# 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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | S | 4 | | 24.0 - 26.0 | 8 | 6 | 2 | 12 | 11 | | | | | | 24.0'<br>24.5'<br>162.1'<br>161.6'<br>24.00'-24.50': Tan and light brown coarse to fine Quartz GRAVEL, little coarse to fine Sand, trace Silt, loose, wet (GP)<br>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) |
| 30 | | | S | 5 | | 29.0 - 31.0 | 9 | 10 | 8 | 7 | 24 | | | | | | 29.0'<br>157.1'<br>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 |
| 35 | | | S | 6 | | 34.0 - 36.0 | 5 | 6 | 7 | 7 | 24 | | | | | | 34.0'<br>152.1'<br>White, gray and yellow-brown Silty CLAY, and coarse to fine Sand, stiff, dry, relict layering observed (CL, Residual Soil); PP = 2.0 tsf |
| 40 | | | 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 |
| | | | S | 8 | | 44.0 - 46.0 | 10 | 18 | 20 | 36 | 24 | | | | | | 44.0'<br>142.1'<br>Dark green and light green-gray medium to fine SAND, and Silt, dense, dry, relict foliation observed |

B&P BORING LOG (FINAL) B&P TUNNEL PH3.GPJ B&P TUNNEL - LIBRARY.GLB 3/16/22

**Note:**

# BORING LOG
(continued)

BORING NUMBER: **IVF-P3-4**
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: **A. Daniyarov**

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | (SM, Decomposed Rock) |
| | | | S | 9 | | 49.0 - 49.0 | 100/0" | | | | 0 | | | | | | 49.0' |
| 50 | | | | | | | | | | | | | | | | | 137.1' No recovery, spoon refusal. (Spoon refusal at 49 ft bgs, see Coring Log) |
| 55 | | | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH3.GPJ B&P TUNNEL - LIBRARY.GLB 3/16/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/2/17 | 9:36 am | 27.4 | 29.0 | 30.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | CORING RUN (in.) | REC. (in.) | REC. % | L>4" (in.) | RQD % | 0.0' |
| | | | | | | | | | | | | Note: Hand excavated for utility clearance, depth 0.0'-7.5' |
| | | | G | 1 | ☒ | 2.0 - 2.5 | G | R | A | B | 6 | Black, coarse to fine GRAVEL, and coarse to fine Sand, little Silt, dry (GM, Fill) |
| | | | G | 2 | ☒ | 4.0 - 4.5 | G | R | A | B | 6 | Black, coarse to fine SAND, some coarse to fine Gravel, little Silt, moist (SM, Fill) |
| 5 | | | G | 3 | ☒ | 6.0 - 6.5 | G | R | A | B | 6 | Black and tan, coarse to fine SAND, little 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, 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) |

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | 5 | | 25.0 - 27.0 | 5 | 8 | 13 | 24 | 14 | | | | | | 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 | 6 | | 28.0 - 28.0 | 50/0" | | | | 0 | | | | | | S-5: Gray, coarse to fine GRAVEL, some coarse to fine Sand, trace Clayey Silt, medium dense, wet (GP, Fill) |
| | | | | | | | | | | | | | | | | | 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) |
| 30 | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/3/17 | 8:45 am | 19.9 | 30.0 | 50.0 |

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

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | | | | | | | | | | |

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

**Note:**

# BORING LOG

BORING NUMBER: **JFW-3**
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; Diamond Coring.**
RIG TYPE: **CME-75, Truck Mounted, Automatic Hammer**

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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| | | | | |

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

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

**Note:**

# 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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | S | 4 | | 23.0 - 23.9 | 15 | 50/5" | | | 10 | | | | | | Tan, coarse to fine SAND, some Silt, very dense, moist (SM, Residual Soil) |
| | | | | | | | | | | | | | | | | | 25.2' |
| | | | | | | | | | | | | | | | | | 39.2' |
| | | | S | 5 | | 26.5 - 26.7 | 50/2" | | | | 2 | | | | | | 26.7' |
| | | | | | | | | | | | | | | | | | 37.7 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 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/3/17 | 11:00 am | 13.3 | 13.0 | 13.0 |

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

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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) |
| 30 | | | S | 6 | | 28.0 - 28.9 | 20 | 50/5" | | | 11 | | | | | | Yellow gray and light gray, coarse to fine SAND, little Silt, trace fine Gravel, very dense, dry, micaceous (SM, Decomposed Rock) |
| | | | S | 7 | | 33.0 - 33.8 | 33 | 50/3" | | | 9 | | | | | | Yellow gray, light gray, and orange, coarse to fine SAND, little Silt, trace fine Gravel, very dense, dry, micaceous (SM, Decomposed Rock) |
| 35 | | | S | 8 | | 33.8 - 33.8 | 50/0" | | | | 0 | | | | | | No recovery (Spoon refusal at 34.3 ft bgs, see Coring Log) |
| 40 | | | | | | | | | | | | | | | | | |

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

**Note:**

# BORING LOG

BORING NUMBER: **SA-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; Diamond Coring.**
RIG TYPE: **CME-55, Truck Mounted, Automatic Hammer**

LOCATION: **SW corner of Mosher St. and N. Payson St.**
COORD.: **N: 594,939.0 E: 1,411,478.7**
SURFACE ELEV.: **158.6 feet**
DATUM: **Horizontal: NAD 83/91**
**Vertical: NAVD 88**
START DATE: **8/21/17** TIME: **1:45 pm**
FINISH DATE: **8/22/17** TIME: **4:16 pm**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| I.D. | 3.25" | 1.375" | 3.0" | n/a | 3.25" | n/a |
| O.D. | 6.625" | 2" | 3.5" | n/a | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/23/17 | 7:15 am | 9.9 | 37.5 | 66.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | | | | | | | | | | | | | | | 4" Asphalt; 8" Concrete |
| | | | | | | | | | | | | | | | | | 1.0' |
| | | | | | | | | | | | | | | | | | 157.6' Note: Hand excavated for utility clearance, depth 0.0'-10.0' |
| | | | G | 1 | | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | Dark gray coarse to fine GRAVEL, little coarse to fine Sand, trace Silty Clay, moist (GP, Fill) |
| | | | G | 2 | | 4.0 - 4.5 | G | R | A | B | 6 | | | | | | Black and dark gray coarse to fine SAND, trace medium to fine Gravel, little Silt, root fragments, moist (SM, Fill) |
| 5 | | | G | 3 | | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | Brown and light gray Silty CLAY, some coarse to fine Sand, little medium to fine Gravel, moist (CL, Fill) |
| | | | G | 4 | | 8.0 - 8.5 | G | R | A | B | 6 | | | | | | Gray, light gray, red-brown and black medium to fine GRAVEL and coarse to fine Sand, trace Silty Clay (in pockets), moist, trace cinders (GP, Fill) |
| | | | G | 5 | | 9.5 - 10.0 | G | R | A | B | 6 | | | | | | |
| 10 | | | S | 1 | | 10.0 - 12.0 | 2 | 3 | 2 | 2 | 17 | | | | | | Black and dark gray medium to fine GRAVEL, little coarse to fine Sand, little Silt, wet, trace cinders, plastic fragments (GM, Fill) |
| | | | | | | | | | | | | | | | | | Gray-brown, brown and light gray coarse to fine SAND, little medium to fine Gravel, little Silty Clay (in pockets), trace wood fragments, very loose to loose, wet (SC, Fill) |
| | | | S | 2 | | 13.0 - 15.0 | 1 | WOH | WOH | 1 | 18 | | | | | | Dark gray, light gray and red-brown coarse to fine GRAVEL, some Clayey Silt, little coarse to fine Sand, very loose, wet (GM, Fill) |
| 15 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 16.5' |
| | | | | | | | | | | | | | | | | | 142.1' |
| | | | S | 3 | | 18.0 - 20.0 | WOH | WOH | WOH | WOH | 18 | | | | | | Gray and yellow-brown CLAY, little medium to fine Sand, very soft, moist (CL) |

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 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) |
| 25 | | | S | 4 | | 23.0 - 25.0 | 11 | 13 | 13 | 10 | 14 | | | | | | |
| | | | | | | | | | | | | | | | | | 26.5' |
| | | | | | | | | | | | | | | | | | 132.1' |
| | | | S | 5 | | 28.0 - 28.4 | 100/5" | | | | 5 | | | | | | Gray and light gray with speckles of black medium to fine SAND, little Silt, very dense, moist (SM, Decomposed Rock) |
| 30 | | | | | | | | | | | | | | | | | |
| | | | 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) |
| 35 | | | | | | | | | | | | | | | | | |
| | | | 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) |
| 40 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| I.D. | 4.25" | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 7.625" | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 1/11/18 | 7:45 am | 10.3 | 31.0 | 60.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | G | 1 | | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | 0'-2' Brick Fragments<br>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)<br>Note: Timber fragments at 3.5' bgs. |
| 5 | | | 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, dry (SC, Fill) |
| | | | G | 4 | | 8.0 - 8.5 | 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) |
| | | | | | | | | | | | | | | | | | 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) |
| | | | 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) |
| 15 | | | | | | | | | | | | | | | | | |
| | | | 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, |

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 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 | | | | | | | | | | | | | | | | | 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) |
| | | | S | 6 | | 31.0 - 31.0 | 100/0" | | | | | | | | | | 31.0' 129.0' No recovery, spoon refusal. (Spoon refusal at 31 ft bgs, see Coring Log) |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 9/21/17 | 8:30 am | 14.0 | 14.0 | 14.0 |

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

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | S | 5 | | 24.0 - 24.8 | 21 | 100/4" | | | 10 | | | | | | 22.5'<br>91.0'<br>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'<br>87.0'<br>No recovery; spoon refusal; rock fragments in spoon tip<br>(Spoon refusal at 26.5 ft bgs, see Coring Log) |
| 30 | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| I.D. | 4.25" | 1.375" | 3.0" | n/a | 3.25" | n/a |
| O.D. | 7.625" | 2" | 3.5" | n/a | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 9/28/17 | 8:09 am | 10.2 | 30.5 | 50.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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)<br>Note: 10" cobble at ~1.0' depth; Hand excavated for utility clearance, depth 0.0'-10.0'<br>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) |
| 5 | | | 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);<br>6.3'-6.5': White and light brown Silty CLAY, dry (CL, Fill)<br>Beige, orange-brown and black Silty CLAY, little coarse to fine Sand, dry (CL, Fill) |
| | | | G | 4 | | 8.0 - 8.5 | G | R | A | B | 6 | | | | | | |
| | | | G | 5 | | 9.5 - 10.0 | G | R | A | B | 6 | | | | | | |
| 10 | | | S | 1 | | 10.0 - 12.0 | 1 | 1 | 1 | 2 | 19 | | | | | | Brown coarse to fine SAND, little Silty Clay, trace coarse to fine Gravel, wet (SC, Fill)<br>10.0'-11.5': Black coarse to fine SAND, little Silt, very loose, wet (SM, Fill);<br>11.5'-12.0': Brown coarse to fine SAND, little Silt, very loose, wet, relict layering observed (SM, Fill) |
| | | | S | 2 | | 14.0 - 16.0 | 1 | 1 | 2 | 1 | 4 | | | | | | |
| 15 | | | | | | | | | | | | | | | | | 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 | | | | | | 19.2'<br>141.6'<br>19.0'-19.2': Black and white coarse to fine GRAVEL, little Silty Clay, little coarse to fine Sand, very dense, |

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

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 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) |
| 25 | | | S | 4 | | 24.0 - 24.8 | 12 | 100/4" | | | 7 | | | | | | 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) |
| | | | S | 5 | | 29.0 - 29.2 | 100/2" | | | | 2 | | | | | | Gray with speckles of black coarse to fine SAND, some coarse to fine Gravel, little Silt, very dense, dry (SM, Decomposed Rock) |
| 30 | | | S | 6 | | 30.5 - 30.5 | 100/0" | | | | 0 | | | | | | 30.5' / 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 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| I.D. | 4.25" | 1.375" | 3.0" | n/a | 3.25" | n/a |
| O.D. | 7.625" | 2" | 3.5" | n/a | 3.375" | n/a |
| 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") | |

| GROUNDWATER DATA | | | | |
|---|---|---|---|---|
| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
| 11/28/17 | 7:38 am | 19.4 | 10.5 | 45.0 |
| 11/29/17 | 11:40 am | 19.4 | 10.5 | 115.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' Note: Hand excavated for utility clearance, depth 0.0'-6.5' |
| | | | G | 1 | | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | Brown and tan, coarse to fine SAND, and coarse to fine Gravel, little Silt, moist (SM, Fill) |
| | | | G | 1 | | 4.0 - 4.5 | 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) |
| 5 | | | G | 2 | | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | |
| | | | 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) 94.0' Note: Soft dig terminated at 6.5' bgs due to dense, natural, material encountered. |
| | | | S | 2 | | 9.0 - 9.0 | 100/0" | | | | 0 | | | | | | 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) 91.7' Note: rig chattering at ~7.5-9.0'. |
| 10 | | | | | | | | | | | | | | | | | 10.5' 90.2' 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) Note: advance casing to 10.5' bgs. (Casing refusal at 10.5 ft bgs, see Coring Log) |
| 15 | | | | | | | | | | | | | | | | | |

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | NW | L | G | C |
| I.D. | 4.25" | 1.375" | 3.0" | n/a | 3.25" | n/a |
| O.D. | 7.625" | 2" | 3.5" | n/a | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 2/9/18 | 8:00 am | 13.1 | 33.0 | 85.0 |

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

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

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

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

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 7/18/18 | 1:45 pm | 9.6 | 0.0 | 10.0 |
| 7/20/18 | 7:30 am | 9.4 | 25.5 | 45.5 |
| 7/23/18 | 7:48 am | 7.2 | - | 86.0 |
| | | | | |

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

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | | | S | 4 | | 24.0 - 24.1 | 75/1" | | | | 1 | | | | | | Note: falling head test at 24' |
| | | | | | | | | | | | | | | | | | 25.5' Gray and white coarse to fine SAND, and Clayey Silt, little fine Gravel, very dense, moist (SM, Decomposed Rock) |
| | | | | | | | | | | | | | | | | | 136.4' (Spoon refusal at 25.5 ft bgs, see Coring Log) |
| 30 | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 7/27/18 | 10:00 am | 7.8 | - | 65.8 |
| 7/30/18 | 7:30 am | 7.7 | - | 86.1 |
| 7/31/18 | 7:50 am | 7.4 | - | 86.1 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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) |
| 5 | | | 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 orangics (SM, Fill) |
| | | | 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) |
| 10 | | | | | | | | | | | | | | | | | |
| | | | 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' |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | Brown, orange, gray coarse to fine SAND, some Silt & Clay, little fine Gravel, very dense, wet (SM, Residual) |
| | | | | | | | | | | | | | | | | | 24.0' |
| 25 | | | S | 4 | | 24.0 - 24.2 | 100/2" | | | | 2 | | | | | | 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 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/14/18 | 10:38 am | 20.6 | 24.0 | 24.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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) |
| 5 | | | 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) |
| | | | 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) |
| 10 | | | | | | | | | | | | | | | | | 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. |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG
(continued)

BORING NUMBER: **S-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: **E. Hill**
INSPECTOR: **B. Godfrey**

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | micaceous (SM, decomposed rock) |
| | | | S | 4 | | 24.0 - 24.4 | 100/5" | | | | 5 | | | | | | |
| 25 | | | | | | | | | | | | | | | | | 24.5' / 130.7' Brown, gray, and red coarse to fine SAND, little Gravel (rock fragments), very dense, dry (SM, decomposed rock) (Spoon refusal at 24.4 ft bgs, see Coring Log) |
| 30 | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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:**
TYPE: Double Tube/ Swivel
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")

**NOTES:**
Structure boring, discontinuity data is not obtained

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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | C-1 51.0 - 54.6 | 35 | 80 | 72 | 51.00'-51.70': Assume recovery loss<br>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 | | | | |
| 55 | | 2.7<br>2.7<br>2.7<br>2.7<br>2.7 | C-2 54.6 - 59.6 | 54 | 90 | 32 | 57.30'-57.80': Assume recovery loss; completely weathered; extremely weak<br>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°<br>Few feldspar bands less than 0.5" thick | II/III<br>V | R3<br>R0 | | | | |
| 60 | | 2.7 | C-3 59.6 - 61.0 | 13 | 76 | 0 | 60.67'-61.0': Assume recovery loss; completely weatheredl extremely weak<br>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°<br>End of Boring at 61 ft bgs. | II/III<br>V | R3<br>R0 | | | | |
| 65 | | | | | | | | | | | | | |

B&P CORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:** * foliation joint

# 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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 7/18/18 | 8:45 am | 36.0 | - | 45.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 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' |
| 10 | | | | | | | | | | | | | | | | | Brown, gray Clayey SILT, trace fine to medium Sand, trace coarse Gravel, very soft, moist (ML, Fill) |
| | | | 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 |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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. Fragoso**

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | (ML, Fill) |
| 25 | | | S | 4 | | 24.0 - 26.0 | 2 | 1 | 2 | 3 | 20 | | | | | | 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) |
| | | | S | 6 | | 34.0 - 36.0 | WOH | WOH | WOH | 29 | 20 | | | | | | 34.0' |
| 35 | | | | | | | | | | | | | | | | | 132.1' Brown Silty CLAY, trace fine Sand, very soft, moist (CL) |
| | | | | | | | | | | | | | | | | | 39.0' |
| 40 | | | S | 7 | | 39.8 - 40.5 | 6 | 50/3" | | | 9 | | | | | | 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 | | | | | | Brown, orange, gray coarse to fine SAND, little Clayey Silt, little coarse to fine Gravel, very dense, moist (SM, decomposed rock) |
| | | | | | | | | | | | | | | | | | 45.0' (Auger refusal at 45 ft bgs, see Coring Log) |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# 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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/20/18 | 9:45 am | 3.5 | - | 20.4 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | | | | | | | | | | | | | | | 0.4' 5" Asphalt; 8" concrete |
| | | | | | | | | | | | | | | | | | 12#.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) |
| 5 | | | | | | | | | | | | | | | | | Very dense material, begin rock coring at 7.1 feet. |
| | | | | | | | | | | | | | | | | | 7.1' |
| | | | | | | | | | | | | | | | | | 118.0' (Auger refusal at 7.1 ft bgs, see Coring Log) |
| 10 | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG

BORING NUMBER: **S-P4-06 OW**
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 Mounted**

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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/1/18 | 10:45 am | 8.9 | - | 23.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 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'<br>Note: Water on spoon at 8'<br>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 | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG
(continued)

BORING NUMBER: **S-P4-06 OW**
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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | Gray and tan coarse to fine SAND, and coarse to fine Gravel (rock fragments), little Clayey Silt, very dense, dry (SM, Decomposed Rock) |
| | | | | | | | | | | | | | | | | | 23.5' |
| | | | | | | | | | | | | | | | | | 105.3' (Spoon refusal at 23.5 ft bgs, see Coring Log) |
| 25 | | | | | | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/15/18 | 1:00 pm | 14.0 | - | 14.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | | | | | | | | | | | | | | | 0.3' 4" Asphalt; 7" concrete |
| | | | | | | | | | | | | | | | | | 0.2' 132.2' 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' 128.5' Gray, green-gray coarse to fine SAND, and Clayey Silt, trace coarse to fine Gravel, moist (SM) |
| 5 | | | G | 3 | | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | 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 | | | | | | Dark, gray-green coarse to fine SAND, and Clayey Silt, trace coase to fine Gravel, moist (SM) |
| | | | S | 1 | | 9.0 - 11.0 | 4 | 7 | 9 | 11 | 24 | | | | | | 9.0' 123.5' |
| 10 | | | | | | | | | | | | | | | | | Green-gray Clayey SILT, and coarse to fine Sand, very stiff, moist, micaceous (ML, Residual) |
| | | | S | 2 | | 14.0 - 16.0 | 13 | 25 | 33 | 60 | 20 | | | | | | 14.0' 118.5' Green-gray coarse to fine SAND, little Clayey Silt, very dense, moist (SM, Decomposed Rock) |
| 15 | | | | | | | | | | | | | | | | | 17.5' |
| | | | | | | | | | | | | | | | | | 115.0' (Auger refusal at 17.5 ft bgs, see Coring Log) |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG

BORING NUMBER: **S-P4-08 OW**
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: **NE side of MARC/Amtrak bridge over W Mulberry St**
COORD.: **N: 592,502.2 E: 1,410,484.7**
SURFACE ELEV.: **126.2 feet**
DATUM: **Horizontal: NAD 83/91**
**Vertical: NAVD 88**
START DATE: **8/16/18** TIME: **9:00 am**
FINISH DATE: **8/16/18** TIME: **2:00 pm**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/16/18 | 1:35 pm | 0.4 | - | 25.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | | | | | | | | | | | | | | | 0.3' 4" Asphalt; 10" concrete |
| | | | | | | | | | | | | | | | | | 0.8' 125.3' |
| | | | G | 1 | ☒ | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | Tan, gray, white coarse to fine SAND, little coarse to fine Gravel, some Clayey Silt, moist (SM, Fill) |
| | | | | | | | | | | | | | | | | | 4.0' |
| | | | G | 2 | ☒ | 4.0 - 4.5 | G | R | A | B | 6 | | | | | | 122.2' Gray, white, tan medium to fine SAND, and Clayey Silt, trace medium to fine Gravel, moist (SM) Soft dig terminated at 4.5' |
| 5 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | 8.5' |
| | | | S | 1 | — | 8.5 - 8.5 | 100/0.5" | | | | 0.5 | | | | | | 8.5' 117.7' 117.7 Brown, white coarse to fine SAND, and coarse to fine Gravel, little Clayey Silt, very dense (SM, decomposed rock) (Auger refusal at 8.5 ft bgs, see Coring Log) |
| 10 | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/29/18 | 8:45 am | 13.6 | - | 26.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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) |
| 5 | | | | | | | | | | | | | | | | | Increase in material density. End soft dig at 5.5 ft |
| | | | 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) |
| 10 | | | | | | | | | | | | | | | | | |
| | | | 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) |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

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

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 3.25 | 1.375" | 3.0" | 2.86 | 3.25" | n/a |
| O.D. | 6.625 | 2" | 3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/15/18 | 10:00 am | 10.1 | - | 26.0 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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) |
| 5 | | | 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) |
| | | | 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) |
| 10 | | | | | | | | | | | | | | | | | 14.0' |
| | | | S | 2 | | 14.0 - 16.0 | WOH | WOH | 2 | 2 | 16 | | | | | | 144.5' Light gray, orange, dark brown, dark gray Clayey SILT, little Sand, very soft, moist (ML) |
| 15 | | | | | | | | | | | | | | | | | 19.0' |
| | | | S | 3 | | 19.0 - 21.0 | 1 | 3 | 9 | 6 | 12 | | | | | | 139.5' Brown, orange coarse to fine SAND, some coarse to fine Gravel, some Clay & Silt, medium dense, moist |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG
(continued)

BORING NUMBER: **UT-05**
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. Fragoso**

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | (SC) |
| | | | S | 4 | | 24.0 - 26.0 | 11 | 13 | 21 | 23 | 18 | | | | | | 24.0' |
| 25 | | | | | | | | | | | | | | | | | 134.5' Orange, light gray, tan coarse to fine SAND, some Silt, trace coarse to fine Gravel (quartz), dense, moist, relict layering (SM, Residual) |
| | | | | | | | | | | | | | | | | | Falling head test at 26 ft. |
| | | | S | 5 | | 29.0 - 29.2 | 100/2" | | | | 2 | | | | | | |
| 30 | | | | | | | | | | | | | | | | | 30.0' Light gray, brown, tan coarse to fine SAND, little Clayey Silt, little Gravel, very dense, moist (SM, Decomposed rock) |
| | | | | | | | | | | | | | | | | | 128.5' (Spoon refusal at 30 ft bgs, see Coring Log) |
| 35 | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH4 W WELL READINGS.GPJ B&P TUNNEL - LIBRARY.GLB 4/6/22

**Note:**

# BORING LOG

BORING NUMBER: **IVF-P5-6**
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: **G. Hanger**
DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
RIG TYPE: **CME-75**

LOCATION: **2000 Linden Ave**
COORD.: **N: 598,969.0 E: 1,416,112.7**
SURFACE ELEV.: **176.3 feet**
DATUM: **Horizontal: NAD 83/91**
**Vertical: NAVD 88**
START DATE: **8/6/19** TIME: **12:50 pm**
FINISH DATE: **8/12/19** TIME: **9:00 am**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 4.25 | 1.375" | "3.0" | 2.86 | 3.25" | n/a |
| O.D. | 7.625 | 2" | "3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 8/9/19 | 7:45 am | 10.9 | - | 151.1 |
| 8/12/19 | 8:00 am | 12.6 | - | 181.1 |
| 8/13/19 | 7:45 am | 12.6 | - | 181.1 |
| | | | | |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | G | 1 | | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | Brown, dark gray, and tan SILT & CLAY, little fine Sand, moist (ML, Fill) |
| | | | G | 2 | | 4.0 - 4.5 | G | R | A | B | 6 | | | | | | Light brown and orange-brown medium to fine SAND, little Silt, moist (SM, Fill) |
| 5 | | | G | 3 | | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | Light brown and orange-brown medium to fine SAND, trace Clayey Silt, trace fine Gravel, moist (SM, Fill) |
| | | | G | 4 | | 8.0 - 8.5 | G | R | A | B | 6 | | | | | | Orange-brown, brown, and gray medium to fine SAND, trace Silt, trace fine Gravel, moist (SM, Fill) |
| | | | G | 5 | | 9.5 - 10.0 | G | R | A | B | 6 | | | | | | |
| 10 | | | S | 1 | | 10.0 - 12.0 | 5 | 3 | 5 | 6 | 22 | | | | | | Tan-brown and gray medium to fine SAND, trace Silt, trace fine Gravel, moist (SM, Fill)<br>Light brown, orange-brown, and tan fine SAND, little Silt, dry (SM, Fill) |
| 15 | | | S | 2 | | 15.0 - 17.0 | 5 | 7 | 7 | 8 | 24 | | | | | | Brown, light brown, gray, orange-brown, and tan coarse to fine SAND, trace Silt, wet (SM, Fill) |
| | | | | | | | | | | | | | | | | | 18.0' |
| | | | | | | | | | | | | | | | | | 158.3' |

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**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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)<br>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) |
| | | | | | | | | | | | | | | | | | 32.5' / 143.8' |
| 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) |
| | | | | | | | | | | | | | | | | | 37.5' / 138.8' |
| 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) |
| | | | | | | | | | | | | | | | | | 42.5' / 133.8' |

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**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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 | | | | | | | | | | | | | | | | | |

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**Note:**

# BORING LOG

BORING NUMBER: **IVF-P5-8A**
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: **G. Hanger**
DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
RIG TYPE: **CME-75**

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**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 4.25 | 1.375" | "3.0" | 2.86 | 3.25" | n/a |
| O.D. | 7.625 | 2" | "3.5" | 3 | 3.375" | n/a |
| Length | 60 | 24" | | 24 | 6" | n/a |
| Hammer Wt. | n/a | | Drill Rod Size | | "A" | |
| Hammer Fall | n/a | | I.D. (O.D.) | | 1.219" (1.75") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 7/1/19 | 8:00 am | 14.0 | - | 76.4 |
| 7/2/19 | 2:15 pm | 11.0 | - | 146.4 |
| 7/3/19 | 7:45 am | 13.5 | - | 181.4 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' |
| | | | 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) |
| | | | G | 2 | | 4.0 - 4.5 | G | R | A | B | 6 | | | | | | Brown, dark brown, red-brown SILT & CLAY, little fine Sand, trace brick fragments, moist (ML, Fill) |
| 5 | | | G | 3 | | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | Brown, dark brown, red-brown SILT & CLAY, little fine Sand, trace fine Gravel, moist (ML) |
| | | | G | 4 | | 8.0 - 8.5 | G | R | A | B | 6 | | | | | | Orange-brown, red-brown, light brown, and tan SILT & CLAY, little medium to fine Sand, moist (ML) |
| | | | G | 5 | | 9.5 - 10.0 | G | R | A | B | 6 | | | | | | 10.0' |
| 10 | | | S | 1 | | 10.0 - 12.0 | 7 | 4 | 6 | 7 | 12 | | | | | | Red-brown, dark gray-brown CLAYEY SILT, some medium to fine Sand, moist (ML) |
| | | | | | | | | | | | | | | | | | 169.8' |
| | | | | | | | | | | | | | | | | | Orange-brown to yellow-brown with speckles of black medium to fine SAND, some Clayey Silt, medium dense, moist (SM) |
| | | | | | | | | | | | | | | | | | 13.5' |
| | | | | | | | | | | | | | | | | | 166.3' |
| 15 | | | S | 2 | | 15.0 - 17.0 | 4 | 5 | 6 | 8 | 24 | | | | | | Orange, red-brown, gold-brown, and light gray coarse to fine GRAVEL, some coarse to fine Sand, little Clayey Silt, medium dense, moist (GP-GM) |
| | | | | | | | | | | | | | | | | | 20.0' |

B&P BORING LOG (FINAL) B&P TUNNEL PH5.GPJ B&P TUNNEL - LIBRARY.GLB 3/16/22

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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)<br>Bottom 8": White and light orange fine SAND, little Silt, trace fine Gravel, micaceous, medium dense, wet (SM, Residual Soil) |
| | | | | | | | | | | | | | | | | | 33.5' 146.3' |
| 35 | | | S | 6 | | 35.0 - 37.0 | 5 | 6 | 9 | 9 | 18 | | | | | | Light gray, orange, black, red-brown, and dark gray SILT, some fine Sand, micaceous, medium dense, moist (ML, Residual Soil) |
| | | | | | | | | | | | | | | | | | 38.5' 141.3' |
| 40 | | | S | 7 | | 40.0 - 42.0 | 15 | 18 | 22 | 30 | 24 | | | | | | Gray, light gray with streaks of orange-brown SILT, some fine Sand, micaceous, dense (CL, Residual Soil) |

B&P BORING LOG (FINAL) B&P TUNNEL PH5.GPJ B&P TUNNEL - LIBRARY.GLB 3/16/22

**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 TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 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) |
| | | | | | | | | | | | | | | | | | 48.5' |
| | | | | | | | | | | | | | | | | | 131.3' |
| 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) |
| | | | | | | | | | | | | | | | | | 56.4' |
| | | | | | | | | | | | | | | | | | 123.4' (Spoon Refusal at 56.4 ft bgs, see Coring Log) |
| 60 | | | | | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH5.GPJ B&P TUNNEL - LIBRARY.GLB 3/16/22

**Note:**

# BORING LOG

BORING NUMBER: **IVF-P5-8B**
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: **G. Hanger**
DRILLING METHOD: **Hollow Stem Augers; Rotary Wash; Diamond Coring.**
RIG TYPE: **CME-75**

LOCATION: **2000 Linden Ave**
COORD.: **N: 599,044.7 E: 1,416,076.0**
SURFACE ELEV.: **179.7 feet**
DATUM: **Horizontal: NAD 83/91**
**Vertical: NAVD 88**
START DATE: **7/10/19** TIME: **1:45 pm**
FINISH DATE: **7/15/19** TIME: **9:40 am**

| | Auger | Split Spoon | Casing | Pitcher | Grab | Core Barrel |
|---|---|---|---|---|---|---|
| Type/Symbol | HSA | S | | L | G | C |
| I.D. | 4.25 | 1.375" | "3.0" | 2.86 | 3.25" | n/a |
| O.D. | 7.625 | 2" | "3.5" | 3 | 3.375" | n/a |
| 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") | |

GROUNDWATER DATA

| Date | Time | Water Depth (ft) | Casing Depth (ft) | Hole Depth (ft) |
|---|---|---|---|---|
| 7/11/19 | 7:30 am | 14.4 | - | 91.4 |
| 7/15/19 | 8:00 am | 14.1 | - | 166.4 |

| DEPTH (feet) | GRAPHIC LOG | CASING (Blows/ft) | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE SYMBOL | SAMPLE DEPTH (feet) | SOIL (Blows/6 in.) 0/6 | 6/12 | 12/18 | 18/24 | REC. (in.) | CORING RUN (in.) | CORING REC. (in.) | CORING REC. % | CORING L>4" (in.) | CORING RQD % | FIELD CLASSIFICATION AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | 0.0' Note: Blind soil drilling to top of rock |
| | | | G | 1 | ☒ | 2.0 - 2.5 | G | R | A | B | 6 | | | | | | Brown, light brown, orange-brown, and tan coarse to fine SAND, some Silt, trace medium to fine Gravel, trace brick fragments, moist (SM, Fill) |
| | | | G | 2 | ☒ | 4.0 - 4.5 | G | R | A | B | 6 | | | | | | Dark brown to brown medium to fine SAND, some Silty Clay, trace very fine brick fragments, moist (SC, Fill) |
| 5 | | | G | 3 | ☒ | 6.0 - 6.5 | G | R | A | B | 6 | | | | | | Brown, light brown, and tan medium to fine SAND and Clayey Silt, moist (SM) |
| | | | G | 4 | ☒ | 8.0 - 8.5 | G | R | A | B | 6 | | | | | | Brown, light brown, and tan SILT & CLAY, little fine Sand, moist (ML) |
| | | | G | 5 | ☒ | 9.5 - 10.0 | G | R | A | B | 6 | | | | | | Red-brown, dark brown, and brown SILT & CLAY, some medium to fine Sand, moist (ML) |
| 10 | | | | | | | | | | | | | | | | | 169.7' ( at 10 ft bgs, see Coring Log) |
| 15 | | | | | | | | | | | | | | | | | |

B&P BORING LOG (FINAL) B&P TUNNEL PH5.GPJ B&P TUNNEL - PHASE 6.GLB 3/10/22

**Note:**

# APPENDIX C: GEOMORPHOLOGY WORK PLAN

# Work Plan for Geomorphology Survey of the South Portal and Approach, Baltimore & Potomac Tunnel Replacement Program, Baltimore City, Maryland

## Draft

Prepared For:

AMTRAK

Prepared by:

WSP USA, Inc.

1 East Pratt Street, Suite 300

Baltimore, Maryland 21202

## 1. INTRODUCTION

On behalf of Amtrak, WSP USA Inc. (WSP) will conduct a geomorphology survey of the proposed Phase IB archaeological survey area of the South Portal and Approach for the Baltimore & Potomac Tunnel Replacement Program (Program) (Figure 1). As the result of a supplemental Phase IA survey for the program, a portions of the APE-Archaeology that include the South Portal and Approach were assessed as having a moderate-to-high sensitivity for the presence of pre-contact and early historic archaeological resources. Other areas within this portion of the APE-Archaeology were additionally assessed as having a moderate sensitivity for the presence of historic archaeological resources associated with the late nineteenth century occupation of the Monroe-Riggs neighborhood. The purpose of the study is to further characterize the subsurface conditions within the survey area in order to identify areas of disturbance as well as determine if buried undisturbed soils are present and have the potential to contain archaeological sites that may be eligible for listing on the National Register of Historic Places (NRHP). In the event that archaeological sites are identified that require additional investigation to evaluate their potential for inclusion the NRHP, WSP will conduct further Phase IB archaeological surveys of those locations after consultation with the Federal Railroad Administration (FRA), the Maryland Historical Trust (MHT) and the other consulting parties, in accordance with Stipulation IV.C.3 of the Programmatic Agreement (PA).

This investigation will assist FRA, as the lead federal agency, with its obligations under Section 106 of the National Historic Preservation Act, as amended (Section 106) and to resolve adverse effects on historic properties in accordance with the Section 106 implementing regulations (36 C.F.R. § 800) for the Program. The survey will also comply and be conducted consistent with Stipulations VI.B and VI.C.1 of the PA for the Program and the *Standards and Guidelines for Archaeological Investigations in Maryland* (Shaffer and Cole 1994).

## 2. PROJECT LOCATION AND DESCRIPTION

The proposed survey area consists of approximately 13 acres located between the existing railroad right-of-way and North Payson Street from Edmondson Avenue to Riggs Avenue (see Figure 1). The improved portions of the survey area contain a mix of late-nineteenth to early twentieth century rowhouses and mid-to-late twentieth century commercial and industrial buildings as well as paved parking lots, and vacant lots covered with a mix of manicured grass and trees.

The survey area is located within the Fall Zone region of the Upland Piedmont physiographic province. A transitional region between the Coastal Plain and the Piedmont, where the rolling terrain and hilltops formed from crystalline bedrock is sometimes overlain by unconsolidated sediments that are thicker toward the southeast. Historically, the survey area was undeveloped pastures and wood lots located on the floodplain and low uplands bordering the north branch of the Gwynns Run. In the early twentieth century, significant modifications were made to the landscape as the stream valley was filled with large quantities of transported soil which resulted in an increased surface elevation of upwards of 20 feet within the survey area. Currently, the survey area is situated on a relatively level landform consisting of imported soil situated approximately 180 feet above mean sea level (amsl). The soils within the survey area are mapped as Urban land, 0 to 15 percent slopes (44UC). 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. Typically the impervious surfaces are underlain by fill which may cover natural soils underneath.

## 3. HISTORICAL MAP REVIEW

A review of the historical mapping indicates that the survey area was slow to develop and did not begin in earnest until the second half of the nineteenth century. Prior to the 1850s, the survey area was situated in Baltimore County. At that time, development in Baltimore was concentrated around the Inner Harbor and was slowing expanding west and north. The area containing the survey area consisted of farms and estates surrounded by forests and pastures. The 1851 *Plan of the City of Baltimore, Maryland* illustrates the plan for the street grid to extend through the survey area (Sidney and Neff 1851); however, the developed portions of the city during that time remained south of Franklin Street and east of Freemont Avenue. Although not a comprehensive map of the development at the time, the 1851 map indicates the survey area was largely unimproved although several farm houses and outbuilding are depicted immediately to the east. J.C. Sidney's 1857 *Map of the city and county of Baltimore, Maryland* similarly depicts an absence of buildings within the survey area while the two nearby farm houses are identified as belonging to J.H. Kaufman and John Kirby (Sidney 1857).

A.D. Bache's 1865 *Approaches to Baltimore, Maryland* provides additional details about the improvements that occurred within the vicinity of the survey area during the mid-nineteenth century (Bache 1865). By that time, the survey area consisted of a mix of cleared terraces and wooded floodplains bordering the north branch of Gwynns Run. West Lafayette Avenue was established by this time and extended east to west through the survey area and the alignment of West Franklin Street is also depicted to the south. The map also depicts a cart road crossing the north branch of Gwynns Run to the south of present-day Lafayette Street as well as several fence lines extending through the survey. However, the nearest buildings are depicted to the east of the survey area in the vicinity of present-day North Fulton and McKean avenues.

Hopkins' 1876 *City Atlas of Baltimore, Maryland and Environs* reflects an increase in development within the vicinity of the survey area during this period (Hopkins 1876). The map depicts the proposed gridded street pattern that is similar to the present-day street pattern. However, the presence of houses and other buildings depicted within roads suggests not all of the proposed roadways depicted on the map were constructed by that time. The Baltimore and Potomac Railroad is depicted as extending along the west side of the survey area parallel to the north branch of Gwynns Run and extending through several large parcels owned by the Patterson, Keerl, Shipley, and Abell families. According to the 1876 map, the survey area appeared to be part of Thomas M. Keerl's estate, Woodley (Figure 2). While none of the estate's buildings are depicted within the survey area, the map shows the mansion house and other outbuilding to the east, north of Lafayette Avenue.

With the sale of much of the Keerl estate in the late nineteenth century, the city expanded west of Gilmor Street as the neighborhoods of Poppleton, Franklin Square, Harlem Park and Sandtown-Winchester were established. According to the 1897 *Atlas of the City of Baltimore*, most residential development did not extend as far as the survey area as the majority of houses depicted on the 1897 are situated east of Payson Street (Duncan 1897). With the exception of the Baltimore and Potomac Railroad and the city streets, the survey area remained largely undeveloped. No buildings are depicted within the survey area and the only development within the boundaries was an area designated as a city dump located south of Lanvale Street, between Payson and Pulaski Streets. The remainder consisted of cleared and undeveloped terraces overlooking the north branch of Gwynns Run.

Sanborn Fire Insurance maps provide additional details about the developmental history within the survey area during the first half of the twentieth century. The 1901 Sanborn maps indicate the majority of development within the survey area occurred along and to the south of Lafayette Avenue (Sanborn Map Company 1901). Two-story brick rowhouses are present on Lafayette Avenue, between Payson and Brice Streets, as well as on Lanvale Street, between Payson and Pulaski Streets. Additionally, the Lafayette Mill and Lumber Company is also present within the survey area (Figure 3). The mill occupied the 2100 block

of Lafayette Street and included one-story wood-frame office and storage buildings as well as several fenced areas on the lot for lumber storage.

The Sanborn maps from 1914 indicate additional two-story brick rowhouses were constructed along Payson Street, north of Lafayette Avenue (Figure 4) (Sanborn Map Company 1914). A large one-story brick warehouse and one-story wood-frame office was also constructed within the survey area on Mosher Street by that time. The block between Lafayette Avenue and Lanvale Street from Pulaski and Brice streets was also nearly fully developed by 1914. Two-story brick rowhouses lined Lanvale and Brice street with several other newly constructed houses erected on Lafayette Avenue. In addition, a one-story brick laundry facility was erected on Pulaski Street. The 1914 maps also indicate that some buildings that were first depicted in the 1901 maps were razed sometime in the subsequent 14 years. They included the rowhouses that were located within present-day Lafayette Payson Park. The lumber mill and rowhouses depicted on the north side of Lafayette Avenue were also razed by 1914.

Later Sanborn maps indicate the survey area remained unchanged through the first half of the twentieth century as there was no variation between the building depicted in the 1914 and 1951 Sanborn maps (Sanborn Map Company 1914, 1951). A review of historic aerial photographs after 1957 indicates little changed within the survey area until 1971 when a grocery store and parking lot was constructed on the north side of Lafayette Avenue at Pulaski Street with street access from Payson Street (Nationwide Environmental Title Research [NETR] 1957, 1971). In the decades that followed, some of the rowhouses on Lanvale Street, Harlem Avenue, and Rayner Avenue were razed; however, the majority of the houses remain.

## 4. ARCHAEOLOGICAL RESOURCE POTENTIAL

With the exception of the 2100 block of Lafayette Avenue, the remainder of the survey area lies within the NRHP-eligible Monroe Riggs Historic District/ Midtown Edmondson Historic District (B-5118), which was a small working class neighborhood that was established between 1890 and 1915. Prior to the 1900, the survey area consisted of floodplains and well-drained uplands extending along both sides of the north branch of Gwynns Run that were largely untouched by development since the arrival of Europeans. The floodplains and uplands were filled with transported soil in order to facilitate additional residential construction in west Baltimore and by 1914, the majority of the survey area was fully developed with rowhouses and commercial and industrial buildings located closer to the railroad tracks.

The portion of the survey area between Riggs Avenue and West Lanvale Street, west of North Payson Street possesses a moderate sensitivity for the presence of intact archaeological resources associated with the late nineteenth and early twentieth century occupation of extant and former rowhouses. The houses in this location were primarily constructed prior to 1914, with several having been built in the late 1890s. Although some of the lots that contained rowhouses within the survey area have since been razed, those areas are now paved lots and open green spaces. Likewise, in locations where the rowhouses are extant, the rear yards are largely undeveloped. As a result, there is the potential for the presence of structural features and other preserved cultural deposits associated with the early residents of the Monroe-Riggs neighborhood.

Additionally, there is the moderate to high sensitivity for the presence of deeply buried pre-contact and early historic archaeological sites located beneath the deep fill soils that cover the survey area. Based on the analysis completed for the supplemental Phase IA survey, significant modifications were made to the landscape as the stream valley of the north branch of Gwynns Run was filled with large quantities of transported soil which resulted in an increased surface elevation upwards to 16 feet in some parts of the survey area. Once the stream valley was filled, the first phase of residential and commercial development within this portion of the survey commenced. While ground disturbance occurred as a result of construction, the impacts were limited to the depth of existing fill and likely did not extend into the underlying buried ground surface. If a deeply buried ground surface is present, it has the potential to contain pre-contact and early historic period archaeological deposits.

# 5. RESEARCH GOALS AND METHODS

Archaeological tasks will be performed or overseen by qualified professionals as defined by the Secretary of the Interior (formerly 36CFR §61) and will be consistent with the principles and standards contained in *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (1983), *Consulting About Archeology Under Section 106* (Advisory Council on Historic Preservation 1990).

## 5.1 Research Goals

The goal of the geomorphology survey is to evaluate the existing soil conditions so as to assess the extent of previous filling activities and to determine whether intact buried surfaces are present capable of containing pre-contact or historic cultural deposits. The following goals were set for the Phase IB investigation:

- Evaluate soil conditions between Riggs Avenue and West Lanvale Street, west of North Payson Street to determine whether there is potential for buried surfaces or features associated with the early development of the Monroe Riggs Historic District/ Midtown Edmondson Historic District.
- Evaluate soil conditions throughout the survey area to determine whether deeply buried surfaces are present that have the potential for containing pre-contact or early historic cultural deposits.
- Determine the need for additional Phase IB archaeological investigations and develop effective survey strategies to identify archaeological resources in the event intact buried surfaces are identified.

## 5.2 Research Methods

The Phase IB archaeological survey will include a geomorphology field survey, laboratory analysis, and reporting. A full health and safety plan (HASP) specific to the survey area and proposed field effort will be developed prior to the start of field investigations. This project-specific HASP will be developed to conform to Amtrak's current safety policies and procedures. All WSP personnel who are assigned to the field effort will be required to review, sign, and follow the procedures laid out in the HASP document. WSP will also conduct daily safety briefings ("tailgates") prior to the start of the fieldwork.

General site and survey area conditions, areas of interest, and crew activities will be documented by the WSP archaeology supervisor. A daily log will be maintained recording information about work progress, visitors to the site, safety issues, weather conditions and/or impediments to work, and general observations and results. Any identified archaeological resources will be recorded on project plans maps or aerial imagery, and further documented with hand drawn sketch maps. The fieldwork will be documented using digital photography.

*Geomorphology Field Survey*

Prior to the geomorphological survey, the survey team will request a utility mark-out by Miss Utility. All boring locations will be placed in area to avoid underground utilities. The fieldwork will be completed by one team and may require up to two weeks to complete, dependent on permissions by property owners.

The geoarchaeological assessment will be conducted by a qualified geoarchaeologist and will entail mechanized direct push geotechnical sampling at selected locations throughout the survey area. The boring locations will be selected by the geoarchaeologist and a quantity of boring will be sufficient to adequately characterized the depth of fill and the presence of intact buried surfaces throughout all portions of the survey area.

Mounted on a standard-sized pickup truck or small mechanized rig, the Geoprobe retrieves a continuous soil column that is approximately two inches in diameter, with minimal damage to the landscape. Each

probe is advanced in four-foot increments to the necessary depths. Given that natural soils in this area could have been floodplain or terrace remnant, the goal will be to reach depths of up to 20 feet below current grade in each test area. All borings holes will be filled topsoil, gravel or cement grout following the completion of testing.

*Laboratory Analysis*

Recovered soil columns will be analyzed on-site at the time of their recovery or collected and transported to the laboratory for later analysis. Examined soil columns will be described employing standard pedological designations for soil horizons, as well as standard descriptive terminology such as Munsell color notations and USDA soil textural classes. Logs will be produced for each of the borings. Artifacts and other material recovered from the soil columns will be photographed, analyzed and a description and depth of the recovered material will be noted in the logs. The soil columns will be retained over the duration of the project and discarded following the acceptance of the report.

*Reporting*

A geomorphology survey report will be completed following the completion of the field investigation and laboratory analysis. The report will minimally consist of a description of the survey area and the results of the relevant background research which includes geology, hydrology, geomorphology, soils, and regional cultural context. The report will also include a description and results of the field investigation, field observations, laboratory analysis and result, and the evaluation of the investigation in terms of its goals, objectives and research topics. The report will also be illustrated with appropriate maps, photographs, charts and tables documenting the excavation and analysis. If intact buried ground surfaces are identified, the report will also provide recommendations for future studies as well as proposed testing strategies to complete Phase IB archaeological testing. The report will include appendices consisting of boring logs and other supporting information and data that will provide sufficient information to complete an accurate review of the study results and recommendations.

One digital copy of the draft report will be provided to Amtrak in both Microsoft Word and pdf format. Upon receipt of comments, a digital copy of the revised draft report will be submitted to Amtrak for delivery to the FRA for their review and comment. Upon the receipt of FRA comments, a final report will be delivered in electronic format (PDF) with two (2) hard copies for review by MHT and a digital copy of the redacted final report will also be provided to the consulting parties.

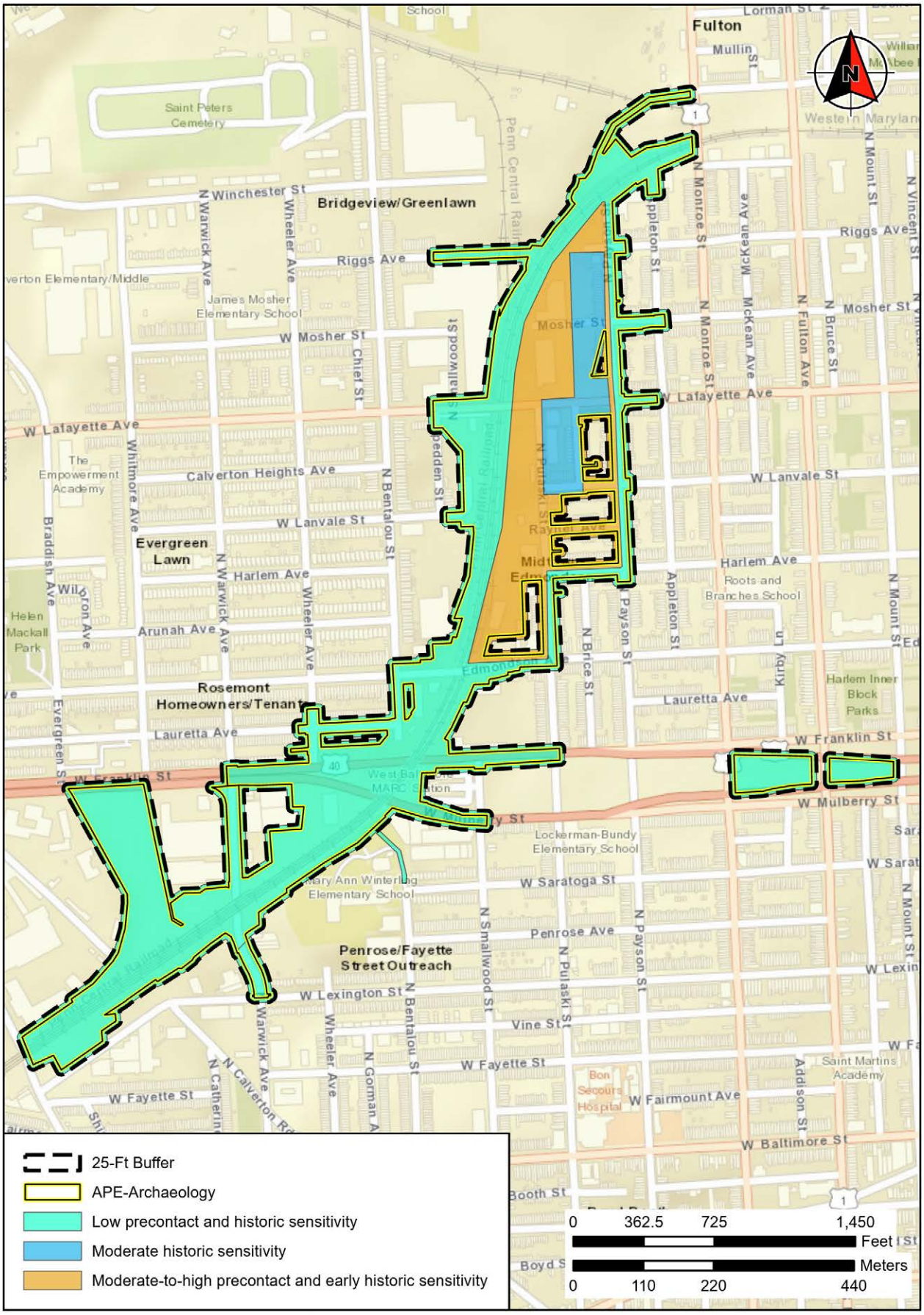
## 6. KEY STAFF QUALIFICATIONS

**H. Henry Ward, Cultural Resource, WSP USA** – 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.

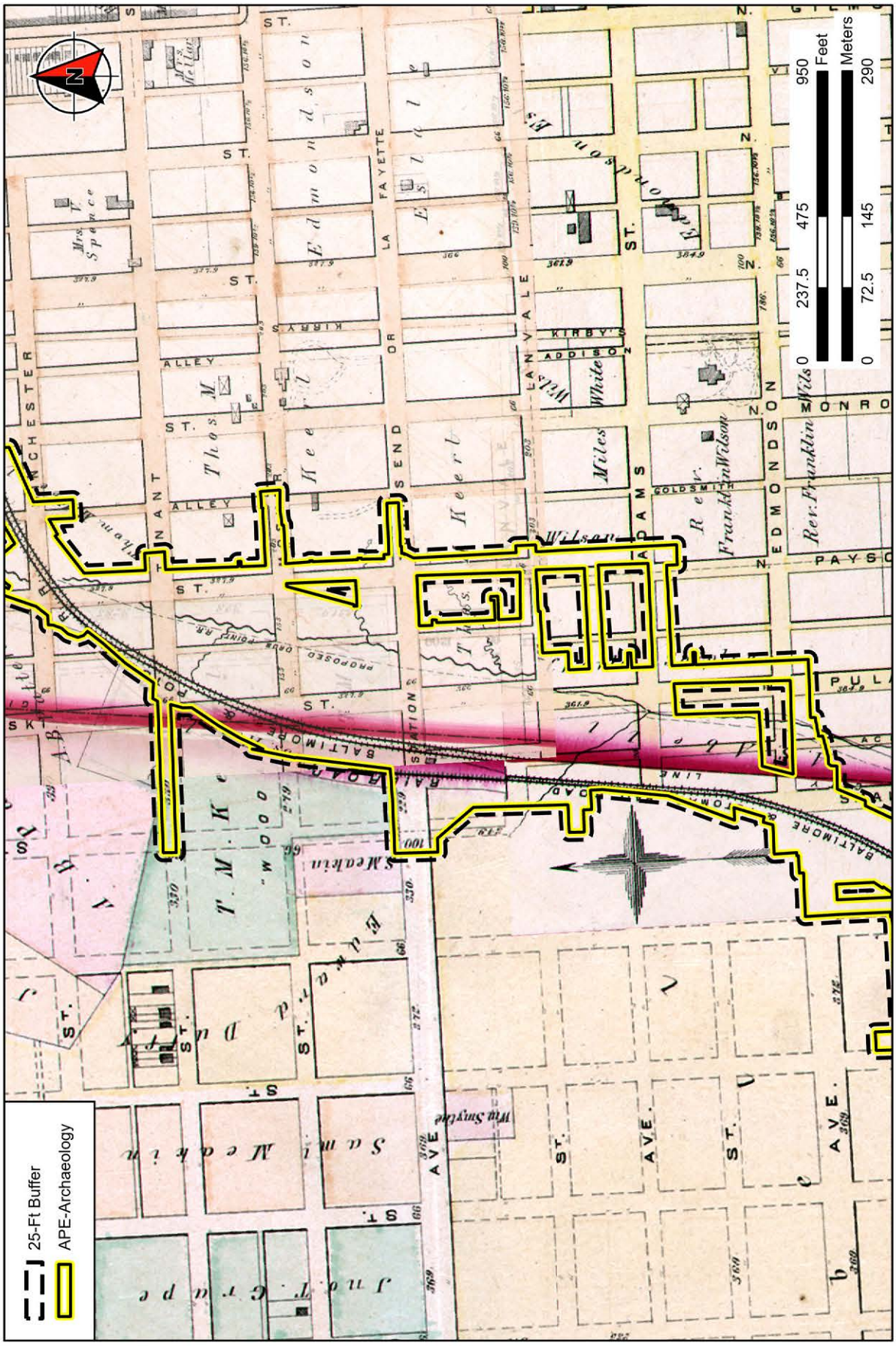
**Jason P. Shellenhamer, WSP USA** – Mr. Shellenhamer is a senior archaeologist with WSP and will serve as the principal investigator; he exceeds the Secretary of the Interior's Professional Qualification Standards for Archaeology. Mr. Shellenhamer has 21 years of experience in archaeology that includes both precontact and historic era research in the Middle Atlantic, Northeast and Southeast 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.

**Joseph Clemens, WSP USA** – Mr. Clemens is an archaeologist with WSP and will serve as the field director for the Phase IB geomorphological survey. In addition to a BA in archaeology (Saint Mary's College, he also has a MA in Geology (University of Delaware) specializing in Geoarchaeology. Mr. Clemens has 11 years of experience conducting archaeological and geoarchaeological investigations in the Middle Atlantic region and meets the Secretary of the Interior's Professional Qualification Standards for Archaeology. He has participated in and supervised all levels of archaeological investigation and possesses a strong understanding of successful field methodologies applied in varied conditions. Mr. Clemens is well-versed in precontact and historic artifact analysis and interpretation, and has extensive experience conducting geomorphology studies in the Middle Atlantic region.

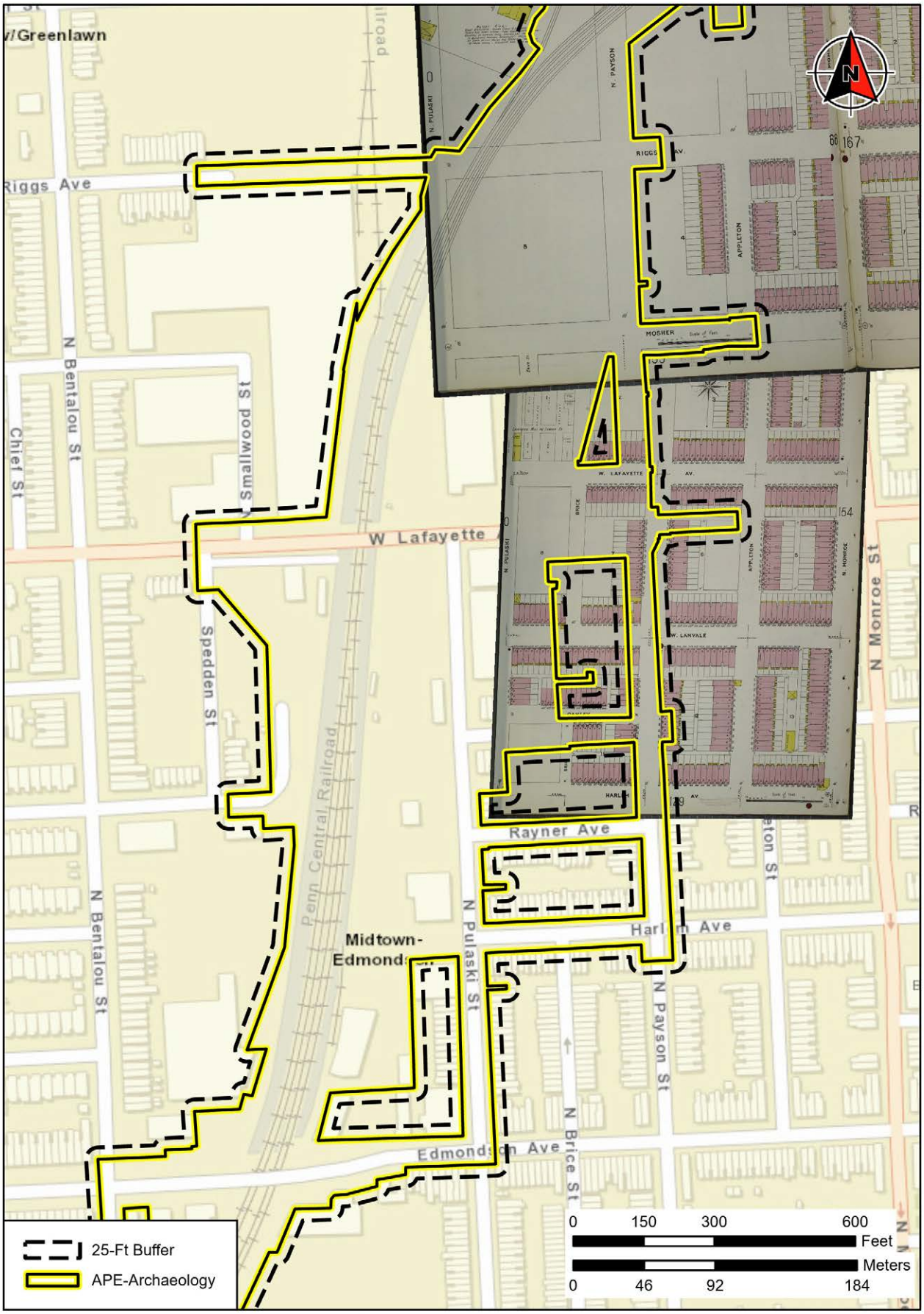
**Daniel P. Wagner, Geo-Sci Consultants, LLC** - Dr. Wagner has worked as a consulting pedologist throughout Eastern North America, Central America, and the Caribbean for more than 40 years. During this time he has either directed or contributed to some 1,200 projects applying soil-geomorphic principles to an array of land resource considerations. In recent years, Dr. Wagner has increasingly concentrated his efforts in pedoarchaeological (geoarchaeological) studies, and to date has contributed to over 430 such investigations. Most of these involved paleogeographic analyses of prehistoric sites emphasizing Holocene depositional and soil weathering sequences as well as evolving environmental conditions. He has also worked on a number of historic sites interpreting landscape modifications for settings ranging in diversity from eighteenth century tidewater plantations to the altered shorelines and core areas of major East Coast cities.



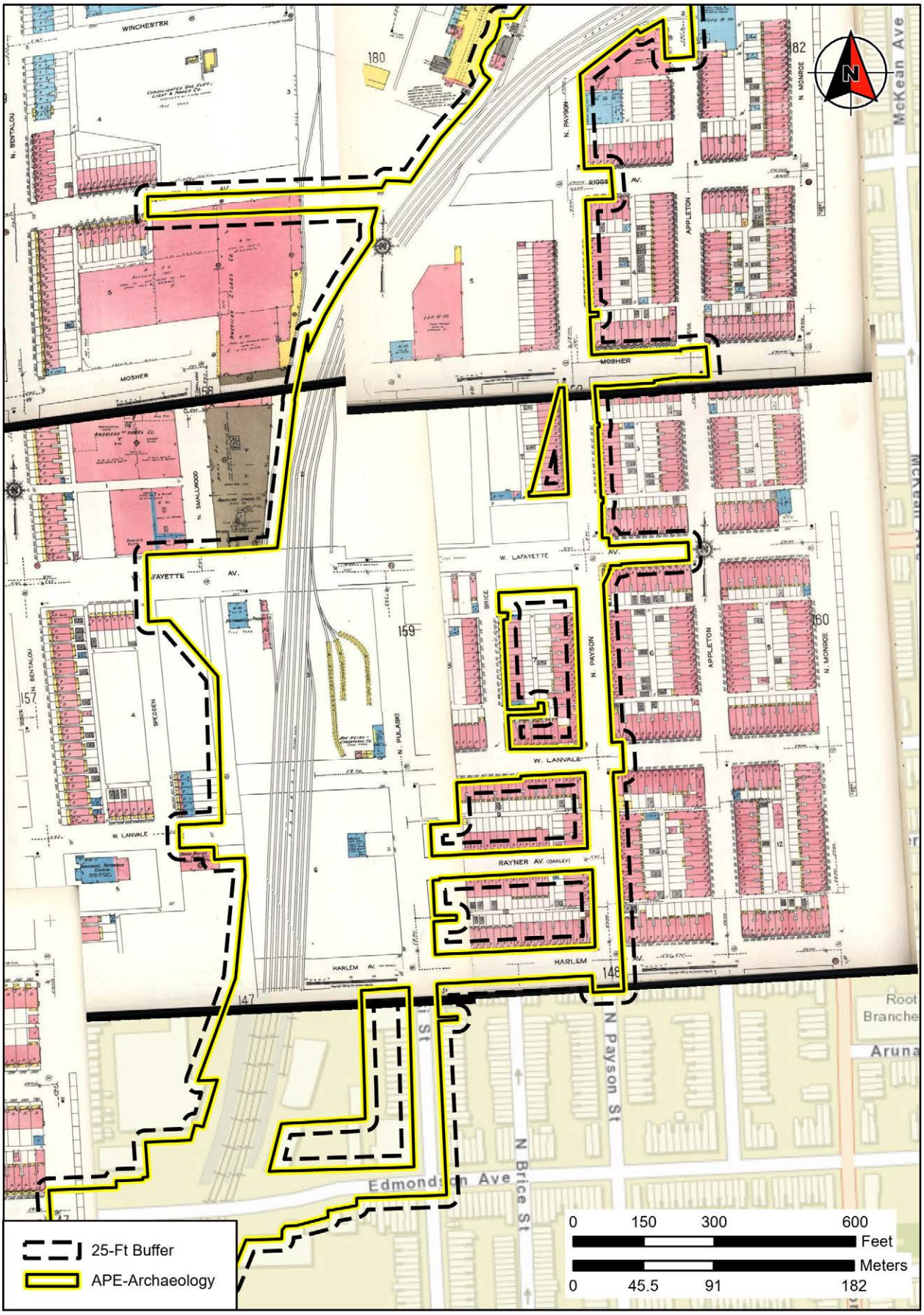

Boundaries of the Survey Area for the Geomorphology Study (ESRI World Street Map 2021)




Survey Area in 1876 (Hopkins 1876)




Survey Area in 1901 (ESRI World Street Map 2021)




Survey Area in 1914 (Sanborn Map Company 1901, ESRI World Street Map 2021)

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# APPENDIX D: PHASE IB/II ARCHAEOLOGICAL SURVEY WORK PLAN

# Work Plan for Phase IB/II Archaeological Survey of the Intermediate Ventilation Facility, Baltimore & Potomac Tunnel Replacement Program, Baltimore City, Maryland

## Draft

Prepared For:

AMTRAK

Prepared by:

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Baltimore, Maryland 21202

## 1. INTRODUCTION

On behalf of Amtrak, WSP USA Inc. (WSP) will conduct a Phase IB/II archaeological survey of the proposed survey area of the Intermediate Ventilation Facility for the Baltimore & Potomac Tunnel Replacement Program (Program) (Figure 1). As the result of a supplemental Phase IA survey for the Program, a portion of the Intermediate Ventilation Facility was assessed as having a moderate-to-high sensitivity for the presence of historic archaeological resources. The proposed survey area encompasses approximately 0.6-acre located on Linden Avenue and includes all areas assessed with a moderate-to-high sensitivity within this portion of the Area of Potential Effects (APE)-Archaeology. The purpose of the study is to identify any archaeological sites in the survey area that might be eligible for listing on the National Register of Historic Places (NRHP). In the event that archaeological sites are identified that require additional investigation to evaluate their potential for inclusion the NRHP, WSP will conduct Phase II archaeological evaluations to evaluate the identified archaeological site(s) for inclusion in the National Register of Historic Places, in accordance with Stipulation IV.D of the Programmatic Agreement (PA).

This investigation will assist FRA, as the lead federal agency, with its obligations under Section 106 of the National Historic Preservation Act, as amended (Section 106) and to resolve adverse effects on historic properties in accordance with the Section 106 implementing regulations (36 C.F.R. § 800) for the Program. The survey will also comply and be conducted consistent with Stipulations VI.B and VI.C.1 of the PA for the Program and the *Standards and Guidelines for Archaeological Investigations in Maryland* (Shaffer and Cole 1994).

## 2. PROJECT LOCATION AND DESCRIPTION

The proposed Intermediate Ventilation Facility (IVF) encompasses approximately 3.91 acres located at 900-940 West North Avenue. It is bound by Linden Avenue to the east and Eutaw Place to the west. The survey area is located at approximately 2002-2012 Linden Avenue, and consists of an approximately 0.6-acre area located in the northeast corner of the APE-Archaeology for the IVF. Seven late nineteenth-century rowhouses occupied the survey area. The houses were demolished in the mid-twentieth century and the survey area was paved for use as a surface parking lot. Currently, the survey area continues to be utilized as a customer parking lot for the E-Z Laundromat located at 2000 Linden Avenue.

The survey area is located within the Fall Zone region of the Upland Piedmont physiographic province. A transitional region between the Coastal Plain and the Piedmont, where the rolling terrain and hilltops formed from crystalline bedrock are sometimes overlain by unconsolidated sediments that are thicker toward the southeast. Historically, the survey area was located on the toe slope of a hill adjacent to an unnamed tributary of the Jones Falls. By the late-nineteenth century, the ground surface was modified as the urban core of Baltimore expanded north. Currently, the survey area is situated on a relatively level landform located at approximately 200 feet above mean sea level (amsl). The soils within the survey area are mapped as Urban land, 0 to 15 percent slopes (44UC). 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. Typically the impervious surfaces are underlain by fill which may cover natural soils underneath.

## 3. HISTORICAL MAP REVIEW

A review of the historical mapping indicates that the survey area was slow to develop and did not begin in earnest until the second half of the nineteenth century. The 1801 *Plan of the City and Enviros of Baltimore* indicates several large estates were present in the vicinity of the survey area and the IVF by the turn of the

nineteenth century (Warner and Hanna 1801). At that time, development in Baltimore was concentrated around the Inner Harbor and extended as far north as New Street (present-day Franklin Street). Areas north of New Street consisted of farms and estates surrounded by forests and pastures. The 1801 map indicates the survey area was part of an unimproved wood lot. Although no farms or other buildings are depicted in the survey area, a meandering cart road is shown to the south.

By the 1850s, portions of Baltimore's street grid were extended as far north as North Avenue; however, the area in the vicinity of the survey area was still rural. J.C. Sidney's 1857 *Map of the City and County of Baltimore* depicts three farms located in close proximity to the survey area (Sidney 1857). The house belonging to a "Mrs. Horn" is the closest, situated to the west of the survey area near the intersection of present-day Madison and West North avenues. A.D. Bache's 1865 *Approaches to Baltimore, Maryland* provides additional details about the improvements that occurred within the vicinity of the survey area during the mid-nineteenth century (Bache 1865). By that time, the meandering cart road (present-day Bloom Street) depicted to the southeast of the survey area in the 1801 map was realigned and straightened as it extended along the southeast side of the survey area. The map also depicts one house situated on the north side of the road, just outside the survey area boundary.

Between 1860 and 1880, settlement increased on the city's undeveloped periphery as families began to leave the center city for new neighborhoods that were connected to the city by horse-drawn street cars. Hopkins' 1876 *City Atlas of Baltimore, Maryland and Environs* reflects the increased development north of the city's original core during this period (Hopkins 1876). By 1876, the vicinity of the proposed location of the IVF was part of the new and rapidly growing neighborhood of Reservoir Hill (Figure 2). The neighborhood was primarily populated by German and Eastern European Jewish families who immigrated to the city during the second half of the nineteenth century, becoming one of Baltimore's largest predominately Jewish neighborhoods. The part of Bloom Street that previously extended along the southeast side of the survey area was closed and replaced by a city block owned by E. Whitman. While the survey area was vacant during that period, the Hopkins map depicts a single wood frame building located to the west near the corner of Eutaw Street (present-day Eutaw Place) and North Avenue with several other buildings located to the north.

In 1897, the proposed location of the IVF was occupied by a series of rowhouses extending along North Avenue and along Eutaw Street (present-day Eutaw Place) and Linden Avenue (Figure 3). Within the survey area, the 1897 *Atlas of the City of Baltimore* depicts seven brick rowhouses fronting Linden Street with the North Avenue Baptist Church to the south and Jordan Street to the west (Duncan 1897). No sheds or other outbuildings are depicted in the yards of the seven houses on the 1897 map.

Sanborn Fire Insurance maps provide additional details about the developmental history within the survey area during the first half of the twentieth century. The 1901 Sanborn map indicates that the seven houses within the survey area were numbered 2000 to 2012 Linden Avenue (Sanborn Map Company 1901). At that time, all seven brick rowhouses were three-story dwellings with two-story brick additions extending into the backyards (Figure 4). In 1901, the house at 2008 Linden Avenue also had a narrow wood frame shed off the brick addition. The Sanborn map from 1915 indicates a wood frame shed was also constructed off the back of the house at 2006 Linden Avenue by that time (Sanborn Map Company 1915). Another wood frame shed was constructed off the rear of 2004 Linden Avenue by the time the 1928 Sanborn map was published (Sanborn Map Company 1928). The 1928 map also indicates the presence of one-story adobe outbuildings located in the rear yards of 2010 and 2012 Linden Avenue (Figure 5). By 1928, the one-story wood frame North Avenue Baptist Church had been constructed between Linden Avenue and Jordan Street north of North Avenue (Sanborn Map Company 1928). By 1950, the North Avenue Baptist Church had been razed and replaced with a commercial building and the Linden movie theater fronting North Avenue (Sanborn Map Company 1950; Kilduffs 2015); however, the map indicates the seven rowhouses within the survey area remained unchanged during the intervening years (Figure 6).

All seven rowhouses were razed by 1957 as an aerial photograph show the survey area contained a paved parking lot at that time (Nationwide Environmental Title Research [NETR] 1957). Subsequent aerial photographs indicate the movie theater located to the south was razed by 1971 (the Linden Theatre was in operation from the late 1930s through the mid-1960s: Kilduffs 2015) while the survey area continued to be utilized for automobile parking through the present day (NETR 1971).

## 4. ARCHAEOLOGICAL RESOURCE POTENTIAL

The survey area is located within the NRHP-listed Reservoir Hill Historic District (B-1379), which was a predominantly Jewish neighborhood that was founded in the 1870s with the earliest houses located along Madison Avenue. Prior to the 1890s, the survey area remained undeveloped as new houses and other buildings were constructed on the surrounding city blocks. By the 1890s, the location for the IVF was primarily occupied by a series of brick rowhouse with basements located along Linden Avenue, Eutaw Place, and West North Avenue. The North Avenue Baptist Church was also constructed on the corner of Linden Avenue and West North Avenue. By the mid-twentieth century, the majority of the location proposed for the IVF was extensively redeveloped. All the rowhouses were razed and the Madison Park Medical Center was constructed on the corner of Eutaw Place and West North Avenue along with a parking lot on Linden Avenue. The North Avenue Baptist Church was also torn down at that time and replaced with commercial retail buildings.

The mid-twentieth-century redevelopment along West North Avenue and Eutaw Place likely caused significant ground disturbance that diminishes the potential to identify intact pre-contact or historic archaeological resources. However, the approximately 0.6-acre survey area along Linden Avenue is assessed as possessing a moderate-to-high sensitivity for the presence of historic archaeological resources dating from the late nineteenth to early twentieth centuries. Prior to the mid-twentieth-century redevelopment, seven brick rowhouses were located within the survey area. By the 1950s, the houses were razed and replaced with a paved parking lot. Construction of the parking lot would not have required significant ground disturbance. Depending on the extent of the demolition associated with the razed houses, there is a likelihood that intact basements and other cultural deposits may be preserved intact underneath the extant parking lot that may contribute to the understanding of this significant Baltimore Jewish community during the late nineteenth and early twentieth centuries.

## 5. RESEARCH GOALS AND METHODS

Archaeological tasks will be performed or overseen by qualified professionals as defined by the Secretary of the Interior (formerly 36CFR §61) and will be consistent with the principles and standards contained in *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (1983), *Consulting About Archeology Under Section 106* (Advisory Council on Historic Preservation 1990).

### 5.1 Research Goals

The goal of the Phase IB/II archaeological survey is to locate and evaluate archaeological resources that may be eligible for listing in the NRHP. The following goals were set for the Phase IB/II investigation:

- Identify and inventory archaeological resources within the survey area that may be eligible for listing in the NRHP.
- Define the horizontal and vertical limits of identified archaeological sites and deposits within the survey area.
- Characterize, interpret, and assess the potential significance of identified archaeological resources;
- Assess the effect of the undertaking on the identified archaeological resources.
- Determine the need for additional archaeological investigations, as warranted.

## 5.2 Research Methods

The Phase IB/II archaeological survey will include additional documentary research of the survey area, followed by archaeological field survey, laboratory analysis of recovered artifacts, and reporting. A full health and safety plan (HASP) specific to the survey area and proposed field effort will be developed prior to the start of field investigations. This project-specific HASP will be developed to conform to Amtrak's current safety policies and procedures. All WSP personnel who are assigned to the field effort will be required to review, sign, and follow the procedures laid out in the HASP document. WSP will also conduct daily safety briefings ("tailgates") prior to the start of the fieldwork.

General site and survey area conditions, areas of interest, and crew activities will be documented by the WSP archaeology supervisor. A daily log will be maintained recording information about work progress, visitors to the site, safety issues, weather conditions and/or impediments to work, and general observations and results. Any identified archaeological resources will be recorded on project plans maps or aerial imagery, and further documented with hand drawn sketch maps. The fieldwork will be documented using digital photography.

*Documentary Research*

Additional background research will be conducted, specific to the occupation of the rowhouses that were located at 2000 to 2012 Linden Avenue. The research will allow for the development of a site-specific historic context and allow for the accurate characterization and interpretation of any archaeological resources or deposits that are identified during the investigation. The research will include the review of pertinent primary and secondary sources, including additional historical maps and atlases, land records, Baltimore City directories, wills, probate inventories, genealogical files, census records, and local histories. Several repositories will be consulted as part of the investigation including, the Maryland State Archives in Annapolis, the Baltimore City Archives in Baltimore, and the Maryland Center for History and Culture which is also located within the City of Baltimore.

*Archaeological Field Survey*

Because the survey area is located in an urban setting and covered by an impervious asphalt parking lot, the archaeological survey will be completed utilizing mechanically excavated trenches. The purpose of the survey is to ascertain the subsurface condition within the survey area and identify and record the presence of subsurface archaeological features and deposits. The excavation of the trenches is intended to collect information on the presence and character of the subsurface remains, rather than allow for intensive excavation or data recovery. As a result, the Phase IB/II survey will include the excavation of eight to 10 backhoe trenches excavated within the 0.62-acre survey area. Each trench will measure approximately 5 by 10 feet.

Prior to commencing field investigations, a ticket will be submitted to Miss Utility to identify and mark buried utilities within the survey area. Locations containing buried utilities will be avoided during the field investigation. All excavations will be directed by the archaeological field team, who will observe and record the excavation process. Rectangular cuts will be made into the asphalt parking lot within the proposed trench locations and a backhoe will be utilized to remove the broken asphalt and any underlying fill soils that may be present. Fill soils will not be screened for artifacts, but any manmade debris will be noted.

The mechanical excavation of the trenches will cease in the event that intact soils or archaeological features are identified and manual excavation within the trenches will commence. Excavations of trenches that extend deeper than five feet will require shoring or be expanded and benched before excavation can continue. Following excavation, the stratigraphy of each trench will be documented. Stratigraphic profile drawings will be prepared of at least one wall of each trench, and digital photographs will be taken. Plans

will be prepared of any foundations or other features uncovered. The location of each trench will be mapped by hand on paper site plans, and recorded using a sub-meter GPS device.

Test units will be excavated with shovels and trowels within trenches where intact soil or archaeological features are identified. Test units will generally measure 3 by 3 feet; however, the size and shape of the test units may be modified to maximize the excavation or sampling of identified features. Test units will be excavated by four-inch arbitrary levels within the natural soil stratigraphy. If a soil horizon interface is encountered within an arbitrary level, the level will be split into natural horizons, with the upper horizon removed down to the interface and screened as one provenience, and the lower horizon screened as a separate provenience down to the base of the level, with separate stratum/level forms completed for each horizon. This method allows the results to be analyzed by four-inch arbitrary levels as well as by natural soil horizon. All excavated soil matrix will be screened through 0.25-inch hardware mesh. The excavation will be documented on standard stratum/level test unit forms will be filled out for each level excavated. Data collected during the excavation will include depth measurements in each corner and in the center of the test unit, USDA soil texture, Munsell soil color, artifacts recovered, disturbances present, date, and excavator initials, as well as observations during excavation and preliminary archaeological interpretations. Artifacts collected during excavation will be bagged by level and stratum provenience. If diagnostic artifacts are encountered *in situ*, their precise horizontal and vertical location within the test unit will be mapped and recorded.

Because of the urban setting of the project, selective artifact retention and discard procedures will be employed during the Phase IB/II survey. Items with limited research potential such as coal, slag, brick, mortar, slate, building stone, plastic, rubber and other synthetic materials will be sampled in the field. A single artifact within these categories will be retained; the rest will be counted and discarded onsite. The test unit will be excavated a maximum of two levels into sterile subsoil, or until the OSHA-defined maximum excavation limits are reached. Hand augers will be utilized to confirm deeper soil profiles if sterile soil is not encountered before reaching OSHA defined depths. A soil profile will be drawn of at least one wall of each test unit, which will be supplemented by digital photographs of the same wall. Test units will be mapped on scale site plans and recorded using a sub-meter GPS unit.

If cultural features are encountered during test unit excavation, they will be treated as distinct analytical units. Foundations or other structural features identified during the investigation will be fully exposed within the trenches. Scale photographs and drawings will be made of the structural features and documented on standardized forms. Other subsurface cultural features encountered during the course of the investigation will be fully excavated within the trenches to determine function. Once the feature is uncovered, it will be mapped in plan view with elevations taken relative to the datum. Following initial documentation, the features will be bisected along their longest axis and one half will be excavated in 0.3-foot arbitrary levels. Following their bisection, feature profiles will be drawn to scale and photographed. Once documentation is complete, the second half of the feature will be excavated following the same protocols. Feature soils will be screened through 0.25-inch mesh in order to facilitate artifact recovery. Final mapping and photography will be completed after the excavation of the feature is complete. All feature locations will also be plotted on a scale map and recorded utilizing a sub-meter GPS unit.

*Artifact Analysis and Curation*

All artifacts recovered from the survey will be washed, cataloged, and prepared for curation by experienced archaeological laboratory staff. Artifacts will be separated by material class (bone, shell, metal, ceramic, etc.) and each class will be analyzed using appropriate typologies. Significant and/or diagnostic artifacts will be digitally photographed. An electronic artifact catalog will be prepared and included as an appendix to the technical report. The artifacts will be processed for curation following standard archaeological practices and the revised MHT guidelines (Morehouse et al. 2018). The work will also be conducted consistent with state standards and guidelines for archaeological survey (Shaffer and Cole 1994). All artifacts will be temporarily stored at WSP's archaeological laboratory in Kansas City, Missouri. Upon

acceptance of the final report, the artifact collection will be delivered for curation at the Maryland Archaeological Conservation Laboratory (MAC Lab) in St. Leonard, Maryland.

*Reporting*

A technical Phase IB/II archaeological survey report will be completed following the completion of the field investigation and artifact analysis in accordance with MHT's *Standard and Guidelines for Archeological Investigations in Maryland* (Shaffer and Cole 1994). The draft Phase IB/II archaeological survey report will minimally consist of a description of the survey area and the results of the relevant background research which includes geology, hydrology, geomorphology, soils, and regional cultural context. The report will also include a description and results of the field investigation, identified sites, field observations, laboratory analysis and result, and the evaluation of the investigation in terms of its goals, objectives and research topics. The report will also be illustrated with appropriate maps, photographs, charts and tables documenting the excavation and analysis. The report will include appendices consisting of inventories, catalogues, MHT site forms, and other supporting information and data that will provide sufficient information to complete an accurate review of the study results and recommendations.

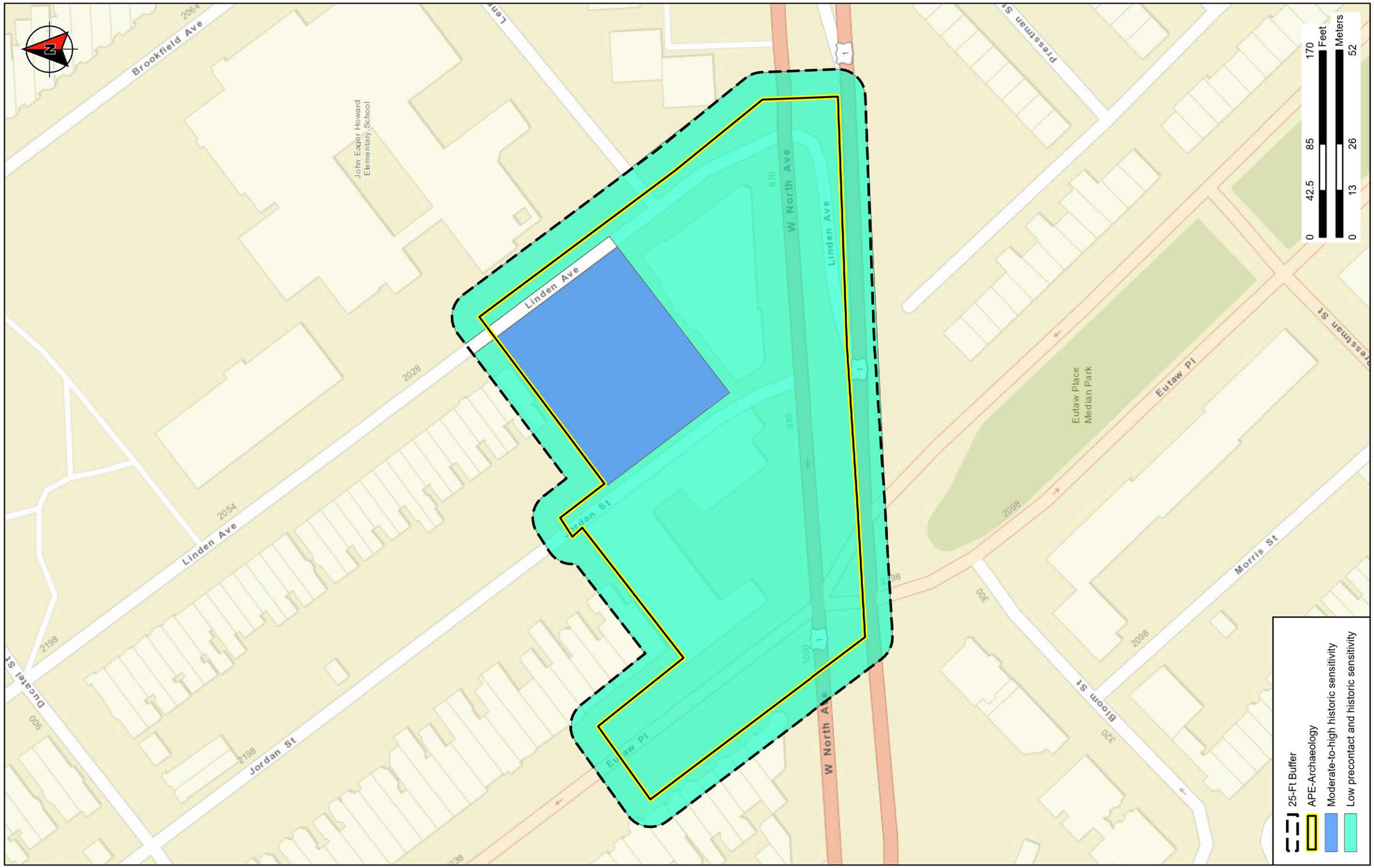
One digital copy of the draft report will be provided to Amtrak in both Microsoft Word and pdf format. Upon receipt of comments, a digital copy of the revised draft report will be submitted to Amtrak for delivery to the FRA for their review and comment. Upon the receipt of FRA comments, a final report will be delivered in electronic format (PDF) with two (2) hard copies for review by MHT and a digital copy of the redacted final report will also be provided to the consulting parties.

## 6. KEY STAFF QUALIFICATIONS

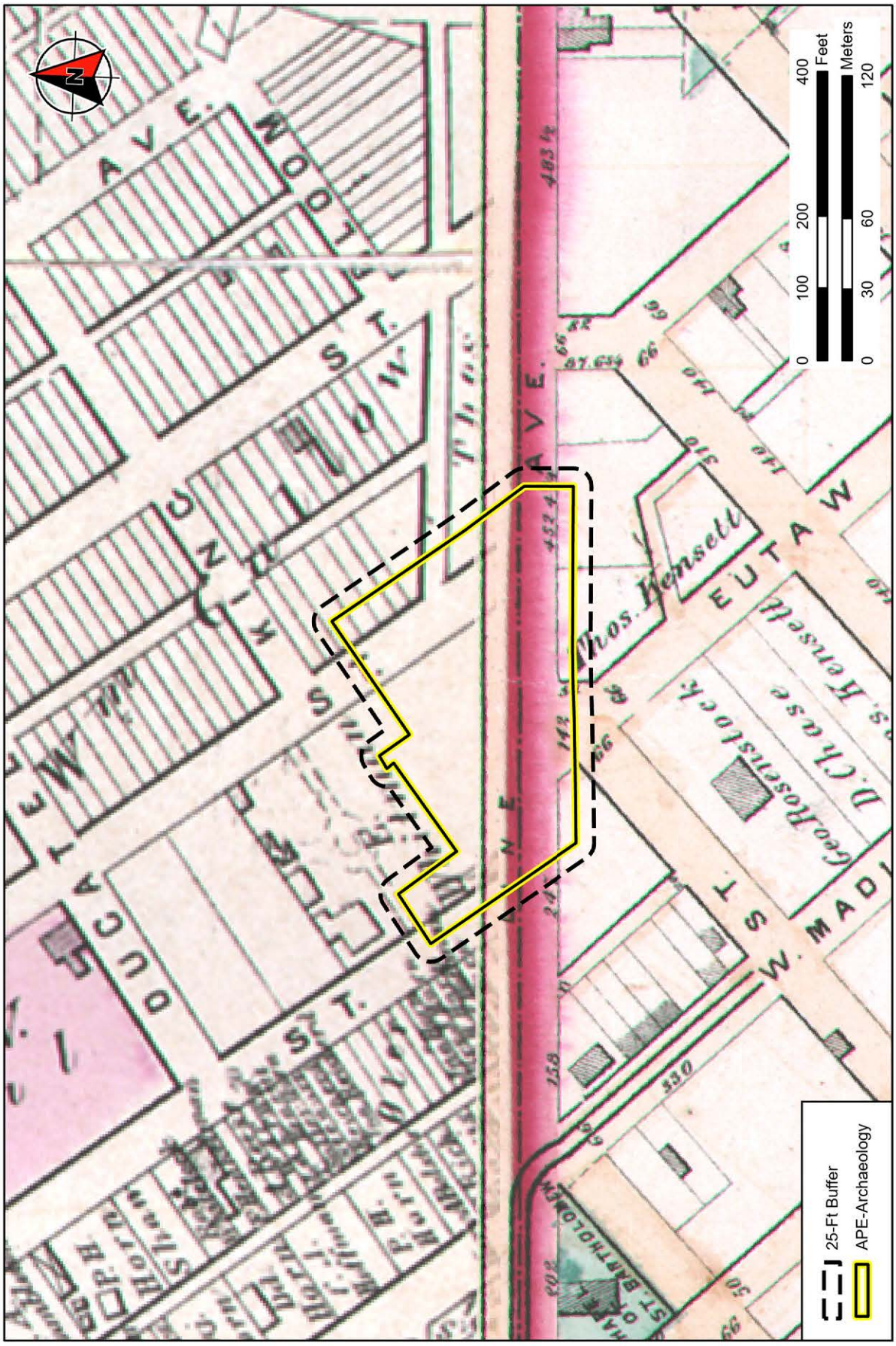
**H. Henry Ward, Cultural Resource, WSP USA** – Mr. Ward is the cultural resources project manager and WSP archaeologist with over 42 years of experience as a professional archaeologist and cultural resources manager and he exceeds the Secretary of the Interior's Professional Qualification Standards 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.

**Jason P. Shellenhamer, WSP USA** – Mr. Shellenhamer is a senior archaeologist with WSP and will serve as the principal investigator; he and exceeds the Secretary of the Interior's Professional Qualification Standards for Archaeology. Mr. Shellenhamer has 21 years of experience in archaeology that includes both precontact and historic era research in the Middle Atlantic, Northeast and Southeast 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.

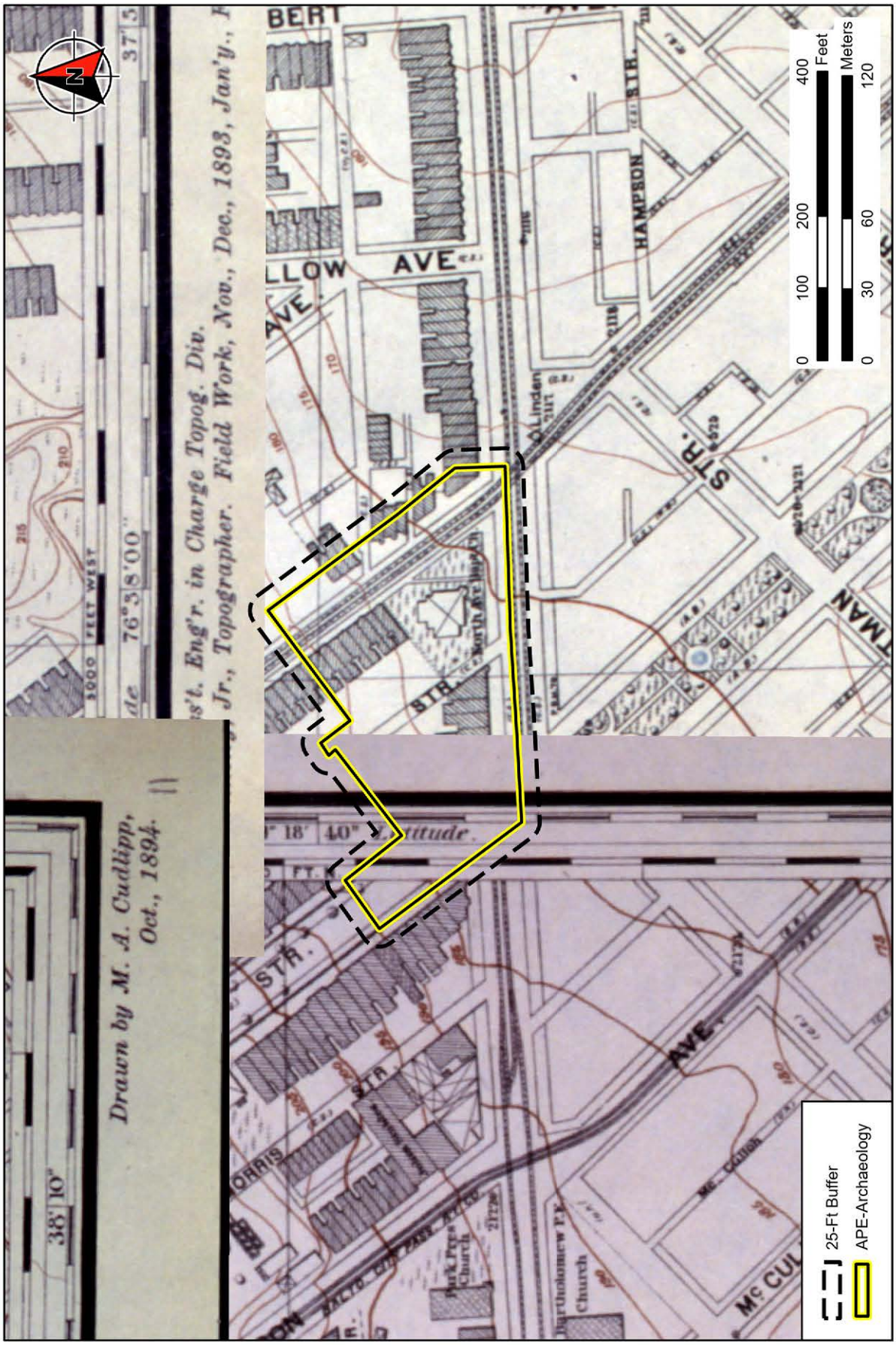
**Joseph Clemens, WSP USA** – Mr. Clemens is an archaeologist with WSP and will serve as the field director for the Phase IB/II survey. In addition to a BA in archaeology (Saint Mary's College), he also has a MA in Geology (University of Delaware) specializing in Geoarchaeology. Mr. Clemens has 11 years of experience conducting archaeological and geoarchaeological investigations in the Middle Atlantic region and he meets the Secretary of the Interior's Professional Qualification Standards for Archaeology. He has participated in and supervised all levels of archaeological investigation and possesses a strong understanding of successful field methodologies applied in varied conditions. Mr. Clemens is well-versed in precontact and historic artifact analysis and interpretation, and has extensive experience conducting geomorphology studies in the Middle Atlantic region.



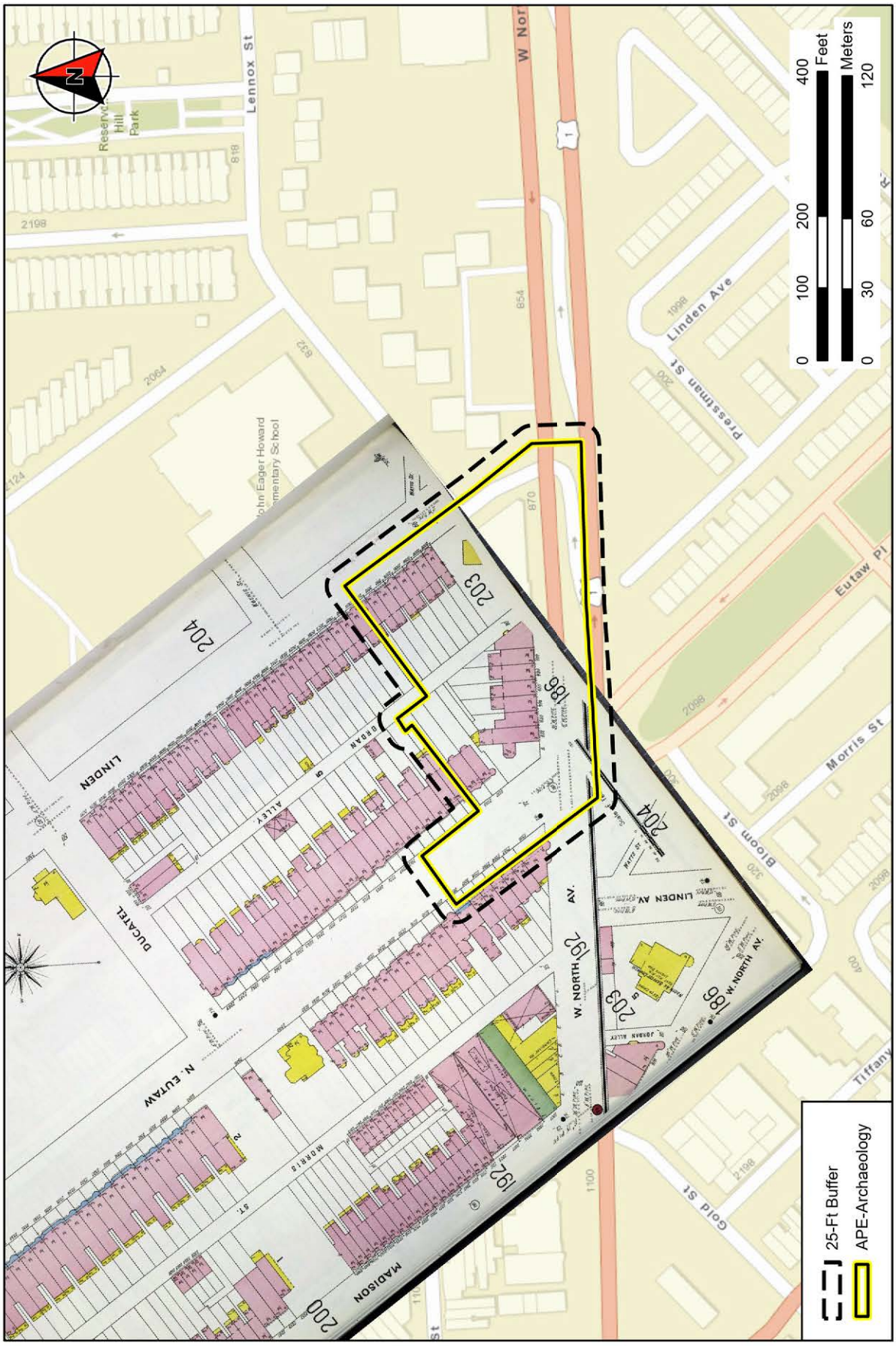

Boundaries of the Survey Area for the Phase IB Archaeological Study (ESRI World Street Map 2021)



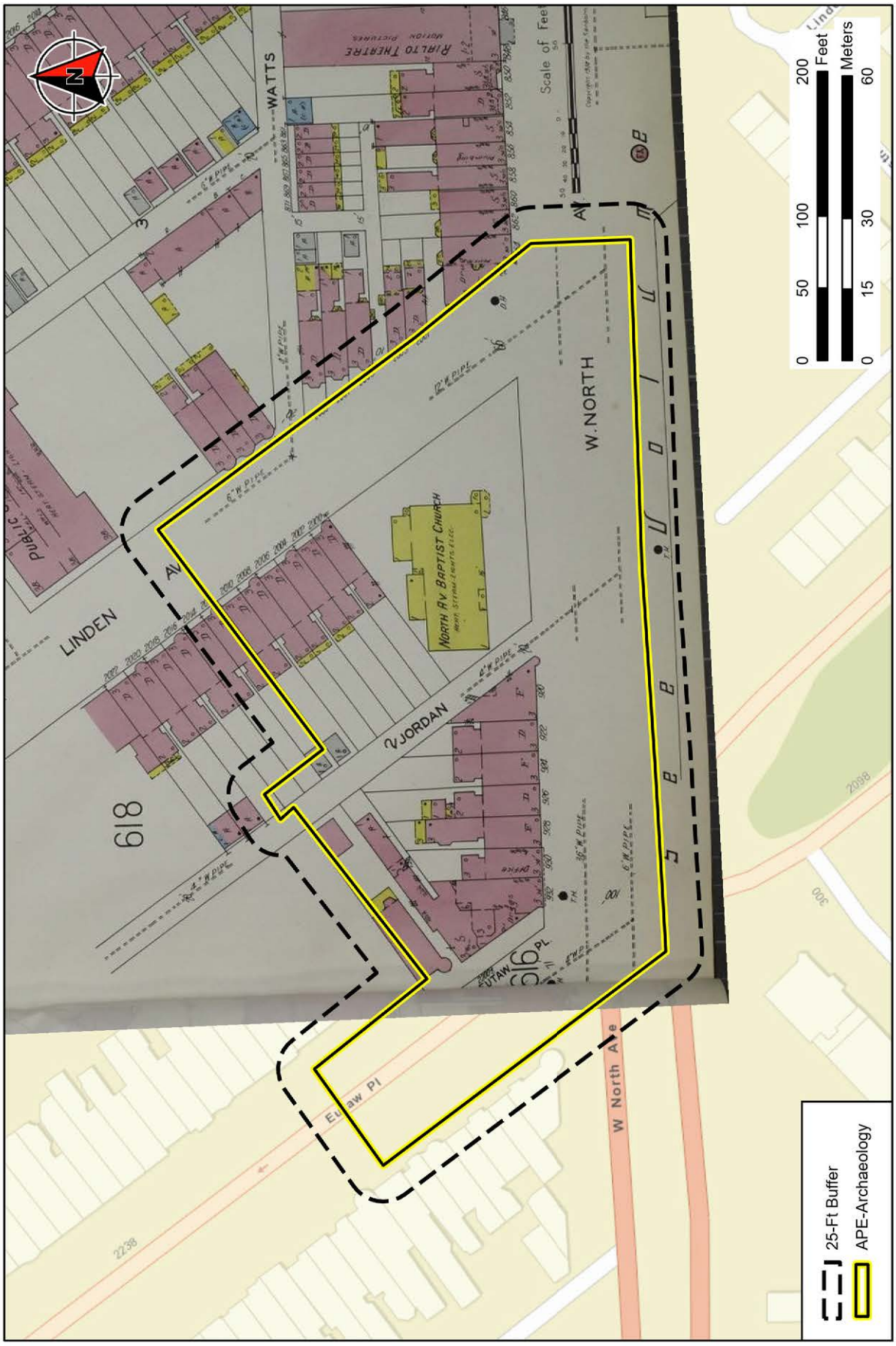

Project Vicinity in 1876 (Hopkins 1876)



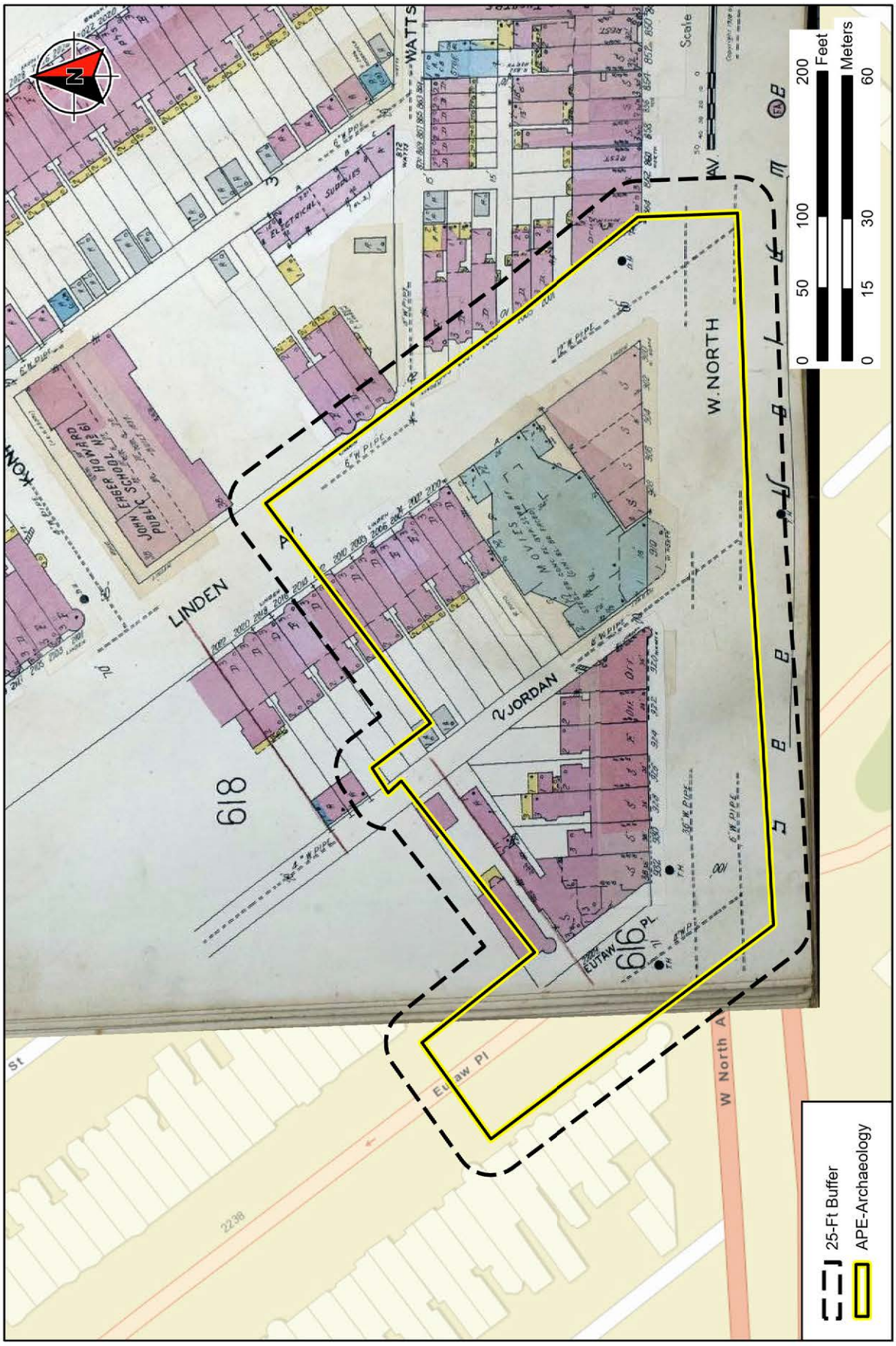

Survey Area in 1901 (Sanborn Map Company 1901, ESRI World Street Map 2021)




Survey Area in 1901 (Sanborn Map Company 1901, ESRI World Street Map 2021)




Survey Area in 1928 (Sanborn Map Company 1928, ESRI World Street Map 2021)




Survey Area in 1950 (Sanborn Map Company 1950, ESRI World Street Map 2021)

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