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

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*

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6/7/2018

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
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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

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,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

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
FRAGS. - 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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [X] ACKER (TER92-0)
- [X] D-50 (TER373)
- [X] CME-550X (HF00072)

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [X] NQ3
- [X] NQ2

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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 WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
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 ALSO AN EXAMPLE.

ROCK HARDNESS

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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
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 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 FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
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

BEDDING

TERM	THICKNESS
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

INDURATION

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.

TERMS AND DEFINITIONS

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 (RQD) - 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: SEE IN NOTES BELOW

ELEVATION: FEET

NOTES:

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'

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
Y-4810K	2A

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)

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.

STRUCTURE

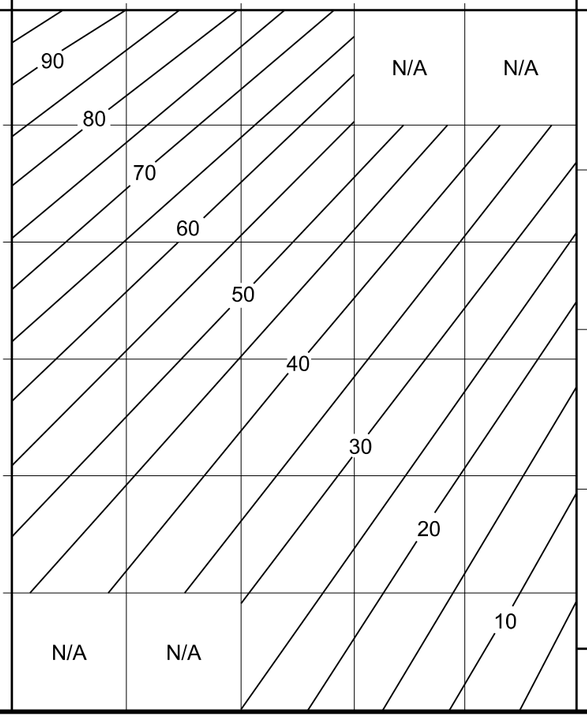
- INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities
- BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets
- VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
- BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity
- DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
- LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

DECREASING INTERLOCKING OF ROCK PIECES ⇩

SURFACE CONDITIONS

VERY GOOD Very rough, fresh unweathered surfaces
GOOD Rough, slightly weathered, iron stained surfaces
FAIR Smooth, moderately weathered and altered surfaces
POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments
VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨



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

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.

COMPOSITION AND STRUCTURE

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.*

B. *Sandstone with thin interlayers of siltstone*

C. *Sandstone and siltstone in similar amounts*

D. *Siltstone or silty shale with sandstone layers*

E. *Weak siltstone or clayey shale with sandstone layers*

C, D, 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.**

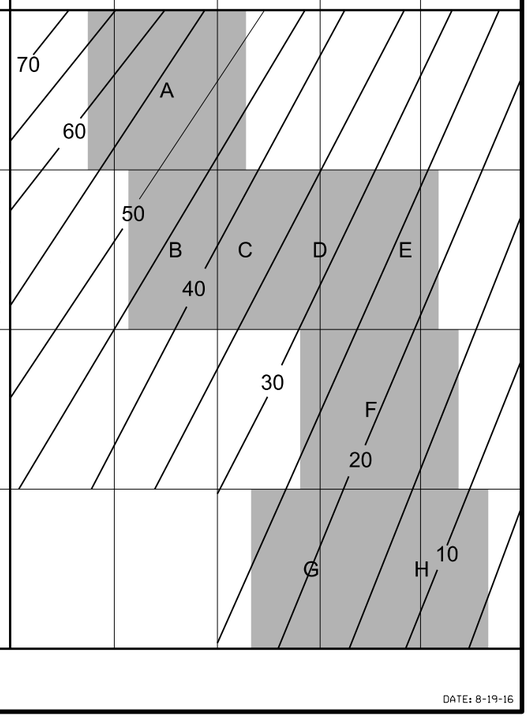
F. *Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure*

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

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

VERY GOOD - Very Rough, fresh unweathered surfaces
GOOD - Rough, slightly weathered surfaces
FAIR - Smooth, moderately weathered and altered surfaces
POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments
VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings



DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
Y-4810K	3

SITE PLAN

0 50 100

FEET

TYPICAL SKEW ANGLE 90°

BY6-33
N: 632,269.1900
E: 1,516,332.228
ELEV. 773.36'

BEGIN BRIDGE
–L– STA. 30+23.11

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

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

B1-A
31+43 -L-
1' LT

B1-B
31+37 -L-
23' RT

–L– POT STA. 30+83.71
–Y6– POT STA. 14+68.43

–L– POT STA. 31+94.08
–Y7– POT STA. 14+65.50

B2-A
32+62 -L-
17' LT

B2-B
32+59 -L-
22' RT

B3-A
33+87 -L-
18' LT

B3-B
33+87 -L-
23' RT

–L– POT STA. 34+35.76
–Y8– POT STA. 14+07.19

EB2-A
35+01 -L-
22' LT

EB2-B
35+01 -L-
28' RT

END BRIDGE
–L– STA. 35+01.11

BL-16
N: 632,336.2840
E: 1,517,071.554
ELEV. 781.49'

TO LOWRANCE AVE.

TO MEADOW AVE.

US 29A (SOUTH) MAIN STREET

NCRR/NS RAILROAD

S. RIDGE AVENUE

ROGERS LAKE ROAD

APPROX. 1934' TO MILE POST 35

30+00 -L-

35+00 -L-

-Y6-

-Y7-

-Y8-

-L-

CARL D. MOORE AND WIFE BETTY P. MOORE

JOHN RANDOLPH TRIECE, PHILIP TIMOTHY TRIECE AND DOUGLAS HENRY TRIECE TRUSTEES

ROXANNE B. REED AND HUSBAND, EDWARD L. REED

CHESTER C. COOK AND WIFE, PATRICIA T. COOK

WILLIAM O. MASSIC AND WIFE, LINDA A. MASSIC

TERESA ROXANNE BRITTINGTON

WOODS

BST

CONC

ISFD

ISBLK BUS

ISF BUS

25BLK BUS

MTL CANOPY

WOOD DECK

CONC. SIDEWALK

CONC. CURB

BL WALL

6" ASBESTOS CEMENT

10" ASBESTOS CEMENT

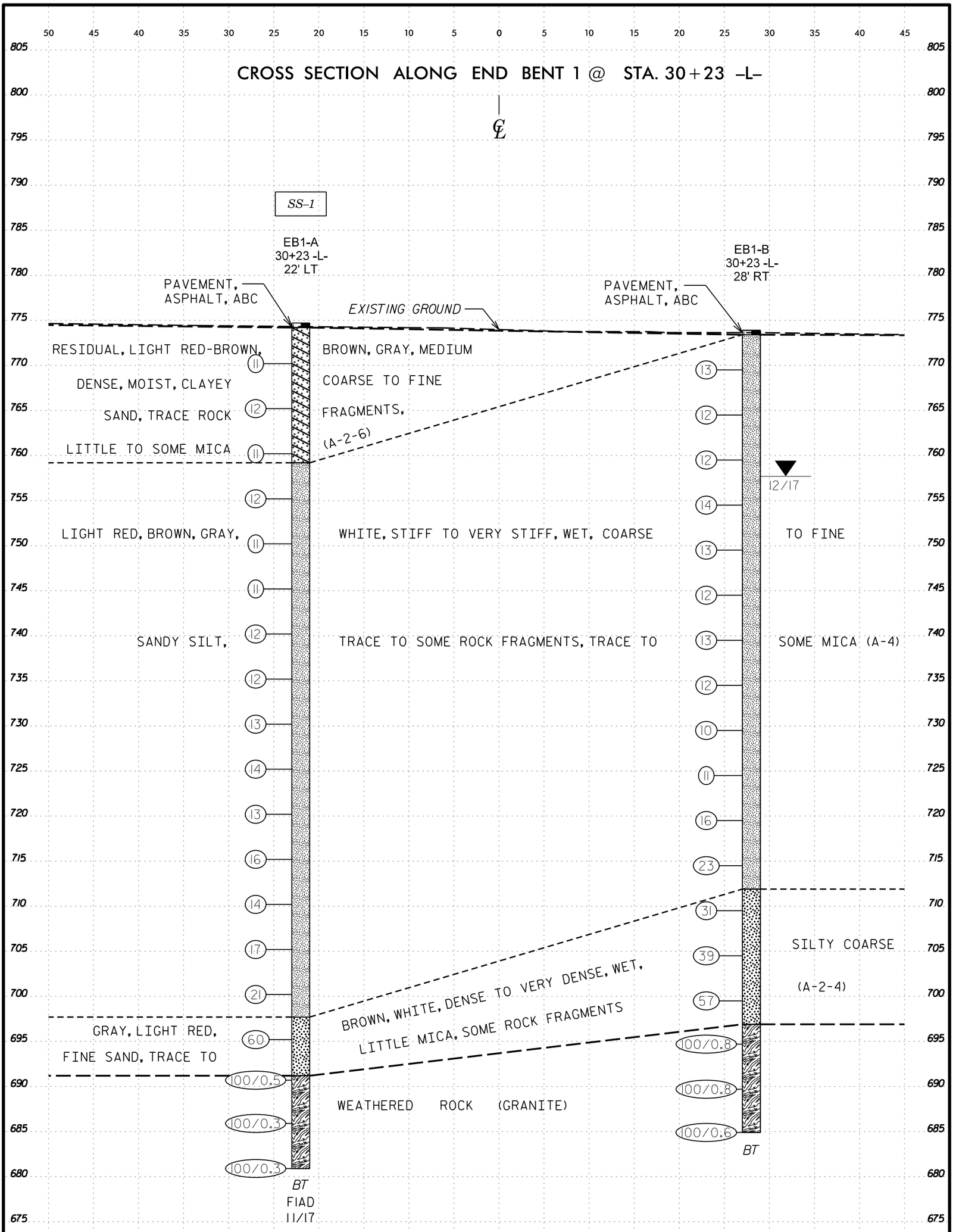
6" PLASTIC

15" RCP

18" RCP

TYPE III

CROSS SECTION ALONG END BENT 1 @ STA. 30+23 –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 ls tin (DATED 10/31/2017)

0 10 20
FEET

PROJ. REFERENCE NO. Y-4810K

SHEET NO. 4

6/23/16

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

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	Y-4810K	6

B2-A
32+62 -L-
17' LT

B2-B
32+59 -L-
22' RT

CONCRETE SLAB

CONCRETE SLAB

EXISTING GROUND

RESIDUAL, WHITE,

6

100/0.4

WEATHERED ROCK (GRANITE)

100/0.9

HARD, MOIST

11

TO DRY, FINE TO COARSE SANDY

14

49

TRACE MICA

100/0.9

10/17

WEATHERED ROCK (GRANITE)

100/0.7

RESIDUAL, WHITE, GRAY,

24

MEDIUM DENSE, MOIST, SILTY

16

COARSE

SAND, TRACE MICA (A-2-4)

100/0.6

WEATHERED

ROCK

(GRANITE)

CRYSTALLINE

AR
FIAD
10/17

ROCK

(GRANITE)

RESIDUAL, RED-ORANGE,

5

6

MEDIUM STIFF, MOIST, SILTY CLAY, TRACE MICA (A-7-5)

TAN-GRAY, GRAY, ORANGE, MEDIUM

6

STIFF TO

8

12

SILT,

17

12

(A-4)

11

04/18

11

15

22

25

38

100/0.6

100/0.2

100/0.2

100/0.2

60/0.0

BT

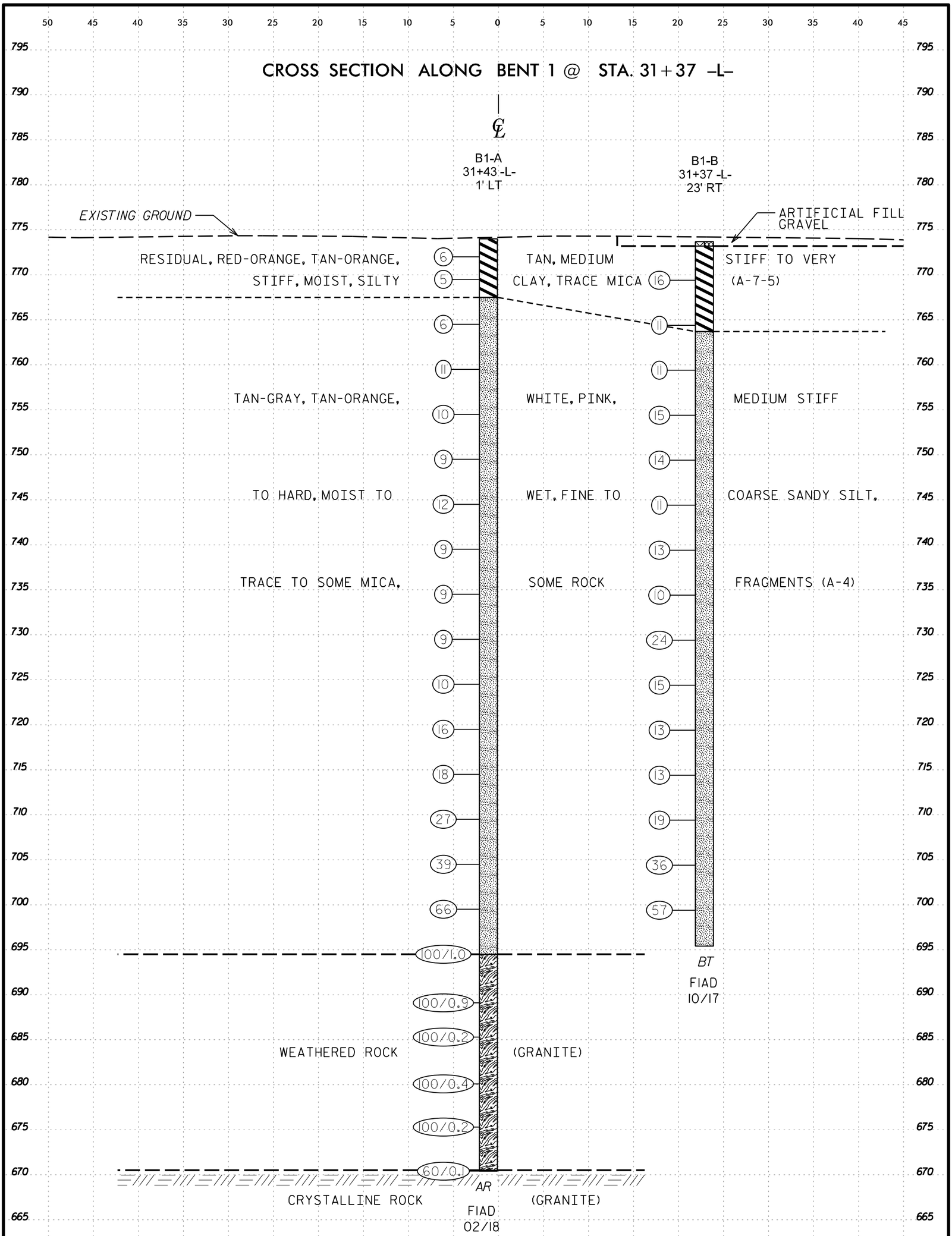
CRYSTALLINE ROCK, GRAY, BLACK, WHITE, VERY SLIGHT TO FRESH, HARD TO VERY HARD, VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, GRANITE

REC=100%
RQD=81%
GSI=80-90

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 ls tin (DATED 10/31/2017)

CROSS SECTION ALONG BENT 1 @ STA. 31+37 –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 ls tin (DATED 10/31/2017)

0 10 20
FEET

PROJ. REFERENCE NO. Y-4810K

SHEET NO. 5

6/23/16

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	Y-4810K	7

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

℄

SS-2

B3-A
33+87 -L-
18' LT

B3-B
33+87 -L-
23' RT

PAVEMENT, CONCRETE, ASPHALT

PAVEMENT, CONCRETE

EXISTING GROUND

RESIDUAL, RED-BROWN, CLAY, TRACE QUARTZ

6

ORANGE-TAN, MEDIUM STIFF TO VERY STIFF, ROCK FRAGMENTS, TRACE TO SOME

4

WET TO MOIST, SILTY MICA (A-7-5)

10

16

RED-BROWN, WHITE-TAN, TO FINE SAND, TRACE TO SOME

9

9

ORANGE, WHITE, BROWN, GRAY, LOOSE TO DENSE, DRY TO WET, TRACE TO SOME ROCK FRAGMENTS, MICA, SAND AND CLAY LAYERS (A-2-4)

SILTY COARSE

9

13

11

100/0.8

WEATHERED ROCK (GRANITE)

11

100/0.3

13

11/17

44

14

100/0.3

WEATHERED ROCK (GRANITE)

AR

60/0.1

CRYSTALLINE ROCK (GRANITE)

FIAD
10/17

BT

REC=86%
RQD=83%
GSI=85-95

CRYSTALLINE ROCK, WHITE, BLACK, GRAY, VERY SLIGHTLY WEATHERED TO FRESH, HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE

TYPICAL SKEW ANGLE 90°

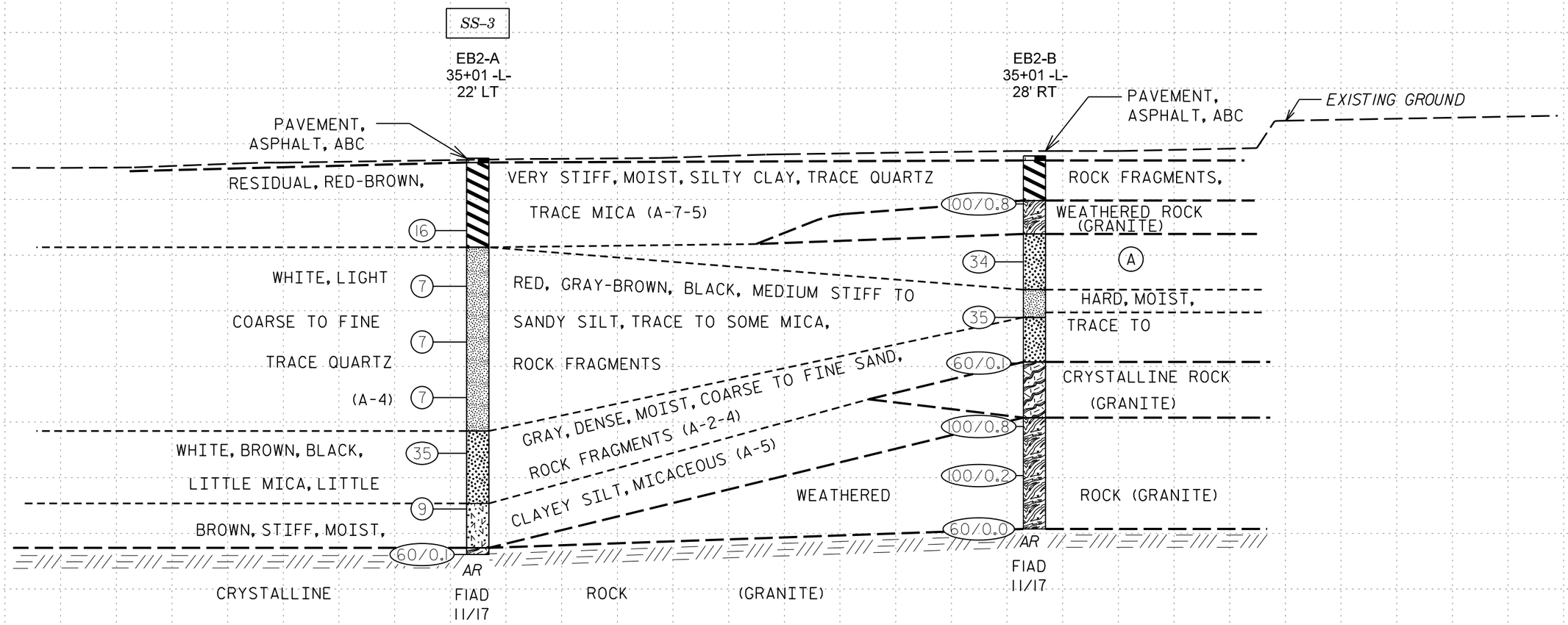
NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: y4810k ls tin (DATED 10/31/2017)

6/23/16

0 10 20 FEET	PROJ. REFERENCE NO.	SHEET NO.
	Y-4810K	8

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

℄



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

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 ls tin (DATED 10/31/2017)

Terracon
Consulting Engineers and Scientists

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-	**0 HR.** N/A
COLLAR ELEV. 774.7 ft	**TOTAL DEPTH** 93.8 ft	**NORTHING** 632,264	**EASTING** 1,516,297	**24 HR.** FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
775										774.7 PAVEMENT SURFACE	0.0
										774.2 **PAVEMENT** 0.1' ASPHALT AND 0.4' ABC STONE	0.5
	771.2	3.5								**RESIDUAL** LIGHT RED-BROWN, BROWN AND GRAY, CLAYEY COARSE TO FINE SAND, TRACE ROCK FRAGMENTS, LITTLE TO SOME MICA	
770			5	5	6	11		M			
	766.2	8.5									
765			5	5	7	12		M			
	761.2	13.5									
760			4	5	6	11	SS-1	M			
										759.2	15.5
	756.2	18.5								LIGHT RED, BROWN, GRAY, AND WHITE, COARSE TO FINE SANDY SILT, TRACE TO SOME ROCK FRAGMENTS, LITTLE MICA	
755			4	5	7	12		M			
	751.2	23.5									
750			3	5	6	11		M			
	746.2	28.5									
745			4	5	6	11		M			
	741.2	33.5									
740			3	5	7	12		M			
	736.2	38.5									
735			3	5	7	12		M			
	731.2	43.5									
730			4	5	8	13		W			
	726.2	48.5									
725			4	6	8	14		W			
	721.2	53.5									
720			5	6	7	13		W			
	716.2	58.5									
715			10	8	8	16		W			
	711.2	63.5									
710			5	6	8	14		W			
	706.2	68.5									
705			5	7	10	17		W			
	701.2	73.5									
700			8	10	11	21		W			
										697.7	77.0
	696.2	78.5									
695			16	26	34	60		W			

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

Terracon
Consulting Engineers and Scientists

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- | 0 HR. N/A
COLLAR ELEV. 774.7 ft | TOTAL DEPTH 93.8 ft | NORTHING 632,264 | EASTING 1,516,297 | 24 HR. FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
695						Match Line				WHITE, BROWN AND LIGHT RED, SILTY COARSE TO FINE SAND, SOME ROCK FRAGMENTS, TRACE MICA *(continued)*	
	691.2	83.5	100/0.5			100/0.5				691.2	83.5
690										**WEATHERED ROCK** (BROWN, GRAY AND WHITE, GRANITE)	
	686.2	88.5	100/0.3			100/0.3					
685											
	681.2	93.5	100/0.3			100/0.3				680.9	93.8
										Boring Terminated at Elevation 680.9 ft IN WEATHERED ROCK (GRANITE)	

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

Terracon
Consulting Engineers and Scientists

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-B	**STATION** 30+23	**OFFSET** 28 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 773.9 ft	**TOTAL DEPTH** 89.0 ft	**NORTHING** 632,215	**EASTING** 1,516,309	**24 HR.** 16.2
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	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
775										
										773.9 PAVEMENT SURFACE 0.0
										773.4 **PAVEMENT** 0.5
										0.1' ASPHALT AND 0.4' ABC STONE
										RESIDUAL
770	770.5	3.4	5	6	7	13		M		WHITE, RED-BROWN, GRAY, LIGHT RED, AND BROWN, COARSE TO FINE SANDY SILT, COARSE SANDY LAYERS, TRACE TO SOME MICA, TRACE TO SOME ROCK FRAGMENTS
765	765.5	8.4	4	6	6	12		M		
760	760.5	13.4	5	5	7	12		M		
755	755.5	18.4	5	6	8	14		M		
750	750.5	23.4	4	6	7	13		M		
745	745.5	28.4	4	5	7	12		W		
740	740.5	33.4	7	6	7	13		W		
735	735.5	38.4	4	5	7	12		W		
730	730.5	43.4	4	5	5	10		W		
725	725.5	48.4	4	5	6	11		W		
720	720.5	53.4	5	7	9	16		W		
715	715.5	58.4	10	11	12	23		W		
										711.9 62.0
710	710.5	63.4	20	16	15	31		W		GRAY, LIGHT RED, BROWN, AND WHITE, SILTY COARSE TO FINE SAND, LITTLE MICA, SOME ROCK FRAGMENTS
705	705.5	68.4	14	17	22	39		W		
700	700.5	73.4	18	24	33	57		W		
										696.9 77.0
695	695.5	78.4								

Terracon
Consulting Engineers and Scientists

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-B | STATION 30+23 | OFFSET 28 ft RT | ALIGNMENT -L- | 0 HR. N/A
COLLAR ELEV. 773.9 ft | TOTAL DEPTH 89.0 ft | NORTHING 632,215 | EASTING 1,516,309 | 24 HR. 16.2
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

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
695						Match Line				
			60	40/0.3		100/0.8				**WEATHERED ROCK**
										(BROWN AND LIGHT RED, GRANITE)
										(continued)
690	690.5	83.4	62	38/0.3		100/0.8				
685	685.5	88.4	80	20/0.1		100/0.6				
										684.9 89.0
										Boring Terminated at Elevation 684.9 ft IN WEATHERED ROCK (GRANITE)

Terracon
Consulting Engineers and Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

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-	**0 HR.** N/A
COLLAR ELEV. 774.0 ft	**TOTAL DEPTH** 103.6 ft	**NORTHING** 632,273	**EASTING** 1,516,418	**24 HR.** FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
775										774.0 GROUND SURFACE 0.0
	773.0	1.0								**RESIDUAL**
			1	3	3	6		M		RED-ORANGE AND TAN, SILTY CLAY,
770	770.5	3.5								TRACE MICA
			1	2	3	5		M		
	767.5	6.5								767.5 6.5
765	765.5	8.5	2	2	4	6		M		TAN-GRAY, WHITE AND PINK, FINE TO COARSE SANDY SILT, TRACE MICA
760	760.5	13.5	3	5	6	11		M		
755	755.5	18.5	3	5	5	10		M		
750	750.5	23.5	4	4	5	9		M		
745	745.5	28.5	3	5	7	12		M		
740	740.5	33.5	2	4	5	9		M		
735	735.5	38.5	2	4	5	9		M		
730	730.5	43.5	3	3	6	9		M		
725	725.5	48.5	3	4	6	10		M		
720	720.5	53.5	4	7	9	16		M		
715	715.5	58.5	5	7	11	18		M		
710	710.5	63.5	7	11	16	27		M		
705	705.5	68.5	12	17	22	39		M		
700	700.5	73.5	21	30	36	66		M		
695	695.5	78.5								

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

Terracon
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GEOTECHNICAL BORING REPORT
BORE LOG

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- | 0 HR. N/A
COLLAR ELEV. 774.0 ft | TOTAL DEPTH 103.6 ft | NORTHING 632,273 | EASTING 1,516,418 | 24 HR. FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
695						Match Line				
			26	45	55	100/1.0		M		694.5 79.5
690	690.5	83.5	26	48	52/0.4	100/0.9				**WEATHERED ROCK** (TAN-GRAY, WHITE AND PINK GRANITE)
685	685.5	88.5	100/0.2			100/0.2				
680	680.5	93.5	100/0.4			100/0.4				
675	675.5	98.5	100/0.2			100/0.2				
	670.5	103.5	60/0.1			60/0.1				670.5 103.5 670.4 103.6 **CRYSTALLINE ROCK** (GRAY, BLACK AND WHITE GRANITE) Boring Terminated by SPT REFUSAL at Elevation 670.4 ft IN CRYSTALLINE ROCK (GRANITE)

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

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Consulting Engineers and Scientists

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-	**0 HR.** FIAD
COLLAR ELEV. 773.7 ft	**TOTAL DEPTH** 78.3 ft	**NORTHING** 632,248	**EASTING** 1,516,418	**24 HR.** FIAD
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	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
775											
										773.7 GROUND SURFACE	0.0
										773.2 **ARTIFICIAL FILL** 0.5' GRAVEL	0.5
770	770.4	3.3	6	8	8	16		M		**RESIDUAL** ORANGE-TAN, SILTY CLAY, TRACE ROCK FRAGMENTS, TRACE MICA	
765	765.4	8.3	5	5	6	11		M		763.7	10.0
760	760.4	13.3	4	5	6	11		M		ORANGE-TAN, TAN-ORANGE, AND WHITE, SANDY SILT, SOME ROCK FRAGMENTS, TRACE TO SOME MICA	
755	755.4	18.3	5	6	9	15		M			
750	750.4	23.3	4	6	8	14		M			
745	745.4	28.3	2	4	7	11		M			
740	740.4	33.3	3	5	8	13		M			
735	735.4	38.3	2	4	6	10		M			
730	730.4	43.3	4	10	14	24		M			
725	725.4	48.3	4	6	9	15		W			
720	720.4	53.3	2	5	8	13		M			
715	715.4	58.3	1	5	8	13		M			
710	710.4	63.3	3	8	11	19		M			
705	705.4	68.3	20	17	19	36		M			
700	700.4	73.3	7	22	35	57		M			
										695.4	78.3

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

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Consulting Engineers and Scientists

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- | 0 HR. FIAD
COLLAR ELEV. 773.7 ft | TOTAL DEPTH 78.3 ft | NORTHING 632,248 | EASTING 1,516,418 | 24 HR. FIAD
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

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
695						Match Line				Boring Terminated at Elevation 695.4 ft IN RESIDUAL SANDY SILT	

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

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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. B2-A	**STATION** 32+62	**OFFSET** 17 ft LT	**ALIGNMENT** -L-	**0 HR.** 35.0
COLLAR ELEV. 780.6 ft	**TOTAL DEPTH** 57.4 ft	**NORTHING** 632,318	**EASTING** 1,516,529	**24 HR.** FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
785										
780										780.6 CONCRETE SLAB 0.0
										780.1 **CONCRETE SLAB** 0.5
										0.5' CONCRETE
	776.5	4.1	4	3	3	6		M		**RESIDUAL** ORANGE, SANDY SILT, TRACE MICA
775										
	771.5	9.1	100/0.4			100/0.4				773.6 7.0
770										**WEATHERED ROCK** (WHITE AND GRAY, GRANITE)
	766.5	14.1								
765			39	30	70/0.4	100/0.9				764.6 16.0
	761.5	19.1								**RESIDUAL** WHITE AND GRAY, SANDY SILT, TRACE MICA
760			8	6	5	11		M		
	756.5	24.1								
755			14	7	7	14		M		
	751.5	29.1								
750			20	35	14	49		D		
	746.5	34.1							▽	746.0 34.6
			22	35	65/0.4	100/0.9				**WEATHERED ROCK** (WHITE AND GRAY, GRANITE)
745	741.5	39.1								
			66	34/0.2		100/0.7				737.6 43.0
740										**RESIDUAL** WHITE AND GRAY, SILTY COARSE SAND, TRACE MICA
	736.5	44.1								
735			14	16	8	24		M		
	731.6	49.0								
730			4	6	10	16		M		
	726.6	54.0								
725			29	52	48/0.1	100/0.6				725.6 55.0 **WEATHERED ROCK** (WHITE AND GRAY, GRANITE) 723.2 57.4
										Boring Terminated BY AUGER REFUSAL at Elevation 723.2 ft ON CRYSTALLINE ROCK (GRANITE)

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GEOTECHNICAL BORING REPORT
BORE LOG

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-	**0 HR.** N/A
COLLAR ELEV. 781.5 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 632,280	**EASTING** 1,516,536	**24 HR.** 36.2
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
785											
										781.5	0.0
780	780.5	1.0								CONCRETE SLAB	
			2	2	3	5		M		780.8	0.7
	778.0	3.5								**CONCRETE SLAB**	
			3	2	4	6		M		CONCRETE 0.7'	
775										**RESIDUAL**	
										RED-ORANGE, SILTY CLAY, TRACE MICA	
	773.0	8.5								775.5	6.0
			2	3	3	6		M		TAN-GRAY AND WHITE, FINE TO COARSE SANDY SILT, TRACE MICA	
770											
	768.0	13.5									
			3	4	4	8		M			
765											
	763.0	18.5									
			4	5	7	12		M			
760											
	758.0	23.5									
			5	9	8	17		M			
755											
	753.0	28.5									
			4	5	7	12		M			
750											
	748.0	33.5									
			4	5	6	11		M			
745								▼			
	743.0	38.5									
			3	5	6	11		M			
740											
	738.0	43.5									
			4	6	9	15		M			
735											
	733.0	48.5									
			7	10	12	22		M			
730											
	728.0	53.5									
			8	11	14	25		M			
725											
	723.0	58.5									
			19	20	18	38		M			
720										720.5	61.0
	718.0	63.5								**WEATHERED ROCK**	
			60	40/0.1		100/0.6				(TAN-GRAY AND WHITE, GRANITE)	
715											
	713.0	68.5									
			100/0.2			100/0.2					
710											
	708.0	73.5									
			100/0.2			100/0.2					
705											

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

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GEOTECHNICAL BORING REPORT
BORE LOG

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- | 0 HR. N/A
COLLAR ELEV. 781.5 ft | TOTAL DEPTH 90.5 ft | NORTHING 632,280 | EASTING 1,516,536 | 24 HR. 36.2
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
705						Match Line					
	703.0	78.5								**WEATHERED ROCK**	
			100/0.2			100/0.2				(TAN-GRAY AND WHITE, GRANITE)	
700										*(continued)*	
	698.0	83.5								698.0	83.5
			60/0.0			60/0.0				**CRYSTALLINE ROCK**	
695										(GRAY, BLACK AND WHITE, GRANITE)	
										691.0	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

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GEOTECHNICAL BORING REPORT
CORE LOG

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-	**0 HR.** N/A
COLLAR ELEV. 781.5 ft	**TOTAL DEPTH** 90.5 ft	**NORTHING** 632,280	**EASTING** 1,516,536	**24 HR.** 36.2
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			

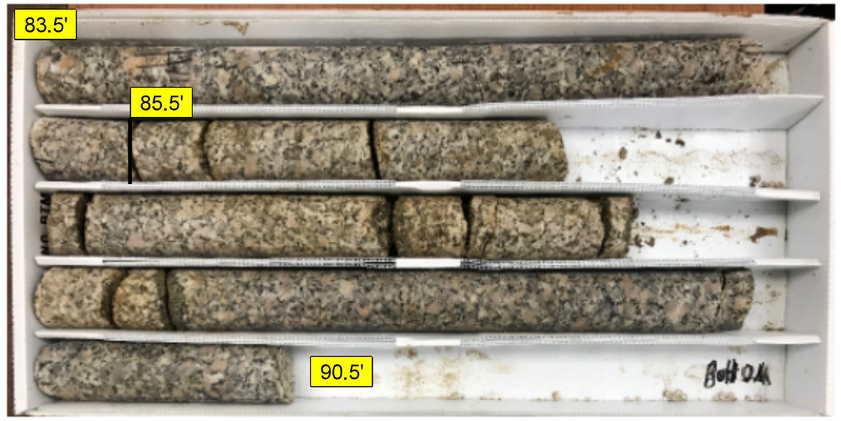
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
698											Begin Coring @ 83.5 ft
	698.0	83.5	2.0	2:40/1.0	(2.0)	(2.0)		(7.0)	(5.7)		698.0 **CRYSTALLINE ROCK** 83.5
	696.0	85.5		1:30/1.0	100%	100%		100%	81%		GRAY, BLACK AND WHITE, VERY SLIGHT TO FRESH,
695			5.0	1:30/1.0	(5.0)	(3.7)					HARD TO VERY HARD, VERY CLOSE TO MODERATELY CLOSE
				1:16/1.0	100%	74%					FRACTURE SPACING, GRANITE
				1:05/1.0							12 JOINTS AT 10º-20º
				1:17/1.0							GSI= 80-90
	691.0	90.5		1:32/1.0							691.0 90.5
											Boring Terminated at Elevation 691.0 ft IN CRYSTALLINE ROCK (GRANITE)

CORE PHOTOGRAPHS

PROJECT REFERENCE NO.	SHEET NO.
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



0 1 2
FEET

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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-	**0 HR.** N/A
COLLAR ELEV. 779.6 ft	**TOTAL DEPTH** 59.9 ft	**NORTHING** 632,350	**EASTING** 1,516,650	**24 HR.** 35.0
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
780										779.6 PAVEMENT SURFACE 0.0
										779.1 **PAVEMENT** 0.5 0.15' CONCRETE AND 0.35' ASPHALT
	776.4	3.2								**RESIDUAL**
775			2	3	3	6		W		RED-BROWN, SILTY CLAY, TRACE QUARTZ FRAGMENTS, TRACE MICA
										773.6 6.0
	771.4	8.2								RED-BROWN, WHITE, BROWN, AND GRAY, SILTY COARSE TO FINE SAND, LITTLE TO SOME MICA, CLAY AND SAND LAYERS, TRACE TO LITTLE QUARTZ FRAGMENTS
770			4	5	5	10		M		
	766.4	13.2								
765			3	4	5	9		M		
	761.4	18.2								
760			4	4	5	9		M		
	756.4	23.2								
755			5	5	6	11		M		
	751.4	28.2								
750			4	5	6	11	SS-2	M		
	746.4	33.2								
745			4	6	7	13				
	741.4	38.2								
740			5	6	8	14		W		
	736.4	43.2								737.6 42.0
			60/0.1			60/0.1				**CRYSTALLINE ROCK**
735										735.4 (WHITE, BLACK, AND GRAY, GRANITE) 44.2
										CRYSTALLINE ROCK
730										(WHITE, BLACK, AND GRAY, GRANITE)
725										
720										719.7 59.9
										Boring Terminated at Elevation 719.7 ft IN CRYSTALLINE ROCK (GRANITE)

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

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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-	**0 HR.** N/A
COLLAR ELEV. 779.6 ft	**TOTAL DEPTH** 59.9 ft	**NORTHING** 632,350	**EASTING** 1,516,650	**24 HR.** 35.0
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	
CORE SIZE NQ3	**TOTAL RUN** 15.7 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft) / DEPTH (ft)
735.4											Begin Coring @ 44.2 ft
735	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%		735.4 **CRYSTALLINE ROCK** 44.2 WHITE, GRAY, AND BLACK, VERY SLIGHTLY WEATHERED TO FRESH, HARD, MODERATELY CLOSE FRACTURE SPACING, GRANITE 10 JOINTS AT 10º-20º GSI=85-95 LOST CIRCULATION IN FRACTURED ROCK SEAM 51.6' - 51.8'
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%					
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									719.7 59.9 Boring Terminated at Elevation 719.7 ft IN CRYSTALLINE ROCK (GRANITE)

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

CORE PHOTOGRAPHS

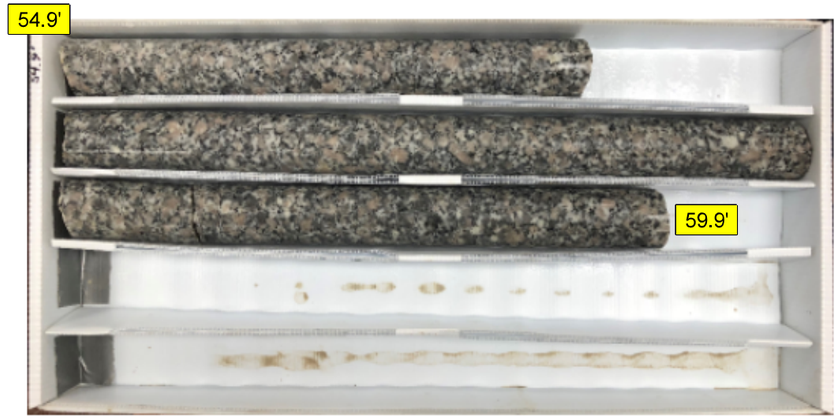
PROJECT REFERENCE NO.	SHEET NO.
Y–4810K	18

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

0 1 2
FEET

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



0 1 2
FEET

Terracon
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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. B3-B	**STATION** 33+87	**OFFSET** 23 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 778.9 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 632,311	**EASTING** 1,516,660	**24 HR.** FIAD
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 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
780										
										778.9 PAVEMENT SURFACE 0.0
										778.4 **PAVEMENT** 0.5
										0.5' CONCRETE
										RESIDUAL
775	775.5	3.4	2	1	3	4		M		ORANGE, AND TAN, SILTY CLAY, SOME MICA, TRACE ROCK FRAGMENTS
770	770.5	8.4	6	7	9	16		M		768.9 10.0
										WHITE AND TAN, SILTY SAND, SOME MICA, SOME ROCK FRAGMENTS
765	765.5	13.4	4	4	5	9		D		
760	760.5	18.4	3	4	9	13		D		
										758.2 20.7
										WEATHERED ROCK
755	755.5	23.4	20	80/0.3		100/0.8				(WHITE-TAN, GRANITE)
750	750.5	28.4	100/0.3			100/0.3				747.9 31.0
										RESIDUAL
745	745.5	33.4	15	16	28	44		D		WHITE-TAN, SILTY SAND, SOME MICA, SOME ANUGLAR ROCK FRAGMENTS
740	740.5	38.4	100/0.3			100/0.3				740.5 38.4
										WEATHERED ROCK
										738.9 (WHITE-TAN, GRANITE) 40.0
										Boring Terminated BY AUGER REFUSAL at Elevation 738.9 ft ON CRYSTALLINE ROCK (GRANITE)
										0 HR. WATER LEVEL CAVED DRY AT 40.0 FEET

Terracon
Consulting Engineers and Scientists

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. EB2-A	**STATION** 35+01	**OFFSET** 22 ft LT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 778.7 ft	**TOTAL DEPTH** 35.6 ft	**NORTHING** 632,383	**EASTING** 1,516,759	**24 HR.** FIAD
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	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										778.7	
										PAVEMENT SURFACE	0.0
										778.3	0.4
										PAVEMENT 0.2' ASPHALT AND 0.2' ABC STONE	
										RESIDUAL RED-BROWN, SILTY CLAY, TRACE QUARTZ FRAGMENTS, TRACE MICA	
775											
	773.2	5.5	7	8	8	16	SS-3	19%			
770										770.7	8.0
	768.2	10.5	3	3	4	7		M		WHITE, LIGHT RED, AND GRAY-BROWN, COARSE TO FINE SANDY SILT, TRACE TO LITTLE MICA, TRACE QUARTZ FRAGMENTS	
765											
	763.2	15.5	3	3	4	7		M			
760											
	758.2	20.5	3	3	4	7		M			
755										754.2	24.5
	753.2	25.5	24	17	18	35		M		WHITE, BROWN, AND BLACK, SILTY COARSE TO FINE SAND, LITTLE ROCK FRAGMENTS, TRACE TO LITTLE MICA	
750											
	748.2	30.5	23	6	3	9		M		747.7	31.0
745										BROWN, CLAYEY SILT, MICACEOUS	
	743.2	35.5	60/0.1			60/0.1				743.7	35.0
										743.1	35.6
										CRYSTALLINE ROCK (WHITE, GRAY, AND BROWN, GRANITE)	
										Boring Terminated by SPT REFUSAL at Elevation 743.1 ft IN CRYSTALLINE ROCK (GRANITE)	
										0 HR. WATER LEVEL CAVED DRY AT 20.1 FEET	

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

Terracon
Consulting Engineers and Scientists

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. EB2-B	**STATION** 35+01	**OFFSET** 28 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 778.9 ft	**TOTAL DEPTH** 33.5 ft	**NORTHING** 632,334	**EASTING** 1,516,772	**24 HR.** FIAD
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	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										778.9	
										PAVEMENT SURFACE	0.0
										778.5	0.4
										PAVEMENT 0.2' ASPHALT AND 0.2' ABC STONE	
										RESIDUAL RED-BROWN, SILTY CLAY, TRACE MICA, TRACE QUARTZ FRAGMENTS	
775	775.4	3.5	50	50/0.3		100/0.8				774.9	4.0
										WEATHERED ROCK (WHITE, GRAY, AND BLACK, GRANITE)	
770	770.4	8.5	37	16	18	34		D		771.9	7.0
										RESIDUAL WHITE, GRAY, AND BLACK, SILTY COARSE TO FINE SAND, TRACE MICA, LITTLE ROCK FRAGMENTS	
765	765.4	13.5	2	3	32	35		M		766.9	12.0
										WHITE AND BROWN, COARSE TO FINE SANDY SILT, SOME MICA, TRACE ROCK FRAGMENTS	
760	760.4	18.5	60/0.1			60/0.1				764.4	14.5
										WHITE, GRAY, AND BLACK, SILTY COARSE TO FINE SAND, LITTLE ROCK FRAGMENTS, TRACE TO LITTLE MICA	
755	755.4	23.5	40	60/0.3		100/0.8				760.4	18.5
										CRYSTALLINE ROCK (WHITE, BLACK, AND BROWN, GRANITE)	
750	750.4	28.5	100/0.2			100/0.2				755.4	23.5
										WEATHERED ROCK (WHITE, BLACK, AND BROWN, GRANITE)	
	745.4	33.5	60/0.0			60/0.0				745.4	33.5
										Boring Terminated by SPT REFUSAL at Elevation 745.4 ft ON CRYSTALLINE ROCK (GRANITE)	
										0 HR. WATER LEVEL CAVED DRY AT 13.9 FEET	

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

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

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (ϕ)	Effective Cohesion (psf)	Effective 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	N/D	N/D	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

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

REFERENCE: Y-4810K

PROJECT: 40235

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	Y-4810K	1	7

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *CABARRUS*

PROJECT DESCRIPTION *SR 1625 (ROGERS LAKE ROAD) GRADE SEPARATION OVER NCRR/NS RAILROAD (CROSSING NO. 724408Y)*

SITE DESCRIPTION *RETAINING WALL ON SR 1625 (ROGERS LAKE ROAD) FROM STA. 38+50 -L- TO STA. 40+50 -L-*

CONTENTS

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.

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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.

PERSONNEL

SCHLEMM, T. S.

TURNAGE, J. R.

ROUSH, J. K.

WERITZ, M. A.

BUNCH, C. M.

INVESTIGATED BY *TERRACON CONSULTANTS*

DRAWN BY *FIELDS, W. D.*

CHECKED BY *RIGGS, Jr., A. F.*

SUBMITTED BY *TERRACON CONSULTANTS*

DATE *DECEMBER 2017*

Prepared in the Office of:

Terracon

Consulting Engineers and Scientists

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RALEIGH, NORTH CAROLINA 27604
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NC REGISTERED GEOLOGIC FIRM: C-367

NORTH CAROLINA PROFESSIONAL SEAL 014155 ENGINEER ABNER F. RIGGS, JR.

DocuSigned by:

Abner F. Riggs, Jr. 1/18/2018

5228073BBA4F482... SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
Y-4810K	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

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.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, CPT, DMT, VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

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
FRAGS. - 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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50 (TER346)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3¼" HSA

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN 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 WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
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 ALSO AN EXAMPLE.

ROCK HARDNESS

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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
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 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 FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
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

BEDDING

TERM	THICKNESS
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

INDURATION

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.

TERMS AND DEFINITIONS

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 (RQD) - 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: BL-16, STA. 42+89.73 -BL-
N-632,336.28, E-1,517,071.55
ELEVATION: 781.49 FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

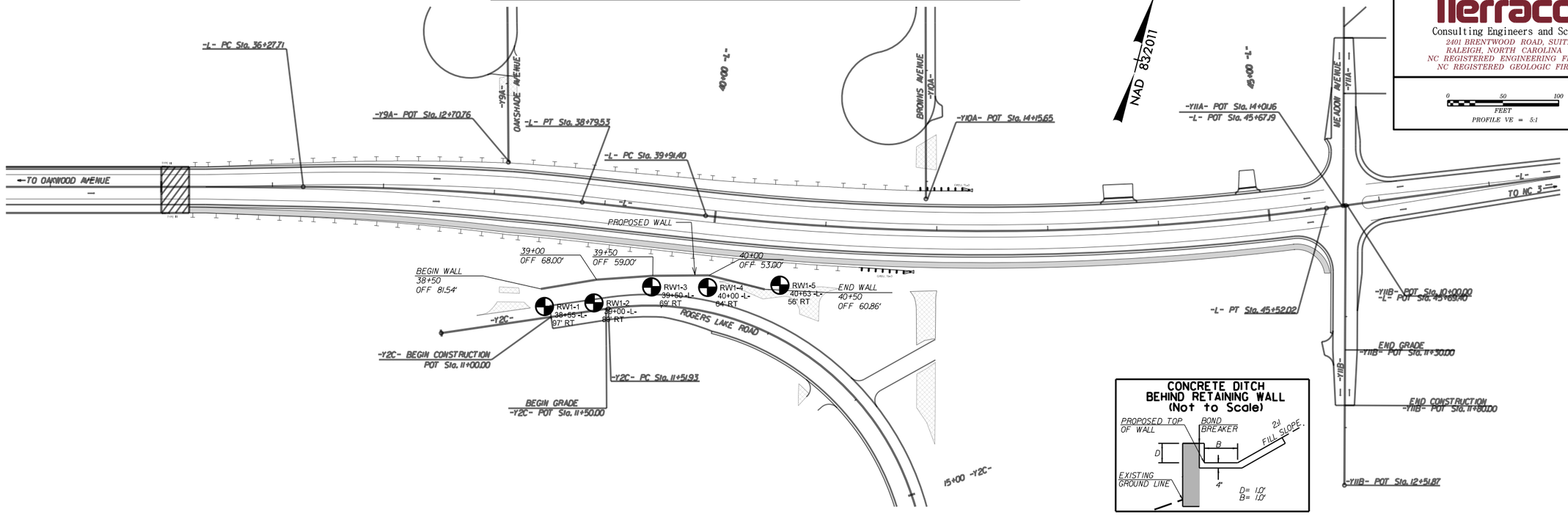
DATE: 8-15-14

-PLAN OF RETAINING WALL-

PROJECT REFERENCE NO.	SHEET NO.
Y-4810K	3

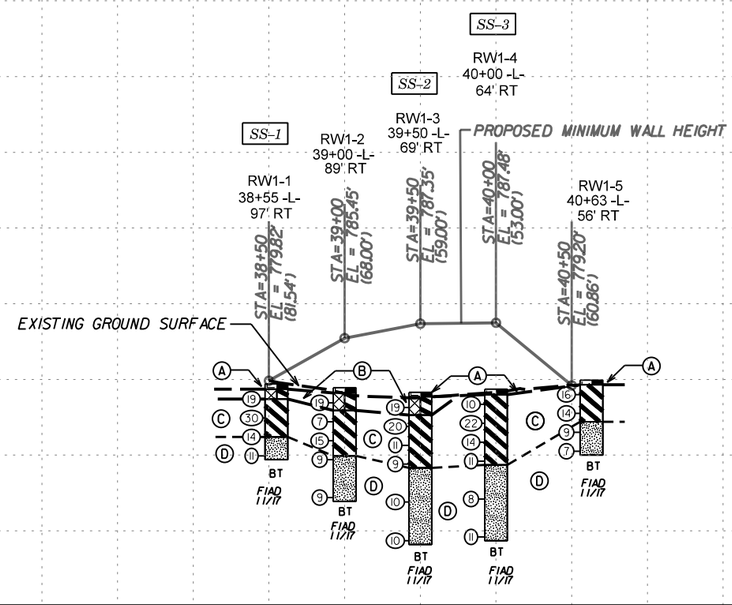
Terracon
Consulting Engineers and Scientists
2401 BRENTWOOD ROAD, SUITE 107
RALEIGH, NORTH CAROLINA 27604
NC REGISTERED ENGINEERING FIRM: P-0869
NC REGISTERED GEOLOGIC FIRM: C-367

0 50 100
FEET
PROFILE VE = 5:1



CONCRETE DITCH BEHIND RETAINING WALL (Not to Scale)

-RETAINING WALL-



Ⓐ PAVEMENT, ASPHALT

Ⓑ ROADWAY EMBANKMENT, BROWN AND LIGHT BROWN, VERY STIFF, MOIST, SILTY CLAY, TRACE TO LITTLE ROCK FRAGMENTS (A-7-5)

Ⓒ RESIDUAL, RED-BROWN AND ORANGE, MEDIUM STIFF TO VERY STIFF, MOIST, SILTY CLAY, TRACE TO LITTLE MICA, TRACE ROCK FRAGMENTS (A-7-5)

Ⓓ WHITE, GRAY, PINK, ORANGE, AND RED-BROWN, MEDIUM STIFF TO STIFF, MOIST, COARSE TO FINE SANDY SILT, TRACE ROCK FRAGMENTS, TRACE TO SOME MICA (A-4)

NOTE: THE WALL ENVELOPE DOES NOT ACCURATELY DEPICT THE ACTUAL FACE OF THE WALL

Terracon
Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40235.1.46	**TIP** Y-4810K	**COUNTY** CABARRUS	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SR 1625 (ROGERS LAKE RD) GRADE SEPARATION OVER NCRR/NS RAILROAD				**GROUND WTR (ft)**
BORING NO. RW1-1	**STATION** 38+55	**OFFSET** 97 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 779.4 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 632,343	**EASTING** 1,517,125	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/22/17	**COMP. DATE** 11/22/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										779.4 PAVEMENT SURFACE	0.0
	778.4	1.0	6	11	8	19 30		M		778.7 **PAVEMENT** ASPHALT 0.7'	0.7
775	775.9	3.5	10	14	16		SS-1	23%		777.4 **ROADWAY EMBANKMENT** BROWN AND LIGHT BROWN, SILTY CLAY, TRACE ROCK FRAGMENTS	2.0
	773.4	6.0	7	7	7	14		M		772.4 **RESIDUAL** RED-BROWN AND ORANGE, SILTY CLAY, TRACE ROCK FRAGMENTS, TRACE MICA	7.0
770	770.9	8.5	5	5	6	11		M		769.4 WHITE, PINK, AND BROWN, COARSE TO FINE SANDY SILT, TRACE TO LITTLE MICA, TRACE ROCK FRAGMENTS	10.0
										Boring Terminated at Elevation 769.4 ft RESIDUAL SANDY SILT	
										0 Hr. Water Level Caved Dry at 5.0'	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40235.1.46	**TIP** Y-4810K	**COUNTY** CABARRUS	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SR 1625 (ROGERS LAKE RD) GRADE SEPARATION OVER NCRR/NS RAILROAD				**GROUND WTR (ft)**
BORING NO. RW1-2	**STATION** 39+00	**OFFSET** 89 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 778.9 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 632,357	**EASTING** 1,517,167	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/22/17	**COMP. DATE** 11/22/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										778.9 PAVEMENT SURFACE	0.0
	777.9	1.0	5	7	12	19		M		778.2 **PAVEMENT** ASPHALT 0.7'	0.7
775	775.4	3.5	3	3	4	7		M		775.9 **ROADWAY EMBANKMENT** RED-BROWN, COARSE TO FINE SILTY CLAY, TRACE TO LITTLE ROCK FRAGMENTS	3.0
	772.9	6.0	6	7	8	15		M		**RESIDUAL** RED-BROWN AND ORANGE, SILTY CLAY, TRACE MICA, TRACE ROCK FRAGMENTS	
770	770.4	8.5	4	4	5	9		M		769.9 WHITE, GRAY, AND PINK, COARSE TO FINE SANDY SILT, TRACE ROCK FRAGMENTS, TRACE TO SOME MICA	9.0
765	765.4	13.5	4	5	4	9		M		763.9	15.0
										Boring Terminated at Elevation 763.9 ft RESIDUAL SANDY SILT	
										0 Hr. Water Level Caved Dry at 8.5'	

Terracon
Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40235.1.46	**TIP** Y-4810K	**COUNTY** CABARRUS	**GEOLOGIST** SCHLEMM, T.S.
SITE DESCRIPTION SR 1625 (ROGERS LAKE RD) GRADE SEPARATION OVER NCRR/NS RAILROAD			**GROUND WTR (ft)**
BORING NO. RW1-3	**STATION** 39+50	**OFFSET** 69 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 778.3 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 632,384	**EASTING** 1,517,214	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/22/17	**COMP. DATE** 11/22/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
	777.3	1.0								778.3 PAVEMENT SURFACE	0.0
			6	11	8	19		M		777.7 **PAVEMENT** ASPHALT 0.6'	0.6
775	774.8	3.5								775.3 **ROADWAY EMBANKMENT**	3.0
			6	8	12	20		M		RED-BROWN, SILTY CLAY, TRACE TO LITTLE ROCK FRAGMENTS, TRACE MICA	
	772.3	6.0								**RESIDUAL**	
			4	5	6	11		M		RED-BROWN AND ORANGE, SILTY CLAY, TRACE ROCK FRAGMENTS, TRACE MICA	
770	769.8	8.5								768.3	10.0
			4	4	5	9	SS-2	20%		WHITE, PINK, AND RED-BROWN, COARSE TO FINE SANDY SILT, TRACE TO LITTLE MICA	
765	764.8	13.5									
			4	5	5	10		M			
760	759.7	18.6									
			4	5	5	10		M		758.2	20.1

Boring Terminated at Elevation 758.2 ft
RESIDUAL SANDY SILT

0 Hr. Water Level Caved Dry at 11.0'

NCDOT BORE SINGLE Y4810K_GEO_RWAL.GPJ NC_DOT.GDT 12/21/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40235.1.46	**TIP** Y-4810K	**COUNTY** CABARRUS	**GEOLOGIST** SCHLEMM, T.S.
SITE DESCRIPTION SR 1625 (ROGERS LAKE RD) GRADE SEPARATION OVER NCRR/NS RAILROAD			**GROUND WTR (ft)**
BORING NO. RW1-4	**STATION** 40+00	**OFFSET** 64 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 778.7 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 632,396	**EASTING** 1,517,263	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/22/17	**COMP. DATE** 11/22/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
	777.7	1.0								778.7 PAVEMENT SURFACE	0.0
			6	5	5	10		M		778.0 **PAVEMENT** ASPHALT 0.7'	0.7
775	775.2	3.5								**RESIDUAL**	
			7	10	12	22	SS-3	23%		RED-BROWN AND ORANGE, SILTY CLAY, TRACE TO LITTLE MICA, TRACE ROCK FRAGMENTS	
	772.7	6.0									
			6	6	8	14		M			
770	770.2	8.5									
			5	5	6	11		M		768.7	10.0
										WHITE, PINK, AND GRAY, COARSE TO FINE SANDY SILT, LITTLE MICA, TRACE ROCK FRAGMENTS	
765	765.2	13.5									
			3	4	4	8		M			
760	760.2	18.5									
			4	5	6	11		M		758.7	20.0

Boring Terminated at Elevation 758.7 ft
RESIDUAL SANDY SILT

0 Hr. Water Level Caved Dry at 10.5'

NCDOT BORE SINGLE Y4810K_GEO_RWAL.GPJ NC_DOT.GDT 12/21/17

Terracon
Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 40235.1.46	**TIP** Y-4810K	**COUNTY** CABARRUS	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SR 1625 (ROGERS LAKE RD) GRADE SEPARATION OVER NCRR/NS RAILROAD				**GROUND WTR (ft)**
BORING NO. RW1-5	**STATION** 40+63	**OFFSET** 56 ft RT	**ALIGNMENT** -L-	**0 HR.** Caved
COLLAR ELEV. 779.9 ft	**TOTAL DEPTH** 9.9 ft	**NORTHING** 632,414	**EASTING** 1,517,326	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 90% 03/10/2017		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic
DRILLER TURNAGE, J.R.	**START DATE** 11/22/17	**COMP. DATE** 11/22/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										779.9 PAVEMENT SURFACE	0.0
	779.0	0.9	6	7	9	16		M		779.3 **PAVEMENT** ASPHALT 0.6'	0.6
	776.5	3.4	6	7	7	14		M		**RESIDUAL** RED-BROWN, SILTY CLAY, TRACE MICA, TRACE ROCK FRAGMENTS	
775	774.0	5.9	4	4	5	9		M		774.4 RED-BROWN, ORANGE, AND WHITE, COARSE TO FINE SANDY SILT, LITTLE MICA, TRACE ROCK FRAGMENTS, SOME CLAY LAYERS	5.5
770	771.5	8.4	3	3	4	7		M		770.0	9.9
										Boring Terminated at Elevation 770.0 ft RESIDUAL SANDY SILT	
										0 Hr. Water Level Caved Dry at 4.2'	

LABORATORY TESTING SUMMARY

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

DESCRIPTION: SR 1625 (Rogers Lake Road) Grade Separation over NCRR/NS Railroad

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (ϕ)	Effective Cohesion (psf)	Effective Friction (ϕ')
SS-1	-L-	38+55	97' RT	3.5-5.0	A-7-5 (21)	70	33	17.1	17.7	18.9	46.3	1	91	80	64	23.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-2	-L-	39+50	69' RT	8.5-10.0	A-7-5 (3)	53	16	28.9	29.9	23.6	17.6	3	86	70	40	19.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-3	-L-	40+00	64' RT	3.5-5.0	A-7-5 (16)	65	28	16.7	21.8	22.5	39.0	2	89	78	59	22.9	N/D	N/D	N/D	N/D	N/D	N/D

N/D - NOT DETERMINED

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number