	3	4	2	19.0'	
											134.1'	Dark gray coarse to fine SAND, and Clayey Silt, little coarse to fine Gravel, loose, moist (SM)

Note:



BORING LOG

(continued)

BORING NUMBER: **UT-02**

SHEET NUMBER: **2** of **2**

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **A. Fragoso**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
25			S	4		24.0 - 26.0	3	6	7	7	14	24.0'	
												129.1'	Tan, orange, coarse to fine SAND, and Clayey Silt, medium dense, moist (SM, Residual)
													Falling head test at 26 ft.
30			S	5		29.0 - 30.3	10	34	100/4"			14	
													Tan, orange, coarse to fine SAND, and Clayey Silt, very dense, moist (SM, Decomposed rock)
35			S	6		34.0 - 34.4	100/5"					4	
													Orange, brown, black coarse to fine SAND, little Clayey Silt, trace fine Gravel, very dense, dry (SM, Decomposed rock)
40			S	7		39.0 - 39.1	100/1"					1	40.0'
													113.1'
													Orange, brown, black coarse to fine SAND, little Clayey Silt, trace fine Gravel, very dense, dry (SM, Decomposed rock)
													(Auger refusal at 40 ft bgs, see Coring Log)

Note:



BORING LOG

BORING NUMBER: **UT-05**

SHEET NUMBER: 1 of 2

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **E. Hill**

INSPECTOR: **A. Fragoso**

DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**

RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

LOCATION: **NE Corner of Mosher and N. Payson Sts.**

COORD.: **N: 595,026.7 E: 1,411,593.4**

SURFACE ELEV.: **158.5 feet**

DATUM: **Horizontal: NAD 83/91**

Vertical: NAVD 88

START DATE: **8/15/18** TIME: **11:30 am**

FINISH DATE: **8/15/18** TIME: **3:00 pm**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
I.D.	HSA	S ■		L ■	G ☒	C ■	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
O.D.	3.25	1.375"	3.0"	2.86	3.25"	n/a	8/15/18	10:00 am	10.1	-	26.0
Length	60	24"		24	6"	n/a					
Hammer Wt.	n/a	140lbs	Drill Rod Size		"A"						
Hammer Fall	n/a	30"	I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
											0.0'		
5			G	1		2.0 - 2.5	G	R	A	B	6	Tan and brown coarse to fine SAND, some coarse to fine Gravel, little Clayey Silt, dry (SM, Fill)	
			G	2		4.0 - 4.5	G	R	A	B	6	Tan and brown coarse to fine SAND and coarse to fine Gravel, little Clayey Silt, dry (SM, Fill)	
			G	3		6.0 - 6.5	G	R	A	B	6	Brown coarse to fine SAND, some coarse to fine Gravel, little Clay & Silt, dry, trace coal (SM, Fill)	
10			S	1		9.0 - 11.0	2	1	1	3	8.5	Orange, brown, black coarse to fine SAND, some coarse to fine Gravel (large brick fragments, 1" in diameter), some Clay & Silt, very loose, moist (SC, Fill)	
			S	2		14.0 - 16.0	WOH	WOH	2	2	16	14.0'	
15												144.5'	Light gray, orange, dark brown, dark gray Clayey SILT, little Sand, very soft, moist (ML)
			S	3		19.0 - 21.0	1	3	9	6	12	19.0'	139.5'

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P5-6**

SHEET NUMBER: 2 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **G. Hanger**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
			S	3		20.0 - 22.0	6	4	4	5	22	Brown, light brown, tan, and dark gray coarse to fine SAND, and medium to fine Gravel, little Silt, wet (SW-SM)
25			S	4		25.0 - 27.0	7	12	14	13	0	No recovery
30			S	5		30.0 - 32.0	5	7	8	5	24	Top 18": Brown, dark brown, tan, and gray medium to fine SAND, some medium to fine Gravel, some CLAY & SILT pockets, moist (SM) Bottom 6": White, tan, light brown with bands of yellow fine SAND and Clayey Silt, trace fine Gravel, relict banding present, micaceous, moist (SM, residual)
35			S	6		35.0 - 37.0	16	15	11	9	24	Light gray, dark gray, interlayered with brown and orange-brown SILT, some fine Sand, relict banding present, micaceous, moist (ML, residual)
40			S	7		40.0 - 42.0	22	19	18	24	16	Dark orange-brown, dark brown, and tan medium to fine SAND, little Silt & Clay, trace fine Gravel, relict banding present, micaceous, moist (SM, residual)

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P5-6**

SHEET NUMBER: 3 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **G. Hanger**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
			S	8		45.0 - 47.0	8	9	13	18	24	White and light blue-gray fine SAND, little Silt, micaceous, moist (SM, Residual)		
50			S	9		50.0 - 52.0	9	12	14	20	24	Light green-gray, white, and green-gray fine SAND, little Silt, micaceous, moist (SM, Residual)		
55			S	10		55.0 - 55.2	100/2"					2	Green-gray, light green-gray with speckles of black medium to fine SAND, trace Silt, relict banding present, moist (SM, decomposed rock)	
			S	11		58.0 - 58.1	100/1"					1	58.1'	
60													118.2'	Light green-gray, gray with speckles of black medium to fine SAND, trace Silt, moist (SM, decomposed rock) (Spoon Refusal at 58.1 ft bgs, see Coring Log)
65														

Note:

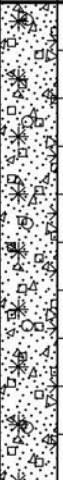


BORING LOG

BORING NUMBER: **IVF-P5-8A**
 SHEET NUMBER: 1 of 3
 PROJECT NUMBER: **185615A**
 LOCATION: **2000 Linden Ave**
 COORD.: **N: 599,043.1 E: 1,416,053.5**
 SURFACE ELEV.: **179.8 feet**
 DATUM: **Horizontal: NAD 83/91**
Vertical: NAVD 88
 START DATE: **6/26/19** TIME: **9:30 am**
 FINISH DATE: **7/2/19** TIME: **2:15 pm**

PROJECT: **B&P Tunnel Replacement Project**
 LOCATION: **Baltimore, MD**
 CLIENT: **AMTRAK**
 CONTRACTOR: **E2CR, Inc.**
 DRILLER: **S. Lyons**
 INSPECTOR: **G. Hanger**
 DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
 RIG TYPE: **CME-75**

Type/Symbol	Auger	Split Spoon	Casing	Pitcher	Grab	Core Barrel	GROUNDWATER DATA				
	HSA	S ■		L ■	G ☒	C ▤	Date	Time	Water Depth (ft)	Casing Depth (ft)	Hole Depth (ft)
I.D.	4.25	1.375"	"3.0"	2.86	3.25"	n/a	7/1/19	8:00 am	14.0	-	76.4
O.D.	7.625	2"	"3.5"	3	3.375"	n/a	7/2/19	2:15 pm	11.0	-	146.4
Length	60	24"		24	6"	n/a	7/3/19	7:45 am	13.5	-	181.4
Hammer Wt.	n/a		Drill Rod Size		"A"						
Hammer Fall	n/a		I.D. (O.D.)		1.219" (1.75")						

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)	
							CORING					
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %	
											0.0'	
5			G	1	☒	2.0 - 2.5	G	R	A	B	6	Brown, light brown, dark gray, light tan, and red-brown coarse to fine SAND, some Silt, little medium to fine subrounded/subangular Gravel, little coarse to fine brick fragments, moist (SM, Fill) Brown, dark brown, red-brown SILT & CLAY, little fine Sand, trace brick fragments, moist (ML, Fill)
			G	2	☒	4.0 - 4.5	G	R	A	B	6	
			G	3	☒	6.0 - 6.5	G	R	A	B	6	
			G	4	☒	8.0 - 8.5	G	R	A	B	6	
10			G	5	☒	9.5 - 10.0	G	R	A	B	6	10.0'
			S	1	■	10.0 - 12.0	G	R	A	B	12	169.8'
												Orange-brown to yellow-brown with speckles of black medium to fine SAND, some Clayey Silt, medium dense, moist (SM)
												13.5'
15			S	2	■	15.0 - 17.0	4	5	6	8	24	166.3'
												20.0'

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P5-8A**

SHEET NUMBER: 2 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **G. Hanger**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS		
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)			
							CORING							
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %			
			S	3		20.0 - 22.0	8	9	8	6	8	159.8'	Light brown, gray, black, and tan coarse to fine SAND, little Clayey Silt, little coarse to fine Gravel, medium dense, wet (SM)	
25			S	4		25.0 - 27.0	6	7	7	9	10		Light brown, light gray, and dark gray coarse to fine SAND, some coarse to fine Gravel, trace Clayey Silt, medium dense (SM)	
30			S	5		30.0 - 32.0	28	5	6	5	18		Top 10": Orange, light brown, light purple-gray, and light gray coarse to fine SAND and coarse to fine Gravel, trace Silt, medium dense, wet (SM) Bottom 8": White and light orange fine SAND, little Silt, trace fine Gravel, micaceous, medium dense, wet (SM, Residual Soil)	
			S	6		35.0 - 37.0	5	6	9	9	18	33.5'	146.3'	
35			S	7		40.0 - 42.0	15	18	22	30	24	38.5'	141.3'	
40														Gray, light gray with streaks of orange-brown SILT, some fine Sand, micaceous, dense (CL, Residual Soil)

Note:



BORING LOG

(continued)

BORING NUMBER: **IVF-P5-8A**

SHEET NUMBER: 3 of 3

PROJECT NUMBER: **185615A**

PROJECT: **B&P Tunnel Replacement Project**

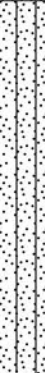
LOCATION: **Baltimore, MD**

CLIENT: **AMTRAK**

CONTRACTOR: **E2CR, Inc.**

DRILLER: **S. Lyons**

INSPECTOR: **G. Hanger**

DEPTH (feet)	GRAPHIC LOG	CASING (Blows/ft)	SAMPLE				SOIL (Blows/6 in.)					FIELD CLASSIFICATION AND REMARKS	
			TYPE	NUMBER	SYMBOL	DEPTH (feet)	0/6	6/12	12/18	18/24	REC. (in.)		
							CORING						
							RUN (in.)	REC. (in.)	REC. %	L>4" (in.)	RQD %		
			S	8		45.0 - 47.0	11	13	15	22	24	Dark green-gray, black, and gray SILT, some fine Sand, highly micaceous, medium dense (CL, Residual Soil)	
50			S	9		50.0 - 52.0	27	40	62	60	24	Dark green-gray to gray, light gray, tan, and black medium to fine SAND and Silt, trace medium to fine Gravel (quartz), relict banding observed, very dense (SM, Decomposed Rock)	
55			S	10		55.0 - 56.0	25	100/6"			12	Dark green-gray, black, and silver fine SAND and Silt, micaceous, relict banding observed, very dense (SM, Decomposed Rock)	
60												123.4'	(Spoon Refusal at 56.4 ft bgs, see Coring Log)
65													

Note:

