

PROJECT DESCRIPTION

THE HAM-74-13.35 BRIDGE CARRIES RACE ROAD OVER IR-74 IN HAMILTON COUNTY, OHIO. S&ME UNDERSTANDS THIS BRIDGE IS TO BE REPLACED WITH A NEW TWO-SPAN BRIDGE WITH MECHANICALLY STABILIZED EARTH (MSE) RETAINING WALLS AT THE FORWARD AND REAR ABUTMENTS AND AN INTERMEDIATE PIER SUPPORTED ON SHALLOW FOUNDATIONS BEARING ON BEDROCK. FISHBECK RECOMMENDS THE INTERMEDIATE PIER BE SUPPORTED BY SHALLOW FOUNDATIONS SINCE THE ENTIRE EXISTING PIER AND COMBINED SPREAD FOOTING ARE TO BE REMOVED TO FACILITATE THE CONSTRUCTION OF THE NEW PIER IN THE SAME APPROXIMATE LOCATION.

HISTORIC RECORDS

BASED ON REVIEW OF THE ODOT TRANSPORTATION INFORMATION MANAGEMENT SYSTEM (TIMS) WEBPAGE, THE HISTORIC BORING LOGS FOR THE INITIAL CONSTRUCTION OF THE HAM-74-13.35 BRIDGE WERE AVAILABLE.

GEOLOGY

GEOLOGIC REFERENCES INDICATE THAT THIS PROJECT SITE IS LOCATED WITHIN THE OUTER BLUEGRASS PHYSIOGRAPHIC REGION. SURFICIAL GEOLOGY MAPPING INDICATES THE OVERBURDEN SOILS IN THE AREA CONSIST PREDOMINANTLY OF SILTY CLAY TO CLAY SOIL DERIVED FROM THE UNDERLYING BEDROCK. THESE OVERBURDEN SOILS OVERLIE INTERBEDDED SHALE AND LIMESTONE FROM THE GRANT LAKE FORMATION OF ORDOVICIAN AGE. AVAILABLE ODNR WATER WELL LOGS INDICATE THAT THE TOP OF BEDROCK IN THE PROJECT AREA IS PRESENT AT DEPTHS OF 20 FEET AND UP TO 50 FEET BELOW GRADE. THE BORINGS PERFORMED FOR THIS STRUCTURE EXPLORATION ENCOUNTERED BEDROCK AT DEPTHS RANGING FROM 5.3 AND 14.5 FEET BELOW EXISTING GRADES.

A REVIEW OF THE ODNR "OHIO KARST AREAS" MAP INDICATES THE SITE LIES IN AN AREA NOT KNOWN TO CONTAIN KARST FEATURES. A REVIEW OF THE ODNR "LANDSLIDES IN OHIO" MAP REVEALS THE SITE IS NOT IN AN AREA SUSCEPTIBLE TO LANDSLIDES, AND THE ODNR "ABANDONED UNDERGROUND MINES OF OHIO" MAP INDICATES THE SITE LIES IN AN AREA WITH NO MAPPED ABANDONED MINES WITHIN A 3-MILE RADIUS. THERE IS A HISTORIC SURFACE MINE LESS THAN 1-MILE SOUTH OF THE SITE.

RECONNAISSANCE

ON SEPTEMBER 19, 2022, S&ME PERFORMED A SITE RECONNAISSANCE OF THE HAM-74-13.35 BRIDGE TO OBSERVE CURRENT CONDITIONS AND TO STAKE THE PLANNED BORING LOCATIONS. THE SITE CONSISTS OF THE EASTBOUND AND WESTBOUND LANES OF IR-74 BELOW THE EXISTING BRIDGE AND OFF ROAD SECTIONS COVERED WITH GRASS, SHRUBS, AND TREES. SIGNS OF SLOPE INSTABILITY WERE NOT PRESENT DURING OUR SITE RECONNAISSANCE.

SUBSURFACE EXPLORATION

FROM SEPTEMBER 23 TO 29, 2022, THREE (3) BORINGS WERE PERFORMED FOR THE HAM-74-13.35 BRIDGE EXPLORATION TO EXPLORE THE EXISTING SOILS AND BEDROCK IN THE AREA OF THE PLANNED REPLACEMENT STRUCTURE. THE BORINGS WERE NUMBERED B-001-0-22, B-002-0-22, AND B-003-0-22. THE LOCATIONS AND ELEVATIONS AND PLAN AND PROFILE INFORMATION WERE PROVIDED BY FISHBECK. LOGS OF HISTORIC BORINGS PERFORMED IN THE VICINITY OF THE HAM-74-13.35 BRIDGE ARE ALSO INCLUDED.

THE CURRENT BORINGS WERE PERFORMED BY A TRACK-MOUNTED DRILLING RIG USING A 3/4-INCH I.D. HOLLOW-STEM AUGER TO ADVANCE THE BORINGS BETWEEN SAMPLING ATTEMPTS. 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 SAMPLES WERE EXAMINED IMMEDIATELY AFTER RECOVERY AND REPRESENTATIVE PORTIONS WERE PRESERVED IN AIRTIGHT GLASS JARS. TEN (10) TO FIFTEEN (15) FEET OF BEDROCK WAS CORED IN EACH OF THE BORINGS USING AN NQ CORE BARREL WITH A DIAMOND BIT UTILIZING WATER AS A CIRCULATING FLUID.

IN ACCORDANCE WITH THE CURRENT ODOT SGE, THE HAMMER SYSTEM ON THE DRILL RIG HAD BEEN CALIBRATED IN ACCORDANCE WITH ASTM D 4633 TO DETERMINE THE DRILL ROD ENERGY RATIO (69.8% ON JUNE 7, 2022). AT THE COMPLETION OF DRILLING, THE BORINGS WERE BACKFILLED WITH CUTTINGS MIXED WITH BENTONITE CHIPS.

IN THE FIELD, EXPERIENCED S&ME PERSONNEL PERFORMED THE FOLLOWING: 1) EXAMINED ALL SAMPLES RECOVERED FROM THE BORINGS; 2) PRESERVED REPRESENTATIVE PORTIONS OF ALL SAMPLES IN AIRTIGHT GLASS JARS; 3) PREPARED A LOG OF EACH BORING; 4) MADE SEEPAGE AND GROUNDWATER OBSERVATIONS; 5) MADE HAND-PENETROMETER MEASUREMENTS IN SOIL SPECIMENS EXHIBITING COHESION; AND, 6) PROVIDED LIAISON BETWEEN THE FIELD WORK AND THE ENGINEER SO THE EXPLORATION PROGRAM COULD BE MODIFIED IN THE EVENT UNUSUAL OR UNEXPECTED SUBSURFACE CONDITIONS WERE ENCOUNTERED. ALL RECOVERED SAMPLES WERE TRANSPORTED TO THE SOILS LABORATORY OF S&ME FOR FURTHER EXAMINATION AND TESTING.

EXPLORATION FINDINGS

EACH OF THE THREE (3) BORINGS ENCOUNTERED 2 TO 18 INCHES OF TOPSOIL/ROOTMAT. BENEATH THESE SURFICIAL MATERIALS, THE BORINGS GENERALLY ENCOUNTERED COHESIVE SOILS OVER BEDROCK, ALTHOUGH BORING B-001-0-22 ENCOUNTERED GRANULAR SOILS. THE SUBSURFACE CONDITIONS ENCOUNTERED IN THE BORINGS PERFORMED FOR THE CURRENT EXPLORATION AT THIS SITE MAY BE DESCRIBED, IN DESCENDING ORDER AS FOLLOWS: 1.5 TO 8 FEET OF COHESIVE SOILS WHICH CAN BE DESCRIBED AS VERY-STIFF TO HARD BROWN AND GRAY SILT AND CLAY (A-6a), VERY-STIFF TO HARD BROWN AND GRAY SILTY CLAY (A-6b), AND VERY-STIFF BROWN AND GRAY CLAY (A-7-6), 2 TO 5 FEET OF GRANULAR SOILS IN BORING B-001-0-22 WHICH CAN BE DESCRIBED AS VERY LOOSE BROWN GRAVEL (A-1-a), BROWN GRAVEL WITH SAND (A-1-b), AND LOOSE BROWN COARSE AND FINE SAND (A-3a).

BORING B-002-0-22 AUGERED THROUGH HIGHLY WEATHERED, VERY-WEAK GRAY SHALE, AND THEN CORED 13.4 FEET INTO INTERBEDDED SHALE (20-75%) AND LIMESTONE (30-80%). BORINGS B-001-0-22 AND B-003-0-22 CORED 15 AND 14.7 FEET, RESPECTIVELY, INTO THE INTERBEDDED SHALE (50-55%) AND LIMESTONE (45-50%) BEDROCK. THE SHALE WAS DARK GRAY, SEVERELY TO MODERATELY WEATHERED, AND WEAK TO SLIGHTLY STRONG. THE LIMESTONE WAS LIGHT GRAY, MODERATELY TO SLIGHTLY WEATHERED, AND MODERATELY STRONG TO VERY STRONG.

GROUNDWATER WAS NOT OBSERVED DURING DRILLING OR PRIOR TO CORING BEDROCK IN EACH OF THE BORINGS. GROUNDWATER LEVELS CAN FLUCTUATE DUE TO SEASONAL VARIATIONS IN PRECIPITATION, CONSTRUCTION ACTIVITIES, ETC. THE BORINGS WERE BACKFILLED UPON COMPLETION; THEREFORE, LONG TERM GROUNDWATER READINGS WERE NOT OBTAINED.

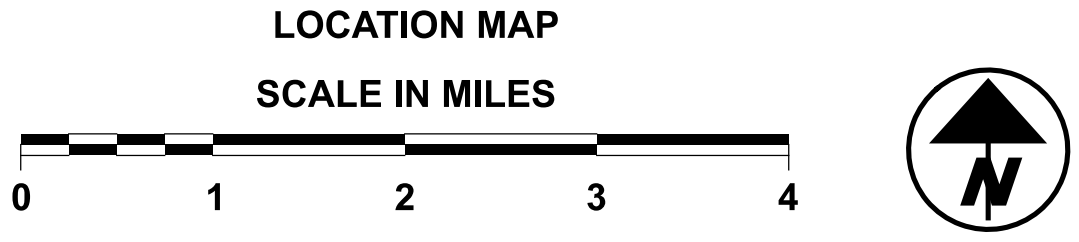
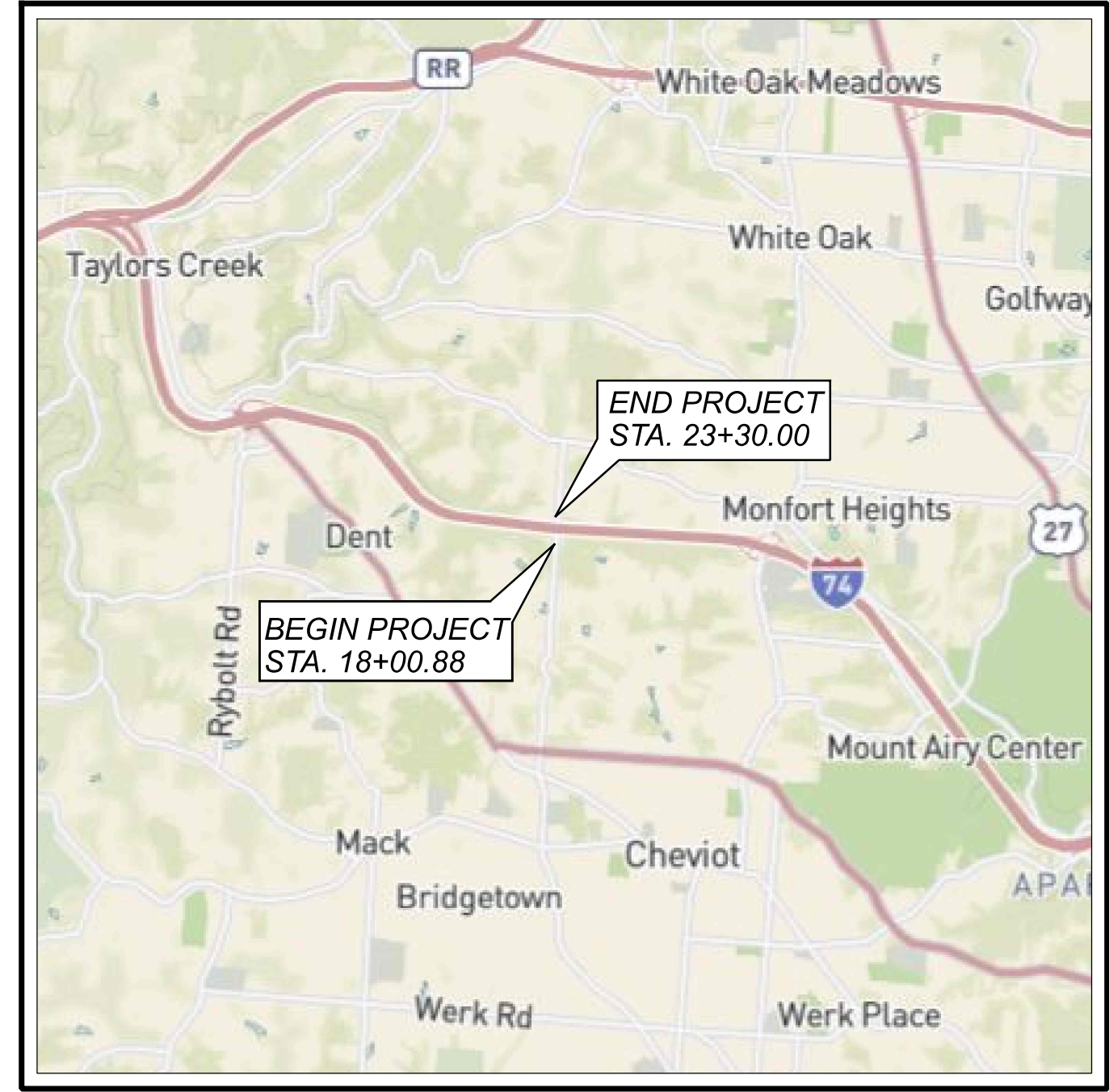
| LEGEND | | ODOT CLASS | CLASSIFIED MECH./VISUAL |
|--------|--|------------|-------------------------|
| | GRAVEL | A-1-A | - 2 |
| | GRAVEL WITH SAND | A-1-b | 1 - |
| | COARSE AND FINE SAND | A-3a | - 1 |
| | SILT AND CLAY | A-6a | 1 2 |
| | SILTY CLAY | A-6b | 1 1 |
| | CLAY | A-7-6 | 1 2 |
| | TOTAL | | 4 8 |
| | SHALE | VISUAL | |
| | INTERBEDDED SHALE AND LIMESTONE | VISUAL | |
| | SOD AND TOPSOIL = X = APPROXIMATE THICKNESS | VISUAL | |
| | BORING LOCATION - PLAN VIEW. | | |
| | HISTORIC 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. | | |
| | X'/Y'/Z/D" 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/D" = NUMBER OF BLOWS (UNCORRECTED) FOR D" OF PERETRATION AT REFUSAL. | | |
| | X''/Y''/D" NUMBER OF BLOWS FOR STANDARD PENETRATION TEST (SPT): X = NUMBER OF BLOWS FOR FIRST 6 INCHES (UNCORRECTED). Y/D" = NUMBER OF BLOWS (UNCORRECTED) FOR D" OF PENETRATION AT REFUSAL. | | |
| | X/D" NUMBER OF BLOWS FOR STANDARD PENETRATION TEST (SPT): X/D" = NUMBER OF BLOWS (UNCORRECTED) FOR D" OF PENETRATION AT REFUSAL. | | |
| | W— INDICATES FREE WATER ELEVATION. | | |
| | SS INDICATES A SPLIT SPOON SAMPLE. | | |
| | NP INDICATES A NON-PLASTIC SAMPLE. | | |
| | TR INDICATES TOP OF ROCK | | |
| | QU INDICATES ROCK COMPRESSION TEST, ASTM D7014, METHOD C, RESULTS | | |

SPECIFICATIONS

S&ME UNDERSTANDS THAT THIS EXPLORATION PROGRAM IS TO BE PERFORMED FOR THIS PROJECT IN ACCORDANCE WITH THE JANUARY 2021 UPDATE TO THE ODOT SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS (SGE).

ADDITIONAL INFORMATION

THE SOIL, BEDROCK, AND GROUNDWATER INFORMATION COLLECTED FOR THIS SUBSURFACE EXPLORATION THAT CAN BE CONVENIENTLY DISPLAYED ON THE SOIL PROFILE SHEETS HAS BEEN PRESENTED. GEOTECHNICAL REPORTS, IF PREPARED, ARE AVAILABLE FOR REVIEW ON THE OFFICE OF CONTRACT SALES WEBSITE.



PARTICLE SIZE DEFINITIONS

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

BEDROCK TEST SUMMARY

| BORING NO | SAMPLE | DEPTH | QU (PSI) |
|------------|--------------|--------------------------------|----------------|
| B-001-0-22 | NQ-7 | 15.8' - 16.2' | 8,986 |
| B-002-0-22 | NQ-10 | 22.8' - 23.2' | 3,888 |
| B-003-0-22 | NQ-5 NQ-6 | 11.8' - 12.2' 14.9' - 15.3' | 1,455 8,195 |

- RECON. - S&ME (9-19-2022)
- DRILLING - S&ME (9-23-2022 to 9-29-2022)
- DRAWN - DWM (12-12-2022 to 12-14-2022, 12-20-2022)
- REVIEWED - BCD (01/17/2023)

DESIGN AGENCY

DESIGNER

DWM

REVIEWER

BCD 01-17-23

PROJECT ID

110563

| | |
|--------|-------|
| SUBSET | TOTAL |
| G.1 | G.12 |

| | |
|-------|-------|
| SHEET | TOTAL |
| 084 | 103 |

Form No. TR-D7012C-01
 Revision No. 1
 Revision Date: 07/14/17

**UNIAXIAL COMPRESSIVE STRENGTH
 OF ROCK**



ASTM D 7012 Method C

Quality Assurance

S&ME, Inc. - Columbus: 6190 Enterprise Court, Dublin, Ohio 43016

| | | | |
|---------------------|---|------------------|-------------|
| Project No.: | 22-78-0033 | Report Date: | 10/24/22 |
| Project Name: | HAM-74-13.35 Bridge Replacement | Test Date(s): | 10/13/22 |
| Client Name: | Fishbeck, Inc. | | |
| Client Address: | 11353 Reed Hartman Hwy, Suite 500, Cincinnati, OH 45241 | Received Date: | 09/29/22 |
| Boring ID: | B-001-0-22, NQ-7 | Depth/Elev., ft: | 15.8'-16.2' |
| Sample Description: | LIMESTONE, gray | | |

Angle of load relative to lithology: Approximately perpendicular to bedding plane

Test Results

Moisture Content 0.9 % Dry Unit Weight 164.2 pcf
 Compressive Strength 8,986 psi



Before Test



After Test

Strain rate: 0.03 in/min.

Notes / Deviations / References: Specimen end preparation was not done in accordance with ASTM D4543.
 Specimen was capped using Sulfur in accordance with ASTM C617, based on previous similar samples.
 Test results for specimens not meeting this requirement may differ from test results obtained from specimens meeting this requirement.

Paula J. Manning
 Technical Responsibility

Paula J. Manning
 Signature

Laboratory Manager
 Position

10/24/2022
 Date

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S&ME, Inc - Corporate

3201 Spring Forest Road 2780033 B-001-0-22 NQ-8 15.8-16.2' D7012 Rx UC.xlsx
 Raleigh, NC 27618

Page 1 of 2
PLATE 2

Form No. TR-D7012C-01
 Revision No. 1
 Revision Date: 07/14/17

**UNIAXIAL COMPRESSIVE STRENGTH
 OF ROCK**



ASTM D 7012 Method C

Quality Assurance

S&ME, Inc. - Columbus: 6190 Enterprise Court, Dublin, Ohio 43016

| | | | |
|---------------------|---|------------------|-------------|
| Project No.: | 22-78-0033 | Report Date: | 10/24/22 |
| Project Name: | HAM-74-13.35 Bridge Replacement | Test Date(s): | 10/13/22 |
| Client Name: | Fishbeck, Inc. | | |
| Client Address: | 11353 Reed Hartman Hwy, Suite 500, Cincinnati, OH 45241 | Received Date: | 09/29/22 |
| Boring ID: | B-002-0-22, NQ-10 | Depth/Elev., ft: | 22.8'-23.2' |
| Sample Description: | SHALE, gray | | |

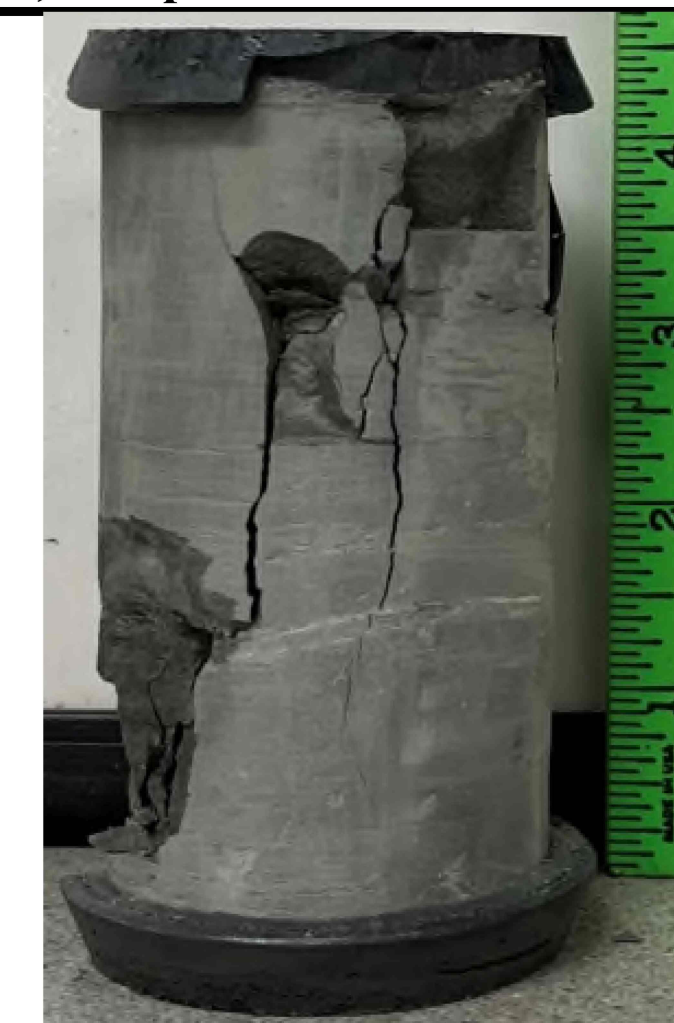
Angle of load relative to lithology: Approximately perpendicular to bedding plane

Test Results

Moisture Content 5.0 % Dry Unit Weight 149.9 pcf
 Compressive Strength 3,888 psi



Before Test



After Test

Strain rate: 0.03 in/min.

Notes / Deviations / References: Specimen end preparation was not done in accordance with ASTM D4543.
 Specimen was capped using Sulfur in accordance with ASTM C617, based on previous similar samples.
 Test results for specimens not meeting this requirement may differ from test results obtained from specimens meeting this requirement.

Paula J. Manning
 Technical Responsibility

Paula J. Manning
 Signature

Laboratory Manager
 Position

10/24/2022
 Date

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S&ME, Inc - Corporate

3201 Spring Forest Road 2780033 B-002-0-22 NQ-10 22.8-23.2' D7012 Rx UC.xlsx
 Raleigh, NC 27618

Page 1 of 2
PLATE 3

HAM-74-13.35

MODEL: Sheet PAPER: 34x22 (in.) DATE: 5/2/2024 TIME: 10:35:16 AM USER: dmarales
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SOIL PROFILE - BRIDGE
 LABORATORY DATA

DESIGN AGENCY



DESIGNER

DWM

REVIEWER

BCD 01-17-23

PROJECT ID

110563

SUBSET TOTAL

G.2 G.12

SHEET TOTAL

085 103

Form No. TR-D7012C-01
 Revision No. 1
 Revision Date: 07/14/17

**UNIAXIAL COMPRESSIVE STRENGTH
 OF ROCK**



ASTM D 7012 Method C

Quality Assurance

S&ME, Inc. - Columbus: 6190 Enterprise Court, Dublin, Ohio 43016

| | | | |
|---------------------|---|------------------|-------------|
| Project No.: | 22-78-0033 | Report Date: | 10/24/22 |
| Project Name: | HAM-74-13.35 Bridge Replacement | Test Date(s): | 10/13/22 |
| Client Name: | Fishbeck, Inc. | | |
| Client Address: | 11353 Reed Hartman Hwy, Suite 500, Cincinnati, OH 45241 | Received Date: | 09/29/22 |
| Boring ID: | B-003-0-22, NQ-5 | Depth/Elev., ft: | 11.8'-12.2' |
| Sample Description: | INTERBEDDED SHALE/LIMESTONE, gray | | |

Angle of load relative to lithology: Approximately perpendicular to bedding plane

Test Results

Moisture Content 1.2 % Dry Unit Weight 159.3 pcf
 Compressive Strength 1,455 psi



Before Test



After Test

Strain rate: 0.03 in/min.

Notes / Deviations / References: Specimen end preparation was not done in accordance with ASTM D4543.
 Specimen was capped using Sulfur in accordance with ASTM C617, based on previous similar samples.
 Test results for specimens not meeting this requirement may differ from test results obtained from specimens meeting this requirement.

Paula J. Manning
 Technical Responsibility

Paula J. Manning
 Signature

Laboratory Manager
 Position

10/24/2022
 Date

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Form No. TR-D7012C-01
 Revision No. 1
 Revision Date: 07/14/17

**UNIAXIAL COMPRESSIVE STRENGTH
 OF ROCK**



ASTM D 7012 Method C

Quality Assurance

S&ME, Inc. - Columbus: 6190 Enterprise Court, Dublin, Ohio 43016

| | | | |
|---------------------|---|------------------|-------------|
| Project No.: | 22-78-0033 | Report Date: | 10/24/22 |
| Project Name: | HAM-74-13.35 Bridge Replacement | Test Date(s): | 10/13/22 |
| Client Name: | Fishbeck, Inc. | | |
| Client Address: | 11353 Reed Hartman Hwy, Suite 500, Cincinnati, OH 45241 | Received Date: | 09/29/22 |
| Boring ID: | B-003-0-22, NQ-6 | Depth/Elev., ft: | 14.9'-15.3' |
| Sample Description: | LIMESTONE, gray | | |

Angle of load relative to lithology: Approximately perpendicular to bedding plane

Test Results

Moisture Content 1.3 % Dry Unit Weight 165.7 pcf
 Compressive Strength 8,195 psi



Before Test



After Test

Strain rate: 0.03 in/min.

Notes / Deviations / References: Specimen end preparation was not done in accordance with ASTM D4543.
 Specimen was capped using Sulfur in accordance with ASTM C617, based on previous similar samples.
 Test results for specimens not meeting this requirement may differ from test results obtained from specimens meeting this requirement.

Paula J. Manning
 Technical Responsibility

Paula J. Manning
 Signature

Laboratory Manager
 Position

10/24/2022
 Date

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DESIGN AGENCY



DESIGNER

DWM

REVIEWER

BCD 01-17-23

PROJECT ID

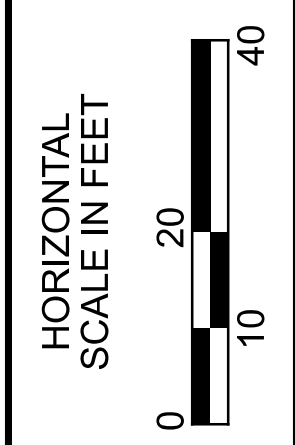
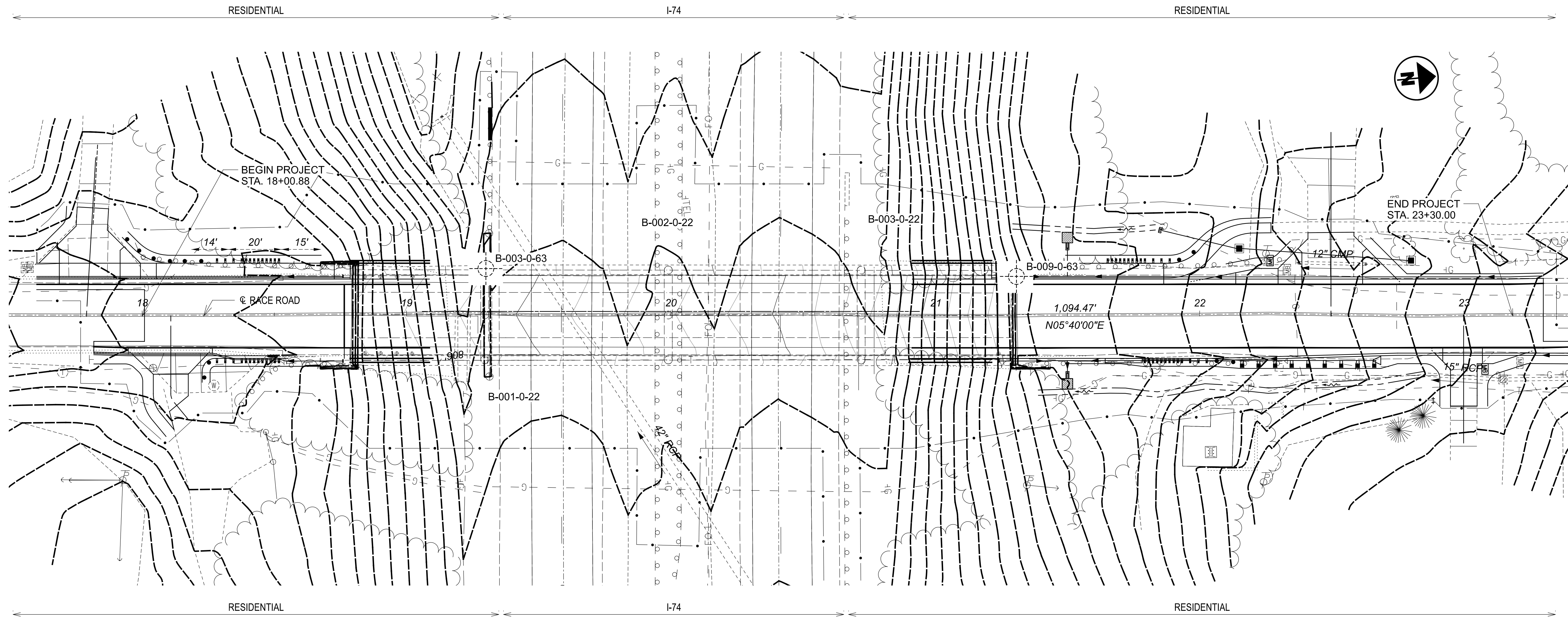
110563

SUBSET TOTAL

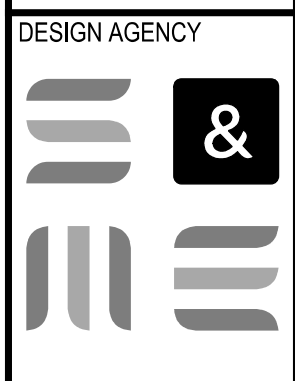
G.3 G.12

SHEET TOTAL

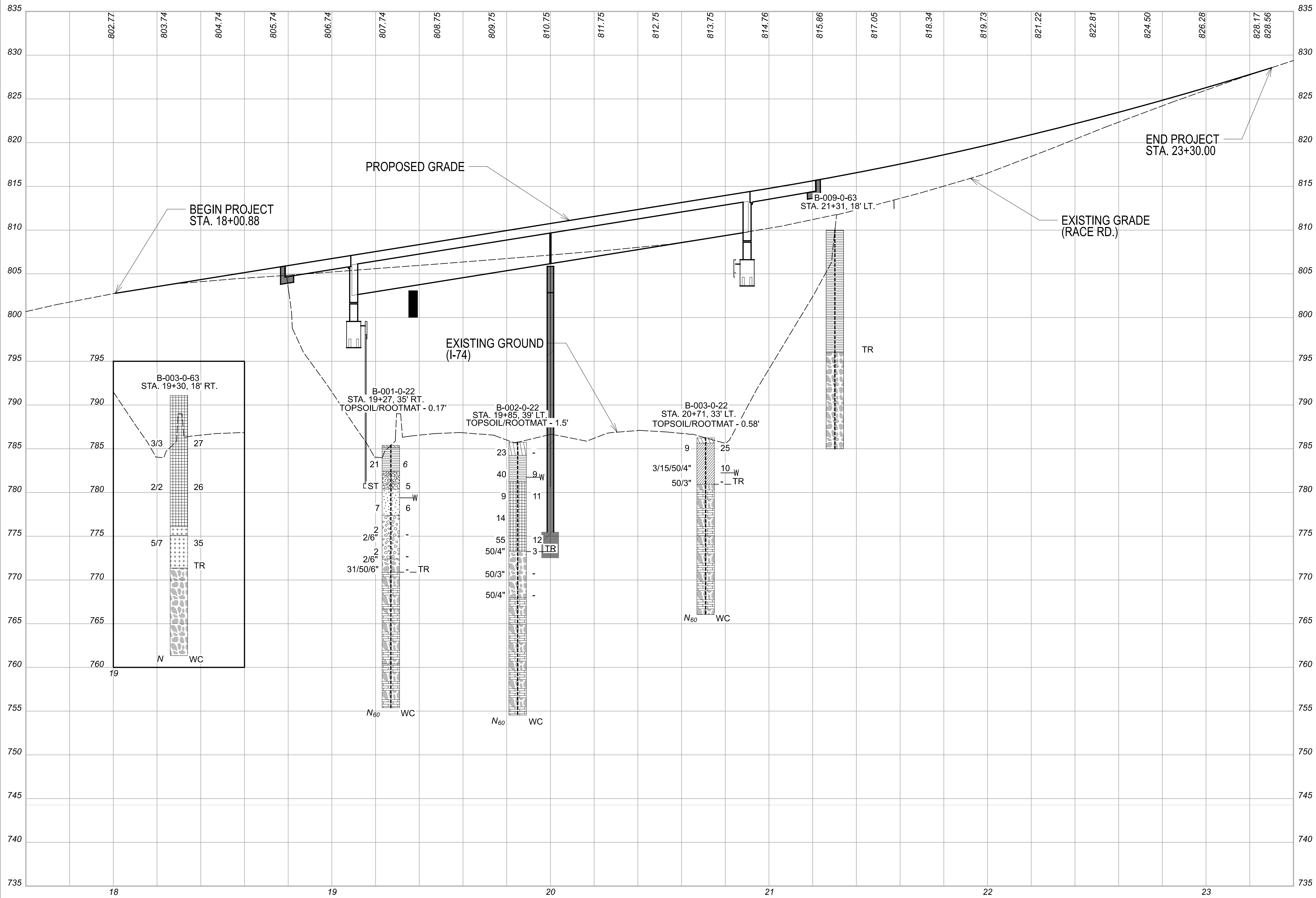
086 103



SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74



| | |
|--------------|-------|
| DESIGNER | |
| DWM | |
| REVIEWER | |
| BCD 01-17-23 | |
| PROJECT ID | |
| 110563 | |
| SUBSET | TOTAL |
| G.4 | G.12 |
| SHEET | TOTAL |
| 087 | 103 |




SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 STA. 18+00 TO STA. 23+30

| | |
|---------------|-------|
| DESIGN AGENCY | |
| | |
| DESIGNER | |
| DWM | |
| REVIEWER | |
| BCD 01-17-23 | |
| PROJECT ID | |
| 110563 | |
| SUBSET | TOTAL |
| G.5 | G.12 |
| SHEET | TOTAL |
| 088 | 103 |

HAM-74-13.35

MODEL Sheet PAPER SIZE: 34x22 (in.) DATE: 5/2/2024 TIME: 10:59:04 AM USER: dmorades
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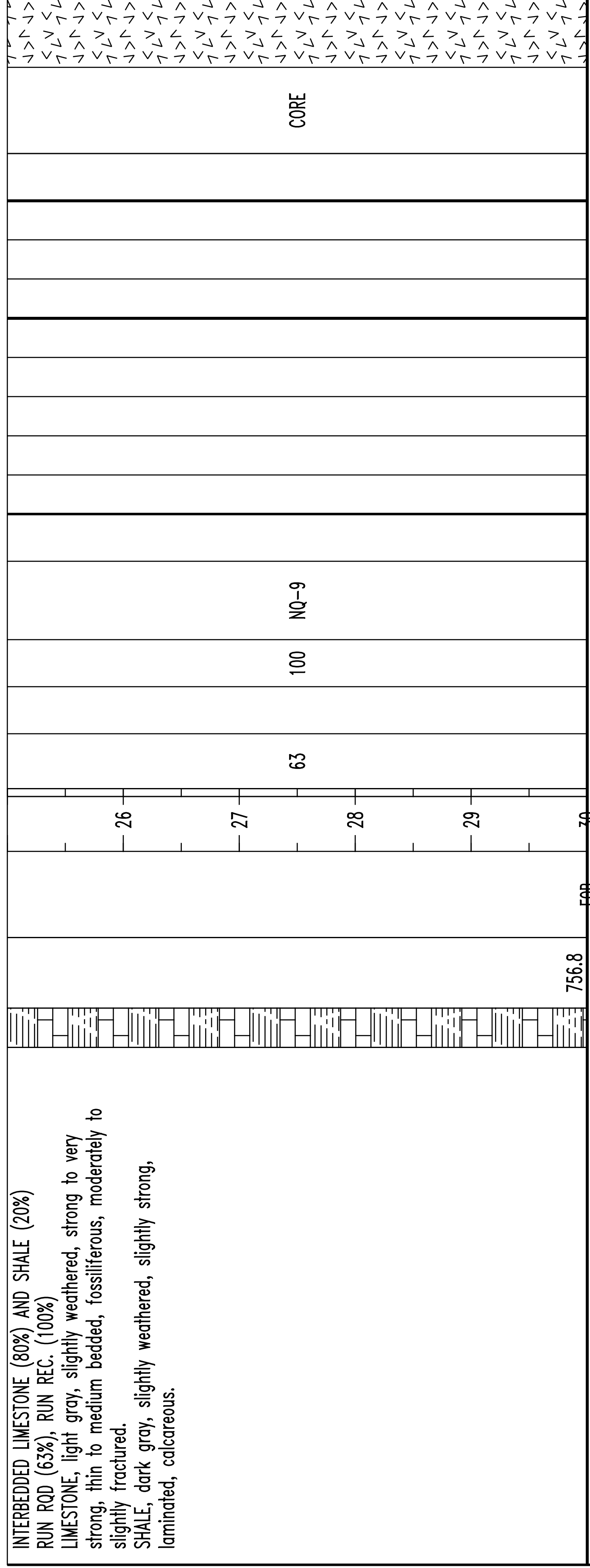
| PROJECT: TYPE: PID: START: | HAM-74-13.35 BRIDGE REPLACEMENT 110563 SFN: 3108680 9/23/22 END: 9/23/22 | DRILLING FIRM / OPERATOR: SAMPLING FIRM / LOGGER: DRILLING METHOD: SAMPLING METHOD: | S&ME / T. FROST S&ME / M. TORRES 3.25" HSA / NQ SPT / NQ / ST | DRILL RIG: HAMMER: CALIBRATION DATE: ENERGY RATIO (%): | S&ME D50 (R61) CME AUTOMATIC 6/7/22 69.8 | STATION / OFFSET: | | | | | | | | | | EXPLORATION ID B-001-0-22 | | | |
|---|---|--|--|---|---|-------------------|----------|----|----|----|------------|----|----|----|----------------|------------------------------|----------------|-----------|--|
| | | | | | | ALIGNMENT: | | | | | RACE RD CL | | | | | | | | |
| | | | | | | GR | CS | FS | SI | CL | LL | PL | PI | WC | ODOT CLASS (c) | | | | |
| MATERIAL DESCRIPTION AND NOTES | | | | SPT / RQD | REC (%) | SAMPLE ID | HP (tsf) | GR | CS | FS | SI | CL | LL | PL | PI | WC | ODOT CLASS (c) | BACK FILL | |
| TOPSOIL/ROOTMAT - 2 INCHES<<>> | | | | ELEV. | DEPTHS | | | | | | | | | | | | | | |
| Hard brown SILTY CLAY, little gravel, little fine to coarse sand, damp. | | | | 786.8 786.6 | 1 | | | | | | | | | | | | | | |
| Loose brown GRAVEL WITH SAND, trace silt, trace clay, damp. | | | | 783.8 | 2 | | | | | | | | | | | | | | |
| Loose brown COARSE AND FINE SAND, little gravel, little clay, trace silt, damp. | | | | 781.8 | 3 | | | | | | | | | | | | | | |
| Very-loose brown GRAVEL, trace fine to coarse sand, trace silt, trace clay, moist. | | | | 778.8 | 4 | | | | | | | | | | | | | | |
| SHALE, gray, highly weathered, very weak, with limestone layers. | | | | 773.8 | 5 | | | | | | | | | | | | | | |
| INTERBEDDED LIMESTONE (75%) AND SHALE (25%) RUN RQD (57%), RUN REC. (100%) LIMESTONE, light gray, moderately weathered, strong, very thin to thinly bedded, fossiliferous, fractured to moderately fractured. SHALE, dark gray, moderately weathered with zones of highly weathered, weak, laminated, calcareous, fractured to highly fractured. UCS = 8,986 psi at 15.8'-16.2' (Limestone) | | | | 772.3 | 6 | | | | | | | | | | | | | | |
| INTERBEDDED SHALE (70%) AND LIMESTONE (30%) RUN RQD (85%), RUN REC. (100%) SHALE, dark gray, slightly weathered, weak to slightly strong, laminated, calcareous, moderately fractured. LIMESTONE, light gray, moderately to slightly weathered, strong, very thin to thinly bedded, fossiliferous. Vuggy at 20.3 feet. | | | | 768.1 | 7 | | | | | | | | | | | | | | |
| | | | | | 8 | | | | | | | | | | | | | | |
| | | | | | 9 | | | | | | | | | | | | | | |
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| | | | | | 15 | | | | | | | | | | | | | | |
| | | | | | 16 | | | | | | | | | | | | | | |
| | | | | | 17 | | | | | | | | | | | | | | |
| | | | | | 18 | | | | | | | | | | | | | | |
| | | | | | 19 | | | | | | | | | | | | | | |
| | | | | | 20 | | | | | | | | | | | | | | |
| | | | | | 21 | | | | | | | | | | | | | | |
| | | | | | 22 | | | | | | | | | | | | | | |
| | | | | | 23 | | | | | | | | | | | | | | |
| | | | | | 24 | | | | | | | | | | | | | | |

DESIGN AGENCY

 DESIGNER: DWM
 REVIEWER: BCD
 PROJECT ID: 110563
 SUBSET: G.6 TOTAL: G.12
 SHEET: 089 TOTAL: 103

**SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 BORING LOG B-001-0-22**

HAM-74-13.35

MODEL Sheet PAPER SIZE: 34x22 (in.) DATE: 5/2/2024 TIME: 11:00:06 AM USER: amrdales
 T:\CIncinmat\1178\Project\2022\22780033_Fishbeck_HAM-74-13.35_Bridge.CIncinmat1 0H\4 GEO\CAD\10563\400-Engineering\GeoTechnical\Sheets\07 - 10563_ID004.dgn



NOTES:

- Groundwater not encountered prior to rock coring.
- Began rock coring using NQ core barrel with water as circulating fluid at 15.0'.
- Water level at 6.0' after rock coring.
- Boring caved at 10.0' upon removal of augers.

SEE ABOVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: SOIL CUTTINGS MIXED WITH BENTONITE

DESIGN AGENCY



DESIGNER

DWM

REVIEWER

BCD 01-17-23

PROJECT ID

110563

SUBSET TOTAL

G.7 G.12

SHEET TOTAL


090 103

SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 BORING LOG B-001-0-22 (continued)

HAM-74-13.35

MODEL: Sheet PAPER: 34x22 (in.) DATE: 5/2/2024 TIME: 10:00:00 AM USER: dmoreales
 T:\CInchmat\1178\Project\2022\22780033_Fishbeck_HAM-74-13.35_Bridge_CInchmat1 0H\4 GEO\CAD\10563\400-Engineering\Geotechnical\Sheets\08 - 10563_ID005.dgn

| PROJECT: TYPE: PID: START: | HAM-74-13.35 BRIDGE REPLACEMENT 110563 SFN: 3108680 9/29/22 END: 9/29/22 | DRILLING FIRM / OPERATOR: SAMPLING FIRM / LOGGER: DRILLING METHOD: SAMPLING METHOD: | S&ME / C. BRUIMMAGE S&ME / M. TORRES 3.25" HSA / NQ SPT / NQ | DRILL RIG: HAMMER: CALIBRATION DATE: ENERGY RATIO (%): | S&ME D50 (R61) CME AUTOMATIC 6/7/22 69.8 | STATION / OFFSET: | | | | | | | | | | EXPLORATION ID B-002-0-22 | | |
|---|---|--|---|---|---|---|---|----------------|----|----|----|----|----|----|----|------------------------------|-----------|-----------|
| | | | | | | ALIGNMENT: ELEVATION: LAT / LONG: | RACE RD CL 785.3 (MSL) EOB: 39.186573, -84.628108 | 19+85, 39' LT. | GR | CS | FS | SI | CL | LL | PL | | PI | WC |
| MATERIAL DESCRIPTION AND NOTES | | | | SPT / RQD | REC (%) | HP (tsf) | GR | CS | FS | SI | CL | LL | PL | PI | WC | ODOT CLASS (G) | BACK FILL | |
| TOPSOIL/ROOTMAT - 18 INCHES<<C>> | | | | 7 | 10 | 10 | - | - | - | - | - | - | - | - | - | - | | |
| Very-stiff brown SILTY CLAY, "and" gravel, some fine to coarse sand, damp. | | | | 1 | 23 | 67 | SS-1 | - | - | - | - | - | - | - | - | - | | |
| Very-stiff brown and gray CLAY, some to little gravel, some to little fine to coarse sand, trace silt, contains limestone fragments, moist to damp. | | | | 2 | 40 | 44 | SS-2 | 2.50 | 37 | 11 | 9 | 19 | 24 | 40 | 20 | 20 | 9 | A-6b (4) |
| | | | | 3 | 15 | 19 | | | | | | | | | | | | |
| | | | | 4 | 9 | 100 | SS-3 | 3.75 | | | | | | | | 11 | A-7-6 (V) | |
| | | | | 5 | 4 | 4 | | | | | | | | | | | | |
| | | | | 6 | 14 | 100 | SS-4 | 3.75 | | | | | | | | 21 | A-7-6 (V) | |
| | | | | 7 | 8 | 4 | | | | | | | | | | | | |
| | | | | 8 | 4 | 8 | | | | | | | | | | | | |
| | | | | 9 | 14 | 100 | SS-5 | 3.25 | 33 | 14 | 12 | 9 | 32 | 44 | 20 | 24 | 12 | A-7-6 (5) |
| | | | | 10 | 55 | 100 | | | | | | | | | | | | |
| | | | | 11 | 8 | 35 | | | | | | | | | | | | |
| | | | | 12 | 50/4" | 100 | SS-6 | - | 44 | 13 | 8 | 15 | 20 | 30 | 15 | 15 | 3 | Rock (V) |
| SHALE, gray, highly weathered, very weak, with limestone layers. | | | | 13 | - | - | | | | | | | | | | | | |
| | | | | 14 | 50/3" | 100 | SS-7 | - | | | | | | | | | | |
| | | | | 15 | - | - | | | | | | | | | | | | |
| | | | | 16 | - | - | | | | | | | | | | | | |
| | | | | 17 | 50/4" | 100 | SS-8 | - | | | | | | | | | | |
| | | | | | - | - | | | | | | | | | | | | |

DESIGN AGENCY

 DESIGNER: DWM
 REVIEWER: BCD 01-17-23
 PROJECT ID: 110563
 SUBSET: G.8 TOTAL: G.12
 SHEET: 091 TOTAL: 103

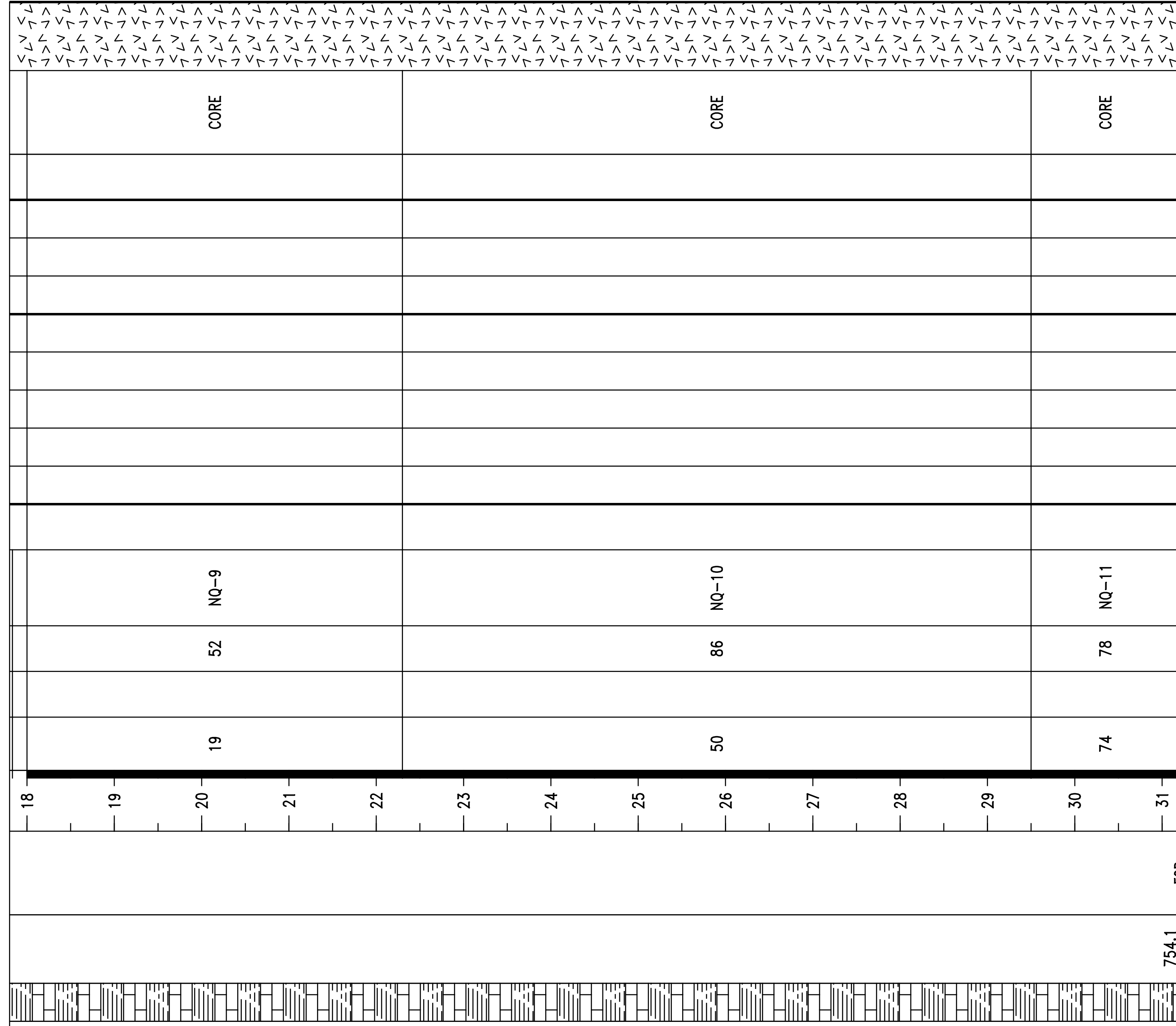
**SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 BORING LOG B-002-0-22**

HAM-74-13.35

MODEL: Sheet PAPER: SIZE: 34x22 (in.) DATE: 5/2/2024 TIME: 10:20:03 AM USER: dmoreales
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INTERBEDDED SHALE (55%) AND LIMESTONE (45%)
 RUN ROD (44%), RUN REC. (75%)
 SHALE, dark gray, highly to slightly weathered, weak to moderately strong, laminated, highly fractured.
 LIMESTONE, light gray, moderately weathered, moderately strong, very thin to medium bedded, fossiliferous.

UCS = 3,888 psi at 22.8'-23.2' (Shale)



- NOTES:
- Groundwater not encountered prior to rock coring.
 - Began rock coring using NQ core barrel with water as circulating fluid at 18.0'.
 - Water level at 4.0' after rock coring.
 - Boring caved at 11.0' upon removal of augers.

NOTES: SEE ABOVE.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: SOIL CUTTINGS

| | |
|---|-------|
| DESIGN AGENCY | |
|  | |
| DESIGNER | |
| DWM | |
| REVIEWER | |
| BCD 01-17-23 | |
| PROJECT ID | |
| 110563 | |
| SUBSET | TOTAL |
| G.9 | G.12 |
| SHEET | TOTAL |
| 092 | 103 |


**SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 BORING LOG B-002-0-22 (continued)**

HAM-74-13-35

| PROJECT: HAM-74-13-35 TYPE: BRIDGE REPLACEMENT PID: 110563 SFN: 3108680 START: 9/29/22 END: 9/29/22 | DRILLING FIRM / OPERATOR: S&M / C. BRUMMAGE SAMPLING FIRM / LOGGER: S&M / M. TORRES DRILLING METHOD: 3.25" HSA / NQ SAMPLING METHOD: SPT / NQ | DRILL RIG: S&M D50 (R61) HAMMER: CME AUTOMATIC CALIBRATION DATE: 6/7/22 ENERGY RATIO (%): 69.8 | STATION / OFFSET: | | | | | | | | | | EXPLORATION ID B-003-0-22 | | | | | | |
|---|--|---|-------------------|---------|---------------------------------------|------------|------|----|----|----|----|----------------|------------------------------|----|----|----------------|-----------|----------|----------|
| | | | ALIGNMENT: | | | RACE RD CL | | | | | | | | WC | | | | | |
| | | ELEVATION: 785.2 (MSL) EOB: 20.2 ft. | | | LATERAL OFFSET: 39.186817, -84.628081 | | | | | | | PAGE 1 OF 1 | | | | | | | |
| MATERIAL DESCRIPTION AND NOTES | | SPT/ROD | N60 | REC (%) | SAMPLE ID | HP ((tsf)) | GR | CS | FS | SI | CL | LL | PL | PI | WC | 0007 CLASS (6) | BACK FILL | | |
| TOPSOIL/ROOTMAT - 7 INCHES<<>> | | 2 | 3 | 9 | 39 | SS-1 | 2.75 | - | - | - | - | - | - | - | - | - | - | <L> | |
| | | 3 | 5 | 5 | 39 | SS-1 | 2.75 | - | - | - | - | - | - | - | - | - | - | <L> | |
| | | 3 | 15 | - | 75 | SS-2 | 2.25 | 44 | 8 | 5 | 26 | 17 | 36 | 21 | 15 | 10 | - | A-6a (V) | |
| | | 5 | 50/3" | - | 67 | SS-3 | - | - | - | - | - | - | - | - | - | - | - | - | A-6a (V) |
| | | 6 | 0 | 89 | NQ-4 | - | - | - | - | - | - | - | - | - | - | - | - | - | CORE |
| INTERBEDDED LIMESTONE (50%) AND SHALE (50%) RUN ROD (17%), RUN REC. (88%) LIMESTONE, light gray, moderately weathered, moderately to very strong, very thin to medium bedded, fossiliferous. SHALE, dark gray, severely to moderately weathered, weak to slightly strong, laminated, highly fractured. | | 7 | | | | | | | | | | | | | | | | <L> | |
| | | 8 | | | | | | | | | | | | | | | | <L> | |
| | | 9 | | | | | | | | | | | | | | | | <L> | |
| | | 10 | | | | | | | | | | | | | | | | <L> | |
| | | 11 | | | | | | | | | | | | | | | | <L> | |
| | | 12 | | | | | | | | | | | | | | | | | <L> |
| | | 13 | | | | | | | | | | | | | | | | | <L> |
| | | 14 | | | | | | | | | | | | | | | | | <L> |
| | | 15 | 20 | 75 | 75 | NQ-5 | - | - | - | - | - | - | - | - | - | - | - | - | CORE |
| | | 16 | | | | | | | | | | | | | | | | | <L> |
| UCS = 1,455 psi at 11.8'-12.2' (Interbedded Limestone and Shale) UCS = 8,195 psi at 14.9'-15.3' (Limestone) | | 17 | | | | | | | | | | | | | | | | <L> | |
| | | 18 | | | | | | | | | | | | | | | | <L> | |
| | | 19 | 14 | 94 | 94 | NQ-7 | - | - | - | - | - | - | - | - | - | - | - | CORE | |
| | | 20 | | | | | | | | | | | | | | | | | <L> |

NOTES:
 - Groundwater not encountered prior to rock coring.
 - Began rock coring using NQ core barrel with water as circulating fluid at 5.5'.
 - Water level at 4.0' after rock coring.
 - Boring cased at 9.0' upon removal of augers.

NOTES: SEE ABOVE.
 ABANDONMENT METHODS, MATERIALS, QUANTITIES: SOIL CUTTINGS

| | | |
|------------------------|-------------|---|
| DESIGN AGENCY | |  |
| DESIGNER: DWM | | |
| REVIEWER: BCD 01-17-23 | | |
| PROJECT ID: 110563 | | |
| SUBSET: G.10 | TOTAL: G.12 | |
| SHEET: 093 | TOTAL: 103 | |

SOIL PROFILE - BRIDGE
 HAM-74-13.35 OVER I-74
 BORING LOG B-003-0-22

Structure Foundation Exploration
HAM-74-13.35 Bridge Replacement (PID 110563)
 Hamilton County, Ohio
 S&ME Project No. 22-78-0033



| | | | |
|----------|---------------|-------------------------------------|-----------------|
| 1 | Boring | B-001-0-22 | Date: 9/29/2022 |
| | Depth | 15.0 feet to 30.0 feet / Box 1 of 1 | |



Photographer: BCD

| | | | |
|----------|---------------|-------------------------------------|-----------------|
| 2 | Boring | B-002-0-22 | Date: 9/29/2022 |
| | Depth | 18.0 feet to 31.2 feet / Box 1 of 1 | |




Photographer: BCD

Structure Foundation Exploration
HAM-74-13.35 Bridge Replacement (PID 110563)
 Hamilton County, Ohio
 S&ME Project No. 22-78-0033

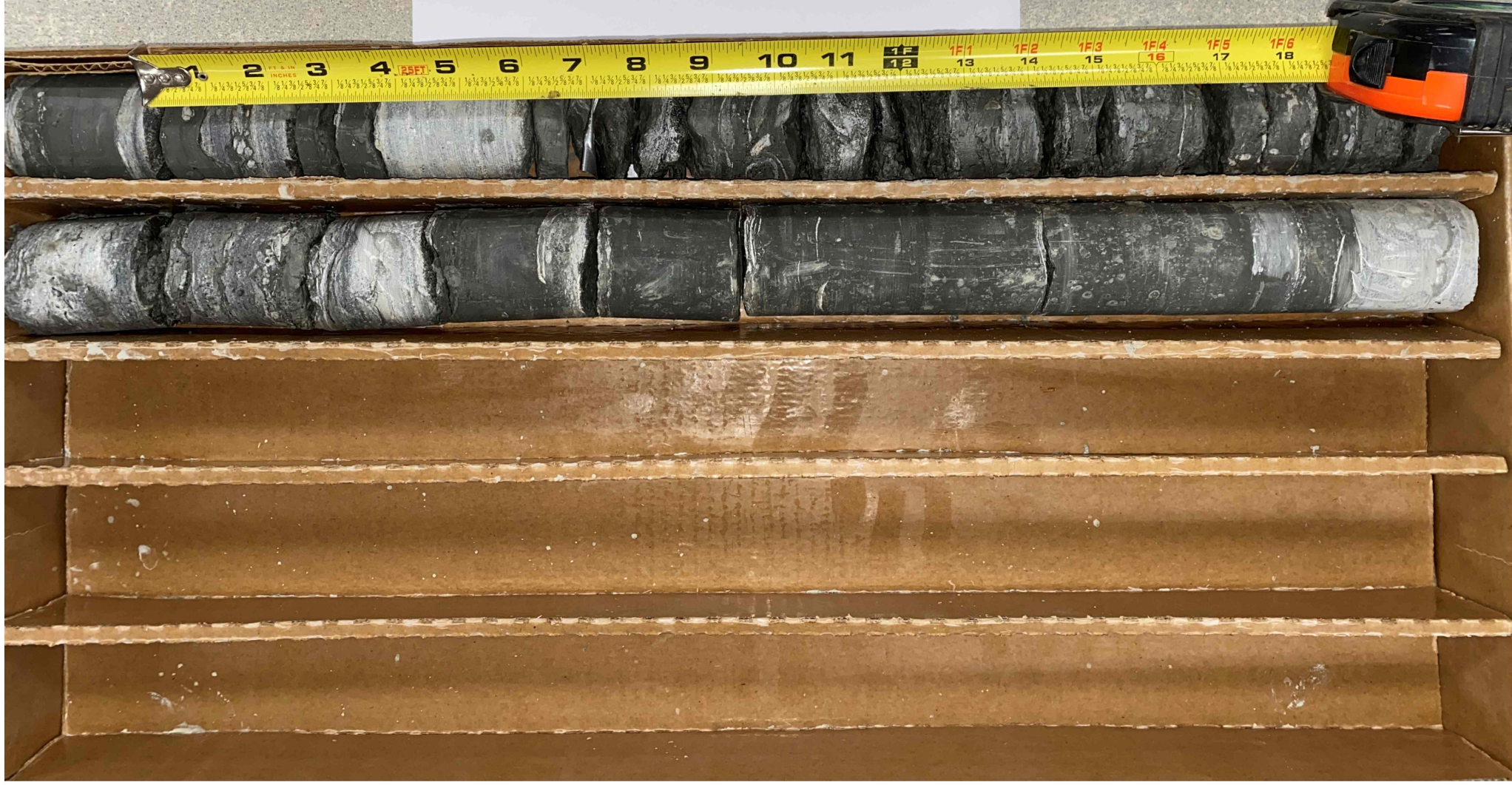


| | | | |
|----------|---------------|------------------------------------|-----------------|
| 3 | Boring | B-003-0-22 | Date: 9/29/2022 |
| | Depth | 5.3 feet to 17.2 feet / Box 1 of 2 | |



Photographer: BCD

| | | | |
|----------|---------------|-------------------------------------|-----------------|
| 4 | Boring | B-003-0-22 | Date: 9/29/2022 |
| | Depth | 17.2 feet to 20.2 feet / Box 2 of 2 | |



Photographer: BCD

State of Ohio
 Department of Highways
 Testing Laboratory

Date Started 2-7-63 Sampler Type SS Dia. 1 3/8" Water Elev. _____
 Date Completed 2-7-63 Casing Length _____ Dia. _____

Project Identification:
HAM-52-11.37
HAM-52-1346
RACE ROAD OVER USR 52

HAMILTON

Boring No. B-3 Station & Offset 19+30.18' Lt. (REAR PIER) Surface Elev. 791.1

| Elev. | Depth | S _N | P _N | L _N | Description | Field No. | Lab. Nos. | Physical Characteristics | | | | | SMTL Cores | | | | |
|-------|-------|----------------|----------------|----------------|------------------------------|-----------|-----------|--------------------------|--------|--------|--------|--------|------------|----|----|------|--|
| | | | | | | | | % Agg. | % C.S. | % F.S. | % Silt | % Clay | | LL | PI | W.C. | |
| 791.1 | 0 | | | | | | | | | | | | | | | | |
| 786.1 | 2 | | | | Brown Gravelly Clay | 1 | 6170 | 29 | 2 | 3 | 21 | 45 | 49 | 26 | 27 | | |
| 781.1 | 4 | 3/3 | | | | | | | | | | | | | | | |
| 776.1 | 6 | | | | Brown and Gray Gravelly Clay | 2 | 6171 | 26 | 3 | 3 | 25 | 43 | 46 | 22 | 26 | | |
| 775.1 | 8 | 2/2 | | | | | | | | | | | | | | | |
| 771.1 | 10 | | | | Brown and Gray Gravelly Clay | 2 | 6171 | 26 | 3 | 3 | 25 | 43 | 46 | 22 | 26 | | |
| | 12 | | | | | | | | | | | | | | | | |
| | 14 | | | | | | | | | | | | | | | | |
| | 16 | | | | Brown and Gray Gravelly Clay | 2 | 6171 | 26 | 3 | 3 | 25 | 43 | 46 | 22 | 26 | | |
| | 18 | | | | | | | | | | | | | | | | |
| | 20 | | | | Brown and Gray Gravelly Clay | 2 | 6171 | 26 | 3 | 3 | 25 | 43 | 46 | 22 | 26 | | |
| | 22 | | | | | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | | | | | |
| | 26 | | | | | | | | | | | | | | | | |
| | 28 | | | | | | | | | | | | | | | | |
| | 30 | | | | | | | | | | | | | | | | |

TOP OF ROCK

Shale, dark gray, fissile, firm, moderately weathered in top 3.0'; with thin, irregular limestone interbeds (gray, crystalline, fossiliferous, hard) comprising 3/4% of the interval. Core loss 3/4%.

BOTTOM OF BORING

State of Ohio
 Department of Highways
 Testing Laboratory

Date Started 2-7-63 Date Completed 2-8-63
 Boring No. B-9 Station & Offset 21+31.18' Lt. (FORWARD ABUTMENT) Surface Elev. 808.8

Project Identification:
HAM-52-11.37
HAM-52-1346
RACE ROAD OVER USR 52

HAMILTON

| Elev. | Depth | S _N | P _N | L _N | Description | Field No. | Lab. Nos. | Physical Characteristics | | | | | SMTL Cores | | | | |
|-------|-------|----------------|----------------|----------------|---|-----------|-----------|--------------------------|--------|--------|--------|--------|------------|----|----|------|--|
| | | | | | | | | % Agg. | % C.S. | % F.S. | % Silt | % Clay | | LL | PI | W.C. | |
| 808.8 | 0 | | | | | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | | | | | |
| | 4 | 0.5 | | | Brown Silty Clay with Limestone Boulders and Cobbles. | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | | | | | |
| | 8 | 1.8 | | | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | |
| | 14 | 4.0 | | | | | | | | | | | | | | | |
| | 16 | | | | | | | | | | | | | | | | |
| | 18 | 5.0 | | | Shale, gray, fissile, firm, calcareous, with interbedded limestone (gray, crystalline, fossiliferous, hard) comprising 50% of the interval; with soft clay seams less than 1 inch in thickness throughout. Core loss 10%. | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | | | | | |
| | 22 | 3.4 | | | | | | | | | | | | | | | |
| | 24 | | | | | | | | | | | | | | | | |

TOP OF ROCK

BOTTOM OF BORING