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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

STATE PROJECT REFERENCE NO. Y-4810K

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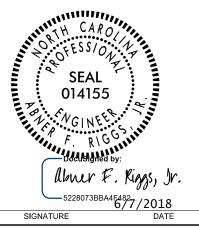
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Prepared in the Office of: Consulting Engineers and Scientists



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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	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
CEMERAL CRANIII AR MATERIALS STIT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤35% PASSING *200) (>35% PASSING *200) UNGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, ONE ISS, CABBRO, SCHIST, ETC.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-2-6 A-2-7 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
000000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL COORDING COORD	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
#10 50 MX GRANULAR SIL1-	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 18 MX 18 MX 11 MN 11 MN 18 MX 18 MX 11 MN 11 MN 1 MN MX 18 MX 11 MN 11 MN MODERATE ORGANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MATOR GRAVEL AND FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	<u> </u>	(MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30	- O-M► SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNIESS OF RANGE OF STANDARD RANGE OF UNCONFINED	TT 25,425	(MOD, SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK, IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT ²)	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SPET DATE TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LUUSE 4 10 10 MC N/A	I M	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY DENSE > 50 VERY SOFT < 2	INFERRED SOIL BOUNDARY	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	MM - TECT DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	MUNITURING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	TTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - TO BE ACCEPTABLE, BUT NOT TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	□	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	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
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 _d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION (ATTERBERG LIMITS) DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED 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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT,) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLIDA PEDILIPES DRVING TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: SEE IN NOTES BELOW
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY	CME-55 CORE SIZE: B*HOLLOW AUGERS -B X NO3	INDURATION	BM1 BL-16; N=632,336.284, E=1,517,071.554 STA. 46+08.63 -BL- ELEVATION 781.49'
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X NO2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	BM2 BY6-33; N=632,269.19, E=1,516,332.23
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	STA. 10+62.91 -Y6- ELEVATION 773.36'
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST X CASING W/ ADVANCER HAND TOOLS: POST HOLE DIGGER	CRAINC CAN BE SERARATED FROM CAMPLE WITH STEEL PROBE.	
HIGHLY PLASTIC 26 OR MORE HIGH	X ACKER (TER92-0) X TRICONE 215/6 STEEL TEETH HAND AUGER	MODERATELY INDURATED MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE 'TUNG,-CARB, COUNDING POR	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X D-50 (TER373) X CORE BIT SUGNITION AND VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X CME-550X (HF00072)	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
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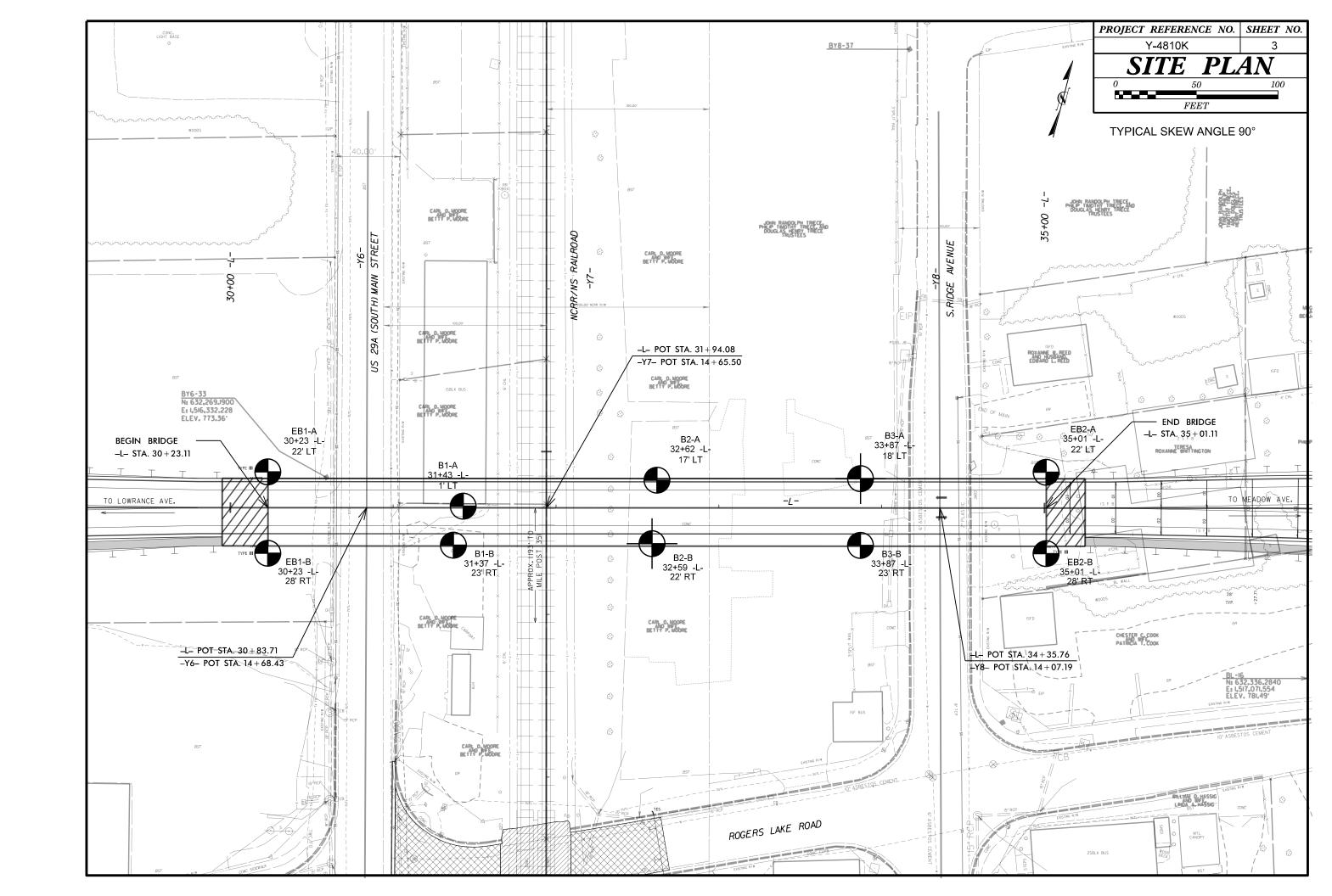
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

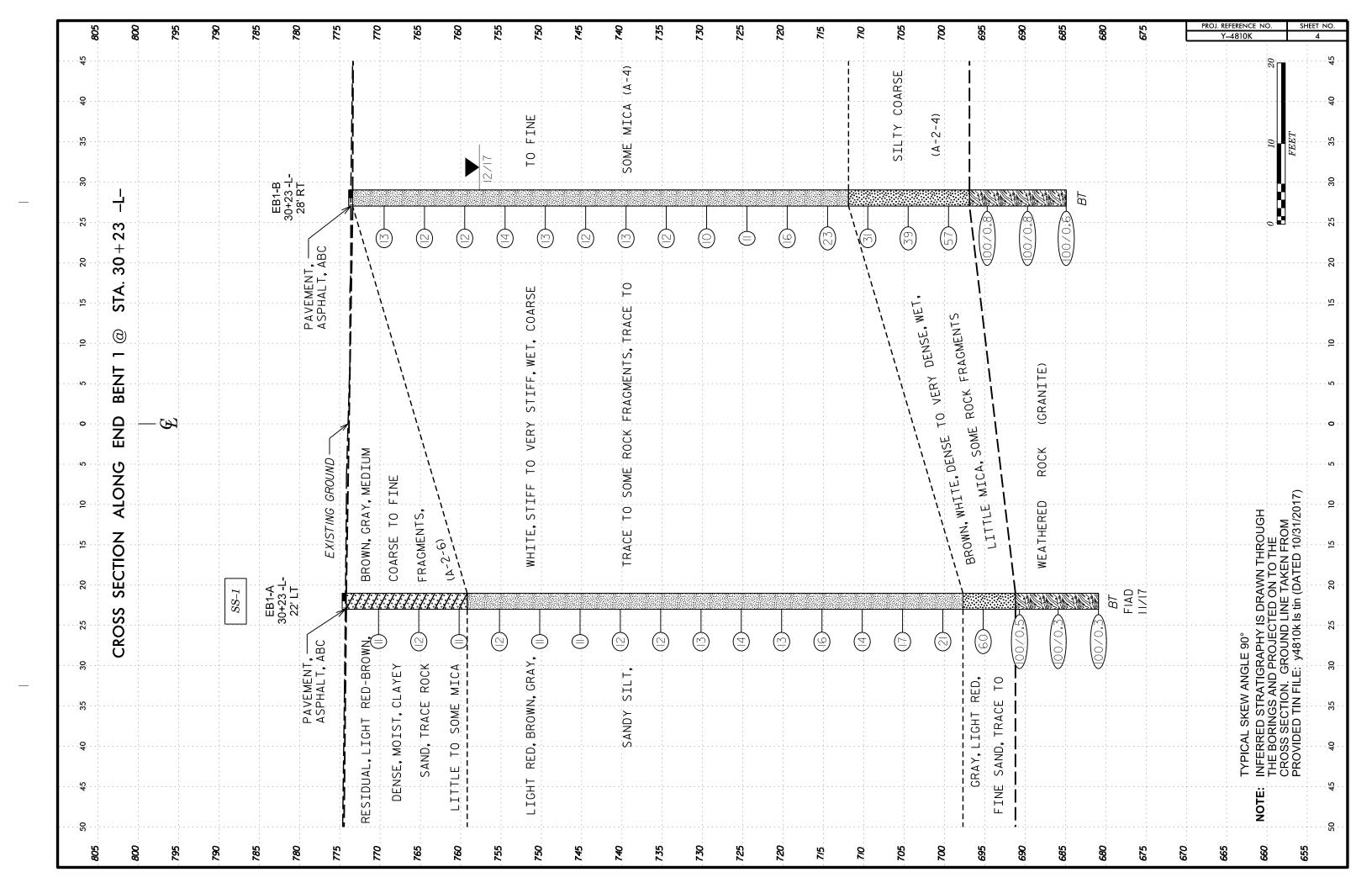
SUBSURFACE INVESTIGATION

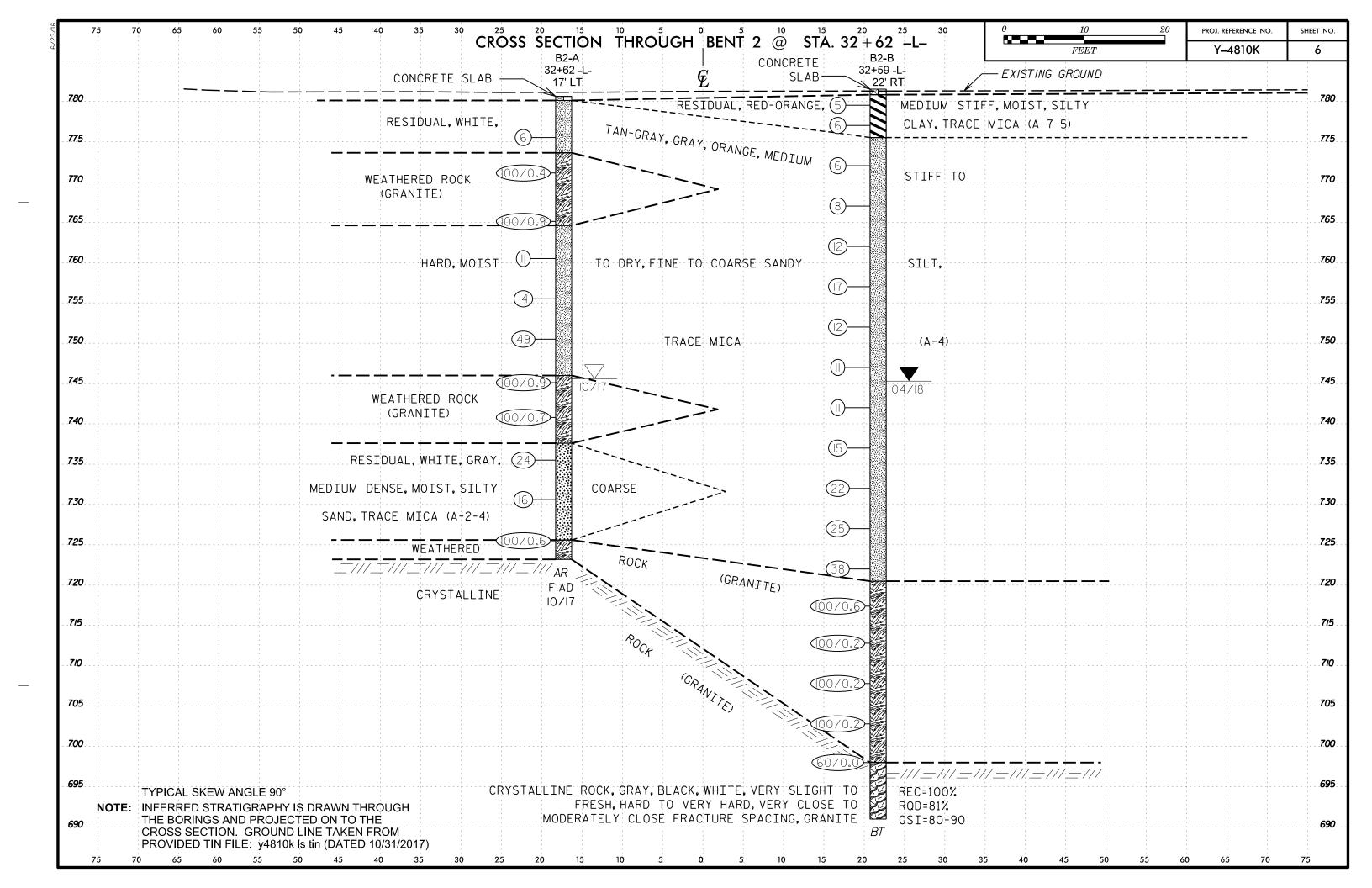
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

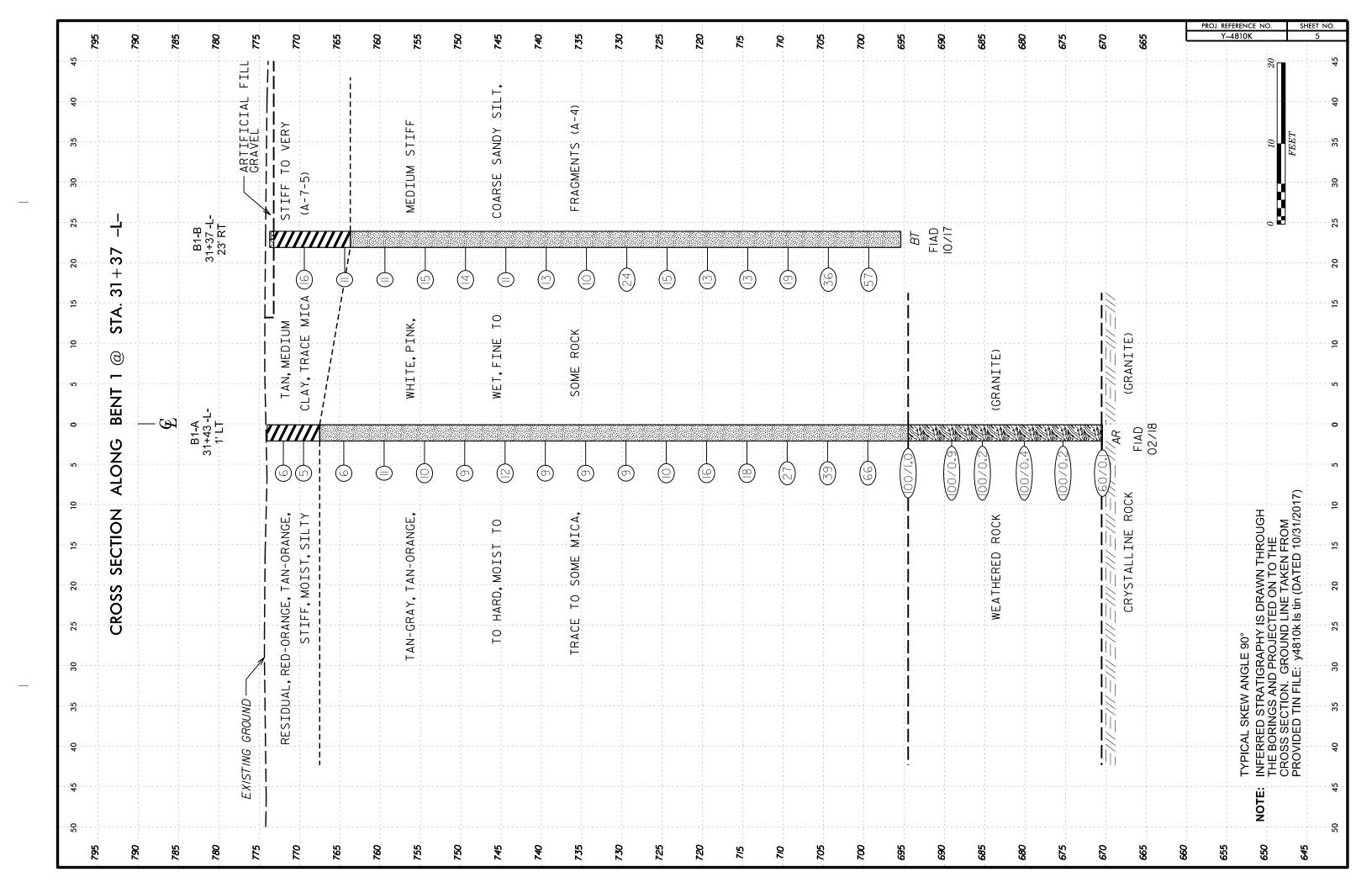
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000) AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

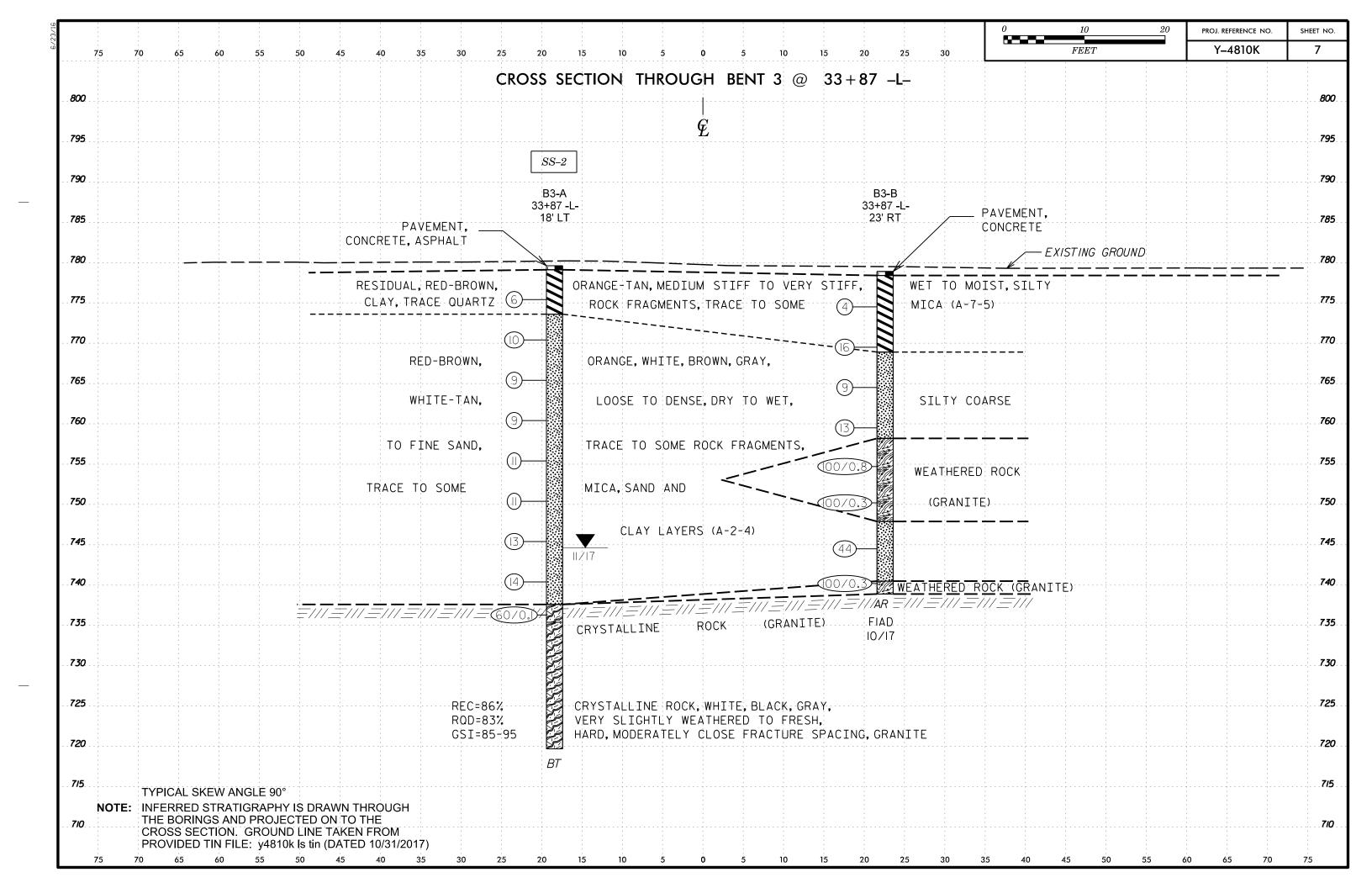
HASTIO ETTE I I I BE LET III I BE LET III I I GOT TO COTTO	a nock Mass (Marinos and noek, שששט)	HH3H10 ENTU Figure 10.4.0.4-2 — Determination of USI for Fectorically Deformed neterogeneous nock Masses (Marinos and nock, 2006)
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000) 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.	esh unweathered surfaces weathered, iron stained ces iighly weathered surfaces coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000) 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.
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. 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 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.
BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	70 60	B. Sand- stone with thin inter- C. Sand- stone and siltstone with sand- with
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	S O O O O O O O O O O O O O O O O O O O	stone with thin inter-layers of siltstone amounts amounts amounts along the siltstone or clayer shale with sandstone layers amounts amounts amounts amounts along the siltstone or clayer shale with sandstone layers
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		C.O. E. and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H. F. Tectonically deformed, intensively folded/faulted, shared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	DECREASING 30 20	G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers H. Tectonically deformed silty or clayey shale with pockets of chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V N/A N/A	Means deformation after tectonic disturbance □ Means deformation after tectonic disturbance













	ılting Enç		nd Sci	entists				ORE L			T	
	40325					P Y-4810K		Y CABARR			GEOLOGIST SCHLEMM,	
				GE N			S LAKE ROAD			AND SO	UTH RIDGE AVENUE	GROUND WTR (fi
BOR	NG NO.	. EB1-/	4		S	TATION 30+23		OFFSET	22 ft LT		ALIGNMENT -L-	0 HR. N/A
COLI	AR ELI	EV . 77	'4.7 ft		T	OTAL DEPTH 9	3.8 ft	NORTHING	632,264		EASTING 1,516,297	24 HR. FIAD
DRILL	RIG/HAN	MER EF	F./DATI	E TER	373 DI	EDRICH D-50 99%	03/09/2017		DRILL MET	HOD Mu	d Rotary H	AMMER TYPE Automatic
DRIL	LER T	URNAG	E, J. F	₹.	S	TART DATE 11.	/29/17	COMP. DA	TE 11/30,	/17	SURFACE WATER DEPTH	I N/A
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W COL		BLC 0 25	WS PER FOOT 50	Γ 7 <u>5</u> 100	SAMP.	MOI G	SOIL AND ROCK	
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	-	<u> </u>				:::::::::					GRAY, CLAYEY COAF	MENTS, LITTLE TO
	766.2	8.5				: : :: : :					SOME	MICA
765	-	+	5	5	7	12-				M	_	
	-	Ŧ				:::::::::::::::::::::::::::::::::::::					•	
760	761.2	13.5	4	5	6				SS-1	М	•	
	-	Ŧ				 						VN. GRAY. AND — — 15
	756.2	18.5				:: ::: :::					WHITE, COARSE TO TRACE TO SOME RO	FINE SANDY SILT,
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750	_	ł	3	5	6	11				М	-	
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Terracon GEOTECHNICAL BORING REPORT

SHEET 9 OF 22

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			I BRIC	GF N								RR AN	D SO	UTH RIDGE AVENUE	, 1. 0	1	D WTR (f
	NG NO.			. UL IV			TION 30-		NOAL	OFFSET				ALIGNMENT -L-		0 HR.	N/A
	AR ELE						TAL DEPTI			NORTHIN		64		EASTING 1,516,297		24 HR.	FIAI
				TER			RICH D-50			NORTHIN			D Mi	id Rotary	НАММ	ER TYPE	
	LER TU						RT DATE			COMP. DA			D IVIO	SURFACE WATER DEF			ratoriatio
EV	ם איר	DEPTH		w co		П	INI DAIL	BLOWS F			SAMP		11	OOK! AGE WATER DEI	111 14/		
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95_								Matc	h Line								
-						TI						Γ		WHITE, BROWN A COARSE TO FINE			
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85 85	686.2	88.5	100/0.3							100/0.3				- -			
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	004.0	- 93.5												<u>.</u> 			
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WBS	40325	5.1.46			TI	P Y-4810	K	COUNT	Y CABA	RRI	JS			GEOLOGI	ST SCHLE	им, т. S		
SITE	DESCR	IPTION	BRI	DGE N	O. 120	407 ON R	OGERS LA	KE ROAD	OVER U	JS 2	9A, NCF	RR ANI	D SOL	JTH RIDGE	AVENUE		GROUN	D WTR (ft)
BOR	ING NO	. EB1-l	В		S	TATION 3	0+23		OFFSE	T 2	28 ft RT			ALIGNME	NT -L-		0 HR.	N/A
COL	LAR EL	EV. 77	'3.9 ft		T	OTAL DEP	TH 89.0 f	t	NORTH	IING	632,2°	15		EASTING	1,516,309		24 HR.	16.2
DRILL	. RIG/HAN	MER EF	F./DAT	E TER	373 DI	EDRICH D-5	99% 03/09				DRILL N	METHOD) Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER T	URNAG	E. J. F	₹.	S	TART DAT	E 12/04/1	7	COMP.	DA.	TE 12/0	05/17		SURFACE	WATER DE	PTH N/	Α	
ELEV	DRIVE	DEPTH		OW COL				PER FOOT			SAMP.		L					
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	МОІ	0 G	ELEV. (ft)	SOIL AND RO	OCK DES	CRIPTION	DEPTH (f
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10	-	<u> </u>					1							773.9 773.4		NT SURF	ACE	0. 0.
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		‡				13				-		'*'		RE	D, AND BROWNDY SILT, CO	VN, CÓAI	RSE TO FI	NE
705	765.5	8.4				::¦::				:					RACE TO SO SOME RO	ME MICA,	TRACE T	
765	700.0		4	6	6	12	1	 	+			М		-	SOIVIL RO	UKT NAG	IVILIVI 3	
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	735.5	38.4				:::::::				-								
735	735.5	30.4	4	5	7	. •12			+	_		W		_				
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715	715.5	58.4				<i>[</i>			: : :	:								
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710	710.5	63.4	20	16	15		<u>'````</u>	: : : :	: : :			w		_ WH	GRAY, LIGHT IITE, SILTY CO	DARSE TO	O FINÉ SA	ND,
		‡				::::	₹31			:		"		LITT	LE MICA, SO	ME ROCK	FRAGME	NTS
<u> </u>	705.5	<u> </u>											<u> </u>					
705	705.5	68.4	14	17	22		39	 	+	-		w		_				
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700	700.5	73.4				::::		\:	: : :	:			## 					
5 700	-	‡	18	24	33		1	57	1	-		W		-				
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695	695.5	78.4				<u> </u>												



GEOTECHNICAL BORING REPORT BORE LOG

SHEET 10 OF 22

	ulting Enginee		u ook	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					UKE L	.00				
WBS	40325.1.4	-6			Т	ΊP	Y-4810K	COUNT	Y CABARR	US			GEOLOGIST SCHLEMM, T. S	i.
SITE	DESCRIPT	ION	BRID	GE NO	D. 12	040	07 ON ROGERS	LAKE ROAD	OVER US 2	9A, NCF	RR ANI	D SOL	JTH RIDGE AVENUE	GROUND WTR (ft)
BOR	ING NO. E	B1-B			s	STA	ATION 30+23		OFFSET 2	28 ft RT			ALIGNMENT -L-	0 HR. N/A
	LAR ELEV.		9 ft		_		TAL DEPTH 89.		NORTHING		15		EASTING 1,516,309	24 HR. 16.2
—				- TED	- 1				NORTHING	DRILL N) M	1	IER TYPE Automatic
					$\overline{}$		DRICH D-50 99% 03			l) IVIU		
DRIL	LER TURN	NAGE				STA	ART DATE 12/0		COMP. DA				SURFACE WATER DEPTH N	′A
ELEV (ft)		PTH_ ft)	BLO 0.5ft	W COL	JNT 0.5ft		0 25	/S PER FOOT	75 100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DES	CRIPTION DEPTH (ft)
695 690	690.5 + 83	3.4		40/0.3 38/0.3				latch Line	. 100/0.8	,			WEATHERED R (BROWN AND LIGHT RE (continued)	D, GRANITE)
685	685.5 = 88	3.4	80	20/0.1					100/0.6	-			_684.9 Boring Terminated at Eleva WEATHERED ROCK (89.0 stion 684.9 ft IN



Consi	ulting En	gineers a	and Sci	entists			В	ORE L	OG						
WBS	40325	5.1.46			Т	ΓΙΡ Υ-4810Κ	COUNT	Y CABARRU	JS			GEOLOGIST Riggs, A	.F. Jr.		
SITE	DESCR	RIPTION	BRI	OGE N	O. 12	20407 ON ROGERS LA	KE ROAD	OVER US 29	A, NCR	RR AN	D SO	UTH RIDGE AVENUE		GROUN	D WTR (f
BOR	ING NO	. B1-A			S	STATION 31+43		OFFSET 1	ft LT			ALIGNMENT -L-		0 HR.	N/
COLI	LAR EL	EV. 77	74.0 ft		Т	FOTAL DEPTH 103.6	ft	NORTHING	632,27	73		EASTING 1,516,418		24 HR.	FIAI
DRILL	. RIG/HAN	MMER EF	F./DAT	E TER	92-0 A	ACKER RENEGADE 95% 02	24/2018		DRILL M	1ETHO	D Mu	d Rotary	HAMM	ER TYPE	Automatic
DRIL	LER D	ouggins,	W.T.		S	START DATE 04/26/1	В	COMP. DAT	E 04/2	27/18		SURFACE WATER DE	PTH N/	'A	
ELEV	DRIVE		1	W COL	JNT	BLOWS	PER FOOT		SAMP.	V /	11				-
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МО	O G	SOIL AND RO	JCK DES	CRIPTION	DEPTH
775															
	773.0	1.0				 		T			H		ND SURF		
		+	1	3	3	6		1 1		М		RED-ORANGE A		SILTY CLA	Α Υ,
770	770.5	3.5	1	2	3	1				М		-	٦.		
	,	‡										767 <u>.5</u>			
705	765.5	+ + 8.5										TAN-GRAY, WHI COARSE SAND	TE AND F	PINK, FINE	TO
765	705.5	† "	2	2	4	6	 	 		М		-	/	TO TOLIVIO	7.
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725	725.5	T 48.5] :;;:: ::::	: : : :								
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720	720.5	53.5	4	7	9	- · · · · · · · · · · · · · · · · · ·				М		-			
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705	705.5	68.5	12	17	22					N.4		-			
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Terracon GEOTECHNICAL BORING REPORT BORE LOG

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Consi	ulting En	gineers	and Sci	entists				В	ORE L	OG						
WBS	4032	5.1.46			TI	P Y-4810h	(COUNT	Y CABARR	US			GEOLOGIST Riggs, A.	F. Jr.		
SITE	DESCR	IPTION	I BRID	OGE N	O. 120	407 ON RC	GERS LA	KE ROAD	OVER US 2	9A, NCF	RR AN	D SC	OUTH RIDGE AVENUE		GROUI	ND WTR (ft)
BOR	ING NO	. B1-A			S	TATION 3	1+43		OFFSET	1 ft LT			ALIGNMENT -L-		0 HR.	N/A
COL	LAR EL	EV . 77	74.0 ft		TO	OTAL DEPT	TH 103.6	ft	NORTHING	632,2	73		EASTING 1,516,418		24 HR.	FIAD
DRILL	RIG/HAM	MER E	F./DAT	E TER	R92-0 AC	CKER RENEG	ADE 95% 02/	/24/2018		DRILL N	1ETHOI	D Mu	ud Rotary	HAMM	ER TYPE	Automatic
DRIL	LER D		, W.T.		S	TART DATE	E 04/26/1	8	COMP. DA	TE 04/	27/18		SURFACE WATER DEF	TH N/	A	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT			PER FOOT		SAMP.	lacksquare		SOIL AND RO	CK DES	CRIPTION	J
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25 !	50	75 100	NO.	MO		ELEV. (ft)			DEPTH (ft)
695		<u> </u>	<u></u> -	45	<u></u> -		Matc	h Line		. 	Ьм-	200000	694.5			79.5
		‡	20	~~	33				100/1.0		"		- 694.5 WEATH - (TAN-GRAY, WHIT			
690	690.5	+ - 83.5											- -			•
030	-	‡	26	48	52/0.4			1 : : : :	100/0.9	,			- -			
		‡											- -			
685	685.5	88.5	100/0.2						100/0.2	•			- -			
		‡											- -			
600	680.5	+ + 93.5	1										- -			
680			100/0.4					 	100/0.4	'			_ -			
		‡											- -			
675	675.5	98.5	100/0.2						100/0.2	,			- 			
		‡	. 00, 012										- -			
	670.5	+ + 103.5											- - 670.5			103.5
	- 670.5	103.3	60/0.1					1	60/0.1	7			CRYSTA (GRAY, BLACK A	LLINE R	OCK TE GRAN	103.5 _103.6
		ŧ											Boring Terminated	by SPT	REFUSA	L at
	_	Ŧ											Elevation 670.4 ft IN (GF	I CRYST ANITE)	ALLINE F	ROCK
	-	Ŧ											-	•		
		Ŧ											-			
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Consulting E	ngineers	and Sci	entists				B	ORE	L	<u>OG</u>							
WBS 403	25.1.46			TI	IP Y-4810h	(COUNT	Y CABA	RRI	JS			GEOLOGI	ST Stickney,	J. K.		
SITE DESC	RIPTION	I BRII	OGE NO	D. 120	0407 ON RC	GERS LA	KE ROAD	OVER U	S 29	A, NCR	RR AN	D SO	JTH RIDGE	AVENUE		GROUN	ID WTR (ft)
BORING N	O . B1-B			S	TATION 3	1+37		OFFSE	T 2	3 ft RT			ALIGNME	NT -L-		0 HR.	FIAD
COLLAR E	LEV. 77	73.7 ft		T	OTAL DEPI	TH 78.3 ft		NORTH	ING	632,24	48		EASTING	1,516,418		24 HR.	FIAD
			E HFO		ME-550X 909					DRILL M		D H.S	ı		HAMME	R TYPE	Automatic
DRILLER				\neg	TART DATE			COMP.	DA				 	WATER DEF			
ELEV DRIV	E DEDTI	1	OW COL				PER FOOT		T	SAMP.	_	11					
(ft) ELE	/ (ft)	0.5ft		0.5ft	o :	25 5	50	75	100	NO.	мо	0 G	ELEV. (ft)	SOIL AND RO	CK DESC	CRIPTION	DEPTH (ft
(1)							1				, wie		LLL V. (II)				DET III (II
775																	
1/15	‡												- 773.7 773.2	GROUN	D SURF	ACE	0.0
	‡								-				113.2		ICIAL FIL GRAVEL	.L	
770 770.4	4			0					•					RE	SIDUAL	==	
	Ŧ	6	8	8	16			1	-		М		- O F	RANGE-TAN, OCK FRAGME	SILTY CL ENTS, TR	AY, TRAC ACE MIC	CE A
	‡								-								
765 765.4	4 # 8.3	5	5	6	1 . 1				-		М		_				
	‡			Ü	. •11 . . j				-		IVI			RANGE-TAN,	TAN-OR	ANGE AN	<u>10</u> .0
	<u> </u>								-				V	VHITE, SANDY	' SILT, SC	OME ROC	K
760 760.4	1 13.3	4	5	6	11			+	-		м		- -	AGMENTS, TF	KACE TO	SOIVIE IVII	ICA
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755	+ 4 + 18.3				::/::				-								
755 755.4	†	5	6	9	15		 	+			М		-				
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750 750.4	4 23.3	<u>.</u>							-								
	Ŧ	4	6	8	•14				-		М		-				
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745 745.	4 28.3	2	4	7	: ;; : :				•		١		_				
	+		4	,	. •11 .				-		M						
	Ŧ						: : : :	: : :	-			F					
740 740.4	4 ‡ 33.3	3	5	8	1						М		-				
	‡				1.				-		'''						
725	, †				: : : :				-								
735 735.4	4 <u>† 38.3</u> †	2	4	6	10				-		М		-				
	+				\; .				-								
730 730.4	4 ^T 43.3] ::::\;				-								
700	‡	4	10	14	 }	24	1	1	-		М		-				
	‡				::::/				-								
725 725.	4 + 48.3	4	6	9	· · ·/·				•		l		_				
	±	4		9	🖣15				-		W						
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720 720.	4 † 53.3	2	5	8	1			ļ · · · ·			М		-				
	‡				• 13.				-		'''						
2	, ‡ _, ,				::i::				-								
715 715.4	4 <u>† 58.3</u>	1	5	8	• 13.	 	 	+ : : :	$\overline{}$		М		-				
2	+				- • •				-								
710 710.4	4 + 63.3] :::\:				-								
	‡	3	8	11	•1	9	: : : :		-		М		-				
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705 705.4	4 68.3	20	17	19		<u> </u>			•				_				
-	İ	20	17	19	: :	●36			:		M						
	Ŧ					: : : ; '											
700 700.	4 † 73.3 †	7	22	35			F7		_		М		-				
3	‡			•			. ♥ 5/		:		'*'						
720 -720.4 715 -715.4 710 -710.4 705 -705.4 700 -700.4	‡	1					:i: : :						605.4				70.0
žL	\pm	1			 		<u> </u>		-	4	<u> </u>	10000	695.4				78.3



GEOTECHNICAL BORING REPORT BORF LOG

SHEET 12 OF 22

Cons	ulting En	gineers a	and Scie	entists						BORE				1				
WBS	40325	5.1.46			T	IP Y-4	810K		COUNT	Y CABAR	RUS			GEOLOGIS	ST Stickney	, J. K.	_	
SITE	DESCR	IPTION	BRID	DGE N	O. 120	0407 ON	N ROGE	RS LAP	KE ROAI	OVER US	29A, NC	RR AN	ID SC	OUTH RIDGE A	VENUE		GROUI	ND WTR (f
BOR	ING NO	. B1-B			S	TATIO	1 31+3	7		OFFSET	23 ft RT	•		ALIGNMEN	IT -L-		0 HR.	FIAI
COL	LAR EL	EV . 77	73.7 ft		T	OTAL [DEPTH	78.3 ft		NORTHIN	I G 632,2	248		EASTING	1,516,418		24 HR.	FIAI
DRILL	. RIG/HAN	/IMER EF	F./DATI	E HFC	00072	ME-550	X 90% 0	5/23/201	7		DRILL	METHO	D H.	S. Augers		HAMN	MER TYPE	Automatic
DRIL	LER S	mith, C	. L.		S	TART [DATE 1	10/25/17	7	COMP. D	ATE 10	/25/17		SURFACE	WATER DE	PTH N	/A	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		Bl	LOWSF	PER FOO	Ť	SAMP	. 🔻	O L		SOIL AND RO	OCK DES	CRIPTION	J
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50	75 10	NO.	МО	ı G	ELEV. (ft)	SOIL AND INC		JOINI TIOI	DEPTH
<u>695</u>		L		L	<u></u> _	L		Matcl	h Line			L	<u> </u>					
		ł												_ Borir	ng Terminated RESIDUA	d at Eleva AL SAND	ation 695.4 Y SILT	ft IN
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TECCHNICAL BORING REPORT

SHEET 13 OF 22

WBS	40325	.1.46			T	IP Y-4810K	COUNT	Y CABARF	RUS			GEOLOGIST Stickney, J. K.	
SITE	DESCR	IPTION	BRID	GE N	O. 120	0407 ON ROGERS LA	KE ROAD	OVER US	29A, NCR	R AND	SOL	UTH RIDGE AVENUE	GROUND WTR (ft
BORI	NG NO.	B2-A			S	TATION 32+62		OFFSET	17 ft LT			ALIGNMENT -L-	0 HR. 35.
COLL	AR ELI	EV. 78	0.6 ft		T	OTAL DEPTH 57.41	t	NORTHIN	G 632,3	18		EASTING 1,516,529	24 HR. FIAI
DRILL	RIG/HAN	MER EF	F./DATE	E HFC	00072 (CME-550X 90% 05/23/20			DRILL M	ETHOD	H.S	S. Augers HAMM	ER TYPE Automatic
DRILI	LER S	mith, C.	L.		S	TART DATE 10/24/	17	COMP. DA	TE 10/2	26/17		SURFACE WATER DEPTH N/A	A
(ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLO 0.5ft	W CO		-	PER FOOT	75 100	SAMP. NO.	/	L O G	SOIL AND ROCK DESC	CRIPTION DEPTH
785	-	-									-	-	
780	- - -					1						780.6 CONCRETE SL CONCRETE SL 0.5' CONCRET	AB
775	776.5	4.1	4	3	3	- 1 · · · · · · · · · · · · · · · · · ·				М		RESIDUAL ORANGE, SANDY SILT, 1	
770	- 771.5 - - -	9.1	100/0.4					100/0.4		स्वापदस्वापदस्व		WEATHERED RO (WHITE AND GRAY, C	
765	766.5 - -	14.1	39	30	70/0.4		+	100/0.9		24 (SA) (SA) (SA) (SA) (SA) (SA) (SA) (SA)		-764.6 RESIDUAL	
760	761.5 - -	19.1	8	6	5	11				М	ŧ	WHITE AND GRAY, SANDY	/ SILT, TRACE
755	756.5 - -	24.1	14	7	7	•14				М	ŧ	-	
750	- 751.5 - -	29.1	20	35	14		49			D		-	
745	746.5 -	34.1	22	35	65/0.4			100/0.9					
740	741.5 - -	39.1	66	34/0.2				100/0.7		ध्याप्टरखापट्टस्वा		(WITTE AND GIVAT, C	>: 3 u vi : ∟j
735	736.5 - -	44.1	14	16	8	9 24	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		M		737.6 RESIDUAL WHITE AND GRAY, SILT SAND, TRACE N	Y COARSE
730	731.6	49.0	4	6	10	16 · · · · · · · · · · · · · · · · · · ·				М		- -	
725	726.6 - -	54.0	29	52	48/0.1			100/0.6					DANITE)
	- - - - - - - - - - - - - - - - - - -	-									- - - - - - - - - - - - - - - - - - -	Boring Terminated By AUG at Elevation 723.2 ft ON CI ROCK (GRANII	ER REFUSAL RYSTALLINE



Consu	ulting Engin	eers a	nd Sci	entists					B	<u>ORI</u>	<u> </u>	<u>OG</u>							
WBS	40325.1	.46			TI	P Y-4	1810K		COUNT	Y CAB	ARRL	JS			GEOLOGI	ST Riggs, A	.F. Jr.		
SITE	DESCRIP	TION	BRID	OGE NO). 120	407 O	N ROC	GERS LA	KE ROAD	OVER	US 29	A, NCR	RR AN	D SO	UTH RIDGE	AVENUE		GROUN	ID WTR (ft)
BORI	NG NO.	B2-B			S	TATIO	N 32-	+59		OFFSI	ET 2	2 ft RT			ALIGNME	NT -L-		0 HR.	N/A
COLI	AR ELEV	/. 78	1.5 ft		TO	DTAL	DEPTI	-1 90.5 ft		NORT	HING	632,28	30		EASTING	1,516,536		24 HR.	36.2
DRILL	RIG/HAMM	ER EF	F./DAT	E TERS	92-0 AC	CKER R	ENEGA	DE 95% 02	24/2018			DRILL M	IETHOI	D Mu	ıd Rotary		HAMM	ER TYPE	Automatic
DRIL	LER Dug	gins,	W.T.		S	TART	DATE	04/25/1	8	COMP	. DAT	E 04/2	26/18		SURFACE	WATER DE	PTH N/	A	
ELEV	DRIVE ELEV D	EPTH	BLC	W COU	INT			BLOWS	PER FOOT			SAMP.	lacktriangledown/		•	SOIL AND RO	OCK DES	^RIDTI∩N	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5 ;	50	75	100	NO.	/мо		ELEV. (ft)	OOIL / II VD I (C	OK DEO		DEPTH (ff
785															_				
	‡														- -				
	780.5	1.0							T	T					- 781.5 - 780.8		RETE SL		0. 0.
780	-/ _{00.5} +	1.0	2	2	3	\$ 5			 	+			М		_	CON	CRETE 0		
	778.0	3.5	3	2	4								М		R	RE ED-ORANGE,	SIDUAL SILTY CI	_AY, TRAC	Œ
775	Ŧ					T°.							'''		- <u>77</u> 5 <u>.5</u>		MICA		
	773.0	8.5														TAN-GRAY AN OARSE SAND			
	-//3.0 	0.0	2	3	3	6				: :			М		-				
770	‡					ښ				+					- -				
	768.0	13.5	3	4	4	: :							١		= -				
765	‡		3		7	:¶8	3						М		- -				
703										1 : :					- -				
	763.0	18.5	4	5	7		12-						М		- -				
760	‡						<u>\i: : </u>								-				
	758.0	23.5				: :	1.								-				
	‡		5	9	8	: :	♦ 17						М		- -				
755	\pm					 	: 		 	+ : :					-				
	753.0	28.5	4	5	7	: :	1						М		-				
750	Ŧ						12.						'''		-				
	748.0	33.5								1					-				
	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	00.0	4	5	6		11 -						М		-				
745	‡							· · · ·		+					- -				
	743.0	38.5	3	5	6										-				
740	‡				O	:9	11 -						M		-				
740	-	40.5					1			1					- -				
	738.0	43.5	4	6	9		1 • 15						М		-				
735	‡						7.			- : :					- 				
	733.0	48.5	-	40	40	::	- /-								- -				
<u> </u>	‡		7	10	12	: :	· •2	2 · · · ·			: :		M		- -				
730	†					 	1			+					- -				
5	728.0	53.5	8	11	14	: :	::\	25					М		- -				
725	<u> </u>						· ·]	<u> </u>							-				
<u> </u>	723.0	58.5				:	::[·\			: :				- -				
	Ŧ		19	20	18	: :		. ♦38-					М		- - 720 5				24.5
720	Ŧ								 	+==	===			70	- 720.5 - /7	WEATH	IERED RO	OCK	61.0
730 725 720 720 715 710 710 700 700 700 700 700 700 700 700	718.0	63.5	60	40/0.1		[-					0/0 6				- -	AN-GRAY AN	VV HITE ע	., GKANII	-)
715	Ŧ								: : : :	. 10	0/0.6				-				
ابا ا	713.0	68.5													-				
	 		100/0.2			::				. 10	0/0.2				- -				
710	‡														- 				
	708.0	73.5	100/0.2			::		: : : :	: : : :		0/0.2				- -				
3 705	‡		100/0.2	1		::				1. 10	0/0.2				- -				
705						Ш							L	1	_				



GEOTECHNICAL BORING REPORT BORE LOG

SHEET 14 OF 22

			entists				D	<u>ORE L</u>	UG							
WBS	40325.1.46			TI	P Y-4810k	(COUNTY	CABARR	JS			GEOLOGI	ST Riggs, A	A.F. Jr.		
SITE	DESCRIPTION	BRID	GE N	O. 120	407 ON RC	GERS LAI	KE ROAD	OVER US 2	9A, NCF	RR AN	D SO	UTH RIDGE	AVENUE		GROUN	ND WTR (ft)
BOR	ING NO. B2-B			ST	TATION 32	2+59		OFFSET 2	22 ft RT			ALIGNME	NT -L-		0 HR.	N/A
COL	LAR ELEV. 78	1.5 ft		тс	OTAL DEPT	FH 90.5 ft		NORTHING	632,2	80		EASTING	1,516,536		24 HR.	36.2
DRILI	RIG/HAMMER EF	F./DATI	E TER	92-0 AC	CKER RENEG	ADE 95% 02	24/2018		DRILL IV	1ETHO[) Mu	d Rotary		HAMM	ER TYPE	Automatic
DRIL	LER Duggins,	W.T.		S1	TART DATE	E 04/25/1	8	COMP. DA	TE 04/2	26/18		SURFACE	WATER DE	PTH N/	'A	
ELEV (ft)	DRIVE ELEV (ft) DEPTH (ft)	BLC 0.5ft	W COL	JNT 0.5ft	0 2		PER FOOT	75 100	SAMP. NO.	MOI	L O I G	ELEV. (ft)	SOIL AND RO	OCK DES	CRIPTION	l DEPTH (ft)
705 700	703.0 78.5	— — - 100/0.2				Matc	h Line	100/0.2	, 				AN-GRAY AN	HERED RO ID W HITE ontinued)		
695	698.0 83.5	60/0.0						60/0.0	,			_	CRYST. RAY, BLACK A	ALLINE R	R OCK TE, GRAN	,
												691.0 Bor	ing Terminate CRYSTALLIN	d at Eleva E ROCK (ttion 691.0 (GRANITE	90.5 ft IN)





SHEET 15 OF 22

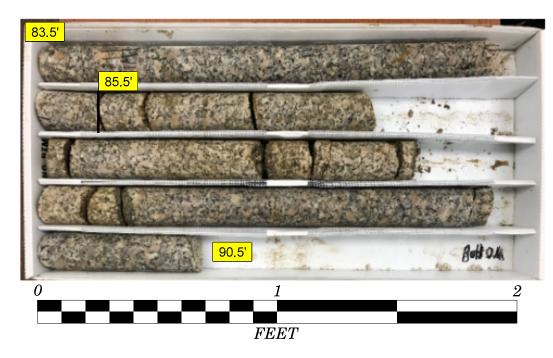
/BS	40325	5.1.46			TIP	Y-481	0K	С	OUNT	Y C	ABARRUS	GEOLOGIST Riggs, A.F. Jr.	
ITE	DESCR	IPTION	BRID	DGE NO.	12040	7 ON F	ROGERS	LAKE	ROAL	OVE	ER US 29A, NCRR AND SOU		GROUND WTR (
	ING NO						32+59			1	FSET 22 ft RT	ALIGNMENT -L-	OHR. N
	LAR EL		1.5 ft				PTH 90.	5 ft		1	RTHING 632,280	EASTING 1,516,536	24 HR. 36
				E TER92-					2018	1	DRILL METHOD Mud		IER TYPE Automatic
	LER D						TE 04/2			СО	MP. DATE 04/26/18	SURFACE WATER DEPTH N	
	E SIZE				-		N 7.0 ft	0, .0		-	1 2 1 1 2 1 1 2 1 1 2 1 1 2		,,
.EV	RUN ELEV	DEPTH	RUN	DRILL	RI	JN			ATA				
ft)	ELEV (ft)	(ft)	(ft)	RATE (Min/ft)	REC. (ft)	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	O G	D ELEV. (ft)	ESCRIPTION AND REMARKS	DEPTH
98	. ,				70	70		,,,	70		ELE V. (III)	Begin Coring @ 83.5 ft	DEI III
-	698.0 696.0	83.5 85.5	2.0	2:40/1.0 1:30/1.0	(2.0) 100%	(2.0) 100%		(7.0) 100%	(5.7) 81%	R	. 698.0	CRYSTALLINE ROCK CK AND WHITE, VERY SLIGHT TO F	8 EDEQU
95	- 030.0	- 00.0	5.0	1:30/1.0	(5.0)	(3.7)		100%	0176		_ HARD TO VERY H	HARD, VERY CLOSE TO MODERAT	
		‡		1:30/1.0 1:16/1.0 1:05/1.0	100%	74%					. F	RACTURE SPACING, GRANITE 12 JOINTS AT 10º-20º	
	691.0	90.5		1:17/1.0 1:32/1.0							691.0	GSI= 80-90	9
	-	<u> </u>									_ Boring Terminate .	ed at Elevation 691.0 ft IN CRYSTALI (GRANITE)	LINE ROCK
		‡									•		
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CORE PHOTOGRAPHS

Y-4810K 16

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





Consi	ulting En	gineers	and Sci	ientists							В	<u>Or</u>	KE L	<u>.OG</u>										
WBS	40325	5.1.46			Т	IP Y	'-4810	K		CC	TAUC	Y C	ABARR	US			GEOL	OGIS	ST SC	CHLEN	IM, T. \$	S.		
SITE	DESCR	IPTION	I BRII	DGE N	O. 120	0407	ON RO	OGE	RS LA	KE F	ROAD	OVE	R US 2	9A, NCI	RR AN	ID SO	UTH RID	GE A	AVENU	ΙE		GROU	JND WT	R (ft)
BOR	ING NO	. B3-A			S	TATI	ON 3	33+87	7			OF	SET	18 ft LT			ALIGN	NMEN	NT -L-			0 HR		N/A
COLI	LAR EL	EV . 77	79.6 ft		Т	OTAL	_ DEP	тн	59.9 f	t		NO	RTHING	632,3	50		EAST	ING	1,516	.650		24 HR.	_	35.0
	. RIG/HAN										, 			· ·		D Mu	id Rotary		.,	,,,,,,	Тнами	MER TYPE		
	LER T						DAT					CO	MD DA	TE 11/		D IVIU		·^CE	WATE	D DEC			. Autom	auc
	DRIVE		T	OW CO		T	DAI		-0WS				VIP. DA	SAMP.	_	11	SUKF	ACE	WAIE	K DEF	'IH N	I/A		
ELEV (ft)	ELEV (ft)	DEPTH (ft)	0.5ft		0.5ft	0		25		50 50		7 5	100	NO.	МО	0	ELEV. (ft		SOIL A	ND RO	CK DE	SCRIPTIC		:PTH (f
780		<u> </u>						T.		<u> </u>		.					779.6 779.1	•	P/		NT SUF			0.
		<u> </u>				<u>i</u>		-		-							٠ ١	0.1	5' CON	CRETE	AND ().35' ASPI	HALT	
775	776.4	3.2	2	3	3		6	<u> :</u>		<u> :</u>		ļ: +-			w		- - -			OWN, S		- CLAY, TRA , TRACE N		
		‡				:'	\ \	:	: : :	:	: : :	:					<u>- 773.6</u> -					BROWN,		
770	771.4	8.2	4	5	5	{ ∶	10.	:	: : :			:			М		- -	GR/ LITTI	AY, SIL	TY CO.	ARSE T MICA, C	O FINE S	SAND, SAND	
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	766.4	13.2] :	į	:	: : :	:	: : :	:					-							
765	-	‡ `	3	4	5	ا	9	<u> </u>		+:		<u> </u>			М		-							
		‡				:	<u>;</u> : :	:	: : :	:	: : :	:					-							
760	761.4	18.2	4	4	5	$\{ \mid : \mid$	F	:	: : :	:	: : :				М		-							
700	-	‡					T 9	1:		T :		T :					-							
	756.4	23.2					1::	:	: : :	:	: : :						- -							
755	750.4	- 23.2	5	5	6	النا	11_	:		<u> </u> :		<u> </u> :			М		-							
		‡					į::	:		:	: : :	:					-							
	751.4	28.2	4	5	6	:	1::	:		:	: : :			00.0	⊦		-							
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745	746.4	33.2	4	6	7	┨ .	. I	.		•							•							
	-	Ŧ					- [-				-			_	†F	-							
	741.4	38.2] :	1	-		:		:					-							
740	_	Ŧ	5	6	8	<u> </u>	_ 14_	<u> </u>		ļ:	• • •	<u> </u>			W		-							
		‡					: i <u>. </u>] <u>:</u>	<u> </u>	<u>ا۔</u> ٰ	· · ·	_	· · ·				- 737.6							42
735	736.4	43.2	60/0.1	1				:		:			60/0.1				- - 735 <u>.4</u>	(WH			LLINE And Gf	ROCK RAY, GRA	NITE)	44
700	-	‡						1:		1:		:					-		С	RYSTA	LLINE			
		‡					: : :	-	: : :	:	: : :						-	(, _,	_ 1011,7		,	/	
730	_	‡						<u> </u> :		<u> </u> :		<u> </u> :					-							
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705] :	‡				:		:		:		:					- -							
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720		‡_		L	L			<u> </u> :		<u> </u> :	· · ·	:					- - 719.7							59.
		<u> </u>															-	Bori	ng Terr	ninated	at Elev	ation 719.	.7 ft IN	
		‡															-	`		!! _		, 0.0	-,	
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GEOTECHNICAL BORING REPORT

SHEET 17 OF 22

											LOG	
WBS -	40325.1.	.46			TIP	Y-481	0K	С	OUNT	Y C	ARRUS GEOLOGIST SCHLEMM, T. S.	
SITE D	ESCRIP	TION	BRID	GE NO.				LAKE	ROAD	_	JS 29A, NCRR AND SOUTH RIDGE AVENUE GROUND W	/TR (ft)
BORIN	G NO.	B3-A			STA	TION	33+87			OF	T 18 ft LT ALIGNMENT -L- 0 HR.	N/A
COLLA	AR ELEV	. 779	9.6 ft		TOT	AL DEI	PTH 59.	9 ft		NO	HING 632,350 EASTING 1,516,650 24 HR.	35.0
DRILL RI	IG/HAMMI	ER EFF	./DATE	E TER373	DIEDF	RICH D-	50 99% 0	3/09/201	7		DRILL METHOD Mud Rotary HAMMER TYPE Auto	matic
DRILLE	ER TUR	RNAGI	E, J. R	₹.	STAF	RT DA	TE 11/2	8/17		CO	DATE 11/29/17 SURFACE WATER DEPTH N/A	
	SIZE N	Q3					N 15.7 f					
		EPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	JN RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	LOG	DESCRIPTION AND REMARKS EV. (ft)	DEPTH (f
	‡	44.2 49.9	5.7	1:36/0.7 5:10/1.0 2:16/1.0 2:29/1.0 1:48/1.0	(3.8) 67%	(3.3) 58%		(13.5) 86%	(13.0) 83%		Begin Coring @ 44.2 ft 5.4 CRYSTALLINE ROCK WHITE, GRAY, AND BLACK, VERY SLIGHTLY WEATHERED TO FRESH, HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE 10 JOINTS AT 10°-20°	44.2
	729.7	5.0	3:39/1.0 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%					GSI=85-95 LOST CIRCULATION IN FRACTURED ROCK SEAM 51.6' - 51.8'		
	719.7	5.0	4:40/1.0 4:24/1.0 4:12/1.0 4:36/1.0 5:21/1.0	98%	(4.9) 98%				KIKK	9.7 Boring Terminated at Elevation 719.7 ft IN CRYSTALLINE ROCK	59	
	+++++++++++++++++++++++++++++++++++++++											

CORE PHOTOGRAPHS

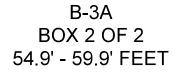
Y-4810K

18

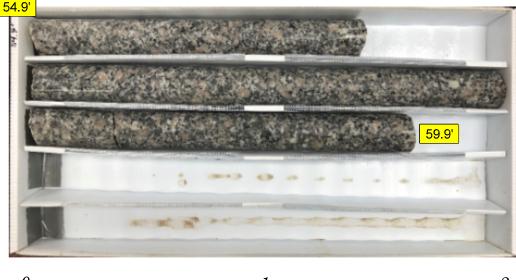
PROJECT NO. 40325.1.46 (Y-4810K)

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







FEET





Terracon GEOTECHNICAL BORING REPORT

SHEET 19 OF 22

WBS	40325	.1.46			TI	IP	Y-4810K			ORE L Y CABARR				GEOLOGIST Stickney,	J. K.	
SITE	DESCR	IPTION	I BRID	DGE N	O. 120)407	7 ON ROG	ERS LA				RR AN	D SO	UTH RIDGE AVENUE		UND WTR (fi
	ING NO.						TION 33+			OFFSET				ALIGNMENT -L-	0 HR	
COL	LAR ELE	EV. 77	78.9 ft		T	OT/	AL DEPTH	4 40.0 ft		NORTHING	G 632,3	11		EASTING 1,516,660	24 HR	
				E HFC			E-550X 90%				, <u> </u>) H.S	<u> </u>	HAMMER TYPI	
	. LER Si						RT DATE			COMP. DA	1			SURFACE WATER DEPT		
ELEV	DRIVE	DEPTH		W CO	UNT	П		BLOWS F	ER FOOT	-	SAMP.	V /		201 411 700		
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	0 25	5 5	50 I	75 100	NO.	MOI	0 G	SOIL AND ROC ELEV. (ft)	K DESCRIPTION	ON DEPTH
780		L												_		
	_					₩	1								T SURFACE_ EMENT	
	-						 								NCRETE IDUAL	
775	775.5	3.4	2	1	3	H	4			+ : : : :	1	М		 ORANGE, AND TAN 	I, SILTY CLAY	
	-						<u> </u>							MICA, TRACE RO	JCK FRAGINEI	NIS
770	770.5	8.4					: 7: :			: : : :				•		
	_	F	6	7	9		• 16			1		M				SOME 10
	-	-					/							MICA, SOME RC		
765	765.5	13.4	4	4	5	╁	. /					D		· -		
	-	-					: 7°: :							•		
760	760.5 ⁻	18.4												•		
700	-		3	4	9		13				-	D		- 758.2		20
	-	_					'				!			WEATHE	RED ROCK	
755	755.5	23.4	20	80/0.3										. (WHITE-TA	N, GRANITE)	
	_		20	00/0.5						. 100/0.8	[
	-										<u> </u>			•		
750	750.5	28.4	100/0.3			╟				100/0.3	•			-		
] -	F								+	i I			_ 747.9 _ RES	IDUAL	3:
745	745.5	33.4		L		\prod								. WHITE-TAN, SILTY - SOME ANUGLAR I	SAND, SOME	MICA,
0	-	F	15	16	28			•44			-	D		SOIVIE ANUGLAR I	ROCK FRAGIVI	ENIS
	-	<u> </u>												•		
740	740.5	38.4	100/0.3	3				<u> </u>	-:-::	100/0.3	 		777	· 740.5 WEATHE	RED ROCK	38
	-	-				H			L		+		VIE		N, GRANITE)	
	- -	-												at Elevation 738.9 f		
	-	F												0 HR. WATER LE\	/EL CAVED DF FEET	RY AT
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GEOTECHNICAL BORING REPORT

WBS	40325	.1.46			T	IP Y-48	10K	COUNT	Y CABARR	US			GEOLOGIST SCHLEMN	<u> </u>	
SITE	DESCR	IPTION	BRID	OGE N	O. 120	0407 ON	ROGERS L	AKE ROAD	OVER US 2	9A, NCF	RR AN	D SO	UTH RIDGE AVENUE	GROUND	WTR (f
BORII	NG NO.	EB2-	A		S	TATION	35+01		OFFSET 2	22 ft LT			ALIGNMENT -L-	0 HR.	Cave
COLL	AR ELE	E V . 77	8.7 ft		T	OTAL DE	EPTH 35.6	ft	NORTHING	632,38	33		EASTING 1,516,759	24 HR.	FIAI
ORILL	RIG/HAM	IMER EF	F./DATI	E TER	R373 DI	IEDRICH D	-50 99% 03/	09/2017		DRILL N	IETHOL).H.C	S. Augers	HAMMER TYPE AL	utomatic
DRILL	ER TU	JRNAG	E, J. F	₹.	S	TART DA	ATE 11/27	/17	COMP. DA	TE 11/2	27/17		SURFACE WATER DEPT	Γ H N/A	
LE V	DRIVE ELEV	DEPTH	BLO	W CO	UNT	1	BLOW	S PER FOO	Г	SAMP.	lacksquare] L	SOIL AND ROC	K DESCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	/MOI		ELEV. (ft)		DEPTH
780		_											_		
	-									+				T_SURFACE EMENT	
	-	_				• • • •								D 0.2' ABC STONE	
775	-	-				 							RED-BROWN, SII	LTY CLAY, TRACE	
ŀ	773.2	5.5	7	8	8	 	16		.	SS-3	19%		QUARTZ FRAGME	ENTS, TRACE MICA	
770	-	Ł				: :/:							- 770.7WHITE LIGH	HT RED, AND	
	768.2	[- GRAY-BROWN, (COARSÉ TO FINE	
	-	-	3	3	4	7 .					М			CE TO LITTLE MICA ΓΖ FRAGMENTS	۱,
65	_	-				-							- -		
-	763.2	15.5	3	3	4	-					М		- -		
60	-	-			'						IVI		. •		
50	7500					 							<u>-</u> -		
f	758.2	20.5	3	3	4	7					М		<u>-</u> -		
55	-	Ĺ				: :``							-		
	753.2	25.5			10	: : :			.				754.2 WHITE, BROWN,	AND BLACK, SILTY	
	-		24	17	18						М		COARSE TO FINE S FRAGMENTS, TRA	SAND, LITTLE ROC .CE TO LITTLE MICA	K A
50	_	F					· / · · ·						- -		
H	748.2	30.5	23	6	3	: : : /	' .				М		- 747.7	SILT, MICACEOUS	3
45	-	F										1, 1	- BROWN, CLAYEY	SILT, MICACEOUS	'
	743.2	35.5				. i		:					- 743.7 - 743.1 CDVSTAL		
Ī	-		60/0.1				'		60/0.1)			- \(WHITE, GRAY, AND		E)
	-	-											Boring Terminated Elevation 743.1 ft IN	by SPT REFUSAL a CRYSTALLINE ROO	it CK
	-	‡												ANITE)	
	-	<u> </u>												EL CAVED DRY AT	-
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Terracon GEOTECHNICAL BORING REPORT BORF LOG

SHEET 20 OF 22

	40325				T	P Y	-4810K	<u> </u>			RE L :ABARRI				GEOLOGIST SCHLEM	M, T. S		
ITE	DESCR	IPTION	BRID	DGE N									RR AN	D SO	UTH RIDGE AVENUE		1	D WTR (f
ORI	NG NO.	EB2-l	В		S	TATIO	ON 35	5+01		OF	FSET 2	28 ft RT			ALIGNMENT -L-		0 HR.	Cave
OLI	AR ELE	EV. 77	'8.9 ft		T	OTAL	DEPT	H 33.5	ft	NO	RTHING	632,3	34		EASTING 1,516,772		24 HR.	FIAI
RILL	RIG/HAM	MER EF	F./DAT	E TER	R373 DI	EDRIC	H D-50	99% 03/0	19/2017			DRILL N	1ETHOI	D H.:	S. Augers	HAMM	ER TYPE	Automatic
RIL	LER TU	JRNAG	E, J. F		S	TART	DATE	11/27/	<u>'</u> 17	СО	MP. DA				SURFACE WATER DEP	TH N/	A	
EV	DRIVE	DEPTH	BLC	w co	UNT			BLOWS	PER FOO	T		SAMP.	V /		0011 4415 500	01/ 050		
ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	0	2	25	50	75	100	NO.	MO	O G	SOIL AND RO	JK DESC	CRIPTION	DEPTH
80															_			
															778.9 PAVEMEN	NT SURF /EMENT	FACE	
	-	-							.	. .					- 0.2' ASPHALT A		ABC STON	E
75	775.4	3.5	50	50/0.3		<u> </u>				+	100/0.8	,		977	 ^{774.9} \ RED-BROWN, S	SILTY CL		
	-	=							.	- -					- ∖ MICA, TRACE QU - 771.9 WEATHI	ERED RO		15]
70	770.4	8.5						-		- -					(WHITE, GRAY, A	ND BLAC SIDUAL	CK, GRANI	TE) /
	-	- -	37	16	18			●34		- -			D		WHITE, GRAY,	AND BLA		
	-	-								: :					COARSE TO FINE LITTLE ROC	K FRAG	MENTS	<u>1</u> ــر ـــ
65	765.4	13.5	2	3	32	ŀ		- 1 -		<u> </u>			l _M		WHITE AND BROV 764.4 SANDY SILT, SOM			
	-	- -				:		. ♥35		: :			"		FRAG WHITE, GRAY,	GMENTS		′
	- 760.4	- 18.5				:		: [: :		: :					COARSE TO FINE	SAND, I	LITTLE RC	OCK ,
60	700.4	- -	60/0.1]		 -					60/0.1	'			CRYSTA	LLINE R	OCK	ICA ,—
	-	_								- -					- (WHITE, BLAC - GR	CK, AND ANITE)	BROWN,	
55	755.4	23.5	40	60/0.3											755.4		OCK.	2
	_	_	40	00/0.3		:				- -	100/0.8	'			(WHITE, BLAC			
	-	-							.	. .					GR	ANITE)		
50	750.4	28.5	100/0.2							<u> </u>	100/0.2	,			- -			
	-	- -								- -					- -			
	745.4 ⁻	- - 33.5									<u>:</u> : :]				- - 745.4			3
	-	-	60/0.0								60/0.0	7			Boring Terminated Elevation 745.4 f			
	-	-														(GRANIT		_
	-	-													0 HR. WATER LE	^ FEET	VED DRY	AT
	-	_													_ 13.! -	9 FEET		
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LABORATORY TESTING SUMMARY

PROJECT NUMBER:	40325.1.46	TIP : Y-4810K	COUNTY:	CABARRUS

DESCRIPTION: BRIDGE NO. 120407 ON ROGERS LAKE ROAD OVER US 29A (S. MAIN STREET), NCRR (NS) AND SOUTH RIDGE AVENUE

				Donath		I	1	T	% by V	Voight		%	0/2	Passing (siev	(AS)			A		Shear Strer	nath Values	
Commis No	Allermone	Ctation	Offset	Depth	AASHTO		P.I.	Caaraa								0/ Maintura	%	Ave. Wet Unit Wt.	Total		Effective	Effective
Sample No.	Alignment	Station	(feet)	Interval (feet)	Class.	L.L.	P.I.	Coarse Sand	Fine Sand	Silt	Clay	Retained #4 Sieve	#10	#40	#200	% Moisture	Organic	(pcf)	Cohesion	Total Friction (φ)	Cohesion	Friction (φ')
SS-1	-L-	30+23	22' LT	13.5-15.0	A-2-7 (0)	49	13	38.4	28.5	16.4	16.7	4	79	58	31	N/D	N/D	N/D	(psf) N/D	N/D	(psf) N/D	N/D
SS-2	-L-	33+87	18' LT	28.2-29.7	A-2-5 (0)	41	8	42.6	24.7	19.7	13	3	85	57	32	N/D	N/D	N/D	N/D	N/D	N/D	N/D
SS-3	-L-	35+01	22' LT	5.5-7.0	A-7-5 (2)	52	12	28.8	28.3	14.1	28.8	3	86	70	41	19.0	N/D	N/D	N/D	N/D	N/D	N/D
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N/D - NOT DETERMINED

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

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



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



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