

PROJECT DESCRIPTION

THIS PROJECT, DESIGNATED AS FUL-120-14.08 PID NO. 101140, INCLUDES REPLACEMENT OF THE SR 120 BRIDGE OVER TENMILE CREEK IN METAMORA

HISTORIC RECORDS

REVIEW OF ODOT RECORDS FOR THE PROJECT AREA INDICATED NUMEROUS HISTORIC AUGER AND DRIVE ROD STRUCTURAL BORINGS HAD BEEN PERFORMED FOR THE SR 120 BRIDGE OVER TENMILE CREEK IN 1954 FOR FUL-120-14.06-14.08. TEN BORINGS WERE PERFORMED NEAR THE INTERSECTIONS PERTINENT TO THIS PROJECT. SINCE THE HISTORIC BORINGS WERE AUGER BORINGS OR DRIVE ROD BORINGS THAT DID NOT INCLUDE STANDARD PENETRATION TESTS, THEY WERE NOT UTILIZED FOR EVALUATIONS FOR THIS PROJECT AND ARE NOT SHOWN ON THE PLAN AND PROFILE SHEETS. HOWEVER, THE COVER SHEET, AS WELL AS THE PERTINENT PLAN-AND-PROFILE DRAWINGS FROM THE HISTORIC SOIL PROFILE, ARE INCLUDED IN APPENDIX C OF THE ASSOCIATED GEOTECHNICAL REPORT.

GEOLOGY

PUBLISHED GEOLOGIC MAPS FROM THE OHIO DEPARTMENT OF NATURAL RESOURCES (ODNR) INDICATE THAT THE PROJECT SITE IS LOCATED IN THE MAUMEE LAKE PLAINS PHYSIOGRAPHIC REGION OF THE HURON-ERIE LAKE PLAINS SECTION. WITHIN THIS REGION, THE GEOLOGIC DEPOSITS CONSIST OF PLEISTOCENE-AGE SILT, CLAY, AND WAVE-PLANED CLAYEY TILL OVERLYING SILURIAN-AGE CARBONATE AND SHALE BEDROCK.

THE USDA NATURAL RESOURCE CONSERVATION SERVICE (NRCS) WEB SOIL SURVEY INDICATES THAT UPPER-PROFILE SOILS IN THE PROJECT AREA ARE PREDOMINANTLY MAPPED AS SLOAN SILTY CLAY LOAM (SO) AT THE BRIDGE, HASKINS LOAM (HKA) JUST PAST THE EXISTING AUTO BODY SHOP EAST OF THE BRIDGE, AND BIXLER LOAMY FINE SAND (BCA) WEST OF THE BRIDGE. THE SO SOILS CONSIST OF LOAMY ALLUVIUM FORMED ON DRAINAGEWAYS, BACKSWAMPS, AND FLATS ON FLOOD PLAINS. THE HKA SOILS CONSIST OF LACUSTRINE DEPOSITS FORMED ON LAKE AND TILL PLAINS. THE BCA SOILS CONSIST OF SANDY LACUSTRINE DEPOSITS FORMED ON RIDGES AND KNOLLS ON BEACH RIDGES, OUTWASH PLAINS, AND DELTAS. THE SO SOILS ARE CHARACTERIZED AS VERY POORLY DRAINED AND HAVE A MODERATELY HIGH TO HIGH PERMEABILITY. THE HKA SOILS ARE CHARACTERIZED AS SOMEWHAT POORLY DRAINED AND HAVE A LOW TO MODERATELY HIGH PERMEABILITY. THE BCA SOILS ARE CHARACTERIZED AS SOMEWHAT POORLY DRAINED AND HAVE A MODERATELY HIGH TO HIGH PERMEABILITY.

THE ALLUVIAL DEPOSITS NEAR TENMILE CREEK ARE ASSOCIATED WITH THE HISTORIC DEPOSITION ASSOCIATED WITH THIS CREEK. THE LACUSTRINE SOILS CONSIST OF HISTORIC LAKE-LAID DEPOSITS, CONSISTING OF PREDOMINANTLY SILTS AND CLAYS, AND OFTEN EXHIBIT ALTERNATING THIN LAYERS OF INTERBEDDED SILTS AND CLAYS KNOWN AS VARVES. VARVED SOILS ARE CHARACTERISTIC OF LACUSTRINE DEPOSITS, AND THE THIN LAYERING IS TYPICALLY ATTRIBUTED TO SEASONAL OR OTHER CYCLIC VARIATIONS OF SEDIMENTATION IN THE LAKE WATERS. IN ADDITION, THIN SAND SEAMS AND PARTINGS MAY BE ENCOUNTERED.

THE GLACIAL TILL, ALSO REFERRED TO AS MORAINE, WAS DEPOSITED BY THE ADVANCE AND RETREAT OF GLACIAL ICE. DUE TO THE WEIGHT OF THE ICE MASS, THE TILL DEPOSITS ARE MODERATELY TO HIGHLY OVER-CONSOLIDATED, THAT IS, THE EXISTING SOIL DEPOSITS HAVE EXPERIENCED A PREVIOUS VERTICAL STRESS SIGNIFICANTLY HIGHER THAN THE PRESENT EFFECTIVE VERTICAL STRESS DUE TO THE REMAINING OVERLYING SOIL STRATA IN THE PROFILE. THE TILL MAY CONTAIN COBBLES AND/OR BOULDERS LEFT IN THE TILL SOIL MATRIX. ADDITIONALLY, SEAMS OF GRANULAR SOILS MAY ALSO BE ENCOUNTERED WITHIN GLACIAL TILLS.

BEDROCK IN THE PROJECT AREA IS BROADLY MAPPED ON THE "GEOLOGIC MAP OF OHIO" AS DEVONIAN-AGE OLENTANGY AND OHIO SHALES. BEDROCK AT THE SITE IS MAPPED AT ELEV. 620± CORRESPONDING TO DEPTHS ON THE ORDER OF APPROXIMATELY 100 FEET BELOW EXISTING GRADES. A LOG FOR A NEARBY WATER WELL INDICATED SHALE BEDROCK WAS ENCOUNTERED AT A DEPTH OF APPROXIMATELY 135 FEET BELOW GRADE.

RECONNAISSANCE

TTL PERFORMED A SITE RECONNAISSANCE ON OCTOBER 1, 2020. THE PROJECT AREA CONSISTED PREDOMINANTLY OF SMALL BUSINESSES WITH A CHURCH JUST WEST OF THE BRIDGE. THE PAVEMENTS WERE IN GENERALLY FAIR TO POOR CONDITION WITH FREQUENT LONGITUDINAL AND TRANSVERSE CRACKING. THE CRACKS WERE GENERALLY SEALED. THE CONCRETE SIDEWALKS ON EITHER SIDE OF THE BRIDGE WERE IN GENERALLY GOOD TO FAIR CONDITION WITH LITTLE TO NO DISTRESS.

SPALLING CONCRETE AND LARGE CRACKS WERE OBSERVED ALONG PORTIONS OF THE HEADWALLS, AND CONNECTED RETAINING WALL. THE BRIDGE GIRDERS GENERALLY HAD MINOR RUST. A PIPE EXTENDS THROUGH THE WESTERN HEADWALL, SOUTH OF THE BRIDGE. SEVERAL PIPES ARE PRESENT DISCHARGING INTO THE CREEK TROUGH THE HEADWALLS AND RETAINING WALL. A PVC PIPE AND A CONCRETE PIPE DISCHARGING TO THE CREEK WERE PRESENT AT THE GROUND SURFACE/TOP OF EAST HEADWALL, SOUTH OF THE BRIDGE. THIS WALL INCLUDED A TURNBACK BEYOND A STEEL I-BEAM THAT HAD BEEN INSTALLED POSSIBLY FOR REINFORCEMENT LATER IN THE LIFE OF THE WALL. IN ANY CASE, THE PORTION OF THE WALL BEYOND THE TURNBACK INCLUDED TILTING AND SPALLING.

THE RETAINING WALL APPEARED TO HAVE A SMALL WINDOW PLACED IN IT APPROXIMATELY 6 TO 12 INCHES BELOW THE TOP OF THE WALL UNDER THE BRICK PORTION OF THE EXISTING AUTO BODY SHOP. AT THE TIME OF OUR RECONNAISSANCE, WATER WAS FLOWING AT THE WALL/CREEK BANK INTERFACE OR BELOW. WEEP HOLES WERE OBSERVED IN THE HEADWALLS.

AT THE TIME OF OUR RECONNAISSANCE, THE TENMILE CREEK BOTTOM WAS APPROXIMATELY 13 FEET AND 14 FEET BELOW ROADWAY GRADES SOUTH AND NORTH OF THE BRIDGE, RESPECTIVELY (Elevs. 706± AND 705±, RESPECTIVELY). THE WATER LEVEL IN THE CREEK WAS APPROXIMATELY 2 INCHES AND 12 INCHES ABOVE CREEK BOTTOM SOUTH AND NORTH OF THE BRIDGE, RESPECTIVELY (Elev. 706±).

706± AND
separate " and A

LEGEND

DESCRIPTION	ODOT CLASS	CLASSIFIED MECH./VISUAL	
SANDY SILT	A-4A	2	4
SILT AND CLAY	A-6A	9	7
SILTY CLAY	A-6B	3	29
	TOTAL	14	40
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.			
DRIVE SAMPLE AND/OR ROCK CORE BORING PLOTTED TO VERTICAL SCALE ONLY. HORIZONTAL BAR INDICATES A CHANGE IN STRATIGRAPHY.			
N ₆₀ INDICATES STANDARD PENETRATION RESISTANCE NORMALIZED TO 60% DRILL ROD ENERGY RATIO.			
WC INDICATES WATER CONTENT IN PERCENT.			
W INDICATES FREE WATER ELEVATION.			
V INDICATES STATIC WATER ELEVATION.			
INDICATES A PLASTIC MATERIAL WITH A MOISTURE CONTENT EQUAL TO OR GREATER THAN THE LIQUID LIMIT MINUS 3.			
SS INDICATES A SPLIT SPOON SAMPLE.			
ST INDICATES SHELBY TUBE.			
NI INDICATES A NOT-INTACT SAMPLE.			
TR INDICATES TOP OF ROCK.			
* INDICATES UNCONFINED COMPRESSIVE STRENGTH TEST BY ASTM D 2166.			

← ORGANIC CONTENT INDICATES ORGANIC CONTENT BY LOSS ON IGNITION.

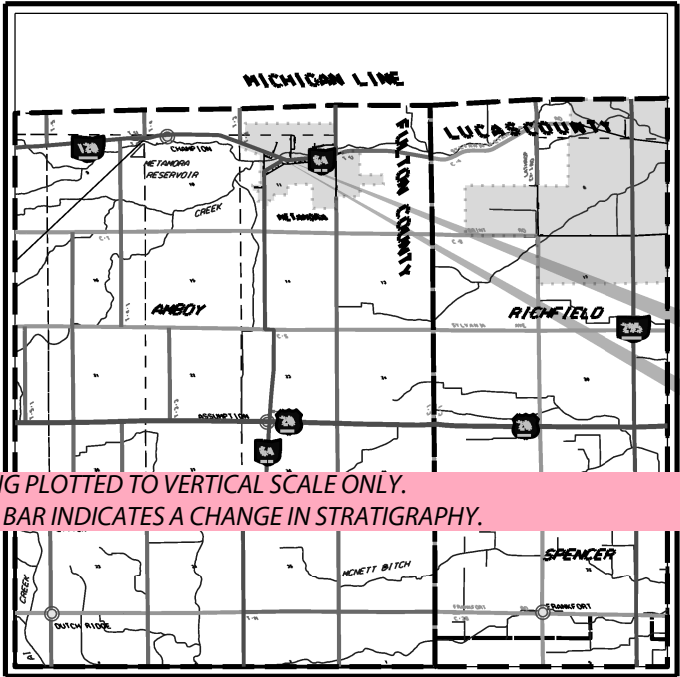
ORGANIC CONTENT = INDICATES ORGANIC CONTENT BY LOSS ON IGNITION.

Move to left and add "="

THIS EXPLORATION INCLUDED THREE TEST BORINGS, DESIGNATED AS B-001-0-20, B-002-0-20 (AND OFFSET BORING B-002-1-20), AND B-004-0-20. ADDITIONALLY, AN AUGER PROBE BORING WAS PERFORMED, DESIGNATED AS X-003-0-20 (ALONG WITH OFFSET AUGER PROBE BORING X-003-1-20) THE BORINGS WERE PERFORMED BY TTL DURING OCTOBER 7 THROUGH 9, 2020. THE BORINGS HAVE BEEN IDENTIFIED IN ACCORDANCE WITH ODOT PROTOCOL, BUT THE "-0-20" OR "-20" PORTION OF THE NOMENCLATURE IS GENERALLY OMITTED FORM THE DISCUSSION HEREIN. BORING B-002-0 WAS TERMINATED DUE TO ENCOUNTERED REBAR IN CONCRETE UNDERLYING THE ASPHALT SURFACE COURSE. AN OFFSET BORING (B-002-1) WAS ADVANCED FURTHER FROM THE BRIDGE SO AS TO AVOID THE APPARENT APPROACH SLAB. AUGER BORING X-003-0 WAS INTENDED TO ENCOUNTER THE FOOTING OF AN EXISTING RETAINING WALL, SO IT COULD BE CORED TO DETERMINE THE FOOTING THICKNESS. BORING X-003-0 WAS TERMINATED AFTER IT WAS EXTENDED DEEPER THAN THE INDICATED BEARING ELEVATION. AN OFFSET BORING (X-003-1) WAS MOVED CLOSER TO THE WALL BUT WAS ALSO TERMINATED AFTER BEING ADVANCED DEEPER THAN THE INDICATED BEARING ELEVATION WITHOUT ENCOUNTERING THE RETAINING WALL FOOTING. THE BORINGS WERE LOCATED IN THE FIELD BY TTL BASED ON A DIRECTION PROVIDED FROM BERGMANN.

IN ACCORDANCE WITH THE ODOT SPECIFICATIONS FOR GEOTECHNICAL EXPLORATIONS (SGE), BORINGS B-001 AND B-002-1 WERE PERFORMED AS ODOT TYPE E1 BRIDGE BORINGS, EXTENDED TO ENCOUNTER A MINIMUM OF 30 CONSECUTIVE FEET OF 30 BLOWS PER FOOT (BPF) MATERIAL. THE UPPER PORTION OF EACH OF THESE BORINGS WAS PERFORMED AS ODOT TYPE A ROADWAY BORINGS TO FACILITATE PAVEMENT SUBGRADE EVALUATIONS. ADDITIONALLY, BORING B-002-1 WAS PERFORMED TO MEET ODOT TYPE E3C RETAINING WALL AND TYPE E6 BUILDING CRITERIA. BORING B-004 WAS ALSO PERFORMED AS AN ODOT TYPE E6 BUILDING BORING.

THE TEST BORINGS PERFORMED DURING THIS EXPLORATION WERE DRILLED WITH AN ATV-MOUNTED DRILLING RIG FOR THE BRIDGE BORINGS AND WITH A TRUCK-MOUNTED DRILLING RIG FOR THE BUILDING AND EXISTING RETAINING WALL EXPLORATORY BORINGS. THE BORINGS WERE EXTENDED UTILIZING 3/4-INCH INSIDE DIAMETER HOLLOW-STEM AUGERS. IN BORINGS B-001 AND B-002-1, SAMPLES WERE OBTAINED CONTINUOUSLY OVER 18-INCH SPLIT-SPOON (SS) SAMPLE DRIVES TO A DEPTH OF 7 FEET, AT 2½-FOOT INTERVALS TO A DEPTH OF 30 FEET, AND AT 5-FOOT INTERVALS THEREAFTER. ADDITIONALLY, IN BORING B-001, SAMPLES WERE OBTAINED CONTINUOUSLY OVER 18-INCH SS SAMPLE DRIVES FROM 11 TO 20 FEET TO INCLUDE SAMPLING FOR EVALUATION OF POTENTIAL SCOUR. IN BORING B-004, SAMPLES WERE OBTAINED AT 2½-FOOT INTERVALS TO A DEPTH OF 10 FEET, AND AT 5-FOOT INTERVALS THEREAFTER. BORINGS X-003-0 AND X-003-1 DID NOT INCLUDE SAMPLING. SPLIT-SPOON SOIL SAMPLES WERE OBTAINED BY THE STANDARD PENETRATION TEST METHOD (ASTM D 1586). THESE SAMPLES WERE SEALED IN JARS AND TRANSPORTED TO OUR LABORATORY FOR FURTHER CLASSIFICATION AND TESTING. THE HAMMER/ROD ENERGY RATIO FOR THE ATV-MOUNTED DRILL RIG (CME 550X) WAS 77.3 PERCENT, AND WAS CALIBRATED ON FEBRUARY 20, 2019. THE HAMMER/ROD ENERGY RATIO FOR THE TRUCK-MOUNTED DRILL RIG (CME 75) WAS 70.8 PERCENT, AND WAS CALIBRATED ON THE SAME DATE.



LOCATION MAP

LATITUDE: 41°42'43" LONGITUDE: 83°54'39"

SCALE IN MILES

ALL SAMPLES WERE VISUALLY CLASSIFIED IN ACCORDANCE WITH THE ODOT SOIL CLASSIFICATION SYSTEM. ALL RECOVERED SAMPLES OF THE SUBSOILS WERE ALSO TESTED IN OUR LABORATORY FOR MOISTURE CONTENT (ASTM D 2216), ORGANIC CONTENT DETERMINATIONS BY THE LOSS-ON-IGNITION (LOI) METHOD (ASTM D 2974) WERE PERFORMED ON SELECTED SAMPLES. DRY DENSITY DETERMINATIONS AND UNCONFINED COMPRESSIVE STRENGTH TESTS BY THE CONSTANT RATE OF STRAIN METHOD (ASTM D 2166) WERE PERFORMED ON SELECTED SPLIT-SPOON SAMPLES. UNCONFINED COMPRESSIVE STRENGTH ESTIMATES WERE OBTAINED FOR THE REMAINING INTACT COHESIVE SPLIT-SPOON SAMPLES USING A CALIBRATED HAND PENETROMETER.

LABORATORY TESTING WAS PERFORMED IN ACCORDANCE WITH GB-1 PLAN SUBGRADES "CRITERIA, INCLUDING MECHANICAL SOIL CLASSIFICATION CONSISTING OF AN ATTERBERG LIMITS TEST (ASTM D 4318) AND A PARTICLE SIZE ANALYSIS (ASTM D 422) [FOR COHESIVE SOIL SAMPLES] FOR AT LEAST TWO SAMPLES FROM BORINGS B-001 AND B-002-1 WITHIN 6 FEET OF THE PROPOSED SUBGRADE. COMPLETE CLASSIFICATION TESTING WAS ALSO PERFORMED FOR SELECTED SAMPLES DEEPER IN THE SUBSOIL PROFILE.

SULFATE CONTENT DETERMINATIONS (ODOT SUPPLEMENT 1122) WERE PERFORMED ON A SUBGRADE SAMPLE FROM BORINGS B-001 AND B-002-1.

EXPLORATION FINDINGS

THE BORINGS ENCOUNTERED SURFACE MATERIALS CONSISTING OF ASPHALT RANGING IN THICKNESS FROM 1 TO 7 INCHES. CONCRETE AND AGGREGATE BASE WERE ENCOUNTERED UNDERLYING THE ASPHALT IN SOME OF THE BORINGS WITH VARYING THICKNESSES. A DESCRIPTION OF THE SURFACE MATERIALS AND THEIR THICKNESSES ARE SUMMARIZED IN THE FOLLOWING TABLE.

DESCRIPTION OF SURFACE MATERIALS			
BORING NUMBER	APPROXIMATE ASPHALT THICKNESS (INCHES)	APPROXIMATE CONCRETE THICKNESS (INCHES)	APPROXIMATE AGGREGATE THICKNESS (INCHES)
B-001-0-20	7	8	3
B-002-0-20	2	> 10 (NOTE 1)	-
B-002-1-20	6	3	N.E.
X-003-0-20	1 (NOTE 2)	N.E.	35
X-003-1-20	1 (NOTE 2)	N.E.	35
B-004-0-20	4	8	N.E.

Remove this space

N.E. = NOT ENCOUNTERED
NOTES:

- BORING B-002-0 WAS TERMINATED AT A DEPTH OF APPROXIMATELY 12 INCHES FROM THE TOP OF PAVEMENT IN THE REINFORCED CONCRETE LAYER DUE TO ENCOUNTERED REBAR.
- BORINGS X-003-0 AND X-003-1 WERE PERFORMED IN AN AREA OF DELIPIDATED ASPHALT BETWEEN THE PARKING AREA AND A GUARDRAIL AT THE TOP OF THE RETAINING WALL.

"PLAN SUBGRADES" CRITERIA
keep " with P and separate " and C

B-002-1
keep as a whole

B-002-1
keep as a whole

CPI 01/22