REFERENCE: U-5813

PROJECT: 44385

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5813	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY RANDOLPH

PROJECT DESCRIPTION US 64 FROM THE ASHEBORO BYPASS TO EAST OF I-73/I-74/US 220

SITE DESCRIPTION BRIDGE NO. 171 OVER US 64 ON SR 1713 (ALBEMARLE ROAD)

CONTENTS

CAUTION NOTICE

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PERSONNEL

S. PAPKE

C. REYNOLDS

C. DRISCOLL

INVESTIGATED BY C. REYNOLDS

DRAWN BY C. REYNOLDS

CHECKED BY T. WELLS

SUBMITTED BY KLEINFELDER INC.

DATE MAY 2020

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
422 GALLIMORE DAIRY RD.
GREENSBORO, NC 27409
NC FIRM LICENSE NO. F-102

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells 5/22/2020
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SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
U-5813	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	50 MX													
#40	30 MX		50 MX											
#200	15 MX	25 MX	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	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	N/A
	DENSE	30 TO 50	
	VERY DENSE	> 50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 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 (CDB.)	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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q2

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 NOTES

ELEVATION: N/A FEET

NOTES:

NOTES:

FIAD: FILLED IMMEDIATELY AFTER DRILLING

BENCHMARKS:

BY9145 (705,517 FT N, 1,751,715 FT E) ELEVATION 878.02 FT

BL113 (705,712 FT N, 1,751,870 FT E) ELEVATION 877.26 FT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-5813	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	GOOD	FAIR	POOR	VERY POOR
Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

90			N/A	N/A
80				
70				
60				
50				
40				
30				
20				
10				
N/A	N/A			

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	GOOD	FAIR	POOR	VERY POOR
Very Rough, fresh unweathered surfaces	Rough, slightly weathered surfaces	Smooth, moderately weathered and altered surfaces	Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
70				
60	A			
50				
40	B	C	D	E
30				
20			F	
10		G	H	

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
U-5813	3

SITE PLAN

0 40 80

FEET

SKEW:
END BENT NO.1 - 44°-18'-35"
END BENT NO.2 - 40°-18'-54"

NC GRID
NAD 83 NA 2011

-BL- BL113
Sta=75+18.48 PINC
-BY11- Sta=10+64.06

-BY9- BY9145
Sta=183+31.34 PINC

-Y_SLIP-

EB2-A

EB2-B

EBI-A

EBI-B

BRIDGE NUMBER 171

SSMH
RIM = 865.14'
INV A = 851.85'
INV B = 851.83'

TOP=856.99'
INV (W)=853.84'

TOP=855.41'
INV (E)=852.48'
INV (W)=852.44'

INV=854.38'
8" CONC
HEAD WALL

INV=858.46'

TOP=864.01'
INV =859.99'

15" RCP

18" RCP

16" RCP

8" VCP

WNDEE ST (SR-1448) BST

HWY 49 UNHARRIE SCENIC RD BST

MTL

CONC

EIP

FLAG POLE

GR

DB 1888
PG 299

PROJECT REFERENCE NO.	SHEET NO.
U-5813	4

BRIDGE ON SR 1713 (ALBEMARLE ROAD) OVER US 64 PROFILE ALONG -Y- CENTERLINE

0 50 100
FEET
VE = 5

Ⓐ **RESIDUAL:**
DRY TO MOIST, SOFT TO HARD, TAN TO GRAY, FINE SANDY SILT (A-4) TO SILTY CLAY (A-7) WITH TRACE ROCK FRAGMENTS

Ⓑ **WEATHERED ROCK:**
TAN METASANDSTONE

Ⓒ **CRYSTALLINE ROCK:**
MODERATE WEATHERING, MODERATELY HARD TO HARD, TAN METASANDSTONE WITH CLOSE TO VERY CLOSE FRACTURE SPACING

Ⓓ **ROADWAY EMBANKMENT:**
MOIST, MEDIUM STIFF, ORANGE AND GRAY, COARSE TO FINE SANDY CLAY (A-6)

Ⓔ **ROADWAY EMBANKMENT:**
MOIST, MEDIUM DENSE, ORANGE AND GRAY, SILTY COARSE TO FINE SAND (A-2-4)

EBI-A
20+90
34' LT

EB2-A
22+80
16' LT

EXISTING GROUNDLINE

(4) 100/0.8 100/0.2 60/0.0
02/20
BT
REC: 98%
RQD: 51%
GSI: 40-50

(5) (21) (31) 60/0.1
BT
DRY
04/19

NOTES:
GROUNDLINE ALONG CENTERLINE TAKEN FROM ROADWAY PLANS RECEIVED ON MARCH 3, 2020.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

SKEW:
END BENT NO. 1: 44°-18'-35"
END BENT NO. 2: 40°-18'-54"

920 910 900 890 880 870 860 850 840 830 820

18+50 19+00 19+50 20+00 20+50 21+00 21+50 22+00 22+50 23+00 23+50 24+00 24+50 25+00

CROSS SECTION ALONG END BENT NO. 1 AT STA. 21+14.06

HORIZ. SCALE (FEET) 0 20 40

VE = 1

920 900 880 860 840 820 800

Ⓐ **RESIDUAL:**
DRY TO WET, SOFT TO MEDIUM STIFF, TAN, ORANGE, GRAY, AND BROWN, FINE SANDY SILT (A-4) TO CLAYEY SILT (A-5) TO SILTY CLAY (A-7) WITH TRACE ROCK FRAGMENTS

Ⓑ **WEATHERED ROCK:**
TAN METASANDSTONE

Ⓒ **ROADWAY EMBANKMENT:**
DRY, MEDIUM DENSE, BROWN, SILTY FINE SAND WITH TRACE GRAVEL (A-2-4)

Ⓓ **RESIDUAL:**
WET, MEDIUM DENSE, BROWN, SILTY FINE SAND (A-2-4)

EBI-A
20+90
34' LT

4 — 100/0.8 — 100/0.2 — 50/0.0
02/20
REC: 98%
RQD: 51%
GSI: 40-50
BT

EBI-B
22+00
64' RT

13 — 8 — 6 — 4 — 13 — 50/0.0 — 50/0.0
BT
FIAD
02/20

CRYSTALLINE ROCK:
MODERATE WEATHERING, MODERATELY HARD TO HARD, TAN METASANDSTONE WITH CLOSE TO VERY CLOSE FRACTURE SPACING

NOTES:

GROUNDLINE TAKEN FROM PROJECT TIN FILE U5813 LS TIN.TIN RECEIVED ON AUGUST 2, 2019. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROTECTED ONTO THE CROSS SECTION

SKEW: 44°-18'-35"

40 20 0 20 40 60 80 100 120 140

CROSS SECTION ALONG END BENT NO. 2 AT STA. 22+81.96

HORIZ. SCALE (FEET) 0 20 40

VE = 1

920 900 880 860 840 820 800

Ⓐ **ROADWAY EMBANKMENT:**
DRY TO MOIST, MEDIUM STIFF, ORANGE AND GRAY TO TAN, COARSE TO FINE SANDY CLAY (A-6) TO COARSE TO FINE SANDY SILT (A-4)

Ⓑ **ROADWAY EMBANKMENT:**
MOIST, MEDIUM DENSE, ORANGE AND GRAY, CLAYEY SILTY COARSE TO FINE SAND (A-2-4)

Ⓒ **RESIDUAL:**
DRY, VERY DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

Ⓓ **RESIDUAL:**
MOIST, STIFF TO HARD, GRAY TO TAN, COARSE TO FINE SANDY SILT (A-4) TO HIGHLY PLASTIC SILTY CLAY (A-7)

Ⓔ **WEATHERED ROCK:**
TAN METASANDSTONE

EB2-A
22+80
16' LT

5 — 2 — 3 — 50/0.0
BT
DRY
04/19

CRYSTALLINE ROCK:
GRAY METAMUDSTONE

EB2-B
23+50
64' RT

6 — 5 — 75 — 11 — 16 — 50/0.0 — 50/0.0
BT
FIAD
02/20

CRYSTALLINE ROCK:
METASANDSTONE

NOTES:

GROUNDLINE TAKEN FROM PROJECT TIN FILE U5813 LS TIN.TIN RECEIVED ON AUGUST 2, 2019. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROTECTED ONTO THE CROSS SECTION

SKEW: 40°-18'-54"

40 20 0 20 40 60 80 100 120

780

PROJECT REFERENCE NO. U-5813

SHEET NO. 5

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 20+90	**OFFSET** 34 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 861.6 ft	**TOTAL DEPTH** 20.8 ft	**NORTHING** 705,594	**EASTING** 1,751,587	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S Augers/Core	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/24/20	**COMP. DATE** 02/25/20	**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)
865											
	861.6	0.0	2	2	2	4		D		861.6 GROUND SURFACE	0.0
860										**RESIDUAL** Tan, Fine Sandy SILT with Trace Rock Fragments (A-4)	
	858.1	3.5	17	22	78/0.3					859.1	2.5
855						100/0.8				**WEATHERED ROCK** Tan METASANDSTONE	
	853.1	8.5	100/0.2			100/0.2					
850	850.2	11.4	60/0.0			60/0.0				850.2 **CRYSTALLINE ROCK** Tan METASANDSTONE	11.4
845											
										840.8 Boring Terminated at Elevation 840.8 ft in CRYSTALLINE ROCK: METASANDSTONE	20.8

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 20+90	**OFFSET** 34 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 861.6 ft	**TOTAL DEPTH** 20.8 ft	**NORTHING** 705,594	**EASTING** 1,751,587	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S Augers/Core	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/24/20	**COMP. DATE** 02/25/20	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 9.4 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)
850.2 850											Begin Coring @ 11.4 ft	
	850.2	11.4	4.4	*N=60/0.0* 1:30/0.4 3:05/1.0 2:55/1.0 3:45/1.0 4:15/1.0	(4.2) 95%	(2.7) 61%		(9.2) 98%	(4.8) 51%		850.2 **CRYSTALLINE ROCK** Moderate Weathering, Moderately Hard to Hard, Tan METASANDSTONE with Close to Very Close Fracture Spacing GSI: 40-50 Vertical fracture from 14.4 to 15.4 ft and 16.8 to 17.6 ft	11.4
845	845.8	15.8	5.0	3:30/1.0 2:55/1.0 3:10/1.0 2:45/1.0 3:50/1.0	(5.0) 100%	(2.1) 42%						
	840.8	20.8									840.8 Boring Terminated at Elevation 840.8 ft in CRYSTALLINE ROCK: METASANDSTONE	20.8

NCDOT BORE DOUBLE U5813_GEO_BRDG0171_GINT.GPJ NC_DOT.GDT 5/13/20

CORE PHOTOGRAPH

EB1-A

BOX 1: 11.4 - 20.8 FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 22+00	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** N/A
COLLAR ELEV. 872.5 ft	**TOTAL DEPTH** 27.5 ft	**NORTHING** 705,555	**EASTING** 1,751,728	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/26/20	**COMP. DATE** 02/26/20	**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)
875											
	872.5	0.0								872.5 GROUND SURFACE	0.0
			10	8	5	13		D		**ROADWAY EMBANKMENT** Brown, Silty Fine SAND with Trace Gravel (A-2-4)	
870	868.8	3.7								869.5	3.0
			3	4	4	8		M		**RESIDUAL** Orange, Clayey SILT (A-5)	
865	863.8	8.7									
			2	3	3	6		M			
860	858.8	13.7								860.5	12.0
			1	2	2	4		W		Gray, Silty CLAY (A-7)	
855	853.8	18.7								855.5	17.0
			3	4	9	13		W		Brown, Silty Fine SAND (A-2-4)	
850	848.8	23.7								848.8	23.7
			60/0.0			60/0.0				**CRYSTALLINE ROCK** Gray METASANDSTONE	
845	845.0	27.5								845.0	27.5
			60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 845.0 ft in CRYSTALLINE ROCK: METASANDSTONE	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** S. Papke	
SITE DESCRIPTION Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 22+80	**OFFSET** 16 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 865.4 ft	**TOTAL DEPTH** 13.7 ft	**NORTHING** 705,661	**EASTING** 1,751,767	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 89% 02/06/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/24/19	**COMP. DATE** 04/24/19	**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)
870											
	865.4	0.0								865.4 GROUND SURFACE	0.0
865			2	2	3	5		M		**ROADWAY EMBANKMENT** Orange and Gray, Coarse to Fine Sandy CLAY (A-6)	
	861.9	3.5								862.9	2.5
			8	9	12	21		M		Orange and Gray, Silty Coarse to Fine SAND (A-2-4)	
860											
	856.9	8.5								855.9	9.5
855			18	17	14	31		M		**RESIDUAL** Highly Plastic, Gray, Silty CLAY (A-7)	
	851.8	13.6								851.8	13.6
			60/0.1			60/0.1				851.7 **CRYSTALLINE ROCK** Gray METAMUDSTONE	13.7
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 851.7 ft in CRYSTALLINE ROCK: METAMUDSTONE	

NCDOT BORE DOUBLE U5813_GEO_BRDG0171_GINT.GPJ NC_DOT.GDT 5/13/20

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+50	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** N/A
COLLAR ELEV. 873.2 ft	**TOTAL DEPTH** 26.1 ft	**NORTHING** 705,614	**EASTING** 1,751,862	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/26/20	**COMP. DATE** 02/27/20	**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
875										ELEV. (ft) DEPTH (ft)
	873.2	0.0	2	2	4	6		D		873.2 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** Tan, Coarse to Fine Sandy SILT (A-4)
870	869.7	3.5	2	3	2	5		D		
865	864.7	8.5	21	34	41	75		D		866.2 7.0 **RESIDUAL** Tan, Silty Coarse to Fine SAND (A-2-4)
860	859.7	13.5	6	5	6	11		M		861.2 12.0 Tan, Coarse to Fine Sandy SILT (A-4)
855	854.7	18.5	5	8	8	16		M		
850	849.7	23.5	100/0.2			100/0.2				850.2 23.0 **WEATHERED ROCK** Tan METASANDSTONE
	847.1	26.1	60/0.0			60/0.0				847.1 26.1 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 847.1 ft on CRYSTALLINE ROCK: METASANDSTONE

NCDOT BORE DOUBLE U5813_GEO_BRDG0171_GINT.GPJ NC_DOT.GDT 5/13/20

SITE PHOTOGRAPH

Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)

Looking Southwest from -Y_SLIP-

Looking North towards End Bent 1

REFERENCE: U-5813

PROJECT: 44385

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5813	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *RANDOLPH*

PROJECT DESCRIPTION *US 64 FROM THE ASHEBORO BYPASS TO EAST OF I-73/I-74/US 220*

SITE DESCRIPTION *RETAINING WALLS AT BRIDGE NO. 171 OVER US 64 ON SR 1713 (ALBEMARLE ROAD)*

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.

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NOTES:

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PERSONNEL

S. PAPKE

C. REYNOLDS

C. DRISCOLL

INVESTIGATED BY *C. REYNOLDS*

DRAWN BY *C. REYNOLDS*

CHECKED BY *T. WELLS*

SUBMITTED BY *KLEINFELDER INC.*

DATE *MAY 2020*

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
422 GALLIMORE DAIRY RD.
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NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

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Thomas R. Wells 5/21/2020
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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	50 MX													
#40	30 MX		50 MX											
#200	15 MX	25 MX	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	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	N/A
	DENSE	30 TO 50	
	VERY DENSE	> 50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 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 (CDB.)	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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q2

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 NOTES

ELEVATION: N/A FEET

NOTES:

NOTES:

FIAD: FILLED IMMEDIATELY AFTER DRILLING

BENCHMARKS:

BY9145 (705,517 FT N, 1,751,715 FT E) ELEVATION 878.02 FT

BL113 (705,712 FT N, 1,751,870 FT E) ELEVATION 877.26 FT

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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 10.4.6.4-1 — 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	GOOD	FAIR	POOR	VERY POOR
Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

90			N/A	N/A
80				
70				
60				
50				
40				
30				
20				
10				
N/A	N/A			

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	GOOD	FAIR	POOR	VERY POOR
Very Rough, fresh unweathered surfaces	Rough, slightly weathered surfaces	Smooth, moderately weathered and altered surfaces	Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
70				
60	A			
50				
40	B	C	D	E
30				
20			F	
10		G	H	

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
U-5813	3

SITE PLAN

0 40 80
FEET

NC GRID
NAD 83 NA 2011

-BL- BL113 Sta=75+18.44 PINC
-BY11- Sta=10+64.06
-Y-
-Y 20-
-Y_SLIP-
-BY9- BY9145 Sta=18+31.34 PINC

RW2-1
EB2-A
RW2-2
EB2-B
EBI-A
Y_EBI
RWI-1
RWI-1(2)
EBI-B
BRIDGE NUMBER 171

RETAINING WALL AT END BENT NO.2
RETAINING WALL AT END BENT NO.1

BUNDEE ST (SR-1448)
HWY 49 VANHARRIE SCENIC RD
I-95

TOP=856.99'
INV (W)=853.84'
TOP=855.41'
INV (E)=852.48'
INV (W)=852.44'
INV=854.38'
8" CONC HEAD WALL
INV=858.46'
INV=854.99'
TOP=864.01'
INV =859.99'

SSMH
RIM = 865.14'
INV A = 851.85'
INV B = 851.83'

24" RCP
18" RCP
15" RCP
8" VCP
8" CONC
75 MTL

EXISTING R/W
WOODS
MTL
EIP
BST
DI
CONC
SS
W
G

312 304 303 202 201 200 72 197 198 199 289 195 74 203

PROJECT REFERENCE NO.	SHEET NO.
U-5813	4

PROFILE ALONG RETAINING WALL 1 AT END BENT NO. 1

0 20 40
FEET
VE = 1

970
950
930
910
890
870
850
830
810
790
770

Ⓐ **RESIDUAL:**
DRY TO WET, SOFT TO STIFF, ORANGE, GRAY, TAN, BROWN, AND RED, FINE SANDY SILT (A-4), CLAYEY SILT (A-5), SILTY CLAY (A-7), AND COARSE TO FINE SANDY CLAY (A-6) WITH TRACE ROCK FRAGMENTS

Ⓑ **ROADWAY EMBANKMENT:**
DRY, MEDIUM DENSE, BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL

Ⓒ **RESIDUAL:**
WET, MEDIUM DENSE, BROWN, SILTY FINE SAND (A-2-4)

-Y- STA. 21+20.70, 39.50' LT
EL. 883.29

TOP OF WALL

MINIMUM BOTTOM OF WALL

-Y- STA. 20+34.08, 25.50' LT
EL. 882.21

RWI-I(2)
21+03
50' RT

EBI-B
22+00
64' RT

EBI-A
20+90
34' LT

Y-EBI
20+42
34' LT

EXISTING GROUNDLINE

WEATHERED ROCK:

METASANDSTONE

CRYSTALLINE ROCK:
MODERATE WEATHERING, MODERATELY HARD TO HARD, TAN METASANDSTONE WITH VERY CLOSE TO CLOSE FRACTURE SPACING

REC: 98%
RQD: 51%
GSI: 40-50

03/20
02/20
04/19
BT

NOTES:

GROUNDLINE TAKEN FROM PROJECT TIN FILES U5813 LS TIN.TIN RECEIVED ON AUGUST 2, 2019.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

NO RETAINING WALL STATIONING WAS PROVIDED, FOR THE PURPOSES OF THE PROFILE, THE WALL BEGINS AT STA. 10+00.

09+80 10+00 10+20 10+40 10+60 10+80 11+00 11+20 11+40 11+60 11+80 12+00 12+20 12+40

PROJECT REFERENCE NO.	SHEET NO.
U-5813	5

PROFILE ALONG RETAINING WALL 2 AT END BENT NO. 2

0 20 40
FEET
VE = 1

970
950
930
910
890
870
850
830
810
790
770

-Y- STA. 22+97.22, 22.50' LT
EL. 889.31

TOP OF WALL

-Y- STA. 24+02.98, 39.50' RT
EL. 890.74

EXISTING GROUNDLINE

MINIMUM BOTTOM OF WALL

(A) **ROADWAY EMBANKMENT:** MOIST, MEDIUM STIFF, TAN, ORANGE AND GRAY, SANDY SILT (A-4) TO COARSE TO FINE SANDY CLAY (A-6)

(B) **ROADWAY EMBANKMENT:** MOIST, MEDIUM DENSE, ORANGE AND GRAY, SILTY COARSE TO FINE SAND (A-2-4)

(C) **RESIDUAL:** MOIST, VERY DENSE, TAN SILTY COARSE TO FINE SAND (A-2-4)

(D) **WEATHERED ROCK:** TAN AND GRAY METASANDSTONE

ROADWAY EMBANKMENT: DRY, MEDIUM STIFF, COARSE TO FINE SANDY SILT (A-4)

RESIDUAL: MOIST, MEDIUM STIFF TO HARD, GRAY, TAN, AND ORANGE, COARSE TO FINE SANDY SILT (A-4), SILTY CLAY (A-7), FINE SANDY CLAY (A-6), AND CLAYEY SILT (A-5)

CRYSTALLINE ROCK: GRAY METASANDSTONE

RW2-1
22+97
32' LT

EB2-A
22+80
16' LT

EB2-B
23+50
64' RT

RW2-2
24+17
50' RT

02/20

DRY
4/19

NOTES:

GROUNDLINE TAKEN FROM PROJECT TIN FILES U5813 LS TIN.TIN RECEIVED ON AUGUST 2, 2019.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

NO RETAINING WALL STATIONING WAS PROVIDED, FOR THE PURPOSES OF THE PROFILE, THE WALL BEGINS AT STA. 10+00.

10+00 10+20 10+40 10+60 10+80 11+00 11+20 11+40 11+60 11+80 12+00 12+20 12+40 12+60

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. RW1-1(2)	**STATION** 21+03	**OFFSET** 50 ft RT	**ALIGNMENT** -Y-	**0 HR.** 22.0
COLLAR ELEV. 877.3 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 705,525	**EASTING** 1,751,637	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/02/20	**COMP. DATE** 03/02/20	**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)
880											
	877.3	0.0								877.3 GROUND SURFACE	0.0
875			2	2	4	6		D		**RESIDUAL** Brown, Fine Sandy SILT (A-4)	
	873.8	3.5								874.3	3.0
			1	2	3	5		M		Orange, Clayey SILT (A-5)	
870											
	868.8	8.5	1	3	4	7		M		869.3 Red, Coarse to Fine Sandy CLAY with Trace Rock Fragments (A-6)	8.0
865										865.3	12.0
	863.8	13.5	3	6	7	13		M		Orange, Silty CLAY (A-7)	
860											
	858.8	18.5	2	2	3	5		M			
855								▽		855.3	22.0
	853.8	23.5	1	2	3	5		W		Brown, Fine Sandy SILT with Trace Mica (A-4)	
850											
	848.8	28.5	5	7	7	14		M		847.3	30.0
										Boring Terminated at Elevation 847.3 ft in RESIDUAL: Sandy SILT Auger Probe RW1-1(2) 0.0-6.0 ft. Lithology Based on RW1-1.	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. RW1-1	**STATION** 21+08	**OFFSET** 40 ft RT	**ALIGNMENT** -Y-	**0 HR.** N/A
COLLAR ELEV. 877.3 ft	**TOTAL DEPTH** 6.0 ft	**NORTHING** 705,537	**EASTING** 1,751,637	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/02/20	**COMP. DATE** 03/02/20	**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)
880											
	877.3	0.0								877.3 GROUND SURFACE	0.0
875			2	2	4	6		D		**RESIDUAL** Brown, Fine Sandy SILT (A-4)	
	873.8	3.5								874.3	3.0
			1	2	3	5		M		Orange, Clayey SILT (A-5)	
										871.3	6.0
										Boring Terminated BY AUGER REFUSAL at Elevation 871.3 ft on Boulder Offset and redrilled as RW1-1(2)	

NCDOT BORE DOUBLE U5813_GEO_RWAL_GINT.GPJ NC_DOT.GDT 5/13/20

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 22+00	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** N/A
COLLAR ELEV. 872.5 ft	**TOTAL DEPTH** 27.5 ft	**NORTHING** 705,555	**EASTING** 1,751,728	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/26/20	**COMP. DATE** 02/26/20	**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
875										ELEV. (ft) DEPTH (ft)
	872.5	0.0								872.5 GROUND SURFACE 0.0
870			10	8	5	13		D		**ROADWAY EMBANKMENT** Brown, Silty Fine SAND with Trace Gravel (A-2-4)
	868.8	3.7								869.5 3.0
			3	4	4	8		M		**RESIDUAL** Orange, Clayey SILT (A-5)
865										
	863.8	8.7								
			2	3	3	6		M		
860										860.5 12.0
	858.8	13.7								Gray, Silty CLAY (A-7)
			1	2	2	4		W		
855										855.5 17.0
	853.8	18.7								Brown, Silty Fine SAND (A-2-4)
			3	4	9	13		W		
850										
	848.8	23.7								848.8 23.7
			60/0.0			60/0.0				**CRYSTALLINE ROCK** Gray METASANDSTONE
845	845.0	27.5								845.0 27.5
			60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 845.0 ft in CRYSTALLINE ROCK: METASANDSTONE

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 20+90	**OFFSET** 34 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 861.6 ft	**TOTAL DEPTH** 20.8 ft	**NORTHING** 705,594	**EASTING** 1,751,587	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S Augers/Core	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/24/20	**COMP. DATE** 02/25/20	**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)
865											
	861.6	0.0	2	2	2	4				861.6 GROUND SURFACE	0.0
860								D		**RESIDUAL**	
	858.1	3.5	17	22	78/0.3					859.1 Tan, Fine Sandy SILT with Trace Rock Fragments (A-4)	2.5
855						100/0.8				**WEATHERED ROCK** Tan METASANDSTONE	
	853.1	8.5	100/0.2			100/0.2					
850	850.2	11.4	60/0.0			60/0.0				850.2 **CRYSTALLINE ROCK** Tan METASANDSTONE	11.4
845											
										840.8 Boring Terminated at Elevation 840.8 ft in CRYSTALLINE ROCK: METASANDSTONE	20.8

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 20+90	**OFFSET** 34 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 861.6 ft	**TOTAL DEPTH** 20.8 ft	**NORTHING** 705,594	**EASTING** 1,751,587	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S Augers/Core	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/24/20	**COMP. DATE** 02/25/20	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 9.4 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)
850.2											Begin Coring @ 11.4 ft	
850	850.2	11.4	4.4	*N=60/0.0* 1:30/0.4 3:05/1.0 2:55/1.0 3:45/1.0 4:15/1.0	(4.2) 95%	(2.7) 61%		(9.2) 98%	(4.8) 51%		850.2 **CRYSTALLINE ROCK** Moderate Weathering, Moderately Hard to Hard, Tan METASANDSTONE with Close to Very Close Fracture Spacing GSI: 40-50 Vertical fracture from 14.4 to 15.4 ft and 16.8 to 17.6 ft	11.4
	845.8	15.8	5.0	3:30/1.0 2:55/1.0 3:10/1.0 2:45/1.0 3:50/1.0	(5.0) 100%	(2.1) 42%						
845	840.8	20.8									840.8 Boring Terminated at Elevation 840.8 ft in CRYSTALLINE ROCK: METASANDSTONE	20.8

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CORE PHOTOGRAPH

EB1-A

BOX 1: 11.4 - 20.8 FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** S. Papke	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. Y_EB1	**STATION** 20+42	**OFFSET** 34 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 858.7 ft	**TOTAL DEPTH** 14.1 ft	**NORTHING** 705,571	**EASTING** 1,751,544	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 89% 02/06/2019		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER C. Odom	**START DATE** 04/24/19	**COMP. DATE** 04/24/19	**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)
860											
	858.7	0.0								858.7 GROUND SURFACE	0.0
			2	3	3	6		D		**RESIDUAL** Orange to Gray, Fine Sandy SILT (A-4)	
855	855.2	3.5								856.2	2.5
			3	4	5	9		M		Orange and Gray, Silty CLAY (A-7)	
850	850.2	8.5								851.2	7.5
			2	3	6	9		M		Orange and Gray, Clayey SILT (A-5)	
845	844.6	14.1								844.6	14.1
			60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 844.6 ft on CRYSTALLINE ROCK: METAMUDSTONE	

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. RW2-1	**STATION** 22+97	**OFFSET** 32 ft LT	**ALIGNMENT** -Y-	**0 HR.** 6.8
COLLAR ELEV. 865.8 ft	**TOTAL DEPTH** 8.9 ft	**NORTHING** 705,683	**EASTING** 1,751,777	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/02/20	**COMP. DATE** 03/02/20	**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)
870											
865	864.9	0.9	6	3	2	5		M		865.8 GROUND SURFACE	0.0
	862.6	3.2	3	3	5	8		M		865.3 **ROADWAY EMBANKMENT** Asphalt (0.0 - 0.5 ft)	0.5
860								▽		862.8 Tan, Sandy SILT (A-4)	3.0
	857.6	8.2								**RESIDUAL** Gray, Fine Sandy SILT (A-4)	
	856.9	8.9	100/0.4			100/0.4				857.8	8.0
			60/0.0			60/0.0				856.9 **WEATHERED ROCK** Gray METASANDSTONE	8.9
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 856.9 ft on CRYSTALLINE ROCK: METASANDSTONE	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** S. Papke	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 22+80	**OFFSET** 16 ft LT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 865.4 ft	**TOTAL DEPTH** 13.7 ft	**NORTHING** 705,661	**EASTING** 1,751,767	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 89% 02/06/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/24/19	**COMP. DATE** 04/24/19	**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)
870											
865	865.4	0.0	2	2	3	5		M		865.4 GROUND SURFACE	0.0
	861.9	3.5	8	9	12	21		M		**ROADWAY EMBANKMENT** Orange and Gray, Coarse to Fine Sandy CLAY (A-6)	
860										862.9 Orange and Gray, Silty Coarse to Fine SAND (A-2-4)	2.5
	856.9	8.5	18	17	14	31		M		855.9 **RESIDUAL** Highly Plastic, Gray, Silty CLAY (A-7)	9.5
855	851.8	13.6	60/0.1			60/0.1				851.8	13.6
										851.7 **CRYSTALLINE ROCK** Gray METAMUDSTONE	13.7
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 851.7 ft in CRYSTALLINE ROCK: METAMUDSTONE	

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+50	**OFFSET** 64 ft RT	**ALIGNMENT** -Y-	**0 HR.** N/A
COLLAR ELEV. 873.2 ft	**TOTAL DEPTH** 26.1 ft	**NORTHING** 705,614	**EASTING** 1,751,862	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/26/20	**COMP. DATE** 02/27/20	**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)
875	873.2	0.0	2	2	4	6		D		873.2 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT Tan, Coarse to Fine Sandy SILT (A-4)	
870	869.7	3.5	2	3	2	5		D			
										866.2 **RESIDUAL** Tan, Silty Coarse to Fine SAND (A-2-4)	7.0
865	864.7	8.5	21	34	41	75		D			
										861.2 Tan, Coarse to Fine Sandy SILT (A-4)	12.0
860	859.7	13.5	6	5	6	11		M			
855	854.7	18.5	5	8	8	16		M			
850	849.7	23.5	100/0.2			100/0.2				850.2 **WEATHERED ROCK** Tan METASANDSTONE	23.0
	847.1	26.1	60/0.0			60/0.0				847.1 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 847.1 ft on CRYSTALLINE ROCK: METASANDSTONE	26.1

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** C. Reynolds	
SITE DESCRIPTION Retaining Walls at Bridge No. 171 over US 64 on SR 1713 (Albemarle Road)				**GROUND WTR (ft)**
BORING NO. RW2-2	**STATION** 24+17	**OFFSET** 50 ft RT	**ALIGNMENT** -Y-	**0 HR.** 18.3
COLLAR ELEV. 882.5 ft	**TOTAL DEPTH** 24.3 ft	**NORTHING** 705,650	**EASTING** 1,751,918	**24 HR.** 17.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 02/27/20	**COMP. DATE** 02/27/20	**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)
885	882.5	0.0	3	7	5	12		M		882.5 GROUND SURFACE	0.0
										RESIDUAL Orange, Coarse to Fine Sandy CLAY (A-6)	
880	879.0	3.5	4	5	8	13		M			
875	874.0	8.5	3	5	8	13		M			
870	869.0	13.5	2	3	5	8		M		870.5 Gray, Clayey SILT (A-5)	12.0
865	864.0	18.5	3	2	5	7		M			
860	859.0	23.5	54	46/0.2		100/0.7				860.5 **WEATHERED ROCK**	22.0
	858.3	24.2	60/0.1			60/0.1				858.2 Gray METASANDSTONE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 858.2 ft in CRYSTALLINE ROCK: METASANDSTONE	24.3

NCDOT BORE DOUBLE U5813_GEO_RWAL_GINT.GPJ NC_DOT.GDT 5/13/20

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5813	1	8

REFERENCE: U-5813

PROJECT: 44385

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY RANDOLPH

PROJECT DESCRIPTION US 64 WIDENING FROM ASHEBORO BYPASS TO NC 49 AND RECONSTRUCTION OF US 64 /NC 49 INTERCHANGE

SITE DESCRIPTION SOUND BARRIER WALL – NW3.1B

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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NOTES:

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

PERSONNEL

B. GOODE

B. FARMER

SUMMIT PERSONNEL

INVESTIGATED BY RK&K

DRAWN BY B. GOODE

CHECKED BY G. GOINS

SUBMITTED BY RK&K

DATE JUNE 2021

RK&K

P: (919) 878-9560
8601 Six Forks Road, Forum 1,Suite 700
Raleigh, North Carolina 27615-3960
NC License No. F-0112

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NORTH CAROLINA PROFESSIONAL SEAL 041709 ENGINEER GREGORY K. GOINS

DocuSigned by:
Greg Goins
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7/9/2021

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5813	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	< 4	N/A
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	> 50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 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
PLASTIC RANGE (PI): LL — LIQUID LIMIT		
	- 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
- [ ] PORTABLE HOIST
- [X] CME-550X
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 2¼" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

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: N/A

ELEVATION: N/A FEET

NOTES:

BOREHOLE ELEVATIONS DETERMINED FROM PROVIDED .TIN FILE

ABBREVIATIONS:

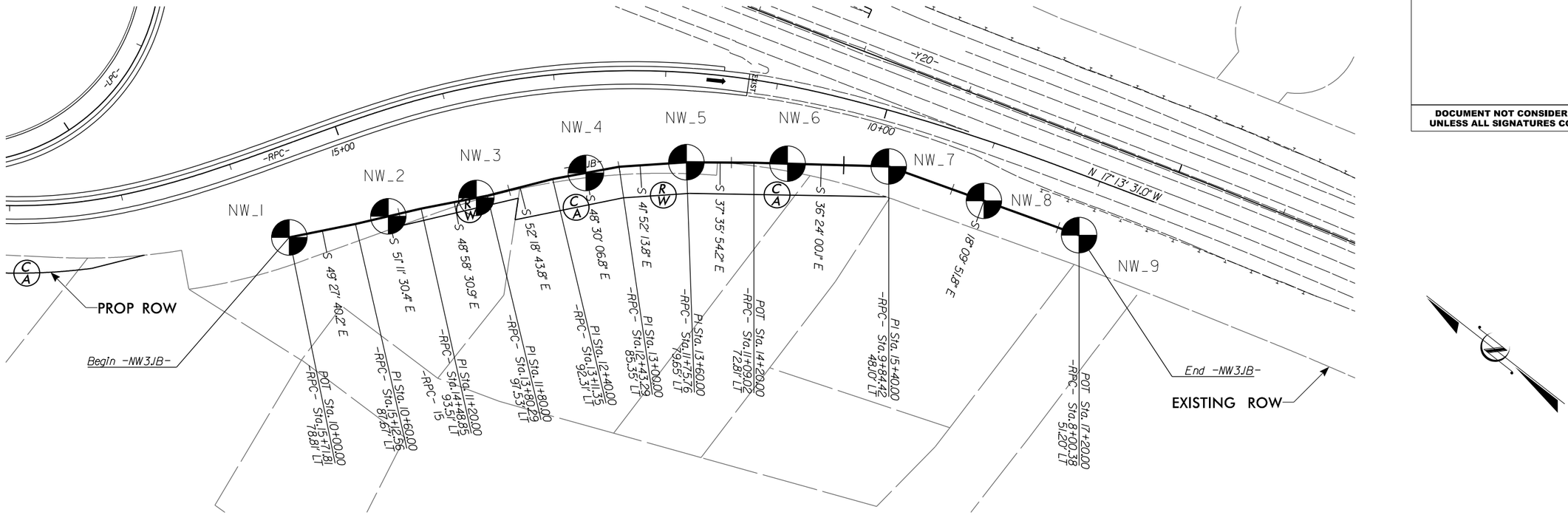
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

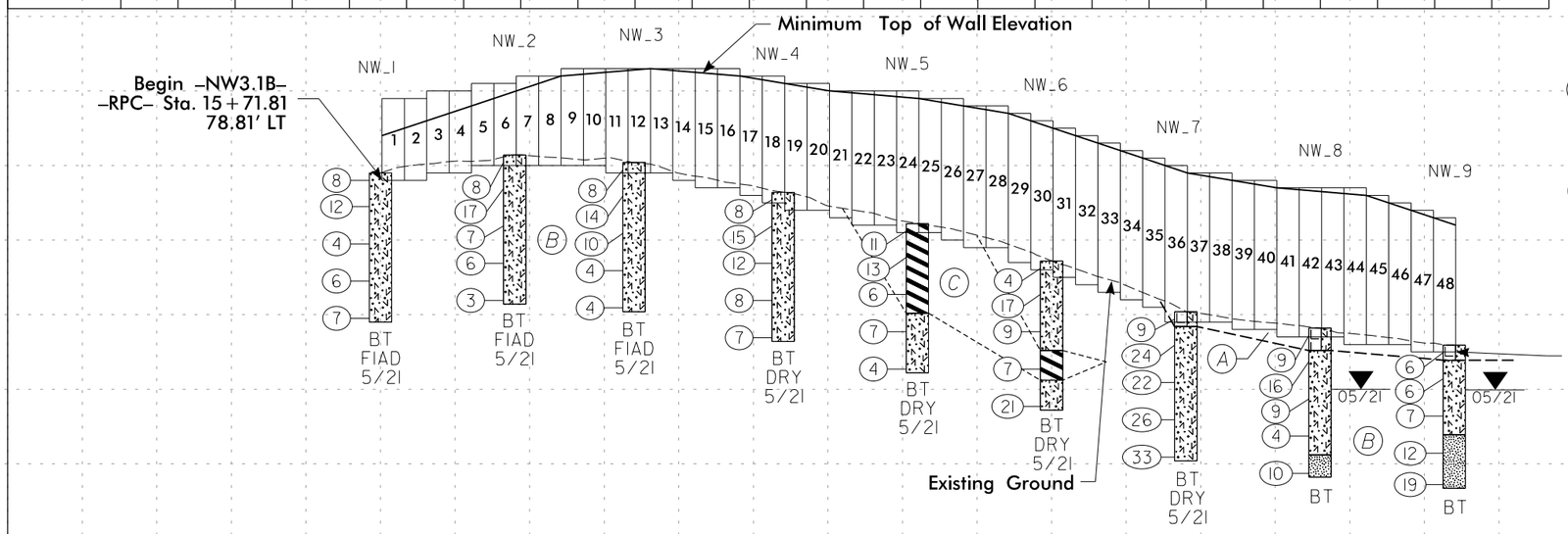
PROJECT REFERENCE NO.	SHEET NO.
U-5813	3

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS



Noise Wall 3.1B Design Data																										
Panel Number	1–2	3–4	5–6	7–8	9–16	17–18	19–20	21–24	25–26	27–28	29	30	31	32	33	34	35	36	37–38	39–40	41–44	45	46	47	48
Top Elevation	839	840	841	842	843	842	841	840	839	838	837	836	835	834	833	832	831	830	829	828	827	826	825	824	823
Panel Width	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15



860 850 840 830 820 810 800 790

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00

(A) *ROADWAY EMBANKMENT* Brown-gray-tan, medium stiff to stiff, sandy clayey SILT (A-5), trace gravel, lenses of clay, moist

(B) *RESIDUAL* Red-orange-white-tan-gray-black, soft to very stiff, sandy to clayey SILT (A-4, A-5), trace rock fragments, saprolitic, moist to wet

(C) Red to gray-orange-brown, medium stiff to stiff, sandy silty CLAY (A-7-5), saprolitic, moist to wet

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Goode, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_1	**STATION** 10+00	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 829.0 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,919	**EASTING** 1,753,333	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/14/21	**COMP. DATE** 05/14/21	**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)
830	829.0	0.0	3	4	4	8		M		829.0 0.0 GROUND SURFACE **RESIDUAL** Red to red-tan to red-black, medium stiff to stiff, clayey SILT (A-5), saprolitic
825	825.5	3.5	4	5	7	12		M		
820	820.5	8.5	1	2	2	4		M		
815	815.5	13.5	2	3	3	6		M		
810	810.5	18.5	2	3	4	7		W		809.0 20.0 Boring Terminated at Elevation 809.0 ft in clayey SILT (A-5)

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Farmer, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_2	**STATION** 10+90	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 831.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,861	**EASTING** 1,753,402	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/14/21	**COMP. DATE** 05/14/21	**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)
835	831.4	0.0	4	4	4	8		M		831.4 0.0 GROUND SURFACE **RESIDUAL** Orange to red-orange to red-orange-black, soft to very stiff, clayey SILT (A-5), saprolitic
830	827.9	3.5	3	7	10	17		M		
825	822.9	8.5	3	3	4	7		W		
820	817.9	13.5	2	2	4	6		W		
815	812.9	18.5	2	1	2	3		W		811.4 20.0 Boring Terminated at Elevation 811.4 ft in clayey SILT (A-5)

NCDOT BORE DOUBLE_U5813_NW_RDY.GPJ NC_DOT.GDT 7/8/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Goode, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_3	**STATION** 11+70	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 830.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,810	**EASTING** 1,753,463	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/14/21	**COMP. DATE** 05/14/21	**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
835										ELEV. (ft) DEPTH (ft)
830	830.4	0.0	3	4	4	8		M		830.4 GROUND SURFACE 0.0
	826.9	3.5								**RESIDUAL** Red-brown to red-tan to brown-tan-black, medium stiff to stiff, clayey SILT (A-5), saprolitic
825			4	6	8	14		M		
	821.9	8.5								
820			3	4	6	10		M		
	816.9	13.5								
815			2	2	2	4		M		
	811.9	18.5	WOH	2	2	4		W		810.4 20.0
										Boring Terminated at Elevation 810.4 ft in clayey SILT (A-5)

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Farmer, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_4	**STATION** 12+70	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 826.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,747	**EASTING** 1,753,540	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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
830										
	826.4	0.0	3	3	5	8		M		826.4 GROUND SURFACE 0.0
825	822.9	3.5								**RESIDUAL** Red to red-white to red-tan, medium stiff to very stiff, clayey SILT (A-5), saprolitic
			5	6	9	15		M		
820	817.9	8.5								
			4	5	7	12		M		
815	812.9	13.5								
			2	4	4	8		M		
810	807.9	18.5								
			2	3	4	7		W		806.4 20.0
										Boring Terminated at Elevation 806.4 ft in clayey SILT (A-5)

NCDOT BORE DOUBLE_U5813_NW_RDY.GPJ NC_DOT.GDT 7/8/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Goode, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_5	**STATION** 13+60	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 822.2 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,682	**EASTING** 1,753,603	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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)
825										
	822.2	0.0								822.2 GROUND SURFACE 0.0
			3	5	6	11		M		**RESIDUAL** Red, medium stiff to stiff, sandy silty CLAY (A-7-5), saprolitic
820	818.7	3.5	4	6	7	13		M		
815	813.7	8.5	2	3	3	6		M		
810										810.2 12.0
	808.7	13.5	2	3	4	7		M		Red, medium stiff, clayey SILT (A-5), saprolitic
805	803.7	18.5						W		802.2 20.0
			2	2	2	4				Boring Terminated at Elevation 802.2 ft in clayey SILT (A-5)

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Farmer, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_6	**STATION** 14+50	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 817.2 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,610	**EASTING** 1,753,657	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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
820										
	817.2	0.0								817.2 GROUND SURFACE 0.0
			2	2	2	4		W		**RESIDUAL** Orange-tan-gray to gray-orange, medium stiff to very stiff, clayey SILT (A-5)
815	813.7	3.5	5	7	10	17		M		
810	808.7	8.5	3	4	5	9		M		
805										805.2 12.0
	803.7	13.5	2	3	4	7		W		Gray-orange-brown, medium stiff, silty CLAY (A-7-5)
800										801.2 16.0
	798.7	18.5	2	8	13	21		M		Gray-orange-brown, very stiff, clayey SILT (A-5), saprolitic
										797.2 20.0
										Boring Terminated at Elevation 797.2 ft in clayey SILT (A-5)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Goode, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_7	**STATION** 15+40	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** Dry
COLLAR ELEV. 810.4 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,538	**EASTING** 1,753,710	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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)
815											
810	810.4	0.0	3	4	5	9		M		810.4 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
	806.9	3.5	7	11	13	24		M		808.4 Brown-tan, stiff, sandy clayey SILT (A-5), trace gravel	2.0
805										**RESIDUAL**	
	801.9	8.5	6	11	11	22		M		Tan-gray to tan-gray-orange, very stiff to hard, sandy clayey SILT (A-5), trace rock fragments, trace clay, saprolitic	
800											
	796.9	13.5	6	10	16	26		M			
795											
	791.9	18.5	11	18	15	33		M		790.4 Boring Terminated at Elevation 790.4 ft in sandy clayey SILT (A-5)	20.0

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Farmer, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_8	**STATION** 16+30	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** 7.7
COLLAR ELEV. 808.2 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 704,453	**EASTING** 1,753,739	**24 HR.** 8.2
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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	
810											
	808.2	0.0	3	6	3	9		M		808.2 GROUND SURFACE	0.0
805										**ROADWAY EMBANKMENT** Gray-tan, stiff, sandy clayey SILT (A-5)	
	804.7	3.5	4	6	10	16		M		805.2 **RESIDUAL** Gray-tan-white to brown-orange, medium stiff to very stiff, sandy clayey SILT (A-5)	3.0
800											
	799.7	8.5	3	4	5	9		W			
795											
	794.7	13.5	WOH	2	2	4		W			
790										791.2 Brown, stiff, clayey sandy SILT (A-4), saprolitic	17.0
	789.7	18.5	3	5	5	10		W		788.2 Boring Terminated at Elevation 788.2 ft in clayey sandy SILT (A-4)	20.0

NCDOT BORE DOUBLE_U5813_NW_RDY.GPJ NC_DOT.GDT 7/8/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** Goode, B.	
SITE DESCRIPTION US 64 Widening from Asheboro Bypass to NC 49 & Reconstruction of US 64/NC 49 Interchange (Noise Wall)				**GROUND WTR (ft)**
BORING NO. NW_9	**STATION** 17+20	**OFFSET** CL	**ALIGNMENT** -NW3.1B-	**0 HR.** 4.2
COLLAR ELEV. 805.9 ft	**TOTAL DEPTH** 19.2 ft	**NORTHING** 704,367	**EASTING** 1,753,767	**24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 91% 11/19/2020		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Gonzalez-Castillo, L.	**START DATE** 05/13/21	**COMP. DATE** 05/13/21	**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)
810											
805	805.9	0.0	2	3	3	6		M		805.9 GROUND SURFACE	0.0
										803.9 **ROADWAY EMBANKMENT** Brown, medium stiff, sandy clayey SILT (A-5), lenses of clay	2.0
	802.4	3.5	2	3	3	6		M		**RESIDUAL** Brown-gray to orange, medium stiff, sandy clayey SILT (A-5), lenses of clay	
800											
	797.4	8.5	3	3	4	7		M			
795										793.9	12.0
	792.4	13.5	14	3	9	12		Sat.		Brown, stiff to very stiff, clayey sandy SILT (A-4), saprolitic	
790											
	788.2	17.7	5	10	9	19		Sat.		786.7	19.2
										Boring Terminated BY AUGER REFUSAL at Elevation 786.7 ft in clayey sandy SILT (A-4)	
										Auger Refusal at 17.7'	

NCDOT BORE DOUBLE_U5813_NW_RDY.GPJ NC_DOT.GDT 7/8/21

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5813	1	6

REFERENCE: U-5813

PROJECT: 44385

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *RANDOLPH*

PROJECT DESCRIPTION *US 64 FROM ASHEBORO BYPASS TO EAST OF I-73/I-74/US 220*

SITE DESCRIPTION *CULVERT REPLACEMENT AT STA. 53+99.0 -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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NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

D. KUBINSKI

TRIGON EXPLORATION

INVESTIGATED BY *D. KUBINSKI*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *APRIL 2022*

Prepared in the Office of:

KLEINFELDER

Bright People. Right Solutions.

422 GALLIMORE DAIRY ROAD, SUITE B
GREENSBORO, NORTH CAROLINA 27409
NC ENGINEERING FIRM LICENSE NO. F-1312

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells
7DA5D2D0518F4B0...

05/06/2022

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5813	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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

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: N/A

ELEVATION: N/A FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

THE BORINGS WERE SURVEYED BY SEPI ENGINEERING & CONSTRUCTION, INC. USING A SUB CENTIMETER GPS.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
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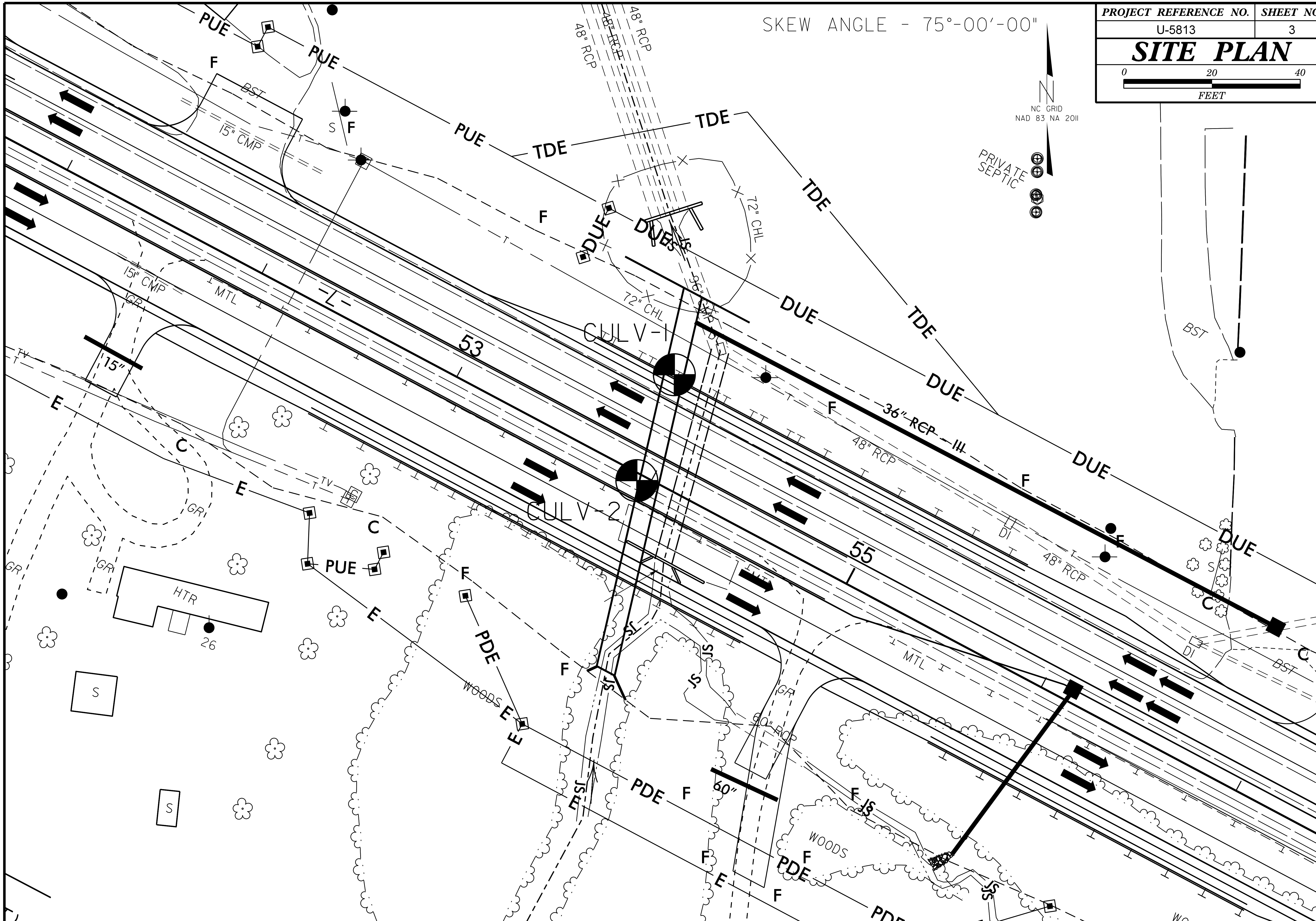
SITE PLAN



PROJECT REFERENCE NO.	SHEET NO.
U-5813	4

PROFILE ALONG CULVERT AT STA. 53+99.00 -L-

0 20 40
FEET
VE = 2

Ⓐ **ROADWAY EMBANKMENT:**
MOIST TO WET, VERY STIFF TO SOFT, BROWN AND RED, SILTY CLAY (A-7)

℄

CULV-1
53+87
47' LT

CULV-2
53+94
3' RT

EXISTING GROUNDLINE

4
5
7
5
4
2
60/0.0

14
6
7
19
4
100/0.8
60/0.0

Ⓐ

BT
DRY
03/22

BT
DRY
03/22

CRYSTALLINE ROCK:
METAVOLCANIC ROCK

780
770
760
750
740
730
720
710
700
690
680

140 120 100 80 60 40 20 0 20 40 60 80 100 120

NOTES:

GROUNDLINE TAKEN FROM PROJECT TIN FILE, U5813_NCDOT_TIN.TIN RECEIVED ON FEBRUARY 27, 2022.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS, WITH BOTH PROJECTED ONTO THE PROFILE.

SKEW ANGLE - 75°-00'-00"

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION US-64 from the Asheboro Bypass to East of I-73/I-74/US-220: Culvert Replacement at Station 53+99.0 -L-				**GROUND WTR (ft)**
BORING NO. CULV-1	**STATION** 53+87	**OFFSET** 47 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 765.1 ft	**TOTAL DEPTH** 26.8 ft	**NORTHING** 707,456	**EASTING** 1,747,903	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/18/22	**COMP. DATE** 03/18/22	**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
770										ELEV. (ft) DEPTH (ft)
765	765.1	0.0	2	2	2	4		M		765.1 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** Red to Red and Brown, Silty CLAY (A-7)
	761.6	3.5	2	2	3	5		M		
760	756.6	8.5	1	3	4	7		M		
755	751.6	13.5	2	2	3	5		M		
750	746.6	18.5	1	2	2	4		M		
745	741.6	23.5	WOH	WOH	2	2		W		
740	738.3	26.8	60/0.0			60/0.0				738.3 26.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 738.3 ft on CRYSTALLLINE ROCK: METAVOLCANIC ROCK

WBS 44385.1.3	**TIP** U-5813	**COUNTY** RANDOLPH	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION US-64 from the Asheboro Bypass to East of I-73/I-74/US-220: Culvert Replacement at Station 53+99.0 -L-				**GROUND WTR (ft)**
BORING NO. CULV-2	**STATION** 53+94	**OFFSET** 3 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 765.3 ft	**TOTAL DEPTH** 24.5 ft	**NORTHING** 707,408	**EASTING** 1,747,886	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/18/22	**COMP. DATE** 03/18/22	**SURFACE WATER DEPTH** N/A	

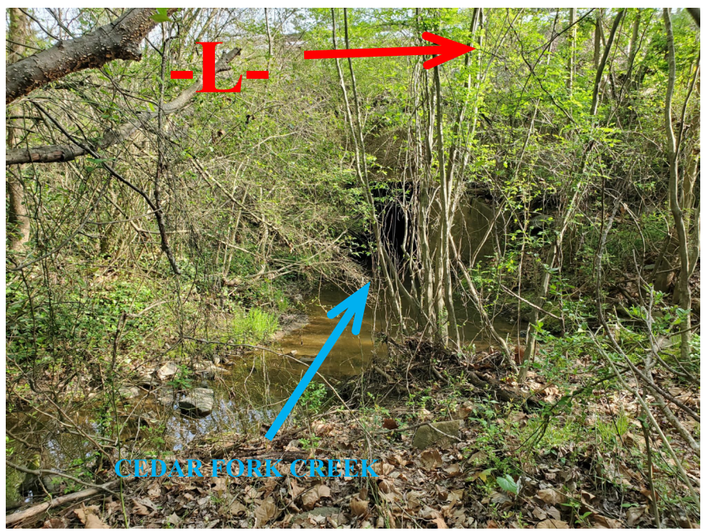
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										
765	763.8	1.5	8	7	7	14		M		765.3 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** Brown and Red, Silty CLAY (A-7)
	761.6	3.7	2	3	3	6		M		
760	756.6	8.7	3	3	4	7		M		
755	751.6	13.7	2	3	16	19		M		
750	746.6	18.7	2	2	2	4		M		
745	741.6	23.7	10	90/0.3		100/0.8		M		
	740.8	24.5	60/0.0			60/0.0				740.8 24.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 740.8 ft on CRYSTALLLINE ROCK: METAVOLCANIC ROCK

NCDOT BORE DOUBLE U5813_GEO_CULV_RWAL1.2_GINT.GPJ NC_DOT.GDT 4/7/22

SITE PHOTOGRAPHS

US-64 FROM ASHEBORO BYPASS TO EAST OF I-73/I-74/US 220: CULVERT REPLACEMENT AT STA. 53+99.0 -L-

Looking East on US-64 (-L-)



Looking North at the Upstream Inlet of Culvert