## PROJECT DESCRIPTION

IT IS PROPOSED TO REPLACE THE EXISTING BRIDGE (NO. MAD-62-0279) WHICH CARRIES US-62 OVER DEER CREEK, JUST NORTHEAST OF MOUNT STERLING, IN MADISON COUNTY, OHIO. THE PROPOSED REPLACEMENT STRUCTURE WILL BE A THREE-SPAN BRIDGE WITH PRE-STRESSED CONCRETE I-BEAMS AND INTEGRAL ABUTMENTS AND BE CONSTRUCTED ALONG HORIZONTAL AND VERTICAL ALIGNMENTS WHICH ARE APPROXIMATELY THE SAME AS THE EXISTING BRIDGE.

## HISTORIC RECORDS

AVAILABLE HISTORIC BRIDGE PLAN SHEETS DATED 1941 INDICATE THAT THE EXISTING BRIDGE IS SUPPORTED ON TIMBER PILING. NO HISTORIC BORING LOGS WERE LOCATED FOR THE EXISTING BRIDGE.

## GEOLOGY

THE PROJECT SITE IS LOCATED IN THE DARBY PLAIN PHYSIOGRAPHIC REGION. THE DARBY PLAIN IS CHARACTERIZED BY BROADLY HUMMOCKY GROUND WITH SEVERAL BROAD, RECESSIONAL MORAINES AND WISCONSINAN-AGE LOAMY TILL OVER SILURIAN AND DEVONIAN-AGE CARBONATE ROCKS. BASED ON AVAILABLE WELL LOGS, THE UPPERMOST BEDROCK NEAR THIS SITE IS LOCATED AT APPROXIMATE EL. 750.

## RECONNAISSANCE

A SITE RECONNAISSANCE VISIT WAS MADE BY S&ME PERSONNEL ON MAY 26, 2017, TO OBSERVE THE EXISTING BRIDGE AND PROJECT VICINITY AND TO FIELD MARK THE BORINGS. SOME CONCRETE DETERIORATION WAS NOTED ON PORTIONS OF THE CONCRETE ABUTMENTS AND CENTER PIER.

## SUBSURFACE EXPLORATION

DURING THE PERIOD OF JUNE 5 THROUGH JUNE 9, 2017, S&ME PERFORMED A TOTAL OF THREE (3) BORINGS AT THIS SITE. THE BORINGS WERE DRILLED TO DEPTHS RANGING FROM 75 FEET TO 80 FEET BELOW THE EXISTING ROADWAY OR BRIDGE DECK SURFACE, AND WERE TERMINATED AFTER ENCOUNTERING 30 FEET OF 30 BLOW-COUNT SOIL.

THE BORINGS WERE PERFORMED USING A TRUCK-MOUNTED DRILLING RIG USING 3-1/4-INCH I.D. HOLLOW-STEM AUGERS. DISTURBED (BUT REPRESENTATIVE) SOIL SAMPLES WERE OBTAINED BY LOWERING A 2-INCH O.D. SPLIT-BARREL SAMPLER THROUGH THE AUGER STEM TO THE BOTTOM OF THE BORING AND THEN DRIVING THE SAMPLER INTO THE SOIL WITH BLOWS FROM A 140-POUND HAMMER FREELY FALLING 30 INCHES (ASTM D1586 - STANDARD PENETRATION TEST, SPT). IN ACCORDANCE WITH THE CURRENT ODOT SPECIFICATIONS, THE HAMMER SYSTEM ON THE DRILL RIG WAS CALIBRATED IN ACCORDANCE WITH ASTM D 4633 TO DETERMINE THE DRILL ROD ENERGY RATIO (99.9%). CONTINUOUS (SPT) SAMPLING WAS PERFORMED IN THE UPPERMOST 6 FEET OF SOIL BELOW THE APPROACH PAVEMENTS, AND IN THE SCOUR ZONE FROM THE APPROXIMATE STREAMBED LEVEL TO 6 FEET BELOW THE STREAMBED LEVEL IN ALL 3 BORINGS. BENEATH THE CONTINUOUS SAMPLING, THE BORINGS WERE SAMPLED AT 2-1/2-FOOT INTERVALS TO 20 FEET BELOW THE FOUNDATION LEVEL. THE REMAINDER OF THE BORINGS WERE SAMPLED AT 5-FOOT INTERVALS. TWO (2) UNDISTURBED SHELBY TUBES SAMPLES WERE ATTEMPTED BY HYDRAULICALLY PRESSING A SEAMLESS STEEL (SHELBY) TUBE INTO THE SOIL; HOWEVER, ONE OF THESE SHELBY TUBE ATTEMPTS ENCOUNTERED REFUSAL IN A SAND AND GRAVEL LAYER. THE RECOVERED SHELBY TUBE SAMPLES WERE SEALED IN THE TUBE WITH WAX. AT COMPLETION, THE ABUTMENT BORINGS WERE SEALED IN ACCORDANCE WITH ODOT SPECIFICATIONS.

## EXPLORATION FINDINGS

IN BORINGS B-001 AND B-003, BETWEEN 9 AND 10 INCHES OF ASPHALT AND BETWEEN 14 AND 15 INCHES OF GRANULAR BASE WAS ENCOUNTERED. BENEATH THE SURFICIAL MATERIALS BETWEEN 3.0 AND 11.0 FEET OF FILL AND/OR PROBABLE FILL WAS ENCOUNTERED. A LAYER OF SLIGHLTY TO MODERATELY ORGANIC CLAY (A-7-6) WAS ENCOUNTERED BELOW THE FILL IN BOTH BORINGS. SOILS DESCRIBED AS GRAVEL (A-1a), GRAVEL WITH SAND (A-1b), SANDY SILT (A-4a), SILT AND CLAY (A-6A), SILTY CLAY (A-6B), ELASTIC CLAY (A-7-5), CLAY (A-7-6)

BORING B-002 WAS PERFORMED NEAR THE CENTER OF THE EXISTING CREEK CHANNEL AND NEAR THE EXISTING CENTER BRIDGE PIER. AFTER ENCOUNTERING THE STREAM BED AT A DEPTH OF 23 FEET BELOW THE EXISTING BRIDGE DECK, BORING B-002 ENCOUNTERED 22.5 FEET OF VERY-STIFF TO HARD GRAY SILTY CLAY (A-6B) AND CLAY (A-7-6) OVER 34.5 FEET OF HARD BROWN BECOMING GRAY SANDY SILT (A-4A) PRIOR TO BEING TERMINATED AT A DEPTH OF 80 FEET.

WATER WAS ENCOUNTERED IN ALL OF THE BORINGS. THE DEPTHS WHERE THE INITIAL SEEPAGE WAS NOTED RANGED FROM 18.5 FEET TO 23 FEET BELOW THE APPROXIMATE EXISTING ROADWAY SURFACE. NO LONG TERM GROUNDWATER MEASUREMENTS WERE OBTAINED IN ANY OF THESE EXPLORATIONS.

## SPECIFICATIONS

THIS GEOTECHNICAL EXPLORATION WAS PERFORMED IN ACCORDANCE WITH THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, OFFICE OF GEOTECHNICAL ENGINEERING, SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS, DATED JULY 2017.

## AVAILABLE INFORMATION

ALL AVAILABLE SOIL AND BEDROCK INFORMATION THAT CAN BE CONVENIENTLY SHOWN ON THE GEOTECHNICAL EXPLORATION SHEETS HAS BEEN SO REPORTED. ADDITIONAL EXPLORATIONS MAY HAVE BEEN MADE TO STUDY SOME SPECIAL ASPECT OF THE PROJECT. COPIES OF THIS DATA, IF ANY, MAY BE INSPECTED IN THE DISTRICT DEPUTY DIRECTOR'S OFFICE OR THE OFFICE OF GEOTECHNICAL ENGINEERING AT 1980 WEST BROAD STREET, COLUMBUS, OHIO.

## LEGEND

| DESCRIPTION | ODOT CLASS | CLASSIFIED MECH. | CLASSIFIED VISUAL |
|---|---|---|---|
| GRAVEL | A-1-a | 5 | 1 |
| GRAVEL WITH SAND | A-1-b | 2 | 1 |
| SANDY SILT | A-4a | 12 | 11 |
| SILT AND CLAY | A-6a | 6 | 5 |
| SILTY CLAY | A-6b | 5 | 4 |
| ELASTIC CLAY | A-7-5 | 1 | - |
| CLAY | A-7-6 | 9 | 6 |
| | TOTAL | 40 | 28 |

PAVEMENT OR BASE = X = APPROXIMATE THICKNESS — VISUAL

BORING LOCATION - PLAN VIEW.

DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.

*WC* INDICATES WATER CONTENT IN PERCENT.

$N_{60}$ INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.

*X/Y/Z* NUMBER OF BLOWS FOR STANDARD PENETRATION TEST (SPT):
X= NUMBER OF BLOWS FOR FIRST 6 INCHES.
Y= NUMBER OF BLOWS FOR SECOND 6 INCHES.
Z= NUMBER OF BLOWS FOR THIRD 6 INCHES.

W— INDICATES FREE WATER ELEVATION.

SS INDICATES A SPLIT SPOON SAMPLE.

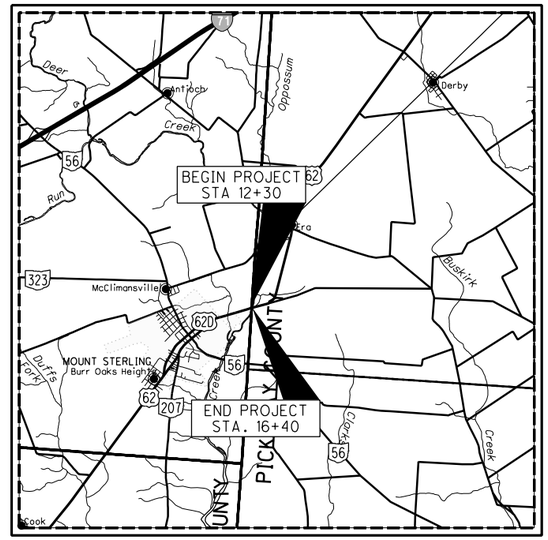
ST INDICATES A SHELBY TUBE SAMPLE.

NP INDICATES A NON-PLASTIC SAMPLE.

UCS INDICATES AN UNCONFINED COMPRESSION TEST (SOIL)

## SCOUR ZONE GRAIN SIZE INFORMATION

| BORING NUMBER | LOCATION | SAMPLE DEPTH | SAMPLE ELEVATION (MSL) | D50 (mm) | D95 (mm) |
|---|---|---|---|---|---|
| B-001-0-17 | REAR ABUTMENT | 21.5 - 23.0 | 839.9 - 841.4 | 1.3922 | 29.9007 |
| | | 23.0 - 24.5 | 838.4 - 839.9 | 3.9326 | 30.5077 |
| | | 24.5 - 26.0 | 836.9 - 838.4 | 5.1922 | 32.2722 |
| | | 26.0 - 27.5 | NO RECOVERY | | |
| | | 28.5 - 30.0 | 832.9 - 834.4 | 0.0128 | 1.5060 |
| B-002-0-17 | BRIDGE MID-SPAN | 23.0 - 24.5 | 838.6 - 840.1 | 0.0376 | 13.7463 |
| | | 24.5 - 26.0 | 837.1 - 838.6 | 0.0558 | 8.4188 |
| | | 26.0 - 27.5 | 835.6 - 837.1 | 0.0189 | 2.4746 |
| | | 27.5 - 29.0 | 834.1 - 835.6 | 0.0182 | 1.4140 |
| B-003-0-17 | FORWARD ABUTMENT | 21.0 - 22.5 | 839.8 - 841.3 | 6.0284 | 28.7310 |
| | | 22.5 - 24.0 | 838.3 - 839.8 | 4.3005 | 29.5872 |
| | | 24.0 - 25.5 | 836.8 - 838.3 | 6.3713 | 26.8127 |
| | | 25.5 - 26.0 | 835.3 - 836.8 | 3.7968 | 26.6974 |
| | | 28.5 - 30.0 | 832.3 - 833.8 | 0.0618 | 8.1744 |




LOCATION MAP

SCALE IN MILES

0 1 2 3 4

N

## PARTICLE SIZE DEFINITIONS

| BOULDERS | COBBLES | GRAVEL | COARSE SAND | FINE SAND | SILT | CLAY |
|---|---|---|---|---|---|---|
| 12" | 3" | 2.0 mm | 0.42 mm | 0.074 mm | 0.005 mm | |
| | | No. 10 SIEVE | No. 40 SIEVE | No. 200 SIEVE | | |

| INDEX OF SHEETS | | | | |
|---|---|---|---|---|
| LOCATION FROM STA. TO STA. | PLAN VIEW SHEET | PROFILE SHEET | CROSS-SECTION SHEET | EMBANKMENT CUT/FILL (MAX) |
| MAD-62 12+30 16+40 | 2 | 2 | - | 0 FT |

**RECON. -** RSW (5-26-2017)
**DRILLING -** KJD (6-5-2017 - 6-9-2017)
**DRAWN -** KJD (2-20-2018 - 3-7-2018)
**REVIEWED -** RSW (3-7-2018)

STATE OF OHIO
Richard S. Weigand
E-56910
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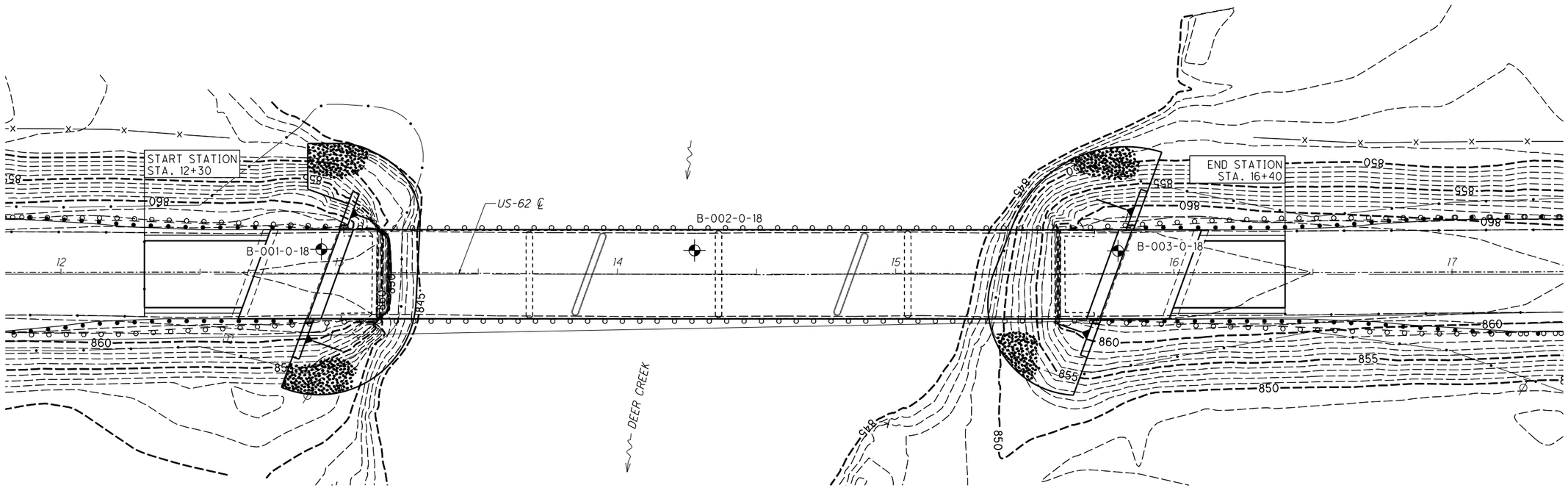
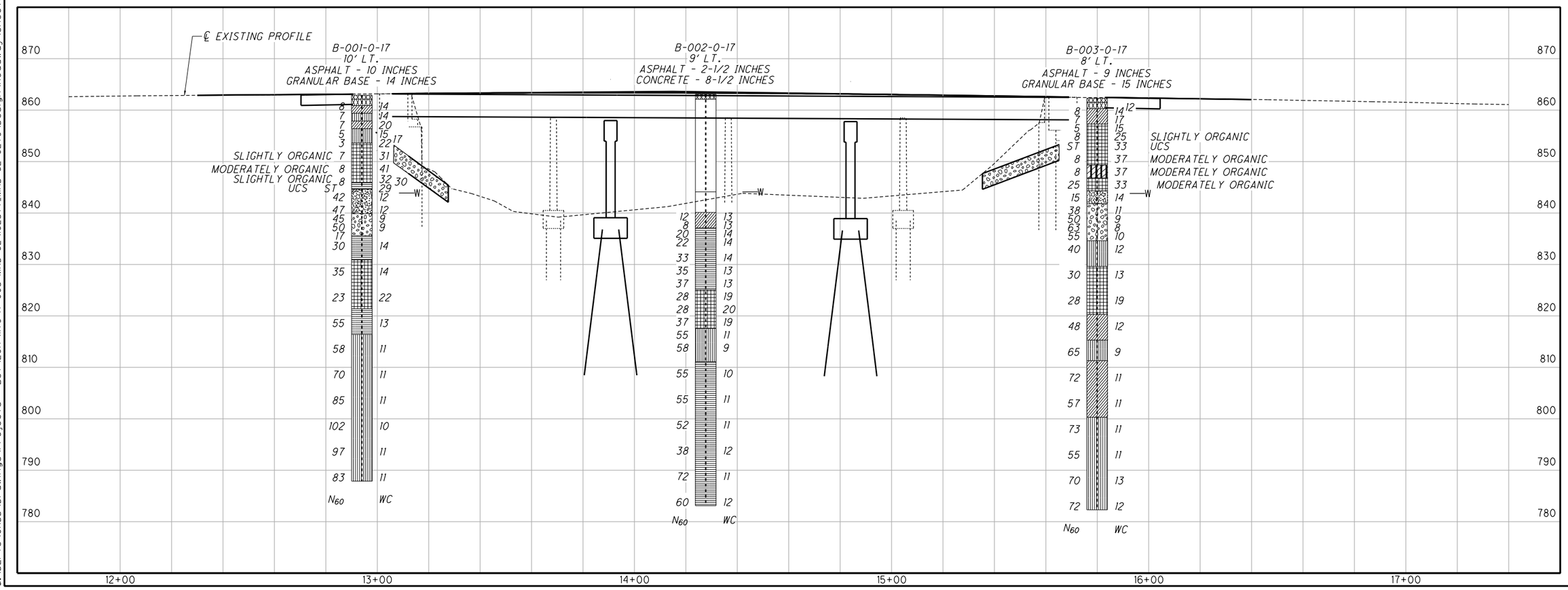
S&ME, Inc.
8400 Sweet Valley Drive
Valley View, OH 44125

PID NO. 102577

STRUCTURE FOUNDATION EXPLORATION

MAD-62-2.79




HORIZONTAL SCALE IN FEET
0 10 20 40

DRAWN KJD
CHECKED RSW

# STRUCTURE FOUNDATION EXPLORATION
## BRIDGE NO. MAD-62-0279 OVER DEER CREEK

MAD-62-2.79

2 / 9

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 12+94, 10' LT | EXPLORATION ID B-001-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 862.9 (MSL) EOB: 75.0 ft. | PAGE 1 OF 2 |
| START: 6/5/17 END: 6/6/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725119 N, 83.250567 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT/RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GR | CS | FS | SI | CL | LL | PL | PI | WC | ODOT CLASS (GI) | HOLE SEALED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT – 10 INCHES | 862.9 | | | | | | | | | | | | | | | | | |
| GRANULAR BASE – 14 INCHES | 862.1 | | | | | | | | | | | | | | | | | |
| FILL: Stiff to very-stiff brown SILT AND CLAY, little fine to coarse sand, trace fine gravel, few medium-stiff zones, damp. | 860.9 | | 2 2 3 | 8 | 33 | SS-1 | 0.5–2.5 | – | – | – | – | – | – | – | – | 14 | A-6a (V) | |
| FILL: Stiff light-brown SANDY SILT, some clay, little fine gravel, damp. | 859.4 | | 2 2 2 | 7 | 56 | SS-2 | 1.5–1.75 | 11 | 9 | 18 | 40 | 22 | 24 | 15 | 9 | 14 | A-4a (5) | |
| FILL: Medium-stiff to stiff brown SILT AND CLAY, some fine to coarse sand, trace fine gravel, damp to moist. | 857.9 | | 2 2 2 | 7 | 56 | SS-3 | 0.5–1.5 | 3 | 8 | 18 | 43 | 28 | 28 | 15 | 13 | 20 | A-6a (8) | |
| FILL: Soft to stiff brown SANDY SILT, some clay, trace fine gravel, moist. | 856.4 | | 1 2 1 | 5 | 61 | SS-4 | 0.7–1.1 | – | – | – | – | – | – | – | – | 15 | A-6a (V) | |
| PROBABLE FILL: Medium-stiff to stiff brown becoming dark-brown CLAY, "and" silt, little fine to coarse sand, trace fine gravel, slightly organic (SS-6/SS-8A) to moderately organic (SS-7), few pockets of topsoil, moist.<br>– Sample SS-7: LOI = 8.3%.<br>– Sample SS-8A: LOI = 1.5%. | 853.6 | | 1 1 1 | 3 | 89 | SS-5A | 0.25–0.6 | 10 | 12 | 18 | 39 | 21 | 24 | 15 | 9 | 17 | A-4a (5) | |
| | | | | | | SS-5B | 0.25 | – | – | – | – | – | – | – | – | 22 | A-4a (V) | |
| | | | 1 2 2 | 7 | 72 | SS-6 | 0.5–1.5 | 4 | 2 | 17 | 46 | 31 | 48 | 25 | 23 | 31 | A-7-6 (15) | |
| | | | 3 2 3 | 8 | 67 | SS-7 | 1.0–2.0 | – | – | – | – | – | – | – | – | 41 | A-7-6 (V) | |
| | 845.9 | | 2 2 3 | 8 | 100 | SS-8A | 1.6–1.7 | 0 | 1 | 24 | 36 | 39 | 48 | 21 | 27 | 32 | A-7-6 (16) | |
| | | | | | | SS-8B | 0.6 | – | – | – | – | – | – | – | – | 30 | A-6b (V) | |
| Soft to medium-stiff brown SILTY CLAY, some fine to coarse sand, trace fine gravel, slightly organic, damp. | 844.6 | | | | 98 | ST-9 | 0.25–0.75 | 7 | 4 | 23 | 37 | 29 | 36 | 18 | 18 | 29 | A-6b (9) | |
| Dense brown GRAVEL WITH SAND, little silt, little clay, wet. | 839.9 | W | 8 12 13 | 42 | 100 | SS-10 | – | – | – | – | – | – | – | – | – | 12 | A-1-b (V) | |
| | | | 8 12 16 | 47 | 78 | SS-11 | – | 42 | 28 | 12 | 14 | 4 | NP | NP | NP | 12 | A-1-b (0) | |
| Dense to very-dense gray fine to coarse GRAVEL, some fine to coarse sand, trace silt, trace clay, wet. | 835.6 | | 9 14 13 | 45 | 72 | SS-12 | – | 60 | 19 | 9 | 10 | 2 | NP | NP | NP | 9 | A-1-a (0) | |
| | | | 7 15 15 | 50 | 67 | SS-13 | – | 65 | 18 | 7 | 8 | 2 | NP | NP | NP | 9 | A-1-a (0) | |
| | | | 7 5 5 | 17 | 0 | -- | – | – | – | – | – | – | – | – | – | – | | |
| Very-stiff to hard gray SILTY CLAY, little fine to coarse sand, trace fine gravel, slightly organic, damp. | 830.9 | | 4 7 11 | 30 | 100 | SS-14 | 3.5–4.5+ | 5 | 5 | 15 | 38 | 37 | 33 | 15 | 18 | 14 | A-6b (11) | |
| Very-stiff to hard gray CLAY, some silt, trace fine to coarse sand, trace fine gravel, damp. | | | 5 9 12 | 35 | 100 | SS-15 | 2.75–4.5+ | – | – | – | – | – | – | – | – | 14 | A-7-6 (V) | |
| | | | 4 5 9 | 23 | 100 | SS-16 | 3.25–4.5+ | 1 | 1 | 11 | 34 | 53 | 52 | 19 | 33 | 22 | A-7-6 (18) | |
| Hard brown mottled with gray SILTY CLAY, little fine to coarse gravel, little fine to coarse sand, damp. | 821.4 | | 12 14 19 | 55 | 100 | SS-17 | 4.5 | – | – | – | – | – | – | – | – | 13 | A-6b (V) | |
| Hard gray SANDY SILT, some silt, some clay, little fine to coarse gravel, damp. | 816.4 | | 11 15 20 | 58 | 100 | SS-18 | 4.5+ | 12 | 9 | 17 | 36 | 26 | 23 | 13 | 10 | 11 | A-4a (5) | |
| | | | 12 17 25 | 70 | 100 | SS-19 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |
| | | | 15 22 29 | 85 | 100 | SS-20 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |

– Continued on Next Sheet –

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 12+94, 10' LT | EXPLORATION ID B-001-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 862.9 (MSL) EOB: 75.0 ft. | PAGE 2 OF 2 |
| START: 6/5/17 END: 6/6/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725119 N, 83.250567 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT/ RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GRADATION (%) GR | CS | FS | SI | CL | ATTERBERG LL | PL | PI | WC | ODOT CLASS (GI) | HOLE SEALED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hard gray SANDY SILT, some silt, some clay, little fine to coarse gravel, damp. | 772.9 | 60 | | | | | | | | | | | | | | | | |
| | | 61 | | | | | | | | | | | | | | | | |
| | | 62 | | | | | | | | | | | | | | | | |
| | | 63 | | | | | | | | | | | | | | | | |
| | | 64 | 12 22 39 | 102 | 100 | SS-21 | 4.5+ | 13 | 9 | 14 | 38 | 26 | 24 | 14 | 10 | 10 | A-4a (6) | |
| | | 65 | | | | | | | | | | | | | | | | |
| | | 66 | | | | | | | | | | | | | | | | |
| | | 67 | | | | | | | | | | | | | | | | |
| | | 68 | | | | | | | | | | | | | | | | |
| | | 69 | 12 24 34 | 97 | 100 | SS-22 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |
| | | 70 | | | | | | | | | | | | | | | | |
| | | 71 | | | | | | | | | | | | | | | | |
| | | 72 | | | | | | | | | | | | | | | | |
| | | 73 | | | | | | | | | | | | | | | | |
| | | 74 | 14 20 30 | 83 | 100 | SS-23 | 4.5+ | 8 | 8 | 14 | 43 | 27 | 24 | 15 | 9 | 11 | A-4a (7) | |
| | 787.9 | 75 EOB | | | | | | | | | | | | | | | | |

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; 12 LB. BENTONITE POWDER; 94 LB. CEMENT; 1 PLASTIC HOLE PLUG DEVICE; 35 GAL. WATER

NOTES:
- Groundwater encountered at 19.0' during drilling.
- From 17.5' to 18.0': Unconfined Compression Test = 1,123 psf.
- Water and bentonite powder added at 26.0' to prevent sand heave.
- After removal of augers, boring caved at 16.0' and was observed to be dry.
- Borehole sealed with bentonite and cement grout.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 14+28, 9' LT | EXPLORATION ID B-002-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 863.1 (MSL) EOB: 80.0 ft. | PAGE 1 OF 2 |
| START: 6/8/17 END: 6/9/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725220 N, 83.250109 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT/RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GRADATION (%) GR | CS | FS | SI | CL | ATTERBERG LL | PL | PI | WC | ODOT CLASS (GI) | BACK FILL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT – 2-1/2 INCHES | 862.9 | | | | | | | | | | | | | | | | | |
| CONCRETE – 8-1/2 INCHES | 862.1 | | | | | | | | | | | | | | | | | |
| AIR – 18 FEET | 863.1 | | | | | | | | | | | | | | | | | |
| WATER – 4 FEET | 844.1 | W | | | | | | | | | | | | | | | | |
| Very–stiff to hard gray SILT AND CLAY, some fine to coarse gravel, some fine to coarse sand, damp. | 840.1 | | 1 4 3 | 12 | 44 | SS-1 | 2.5–4.1 | 17 | 9 | 16 | 33 | 25 | 25 | 14 | 11 | 13 | A-6a (5) | |
| | | | 1 3 2 | 8 | 56 | SS-2 | 3.1 | 22 | 10 | 15 | 31 | 22 | 26 | 15 | 11 | 13 | A-6a (4) | |
| Very–stiff to hard gray SILTY CLAY, some fine to coarse sand, trace fine gravel, damp. | 837.1 | | 4 4 8 | 20 | 72 | SS-3 | 4.5 | 6 | 5 | 14 | 48 | 27 | 31 | 14 | 17 | 14 | A-6b (11) | |
| | | | 4 4 9 | 22 | 83 | SS-4 | 3.75 | 4 | 6 | 14 | 49 | 27 | 33 | 14 | 19 | 14 | A-6b (12) | |
| | | | 4 8 12 | 33 | 72 | SS-5 | 4.5+ | – | – | – | – | – | – | – | – | 14 | A-6b (V) | |
| | | | 4 8 13 | 35 | 100 | SS-6 | 4.5+ | – | – | – | – | – | – | – | – | 13 | A-6b (V) | |
| | 825.1 | | 5 8 14 | 37 | 67 | SS-7 | 4.5+ | 3 | 6 | 17 | 49 | 25 | 31 | 14 | 17 | 13 | A-6b (11) | |
| Very–stiff to hard gray CLAY, some "and" silt, little fine to coarse sand, trace fine gravel, damp. | | | 4 7 10 | 28 | 100 | SS-8 | 3.5–4.5+ | 0 | 2 | 13 | 50 | 35 | 43 | 16 | 27 | 19 | A-7-6 (15) | |
| | | | 4 8 9 | 28 | 100 | SS-9 | 3.1–4.1 | 1 | 2 | 13 | 35 | 49 | 49 | 19 | 30 | 20 | A-7-6 (18) | |
| | | | 4 7 15 | 37 | 67 | SS-10 | 2.75–4.5+ | – | – | – | – | – | – | – | – | 19 | A-7-6 (V) | |
| | 817.6 | | | | | | | | | | | | | | | | | |
| Hard brown SANDY SILT, some clay, trace fine gravel, damp. | | | 7 15 18 | 55 | 100 | SS-11 | 4.5+ | 9 | 8 | 17 | 41 | 25 | 22 | 14 | 8 | 11 | A-4a (6) | |
| | | | 5 17 18 | 58 | 100 | SS-12 | 4.5+ | – | – | – | – | – | – | – | – | 9 | A-4a (V) | |
| | 811.1 | | | | | | | | | | | | | | | | | |
| Hard gray SANDY SILT, some clay, little fine to coarse gravel, damp. | | | 8 14 19 | 55 | 100 | SS-13 | 4.5+ | – | – | – | – | – | – | – | – | 10 | A-4a (V) | |
| | | | 10 15 18 | 55 | 100 | SS-14 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |

– Continued on Next Sheet –

| | | | | | |
|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 14+28, 9' LT | EXPLORATION ID B-002-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 863.1 (MSL) EOB: 80.0 ft. | PAGE 2 OF 2 |
| START: 6/8/17 END: 6/9/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725220 N, 83.250109 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT/ RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GRADATION (%) GR | CS | FS | SI | CL | ATTERBERG LL | PL | PI | WC | ODOT CLASS (GI) | BACK FILL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hard gray SANDY SILT, some clay, little fine to coarse gravel, damp. | 763.1 | 60 | | | | | | | | | | | | | | | | |
| | | 61 | | | | | | | | | | | | | | | | |
| | | 62 | | | | | | | | | | | | | | | | |
| | | 63 | | | | | | | | | | | | | | | | |
| | | 64 | 7 14 17 | 52 | 100 | SS-15 | 4.5+ | 14 | 7 | 14 | 37 | 28 | 25 | 15 | 10 | 11 | A-4a (6) | |
| | | 65 | | | | | | | | | | | | | | | | |
| | | 66 | | | | | | | | | | | | | | | | |
| | | 67 | | | | | | | | | | | | | | | | |
| | | 68 | | | | | | | | | | | | | | | | |
| | | 69 | 7 10 13 | 38 | 100 | SS-16 | 4.5 | – | – | – | – | – | – | – | – | 12 | A-4a (V) | |
| | | 70 | | | | | | | | | | | | | | | | |
| | | 71 | | | | | | | | | | | | | | | | |
| | | 72 | | | | | | | | | | | | | | | | |
| | | 73 | | | | | | | | | | | | | | | | |
| | | 74 | 10 17 26 | 72 | 100 | SS-17 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |
| | | 75 | | | | | | | | | | | | | | | | |
| | | 76 | | | | | | | | | | | | | | | | |
| | | 77 | | | | | | | | | | | | | | | | |
| | | 78 | | | | | | | | | | | | | | | | |
| | | 79 | 10 15 21 | 60 | 100 | SS-18 | 4.5+ | 10 | 8 | 14 | 41 | 27 | 24 | 15 | 9 | 12 | A-4a (7) | |
| | 783.1 | 80 EOB | | | | | | | | | | | | | | | | |

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SOIL CUTTINGS

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 15+80, 8' LT | EXPLORATION ID B-003-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 862.3 (MSL) EOB: 80.0 ft. | PAGE 1 OF 2 |
| START: 6/6/17 END: 6/7/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725336 N, 83.249588 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT/RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GRADATION (%) GR | CS | FS | SI | CL | ATTERBERG LL | PL | PI | WC | ODOT CLASS (GI) | HOLE SEALED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ASPHALT – 9 INCHES | 862.3 | | | | | | | | | | | | | | | | | |
| GRANULAR BASE – 15 INCHES | 861.5 | | | | | | | | | | | | | | | | | |
| FILL: Stiff–very stiff brown SILT AND CLAY, some fine to coarse sand, trace to little fine gravel, few pockets of fine to coarse sand, few roots, damp. | 860.3 | | 1 2 3 | 8 | 78 | SS-1A<br>SS-1B | 1.0–3.5<br>1.5–4.25 | –<br>11 | –<br>11 | –<br>18 | –<br>36 | –<br>24 | –<br>25 | –<br>14 | –<br>11 | 12<br>14 | A-6a (V)<br>A-6a (5) | |
| | | | 2 1 3 | 7 | 67 | SS-2 | 1.6–2.1 | 10 | 9 | 21 | 33 | 27 | 29 | 15 | 14 | 17 | A-6a (7) | |
| PROBABLE FILL: Medium–stiff to stiff dark–brown CLAY, some silt, little to some fine to coarse sand, trace to little fine to coarse gravel, slightly becoming moderately organic, few very–soft zones, damp.<br>– From 8.0' to 8.5': Unconfined Compression Test = 1,209 psf.<br>– SS–6: LOI = 6.5% and OD/AD LL Ratio = 0.80. | 857.3 | | 2 1 2 | 5 | 22 | SS-3 | 0.5–0.75 | – | – | – | – | – | – | – | – | 15 | A-7-6 (V) | |
| | | | 1 2 3 | 8 | 11 | SS-4 | 0.5 | – | – | – | – | – | – | – | – | 25 | A-7-6 (V) | |
| | | | | | 88 | ST-5 | 0.1–0.6 | 14 | 3 | 11 | 37 | 35 | 51 | 27 | 24 | 33 | A-7-6 (15) | |
| | | | 2 2 3 | 8 | 67 | SS-6 | 0.5–1.25 | 0 | 3 | 17 | 44 | 36 | 55 | 29 | 26 | 37 | A-7-6 (17) | |
| Stiff dark–brown ELASTIC CLAY, "and" silt, little fine to coarse sand, trace fine gravel, moderately organic, damp.<br>– SS–7: LOI = 7.4%. | 849.3 | | 1 2 3 | 8 | 78 | SS-7 | 1.0–1.6 | 1 | 2 | 11 | 47 | 39 | 54 | 30 | 24 | 37 | A-7-5 (16) | |
| Medium–stiff dark–brown CLAY, "and" silt, some fine sand, trace coarse sand, trace fine gravel, moderately organic.<br>– SS–8: OD/AD LL Ratio = 0.76. | 846.8 | | 2 4 11 | 25 | 56 | SS-8 | 0.6–1.75 | 5 | 6 | 20 | 37 | 32 | 51 | 26 | 25 | 33 | A-7-6 (15) | |
| Medium–dense brown GRAVEL WITH SAND, little silt, trace clay, wet. | 844.3 | W | 3 5 4 | 15 | 33 | SS-9 | – | 49 | 27 | 9 | 13 | 2 | NP | NP | NP | 14 | A-1-b (0) | |
| Dense to very–dense brown fine to coarse GRAVEL, some fine to coarse sand, trace silt, trace clay, wet. | 841.8 | | 7 10 13 | 38 | 67 | SS-10 | – | 69 | 15 | 6 | 8 | 2 | – | – | – | 11 | A-1-a (V) | |
| | | | 11 15 15 | 50 | 78 | SS-11 | – | 62 | 18 | 8 | 9 | 3 | NP | NP | NP | 9 | A-1-a (0) | |
| | | | 11 24 14 | 63 | 67 | SS-12 | – | 66 | 17 | 6 | 8 | 3 | NP | NP | NP | 8 | A-1-a (0) | |
| | | | 4 16 17 | 55 | 78 | SS-13 | – | 58 | 21 | 9 | 9 | 3 | NP | NP | NP | 10 | A-1-a (0) | |
| Very–stiff to hard gray SANDY SILT, little fine gravel, little clay, damp. | 834.6 | | 3 11 13 | 40 | 56 | SS-14 | 2.4–4.5+ | 17 | 13 | 17 | 35 | 18 | 21 | 14 | 7 | 12 | A-4a (4) | |
| Very–stiff to hard gray CLAY, some silt, little fine to coarse sand, trace fine gravel, damp. | 829.6 | | 5 8 10 | 30 | 100 | SS-15 | 4.5+ | – | – | – | – | – | – | – | – | 13 | A-7-6 (V) | |
| | | | 4 7 10 | 28 | 100 | SS-16 | 3.1–4.5 | 1 | 2 | 13 | 35 | 49 | 46 | 17 | 29 | 19 | A-7-6 (17) | |
| Hard gray SILT AND CLAY, little fine to coarse sand, trace fine gravel, damp. | 820.3 | | 9 14 15 | 48 | 100 | SS-17 | 4.5+ | – | – | – | – | – | – | – | – | 12 | A-6a (V) | |
| Hard gray SANDY SILT, some fine to coarse gravel, little clay, damp. | 815.3 | | 4 15 24 | 65 | 44 | SS-18 | 4.5+ | 23 | 15 | 22 | 27 | 13 | 18 | 13 | 5 | 9 | A-4a (1) | |
| Hard gray SILT AND CLAY, some fine to coarse sand, little fine to coarse gravel, damp. | 811.3 | | 16 18 25 | 72 | 100 | SS-19 | 4.5+ | 14 | 8 | 13 | 38 | 27 | 25 | 14 | 11 | 11 | A-6a (6) | |
| | | | 9 14 20 | 57 | 67 | SS-20 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-6a (V) | |

– Continued on Next Sheet –

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PROJECT: MAD-62-2.79 | DRILLING FIRM / OPERATOR: OTB / A. FAY | DRILL RIG: OTB MOBILE B-57 | STATION / OFFSET: 15+80, 8' LT | EXPLORATION ID B-003-0-17 |
| TYPE: BRIDGE REPLACEMENT | SAMPLING FIRM / LOGGER: S&ME / K. DOHLEN | HAMMER: CME AUTOMATIC | ALIGNMENT: US 62 CENTERLINE | |
| PID: 102577 BR ID: | DRILLING METHOD: 3.25" HSA | CALIBRATION DATE: 5/22/17 | ELEVATION: 862.3 (MSL) EOB: 80.0 ft. | PAGE 2 OF 2 |
| START: 6/6/17 END: 6/7/17 | SAMPLING METHOD: SPT | ENERGY RATIO (%): 99.9 | LAT / LONG: 39.725336 N, 83.249588 W | |

| MATERIAL DESCRIPTION AND NOTES | ELEV. | DEPTHS | SPT / RQD | N60 | REC (%) | SAMPLE ID | HP (tsf) | GRADATION (%) GR | CS | FS | SI | CL | ATTERBERG LL | PL | PI | WC | ODOT CLASS (GI) | HOLE SEALED |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hard gray SILT AND CLAY, some fine to coarse sand, little fine to coarse gravel, damp. | 762.3 | 60 | | | | | | | | | | | | | | | | |
| | 800.3 | 61 | | | | | | | | | | | | | | | | |
| Hard gray SANDY SILT, some fine to coarse gravel, some fine to coarse sand, damp. | | 62 | | | | | | | | | | | | | | | | |
| | | 63 | | | | | | | | | | | | | | | | |
| | | 64 | 13 18 26 | 73 | 100 | SS-21 | 4.5+ | – | – | – | – | – | – | – | – | 11 | A-4a (V) | |
| | | 65 | | | | | | | | | | | | | | | | |
| | | 66 | | | | | | | | | | | | | | | | |
| | | 67 | | | | | | | | | | | | | | | | |
| | | 68 | | | | | | | | | | | | | | | | |
| | | 69 | 13 16 17 | 55 | 100 | SS-22 | 4.5 | 21 | 9 | 12 | 36 | 22 | 23 | 14 | 9 | 11 | A-4a (5) | |
| | | 70 | | | | | | | | | | | | | | | | |
| | | 71 | | | | | | | | | | | | | | | | |
| | | 72 | | | | | | | | | | | | | | | | |
| | | 73 | | | | | | | | | | | | | | | | |
| | | 74 | 14 16 26 | 70 | 100 | SS-23 | 4.5+ | – | – | – | – | – | – | – | – | 13 | A-4a (V) | |
| | | 75 | | | | | | | | | | | | | | | | |
| | | 76 | | | | | | | | | | | | | | | | |
| | | 77 | | | | | | | | | | | | | | | | |
| | | 78 | | | | | | | | | | | | | | | | |
| | 782.3 | 79 | 12 16 27 | 72 | 78 | SS-24 | 4.5 | 9 | 8 | 13 | 41 | 29 | 25 | 15 | 10 | 12 | A-4a (7) | |
| | | EOB 80 | | | | | | | | | | | | | | | | |

NOTES: NONE

ABANDONMENT METHODS, MATERIALS, QUANTITIES: ASPHALT PATCH; 15 LB. BENTONITE POWDER; 94 LB. CEMENT; PLASTIC HOLE PLUG DEVICE; 35 GAL. WATER

NOTES:
- Groundwater encountered at 18.5' during drilling.
- Water added at 21.0' to prevent sand heave.
- Borehole sealed with bentonite and cement grout.

## UNCONFINED COMPRESSION TEST REPORT

*ASTM D2166*

### PROJECT INFORMATION

| | |
|---|---|
| CLIENT: | Euthenics, Inc. |
| PROJECT NUMBER: | 1179-17-005 |
| PROJECT NAME: | MAD-62-2.79 |
| PROJECT LOCATION: | Mount Sterling, Ohio |

### SAMPLE INFORMATION

| | |
|---|---|
| BORING ID: | B-001-0-17 |
| SAMPLE NUMBER: | S-9 |
| SAMPLE DEPTH: | 17.5' - 18.0' |
| DATE OF TEST: | 7/6/2017 |

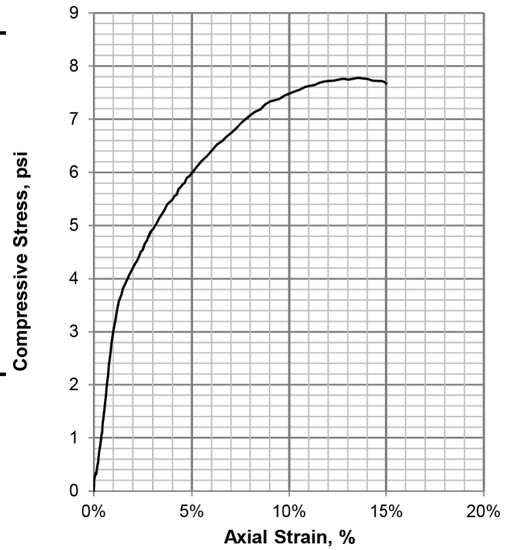
SAMPLE DESCRIPTION: Very soft to medium-stiff, dark brown, SILTY CLAY, some fine to coarse sand, trace fine gravel

### SPECIMEN MEASUREMENTS

| | | |
|---|---|---|
| MOISTURE CONTENT: | 30.71% | |
| AVERAGE DIAMETER: | 2.8082 | in. |
| AVERAGE HEIGHT: | 5.6012 | in. |
| HEIGHT/DIAMETER RATIO: | 1.99 | |
| WET DENSITY: | 115.17 | pcf |
| DRY DENSITY: | 88.11 | pcf |
| SPECIFIC GRAVITY: | 2.75 | (est.) |
| SATURATION: | 89.04% | (est.) |
| VOID RATIO: | 0.9485 | (est.) |

### TEST RESULTS

| | | |
|---|---|---|
| MAXIMUM LOAD: | **56** | lbs |
| UNCONFINED STRENGTH: | **7.8** | psi |
| STRAIN RATE: | **1%** | %/min |
| STRAIN AT FAILURE: | **13.53%** | % |




ADDITIONAL TESTING REMARKS:

TESTED BY: KJD CHECKED BY: RSW

**SPECIMEN BEFORE TESTING**

NO PHOTO AVAILABLE

**SPECIMEN AFTER TESTING**

NO PHOTO AVAILABLE

## UNCONFINED COMPRESSION TEST REPORT

*ASTM D2166*

### PROJECT INFORMATION

| | |
|---|---|
| CLIENT: | Euthenics, Inc. |
| PROJECT NUMBER: | 1179-17-005 |
| PROJECT NAME: | MAD-62-2.79 |
| PROJECT LOCATION: | Mount Sterling, Ohio |

### SAMPLE INFORMATION

| | |
|---|---|
| BORING ID: | B-003-0-17 |
| SAMPLE NUMBER: | S-5 |
| SAMPLE DEPTH: | 8.0' - 8.5' |
| DATE OF TEST: | 7/6/2017 |

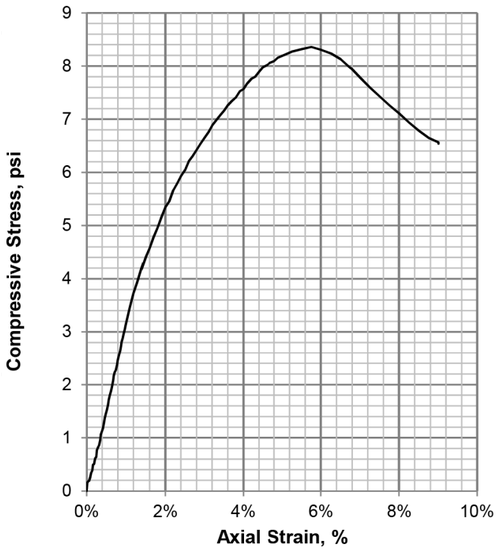
SAMPLE DESCRIPTION: Very-soft to medium-stiff, dark brown, CLAY, some silt, little fine to coarse gravel, little fine to coarse sand.

### SPECIMEN MEASUREMENTS

| | | |
|---|---|---|
| MOISTURE CONTENT: | 39.05% | |
| AVERAGE DIAMETER: | 2.8342 | in. |
| AVERAGE HEIGHT: | 5.5940 | in. |
| HEIGHT/DIAMETER RATIO: | 1.97 | |
| WET DENSITY: | 113.08 | pcf |
| DRY DENSITY: | 81.33 | pcf |
| SPECIFIC GRAVITY: | 2.75 | (est.) |
| SATURATION: | 96.65% | (est.) |
| VOID RATIO: | 1.1110 | (est.) |

### TEST RESULTS

| | | |
|---|---|---|
| MAXIMUM LOAD: | **56** | lbs |
| UNCONFINED STRENGTH: | **8.4** | psi |
| STRAIN RATE: | **1%** | %/min |
| STRAIN AT FAILURE: | **5.76%** | % |




ADDITIONAL TESTING REMARKS:

TESTED BY: KJD CHECKED BY: RSW

**SPECIMEN BEFORE TESTING**

NO PHOTO AVAILABLE

**SPECIMEN AFTER TESTING**

NO PHOTO AVAILABLE

DRAWN KJD CHECKED RSW

STRUCTURE FOUNDATION EXPLORATION
COMPRESSIVE STRENGTH TEST RESULTS

MAD-62-2.79

9 / 9