

REFERENCE: Y-4810K

PROJECT: 40325

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CABARRUS
PROJECT DESCRIPTION NORFOLK SOUTHERN
MAINLINE GRADE CROSSING SEPARATION AT
ROGERS LAKE ROAD (CROSSING NO. 724408Y)
IN KANNAPOLIS

SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS
LAKE ROAD (31+94.08 -L-) OVER US 29A (SOUTH
MAIN STREET), NCRR (NS) AND SOUTH RIDGE
AVENUE BETWEEN LOWRANCE AVENUE AND
MEADOW AVENUE

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-8	CROSS SECTION(S)
9-20	BORE LOGS, CORE REPORTS & CORE PHOTOGRAPHS
21	SOIL TEST RESULTS
22	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	Y-4810K	1	23

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

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SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																			
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																			
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING																													
GENERAL CLASS. GRANULAR MATERIALS (≤ 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTARY ROCK (CPI) - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																													
COMPRESSIBILITY										PERCENTAGE OF MATERIAL										GROUND WATER																													
SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP																													
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																													
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT VST PMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS																													
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAG. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED U - UNIT WEIGHT UG - DRY UNIT WEIGHT										SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO																			
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CORE SIZE: HAND TOOLS:										TERM SPACING TERM THICKNESS										BENCH MARK: SEE IN NOTES BELOW																			
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT										<input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input checked="" type="checkbox"/> ACKER (TER92-0) <input checked="" type="checkbox"/> D-50 (TER373) <input checked="" type="checkbox"/> CME-550X (#F00072)										VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET										ELEVATION: FEET									
PLASTICITY										NOTES:										INDURATION																													
NON PLASTIC SLIGHTLY PLASTIC MODERATELY PLASTIC HIGHLY PLASTIC										FIAD - FILLED IMMEDIATELY AFTER DRILLING BM1 BL-16; N=632,336,284 E=1,517,071,554 STA. 46+08.63-BL-ELEVATION 781.49 BM2 BY6-33; N=632,269,19 E=1,516,332,23 STA. 10+62.91-Y6-ELEVATION 773.36										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																													
COLOR																																																	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																	

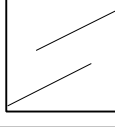

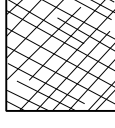




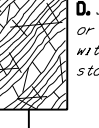
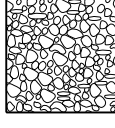
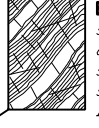
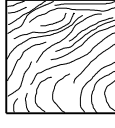

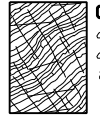

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

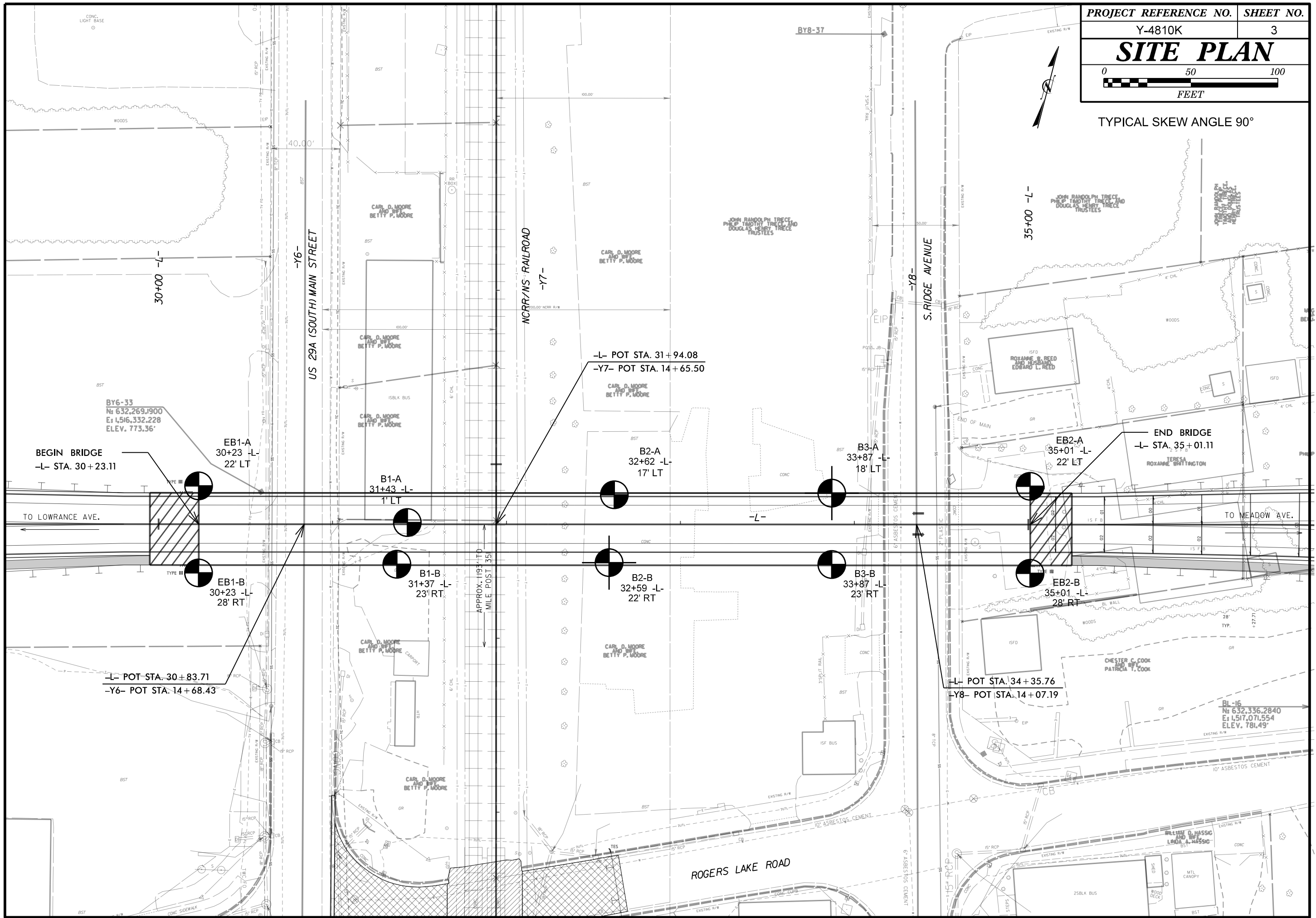
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE						
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A		A. Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70				
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80	70					B. Sandstone with thin inter-layers of siltstone	60	50			
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		60	50				C. Sandstone and siltstone in similar amounts		40			
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity			40				D. Siltstone or silty shale with sandstone layers		30			
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces				30			E. Weak siltstone or clayey shale with sandstone layers		20			
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A			20		F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure		10			
						10		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers					
								H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.					

→ Means deformation after tectonic disturbance

SITE PLAN



TYPICAL SKEW ANGLE 90°



CROSS SECTION ALONG END BENT 1 @ STA. 30+23 -L-

℄

SS-1

EB1-A
30+23-L-
22' LT

EB1-B
30+23-L-
28' RT

PAVEMENT,
ASPHALT, ABC

PAVEMENT,
ASPHALT, ABC

EXISTING GROUND

RESIDUAL, LIGHT RED-BROWN,

DENSE, MOIST, CLAYEY

SAND, TRACE ROCK

LITTLE TO SOME MICA

BROWN, GRAY, MEDIUM

COARSE TO FINE

FRAGMENTS,

(A-2-6)

LIGHT RED, BROWN, GRAY,

SANDY SILT,

WHITE, STIFF TO VERY STIFF, WET, COARSE

TRACE TO SOME ROCK FRAGMENTS, TRACE TO

SOME MICA (A-4)

12/17

TO FINE

GRAY, LIGHT RED,

FINE SAND, TRACE TO

SILTY COARSE

(A-2-4)

BROWN, WHITE, DENSE TO VERY DENSE, WET,

LITTLE MICA, SOME ROCK FRAGMENTS

WEATHERED ROCK (GRANITE)

BT
FIAD
11/17

BT

13

12

12

14

13

12

13

12

10

11

16

23

31

39

57

100/0.8

100/0.8

100/0.6

11

12

11

12

11

11

12

12

13

14

13

16

14

17

21

60

100/0.5

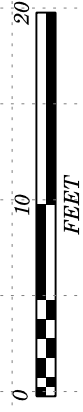
100/0.3

100/0.3

805 800 795 790 785 780 775 770 765 760 755 750 745 740 735 730 725 720 715 710 705 700 695 690 685 680 675

45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45

PROJ. REFERENCE NO. Y-4810K	SHEET NO. 4
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NOTE: TYPICAL SKEW ANGLE 90°
INFERRED STRATIGRAPHY IS DRAWN THROUGH
THE BORINGS AND PROJECTED ON TO THE
CROSS SECTION. GROUND LINE TAKEN FROM
PROVIDED TIN FILE: y4810k Is tin (DATED 10/31/2017)

805 800 795 790 785 780 775 770 765 760 755 750 745 740 735 730 725 720 715 710 705 700 695 690 685 680 675 670 665 660 655

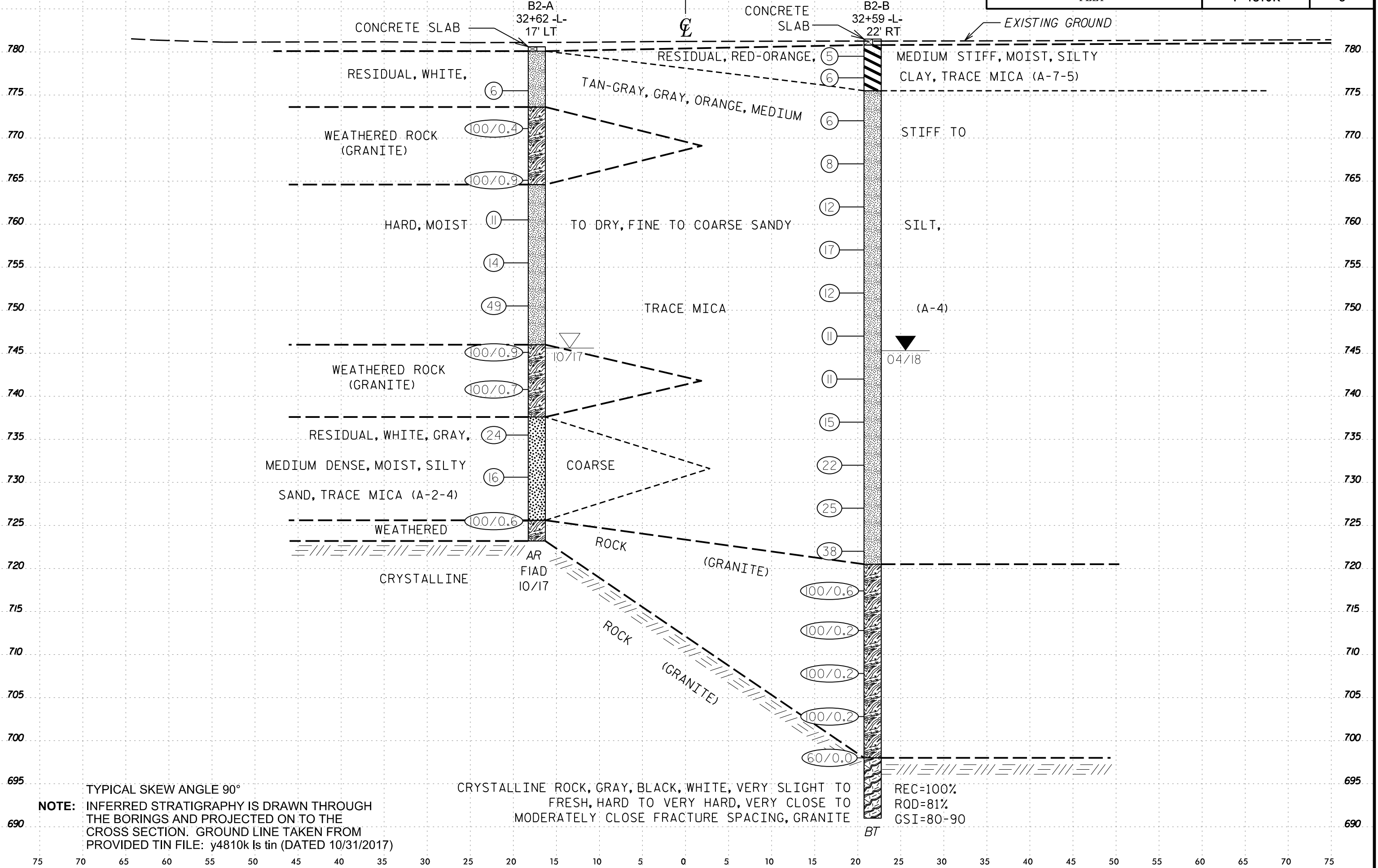
45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45

6/23/16

CROSS SECTION THROUGH BENT 2 @ STA. 32+62 -L-



PROJ. REFERENCE NO.	SHEET NO.
Y-4810K	6

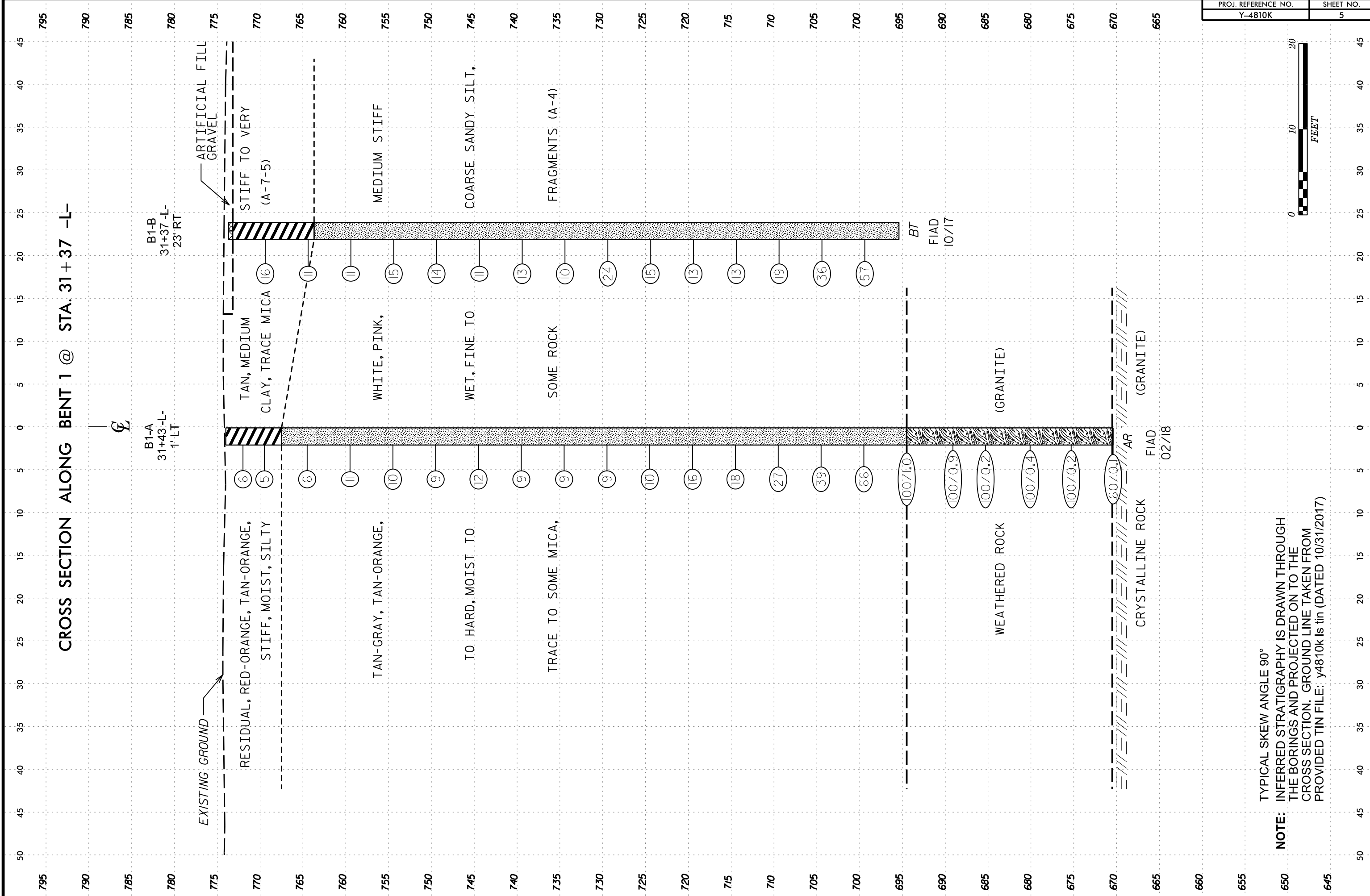


TYPICAL SKEW ANGLE 90°
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: y4810k Is tin (DATED 10/31/2017)

CRYSTALLINE ROCK, GRAY, BLACK, WHITE, VERY SLIGHT TO FRESH, HARD TO VERY HARD, VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, GRANITE
 REC=100%
 RQD=81%
 GSI=80-90

BT

CROSS SECTION ALONG BENT 1 @ STA. 31+37 -L-



PROJ. REFERENCE NO. Y-4810K	SHEET NO. 5
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NOTE: TYPICAL SKEW ANGLE 90°
 INFERRED STRATIGRAPHY IS DRAWN THROUGH
 THE BORINGS AND PROJECTED ON TO THE
 CROSS SECTION. GROUND LINE TAKEN FROM
 PROVIDED TIN FILE: y4810k Is tin (DATED 10/31/2017)

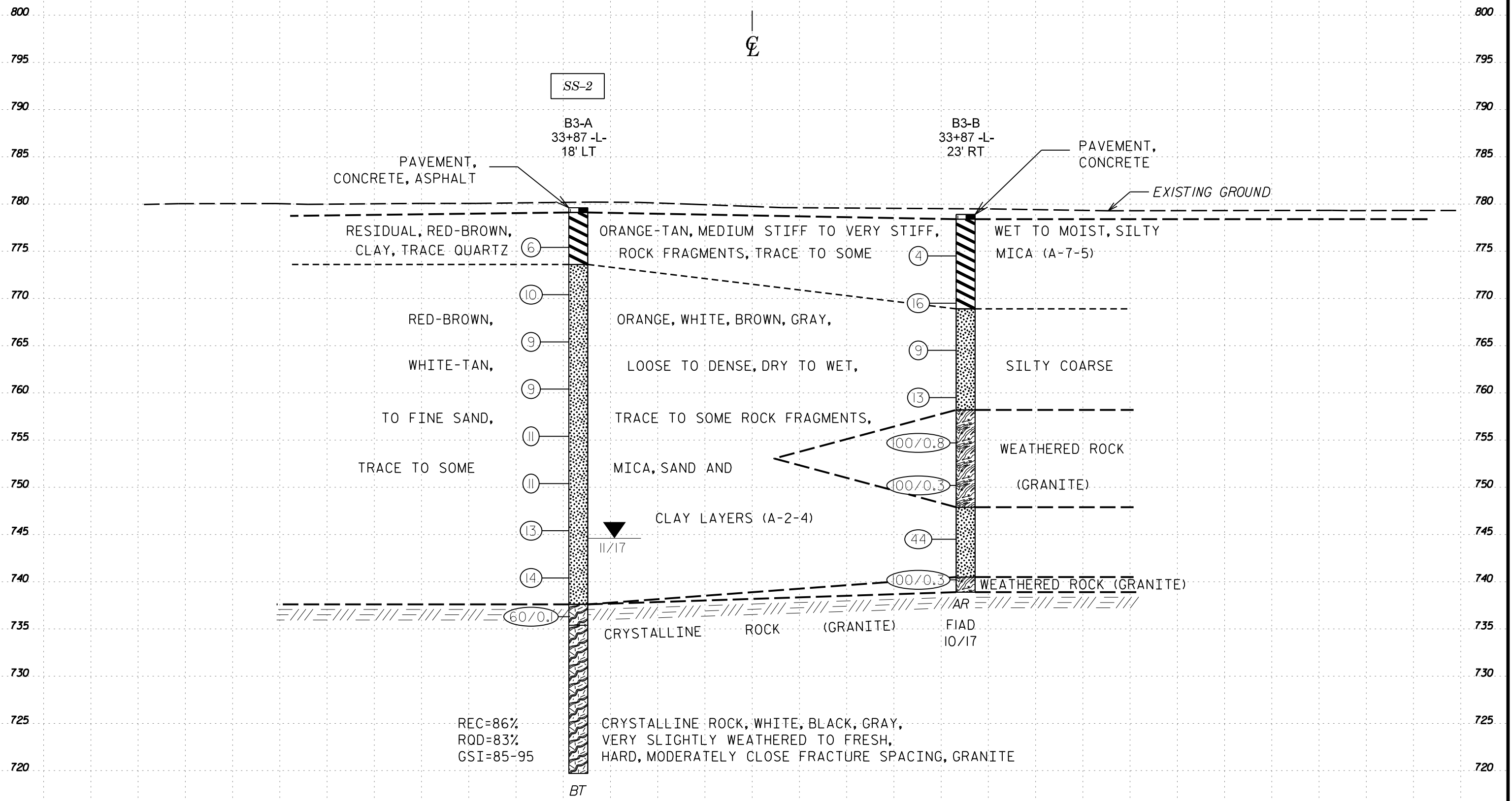
6/23/16

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30



PROJ. REFERENCE NO.	SHEET NO.
Y-4810K	7

CROSS SECTION THROUGH BENT 3 @ 33+87 -L-



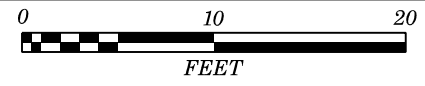
TYPICAL SKEW ANGLE 90°

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: y4810k Is tin (DATED 10/31/2017)

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

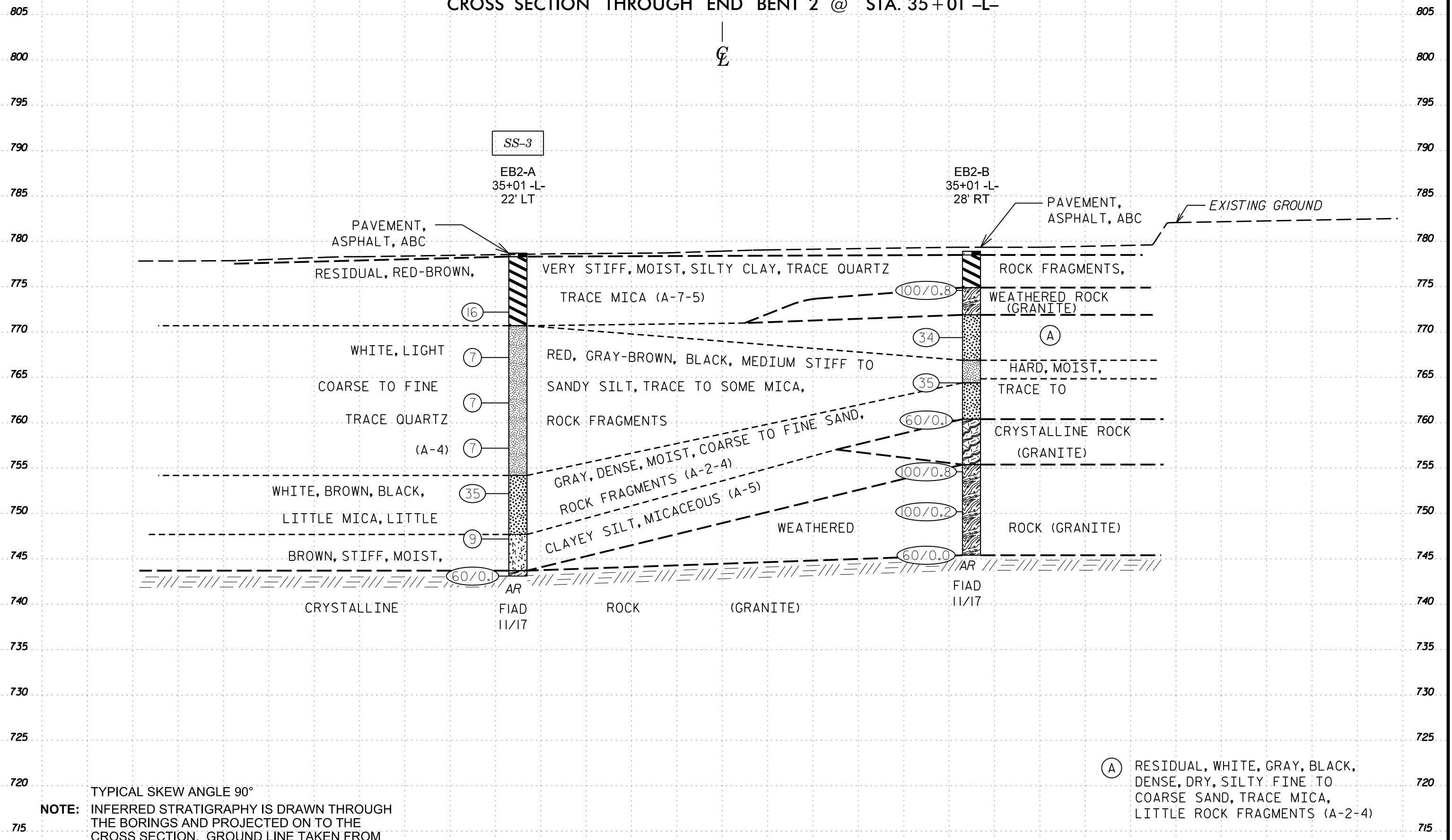
6/23/16

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30



PROJ. REFERENCE NO.	SHEET NO.
Y-4810K	8

CROSS SECTION THROUGH END BENT 2 @ STA. 35+01 -L-



TYPICAL SKEW ANGLE 90°
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: y4810k Is tin (DATED 10/31/2017)

(A) RESIDUAL, WHITE, GRAY, BLACK, DENSE, DRY, SILTY FINE TO COARSE SAND, TRACE MICA, LITTLE ROCK FRAGMENTS (A-2-4)

75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

**GEOTECHNICAL BORING REPORT
BORE LOG**

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.					
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)					
BORING NO. EB1-A	STATION 30+23	OFFSET 22 ft LT	ALIGNMENT -L-					
COLLAR ELEV. 774.7 ft	TOTAL DEPTH 93.8 ft	NORTHING 632,264	EASTING 1,516,297					
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.	START DATE 11/29/17	COMP. DATE 11/30/17	SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	BLOWS PER FOOT	SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft 0.5ft 0.5ft	0 25 50 75 100				
775							PAVEMENT SURFACE 0.0 774.2 PAVEMENT 0.5 0.1' ASPHALT AND 0.4' ABC STONE	
	771.2	3.5	5 5 6			M	RESIDUAL LIGHT RED-BROWN, BROWN AND GRAY, CLAYEY COARSE TO FINE SAND, TRACE ROCK FRAGMENTS, LITTLE TO SOME MICA	
770						M		
	766.2	8.5	5 5 7			M		
765						M		
	761.2	13.5	4 5 6			SS-1		
760						M	759.2 LIGHT RED, BROWN, GRAY, AND WHITE, COARSE TO FINE SANDY SILT, TRACE TO SOME ROCK FRAGMENTS, LITTLE MICA 15.5	
	756.2	18.5	4 5 7			M		
755						M		
	751.2	23.5	3 5 6			M		
750						M		
	746.2	28.5	4 5 6			M		
745						M		
	741.2	33.5	3 5 7			M		
740						M		
	736.2	38.5	3 5 7			M		
735						M		
	731.2	43.5	4 5 8			W		
730						W		
	726.2	48.5	4 6 8			W		
725						W		
	721.2	53.5	5 6 7			W		
720						W		
	716.2	58.5	10 8 8			W		
715						W		
	711.2	63.5	5 6 8			W		
710						W		
	706.2	68.5	5 7 10			W		
705						W		
	701.2	73.5	8 10 11			W		
700						W		
	696.2	78.5	16 26 34			W	697.7	77.0
695						W		

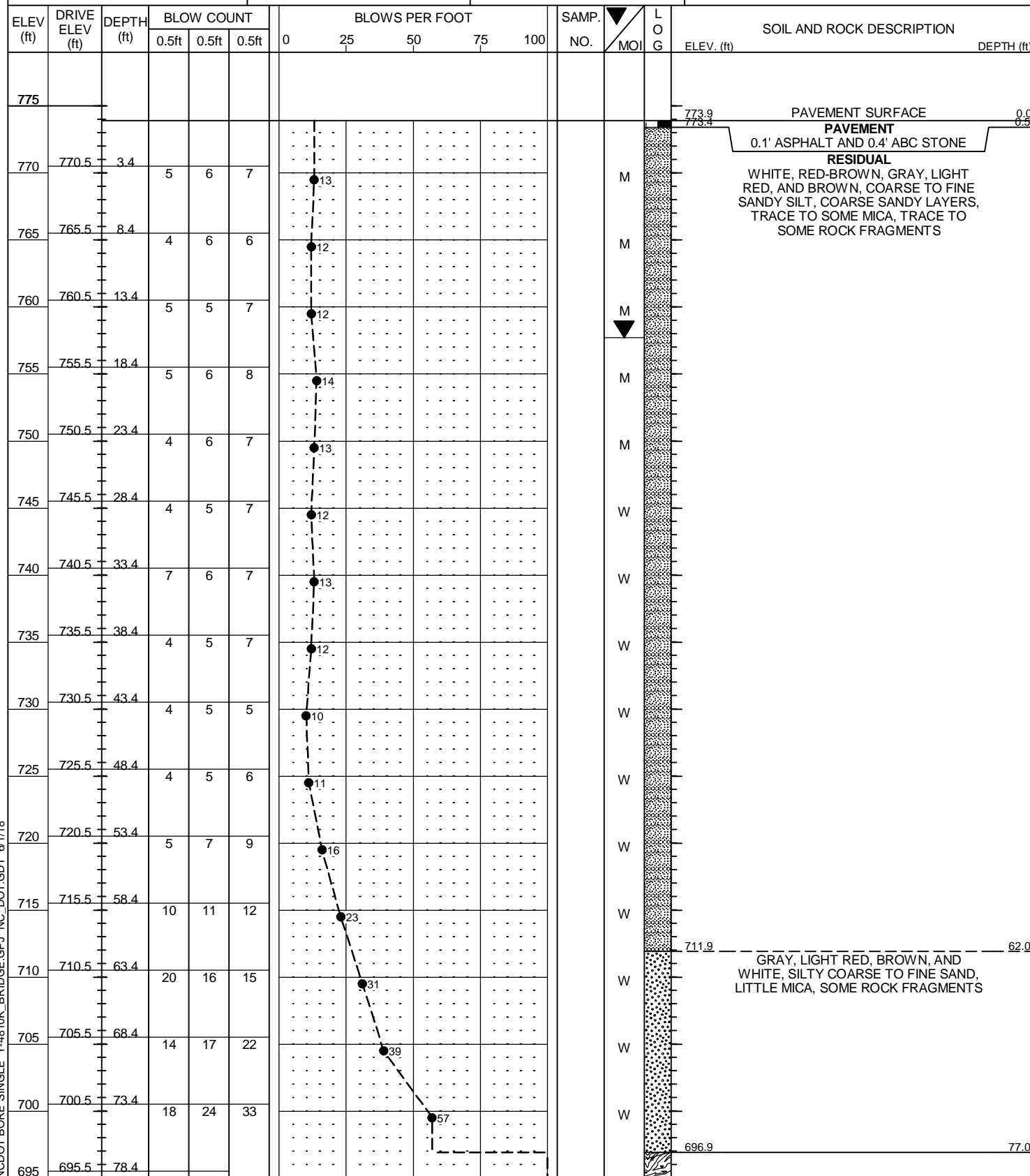
NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

**GEOTECHNICAL BORING REPORT
BORE LOG**

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.					
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)					
BORING NO. EB1-A	STATION 30+23	OFFSET 22 ft LT	ALIGNMENT -L-					
COLLAR ELEV. 774.7 ft	TOTAL DEPTH 93.8 ft	NORTHING 632,264	EASTING 1,516,297					
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.	START DATE 11/29/17	COMP. DATE 11/30/17	SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT	BLOWS PER FOOT	SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft 0.5ft 0.5ft	0 25 50 75 100				
695							Match Line	
	691.2	83.5	100/0.5				WHITE, BROWN AND LIGHT RED, SILTY COARSE TO FINE SAND, SOME ROCK FRAGMENTS, TRACE MICA (continued)	83.5
690							WEATHERED ROCK (BROWN, GRAY AND WHITE, GRANITE)	
	686.2	88.5	100/0.3					
685								
	681.2	93.5	100/0.3					
							Boring Terminated at Elevation 680.9 ft IN WEATHERED ROCK (GRANITE)	93.8

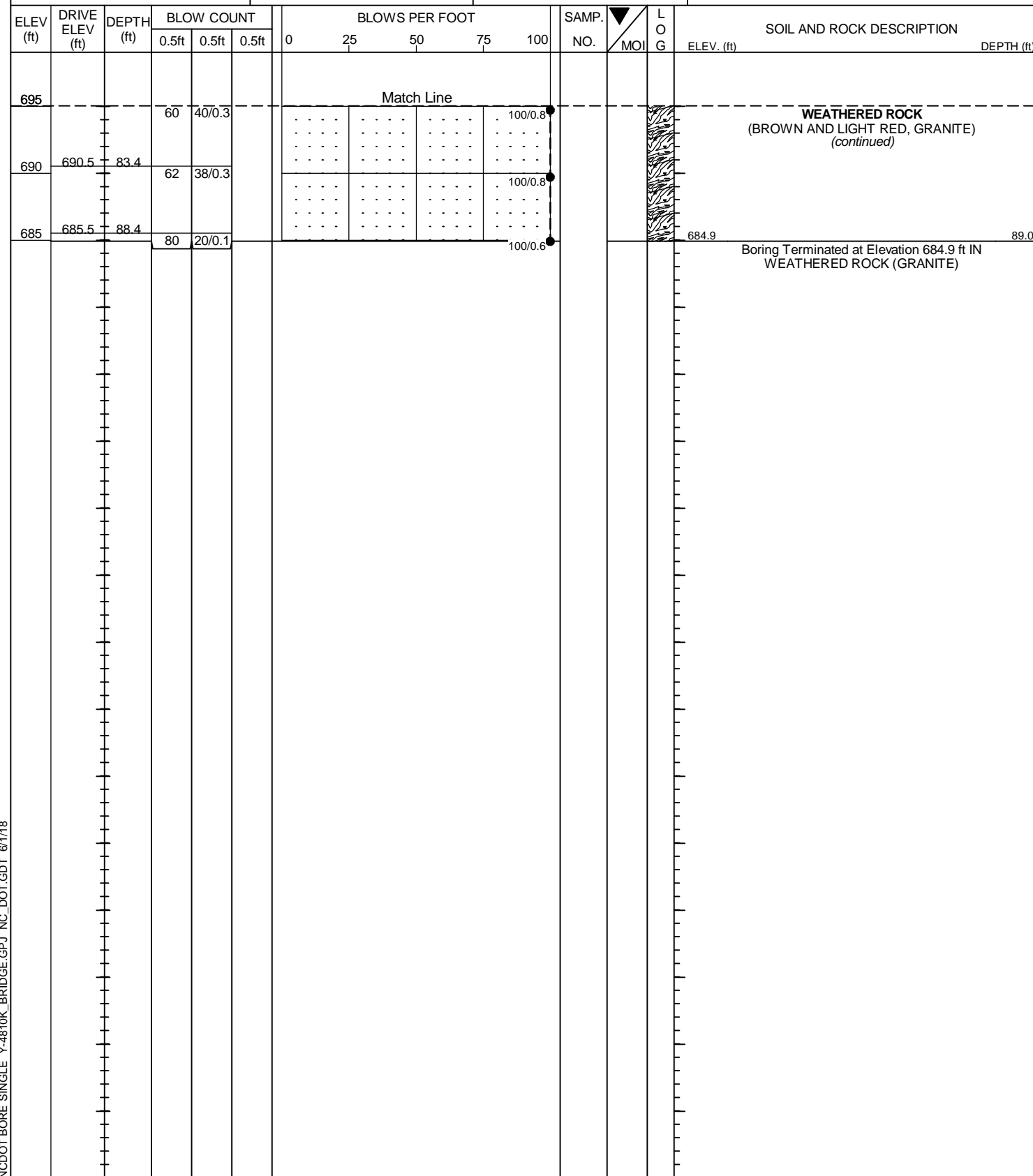
NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. EB1-B	STATION 30+23	OFFSET 28 ft RT	ALIGNMENT -L-
COLLAR ELEV. 773.9 ft	TOTAL DEPTH 89.0 ft	NORTHING 632,215	EASTING 1,516,309
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 12/04/17	COMP. DATE 12/05/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. EB1-B	STATION 30+23	OFFSET 28 ft RT	ALIGNMENT -L-
COLLAR ELEV. 773.9 ft	TOTAL DEPTH 89.0 ft	NORTHING 632,215	EASTING 1,516,309
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 12/04/17	COMP. DATE 12/05/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46		TIP Y-4810K		COUNTY CABARRUS		GEOLOGIST Riggs, A.F. Jr.											
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE							GROUND WTR (ft)										
BORING NO. B1-A		STATION 31+43		OFFSET 1 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 774.0 ft		TOTAL DEPTH 103.6 ft		NORTHING 632,273		EASTING 1,516,418											
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 95% 02/24/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER Duggins, W.T.		START DATE 04/26/18		COMP. DATE 04/27/18		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
775															774.0	GROUND SURFACE	0.0
770	773.0	1.0	1	3	3									M		RESIDUAL RED-ORANGE AND TAN, SILTY CLAY, TRACE MICA	
765	770.5	3.5	1	2	3									M			
760	765.5	8.5	2	2	4									M		TAN-GRAY, WHITE AND PINK, FINE TO COARSE SANDY SILT, TRACE MICA	6.5
755	760.5	13.5	3	5	6									M			
750	755.5	18.5	3	5	5									M			
745	750.5	23.5	4	4	5									M			
740	745.5	28.5	3	5	7									M			
735	740.5	33.5	2	4	5									M			
730	735.5	38.5	2	4	5									M			
725	730.5	43.5	3	3	6									M			
720	725.5	48.5	3	4	6									M			
715	720.5	53.5	4	7	9									M			
710	715.5	58.5	5	7	11									M			
705	710.5	63.5	7	11	16									M			
700	705.5	68.5	12	17	22									M			
695	700.5	73.5	21	30	36									M			

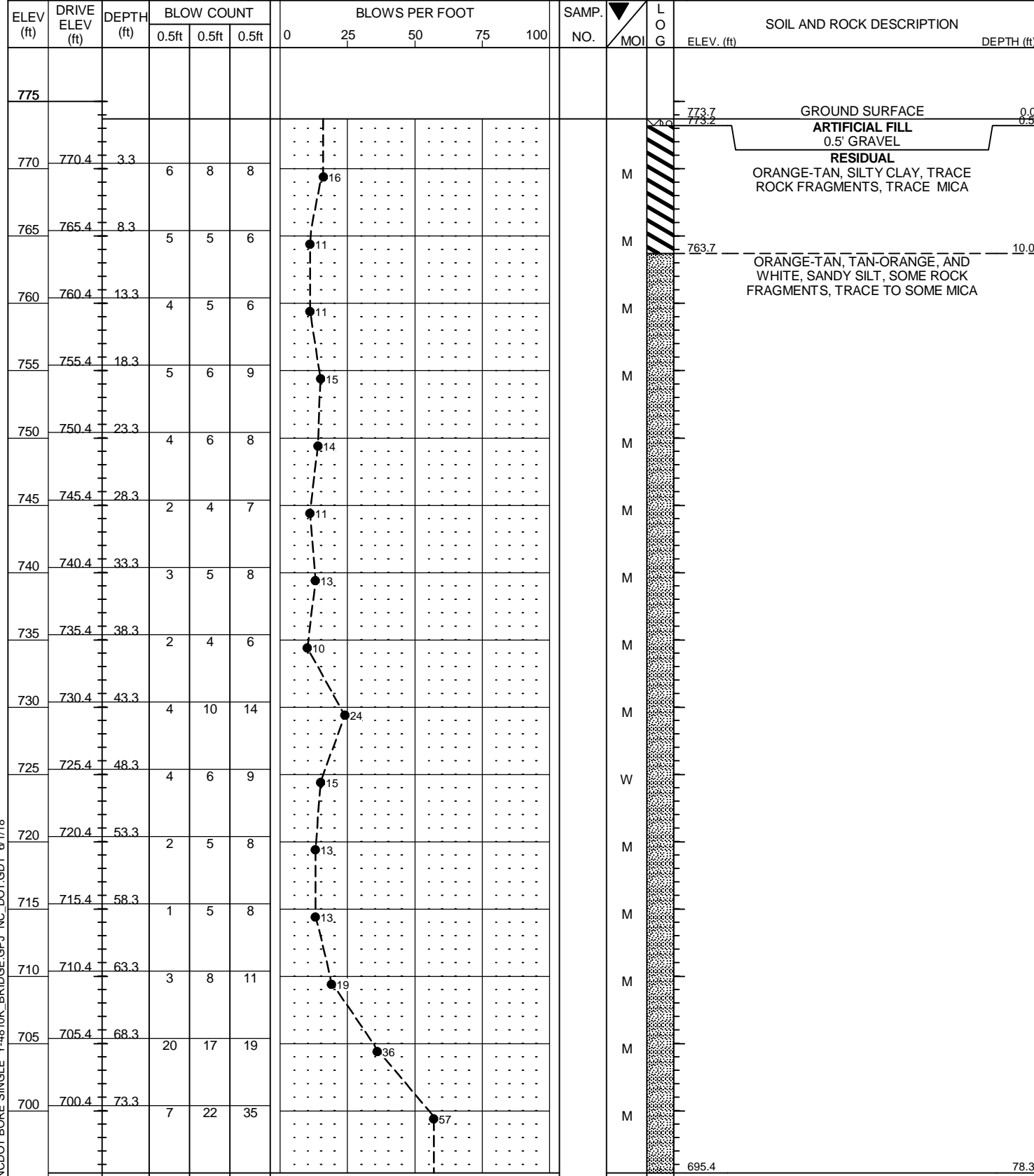
NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46		TIP Y-4810K		COUNTY CABARRUS		GEOLOGIST Riggs, A.F. Jr.												
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE							GROUND WTR (ft)											
BORING NO. B1-A		STATION 31+43		OFFSET 1 ft LT		ALIGNMENT -L-												
COLLAR ELEV. 774.0 ft		TOTAL DEPTH 103.6 ft		NORTHING 632,273		EASTING 1,516,418												
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 95% 02/24/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic												
DRILLER Duggins, W.T.		START DATE 04/26/18		COMP. DATE 04/27/18		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100								
695																		
690	695	83.5	26	45	55									M	Match Line	694.5	WEATHERED ROCK (TAN-GRAY, WHITE AND PINK GRANITE)	79.5
685	690.5	88.5	26	48	52/0.4									M				
680	685.5	93.5	100/0.2											M				
675	680.5	98.5	100/0.4											M				
	675.5	103.5	100/0.2											M				
	670.5	103.5	60/0.1											M			CRYSTALLINE ROCK (GRAY, BLACK AND WHITE GRANITE) Boring Terminated by SPT REFUSAL at Elevation 670.4 ft IN CRYSTALLINE ROCK (GRANITE)	103.5

NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

**GEOTECHNICAL BORING REPORT
BORE LOG**

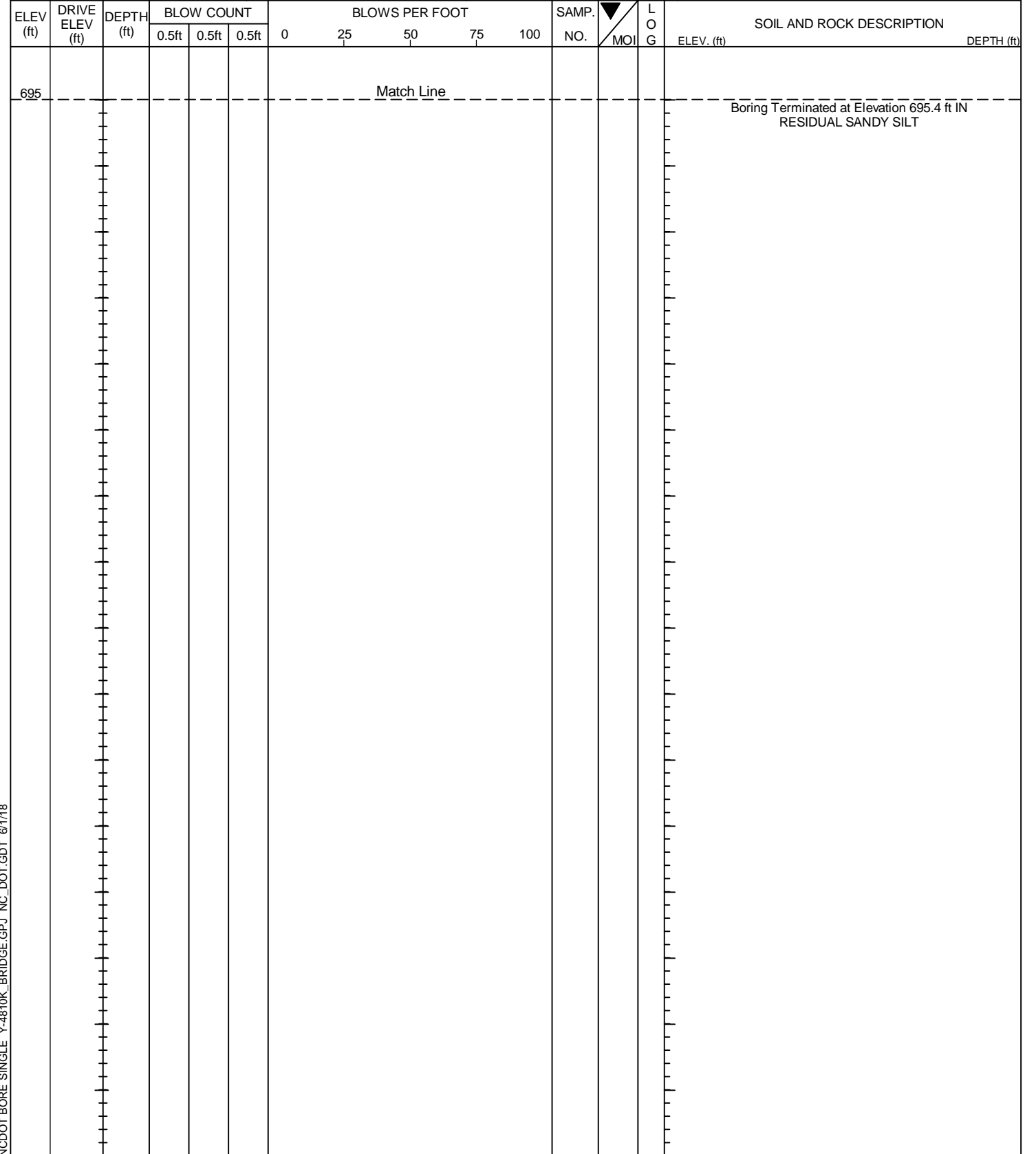
WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B1-B	STATION 31+37	OFFSET 23 ft RT	ALIGNMENT -L-
COLLAR ELEV. 773.7 ft	TOTAL DEPTH 78.3 ft	NORTHING 632,248	EASTING 1,516,418
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 90% 05/23/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Smith, C. L.	START DATE 10/25/17	COMP. DATE 10/25/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

**GEOTECHNICAL BORING REPORT
BORE LOG**

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B1-B	STATION 31+37	OFFSET 23 ft RT	ALIGNMENT -L-
COLLAR ELEV. 773.7 ft	TOTAL DEPTH 78.3 ft	NORTHING 632,248	EASTING 1,516,418
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 90% 05/23/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Smith, C. L.	START DATE 10/25/17	COMP. DATE 10/25/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B2-A	STATION 32+62	OFFSET 17 ft LT	ALIGNMENT -L-
COLLAR ELEV. 780.6 ft	TOTAL DEPTH 57.4 ft	NORTHING 632,318	EASTING 1,516,529
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 90% 05/23/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Smith, C. L.	START DATE 10/24/17	COMP. DATE 10/26/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
785																
780														780.6	CONCRETE SLAB	0.0
														780.1	CONCRETE SLAB	0.5
															0.5' CONCRETE	
															RESIDUAL	
															ORANGE, SANDY SILT, TRACE MICA	
775	776.5	4.1	4	3	3								M	773.6	WEATHERED ROCK	7.0
															(WHITE AND GRAY, GRANITE)	
770	771.5	9.1	100/0.4													
765	766.5	14.1	39	30	70/0.4											
760	761.5	19.1	8	6	5								M			
755	756.5	24.1	14	7	7								M			
750	751.5	29.1	20	35	14								D			
745	746.5	34.1	22	35	65/0.4									746.0	WEATHERED ROCK	34.6
															(WHITE AND GRAY, GRANITE)	
740	741.5	39.1	66	34/0.2												
735	736.5	44.1	14	16	8								M	737.6	RESIDUAL	43.0
															WHITE AND GRAY, SILTY COARSE SAND, TRACE MICA	
730	731.6	49.0	4	6	10								M			
725	726.6	54.0	29	52	48/0.1									725.6	WEATHERED ROCK	55.0
															(WHITE AND GRAY, GRANITE)	
														723.2	Boring Terminated BY AUGER REFUSAL at Elevation 723.2 ft ON CRYSTALLINE ROCK (GRANITE)	57.4

NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Riggs, A.F. Jr.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B2-B	STATION 32+59	OFFSET 22 ft RT	ALIGNMENT -L-
COLLAR ELEV. 781.5 ft	TOTAL DEPTH 90.5 ft	NORTHING 632,280	EASTING 1,516,536
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 95% 02/24/2018		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Duggins, W.T.	START DATE 04/25/18	COMP. DATE 04/26/18	SURFACE WATER DEPTH N/A


ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
785														
780	780.5	1.0	2	2	3							M	CONCRETE SLAB CONCRETE SLAB CONCRETE 0.7'	0.0 0.7
	778.0	3.5	3	2	4							M	RESIDUAL RED-ORANGE, SILTY CLAY, TRACE MICA	
775	773.0	8.5	2	3	3							M	TAN-GRAY AND WHITE, FINE TO COARSE SANDY SILT, TRACE MICA	6.0
770	768.0	13.5	3	4	4							M		
765	763.0	18.5	4	5	7							M		
760	758.0	23.5	5	9	8							M		
755	753.0	28.5	4	5	7							M		
750	748.0	33.5	4	5	6							M		
745	743.0	38.5	3	5	6							M		
740	738.0	43.5	4	6	9							M		
735	733.0	48.5	7	10	12							M		
730	728.0	53.5	8	11	14							M		
725	723.0	58.5	19	20	18							M		
720	718.0	63.5	60	40/0.1								M	WEATHERED ROCK (TAN-GRAY AND WHITE, GRANITE)	61.0
715	713.0	68.5	100/0.2											
710	708.0	73.5	100/0.2											
705														

NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Riggs, A.F. Jr.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B2-B	STATION 32+59	OFFSET 22 ft RT	ALIGNMENT -L-
COLLAR ELEV. 781.5 ft	TOTAL DEPTH 90.5 ft	NORTHING 632,280	EASTING 1,516,536
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 95% 02/24/2018		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic
DRILLER Duggins, W.T.	START DATE 04/25/18	COMP. DATE 04/26/18	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
705														
	703.0	78.5	100/0.2										Match Line	
700	698.0	83.5	60/0.0										WEATHERED ROCK (TAN-GRAY AND WHITE, GRANITE) (continued)	83.5
695													CRYSTALLINE ROCK (GRAY, BLACK AND WHITE, GRANITE)	90.5
													Boring Terminated at Elevation 691.0 ft IN CRYSTALLINE ROCK (GRANITE)	

NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46		TIP Y-4810K		COUNTY CABARRUS		GEOLOGIST Riggs, A.F. Jr.					
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE							GROUND WTR (ft)				
BORING NO. B2-B		STATION 32+59		OFFSET 22 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 781.5 ft		TOTAL DEPTH 90.5 ft		NORTHING 632,280		EASTING 1,516,536					
DRILL RIG/HAMMER EFF./DATE TER92-0 ACKER RENEGADE 95% 02/24/2018				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic					
DRILLER Duggins, W.T.		START DATE 04/25/18		COMP. DATE 04/26/18		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 7.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
698	698.0	83.5	2.0	2:40/1.0	(2.0)	(2.0)	(7.0)	(5.7)		Begin Coring @ 83.5 ft CRYSTALLINE ROCK GRAY, BLACK AND WHITE, VERY SLIGHT TO FRESH, HARD TO VERY HARD, VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, GRANITE 12 JOINTS AT 10°-20° GSI= 80-90	83.5
695	696.0	85.5	5.0	1:30/1.0 1:16/1.0 1:05/1.0 1:17/1.0	(5.0) 100%	(3.7) 74%					
	691.0	90.5		1:32/1.0						Boring Terminated at Elevation 691.0 ft IN CRYSTALLINE ROCK (GRANITE)	90.5

NCDOT CORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

CORE PHOTOGRAPHS

PROJECT REFERENCE NO.

SHEET NO.

Y-4810K

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PROJECT NO. 40325.1.46 (Y-4810K)
BRIDGE NO. 120407 ON SR 1625 (ROGER LAKE ROAD) OVER US 29A (SOUTH MAIN STREET), NCRR (NS)
AND SOUTH RIDGE AVENUE BETWEEN LOWRANCE AVE. AND MEADOW AVENUE

B2-B
BOX 1 OF 1
83.5' - 90.5' FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40325.1.46		TIP Y-4810K		COUNTY CABARRUS		GEOLOGIST SCHLEMM, T. S.											
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE							GROUND WTR (ft)										
BORING NO. B3-A		STATION 33+87		OFFSET 18 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 779.6 ft		TOTAL DEPTH 59.9 ft		NORTHING 632,350		EASTING 1,516,650											
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic											
DRILLER TURNAGE, J. R.		START DATE 11/28/17		COMP. DATE 11/29/17		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
780															779.6	PAVEMENT SURFACE	0.0
															779.1	PAVEMENT 0.15' CONCRETE AND 0.35' ASPHALT	0.5
	776.4	3.2	2	3	3								W				
775																	
	771.4	8.2	4	5	5								M		773.6	RESIDUAL RED-BROWN, SILTY CLAY, TRACE QUARTZ FRAGMENTS, TRACE MICA	6.0
770																	
	766.4	13.2	3	4	5								M				
765																	
	761.4	18.2	4	4	5								M				
760																	
	756.4	23.2	5	5	6								M				
755																	
	751.4	28.2	4	5	6								M				
750													SS-2				
	746.4	33.2	4	6	7												
745																	
	741.4	38.2	5	6	8								W				
740																	
	736.4	43.2	60/0.1												737.6	CRYSTALLINE ROCK (WHITE, BLACK, AND GRAY, GRANITE)	42.0
735															735.4	CRYSTALLINE ROCK (WHITE, BLACK, AND GRAY, GRANITE)	44.2
730																	
725																	
720															719.7	Boring Terminated at Elevation 719.7 ft IN CRYSTALLINE ROCK (GRANITE)	59.9

NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ_NC_DOT.GDT 6/1/18

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 40325.1.46		TIP Y-4810K		COUNTY CABARRUS		GEOLOGIST SCHLEMM, T. S.						
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE							GROUND WTR (ft)					
BORING NO. B3-A		STATION 33+87		OFFSET 18 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 779.6 ft		TOTAL DEPTH 59.9 ft		NORTHING 632,350		EASTING 1,516,650						
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017				DRILL METHOD Mud Rotary		HAMMER TYPE Automatic						
DRILLER TURNAGE, J. R.		START DATE 11/28/17		COMP. DATE 11/29/17		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
735.4												
	735.4	44.2	5.7	1:36/0.7 5:10/1.0 2:16/1.0 2:29/1.0 1:48/1.0 3:39/1.0	(3.8) 67%	(3.3) 58%		(13.5) 86%	(13.0) 83%		Begin Coring @ 44.2 ft CRYSTALLINE ROCK WHITE, GRAY, AND BLACK, VERY SLIGHTLY WEATHERED TO FRESH, HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE 10 JOINTS AT 10°-20° GSI=85-95	44.2
730												
	729.7	49.9	5.0	3:21/1.0 2:46/1.0 3:16/1.0 3:52/1.0 4:29/1.0	(4.8) 96%	(4.8) 96%					LOST CIRCULATION IN FRACTURED ROCK SEAM 51.6' - 51.8'	
725												
	724.7	54.9	5.0	4:40/1.0 4:24/1.0 4:12/1.0 4:36/1.0 5:21/1.0	(4.9) 98%	(4.9) 98%						
720												
	719.7	59.9									Boring Terminated at Elevation 719.7 ft IN CRYSTALLINE ROCK (GRANITE)	59.9

NCDOT CORE SINGLE Y-4810K_BRIDGE.GPJ_NC_DOT.GDT 6/1/18

CORE PHOTOGRAPHS

PROJECT REFERENCE NO.

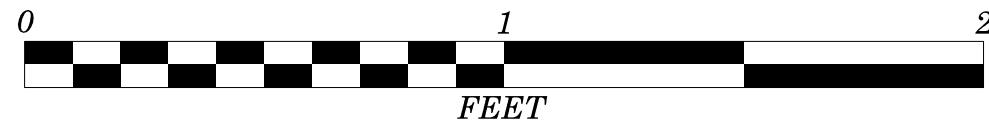
SHEET NO.

Y-4810K

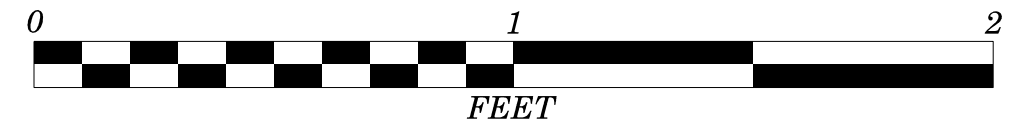
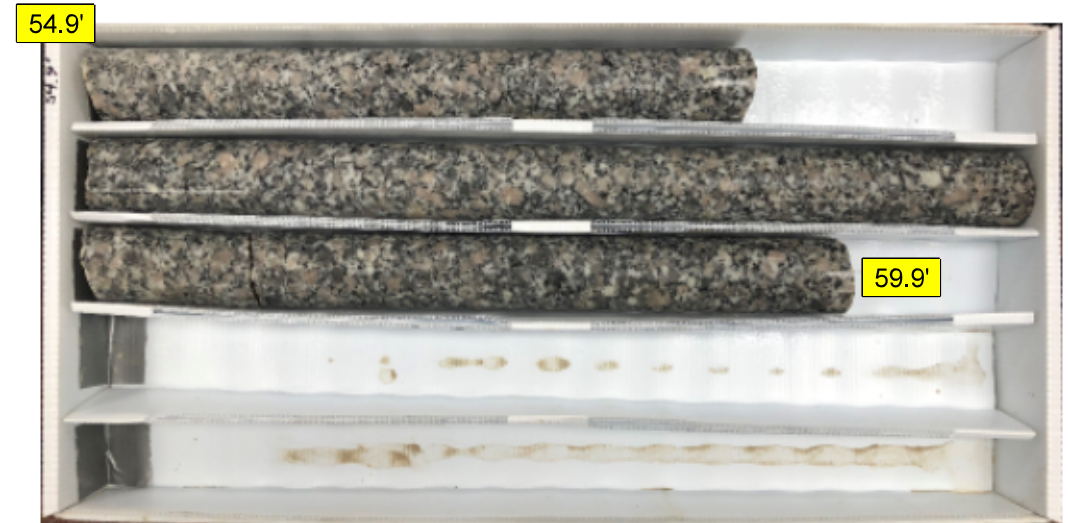
18

PROJECT NO. 40325.1.46 (Y-4810K)
BRIDGE NO. 120407 ON SR 1625 (ROGER LAKE ROAD) OVER US 29A (SOUTH MAIN STREET), NCRR (NS)
AND SOUTH RIDGE AVENUE BETWEEN LOWRANCE AVE. AND MEADOW AVENUE

B-3A
BOX 1 OF 2
44.2' - 54.9' FEET



B-3A
BOX 2 OF 2
54.9' - 59.9' FEET

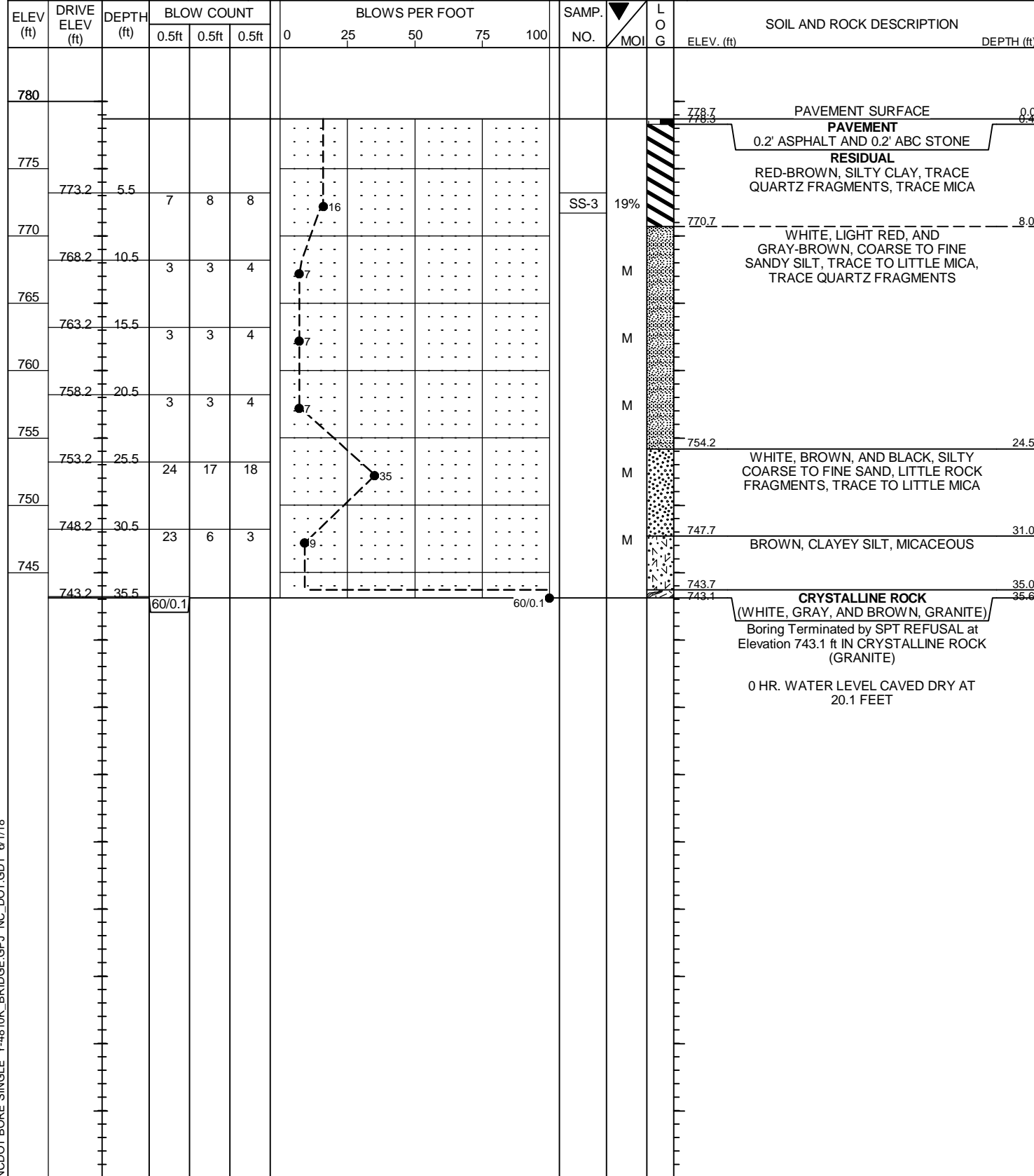


WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. B3-B	STATION 33+87	OFFSET 23 ft RT	ALIGNMENT -L-
COLLAR ELEV. 778.9 ft	TOTAL DEPTH 40.0 ft	NORTHING 632,311	EASTING 1,516,660
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 90% 05/23/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Smith, C. L.	START DATE 10/24/17	COMP. DATE 10/24/17	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
780														PAVEMENT SURFACE	0.0
														PAVEMENT 0.5' CONCRETE	0.5
775	775.5	3.4	2	1	3	4						M	RESIDUAL ORANGE, AND TAN, SILTY CLAY, SOME MICA, TRACE ROCK FRAGMENTS		
770	770.5	8.4	6	7	9	16						M			
765	765.5	13.4	4	4	5	9						D	WHITE AND TAN, SILTY SAND, SOME MICA, SOME ROCK FRAGMENTS	10.0	
760	760.5	18.4	3	4	9	13						D			
755	755.5	23.4	20	80/0.3					100/0.8				WEATHERED ROCK (WHITE-TAN, GRANITE)	20.7	
750	750.5	28.4	100/0.3						100/0.3						
745	745.5	33.4	15	16	28	44						D	RESIDUAL WHITE-TAN, SILTY SAND, SOME MICA, SOME ANUGLAR ROCK FRAGMENTS	31.0	
740	740.5	38.4	100/0.3						100/0.3				WEATHERED ROCK (WHITE-TAN, GRANITE)	38.4	
													Boring Terminated BY AUGER REFUSAL at Elevation 738.9 ft ON CRYSTALLINE ROCK (GRANITE)	40.0	
													0 HR. WATER LEVEL CAVED DRY AT 40.0 FEET		

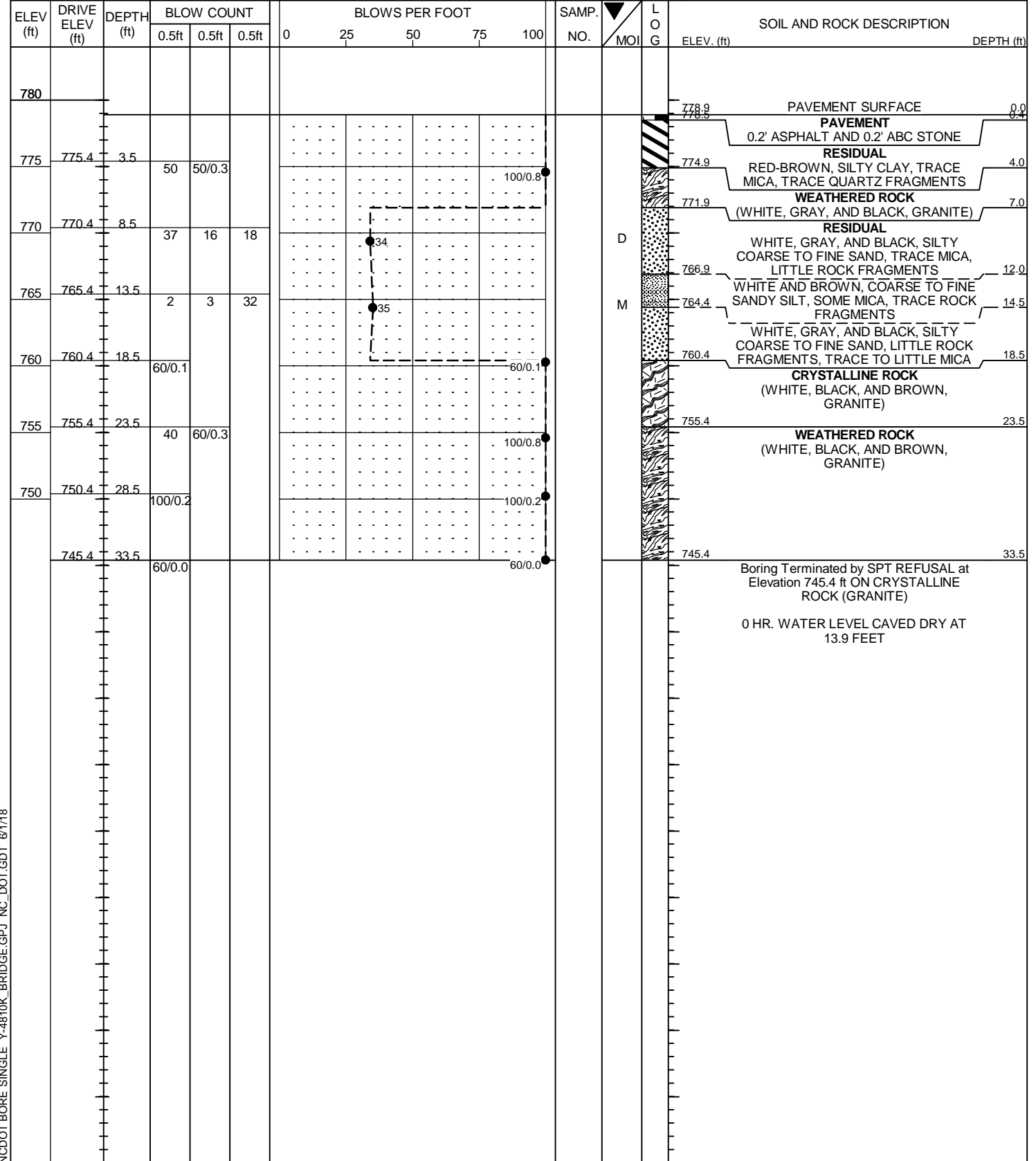
NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. EB2-A	STATION 35+01	OFFSET 22 ft LT	ALIGNMENT -L-
COLLAR ELEV. 778.7 ft	TOTAL DEPTH 35.6 ft	NORTHING 632,383	EASTING 1,516,759
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 11/27/17	COMP. DATE 11/27/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

WBS 40325.1.46	TIP Y-4810K	COUNTY CABARRUS	GEOLOGIST SCHLEMM, T. S.
SITE DESCRIPTION BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A, NCRR AND SOUTH RIDGE AVENUE			GROUND WTR (ft)
BORING NO. EB2-B	STATION 35+01	OFFSET 28 ft RT	ALIGNMENT -L-
COLLAR ELEV. 778.9 ft	TOTAL DEPTH 33.5 ft	NORTHING 632,334	EASTING 1,516,772
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 99% 03/09/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	START DATE 11/27/17	COMP. DATE 11/27/17	SURFACE WATER DEPTH N/A



NCDOT BORE SINGLE Y-4810K_BRIDGE.GPJ NC_DOT.GDT 6/1/18

SITE PHOTOGRAPHS

(Y-4810K) BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A (SOUTH MAIN STREET) , NCRR (NS) AND SOUTH RIDGE AVENUE



PHOTOGRAPH NO. 1: WEST APPROACH TO END BENT NO. 1, ALONG -L- ALIGNMENT, WEST OF SOUTH MAIN STREET, LOOKING EAST



PHOTOGRAPH NO. 3: SOUTH OF -L- ALIGNMENT, LOOKING NORTH ACROSS INTERIOR BENT NO. 2



PHOTOGRAPH NO. 2: SOUTH OF -L- ALIGNMENT, LOOKING NORTH ACROSS INTERIOR BENT NO. 1



PHOTOGRAPH NO. 4: EAST APPROACH TO END BENT NO. 2, ALONG -L- ALIGNMENT, EAST OF SOUTH RIDGE AVENUE, LOOKING WEST