STATE	STATE PROJECT REFERENCE NO.	SHEET NO.
N.C.	U–2728B	1

REFERENCE: U–2827B

PROJECT: 34872

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

SUBSURFACE INVESTIGATION

INVENTORY SECTION B

DS

INITIALS

1/7/2016

DATE

SECTION 4

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	8

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)*

INVENTORY

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by: W. Patrick Alton A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U–2827B	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	
	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 (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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 _____
- [X] -N 03

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:

BRIDGES SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN

0 60 120

FEET

-Y3A- POT Sta. 10+00.00
-Y3- PT Sta. 10+10.33
-L3- PC Sta. 33+69.84
-L3- POC Sta. 33+77.20=
-Y3- POT Sta. 19+32.97
-Y3A- POT Sta. 12+60.00
Y3A_EB1
Y3A_BI
Y3A_EB2
WATKINS ST
BALLPARK WAY
BROAD ST
I-40 BUS/US 421/US 158 WBL
I-40 BUS/US 421/US 158 EBL
60' CONC
8" TYPE UNKNOWN
6" VC
4'STL
ATTACHED TO BRIDGE
AATUR
SEDIMENT FILLED
GR
CONC
MTL

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y3A_EB1	**STATION** 10+58	**OFFSET** 12 ft LT	**ALIGNMENT** -Y3A-	**0 HR.** 56.6
COLLAR ELEV. 902.9 ft	**TOTAL DEPTH** 88.8 ft	**NORTHING** 854,632	**EASTING** 1,629,893	**24 HR.** 55.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/07/15	**COMP. DATE** 08/07/15	**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)
915											
910											
905											
	902.4	0.5	18	12	4	16		M		902.9 GROUND SURFACE	0.0
900										0.5' ASPHALT AND 1.4' ABC STONE	
	899.4	3.5	2	2	5	7		M		901.0 **ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, ORGANICS (ROOTS), AND MICA	1.9
895										895.9	7.0
	894.4	8.5	6	7	10	17		M		RED-BROWN, SILTY CLAY (A-7-5) WITH TRACE MICA AND ORGANICS	
890											
	889.4	13.5	5	3	4	7		M		889.1 **RESIDUAL** DARK RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL	13.8
885											
	884.4	18.5	3	5	5	10		M			
880										880.9 LIGHT BROWN-RED, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	22.0
	879.4	23.5	4	6	6	12		M		878.5 LIGHT RED-BROWN AND YELLOW-WHITE, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	24.4
875											
	874.4	28.5	6	7	7	14		M			
870											
	869.4	33.5	5	7	6	13		M			
865										865.9 GRAY-LIGHT BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	37.0
	864.4	38.5	4	6	7	13		M			
860										860.9 BROWN-YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	42.0
	859.4	43.5	6	8	9	17		W			
855										855.9 YELLOW-RED-BROWN, CLAYEY FINE SANDY SILT (A-4), SAPROLITIC	47.0
	854.4	48.5	2	6	9	15		W			
850											
	849.4	53.5	2	3	4	7		W			
845											
	844.4	58.5	3	5	8	13		W			
840										840.9 WHITE-LIGHT BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	62.0
	839.4	63.5	12	38	57	95		W			
835											

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y3A_EB1	**STATION** 10+58	**OFFSET** 12 ft LT	**ALIGNMENT** -Y3A-	**0 HR.** 56.6
COLLAR ELEV. 902.9 ft	**TOTAL DEPTH** 88.8 ft	**NORTHING** 854,632	**EASTING** 1,629,893	**24 HR.** 55.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/07/15	**COMP. DATE** 08/07/15	**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						Match Line				
	834.4	68.5	5	13	13	26		W		WHITE-LIGHT BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC *(continued)*
830										830.9 72.0
	829.4	73.5	5	18	21	39		W		GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
825										
	824.4	78.5	100/0.2			100/0.2				824.4 78.5 **WEATHERED ROCK** GRAY-WHITE AND YELLOW (BIOTITE GNEISS)
820										
	819.4	83.5	68	32/0.1		100/0.6				
815										
	814.4	88.5	100/0.3			100/0.3				814.1 88.8 Boring Terminated at Elevation 814.1 ft in WEATHERED ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y3A_B1	**STATION** 11+36	**OFFSET** 6 ft RT	**ALIGNMENT** -Y3A-	**0 HR.** N/M
COLLAR ELEV. 886.1 ft	**TOTAL DEPTH** 48.4 ft	**NORTHING** 854,554	**EASTING** 1,629,912	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/10/15	**COMP. DATE** 08/12/15	**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)
890											
										886.1 GROUND SURFACE	0.0
885	885.2	0.9								885.2 0.1' ASPHALT AND 0.8' CONCRETE	0.9
			7	7	6	13		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL, CONCRETE, AND MICA	
	882.6	3.5									
			4	4	3	7		M			
880											
	877.6	8.5									
			3	3	4	7		M			
875											
	872.6	13.5									
			3	4	4	8		M			
870											
	867.6	18.5									
			4	4	5	9		M			
865											
	862.6	23.5									
			6	7	8	15		M			
860											
	857.6	28.5									
			3	4	5	9		M			
855											
	852.6	33.5									
			3	3	4	7		M			
850											
	847.7	38.4				60/0.0				847.7	38.4
			60/0.0							**CRYSTALLINE ROCK** GRAY (BIOTITE GNEISS)	
845											
840							RS-6				
										837.7	48.4
										Boring Terminated at Elevation 837.7 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

NCDOT BORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y3A_B1	**STATION** 11+36	**OFFSET** 6 ft RT	**ALIGNMENT** -Y3A-	**0 HR.** N/M
COLLAR ELEV. 886.1 ft	**TOTAL DEPTH** 48.4 ft	**NORTHING** 854,554	**EASTING** 1,629,912	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/10/15	**COMP. DATE** 08/12/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 10.0 ft			

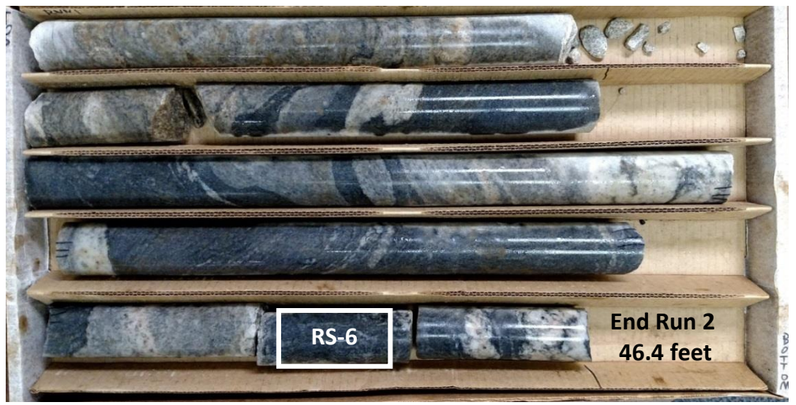
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
847.7											Begin Coring @ 38.4 ft	
	847.7	38.4	3.0	4:02/1.0 3:52/1.0 3:15/1.0	(2.9) 97%	(2.9) 97%		(9.9) 99%	(9.9) 99%		847.7 **CRYSTALLINE ROCK** GRAY, SLIGHTLY WEATHERED TO FRESH, MODERATELY HARD TO HARD (BIOTITE GNEISS) WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING RS-6: 45.7'-46.0', qu=13,911 psi, R1=7, R2=20, R3=20, R4=20, R5=7 RMR=74, ROCK TYPE=E	38.4
845	844.7	41.4	5.0	3:45/1.0 5:30/1.0 5:15/1.0 6:30/1.0 5:50/1.0	(5.0) 100%	(5.0) 100%						
840	839.7	46.4					RS-6					
	837.7	48.4	2.0	6:00/1.0 5:40/1.0	(2.0) 100%	(2.0) 100%					837.7 Boring Terminated at Elevation 837.7 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	48.4

NCDOT CORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

CORE PHOTOGRAPHS: Bridge on -Y3A- (Pedestrian Bridge) over -L- (I-40 Business), Y3A_B1: -Y3A- Station 11+36, 6’ RT

Begin Run 1
38.4 feet

End Run 1 &
Begin Run 2
41.4 feet



0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

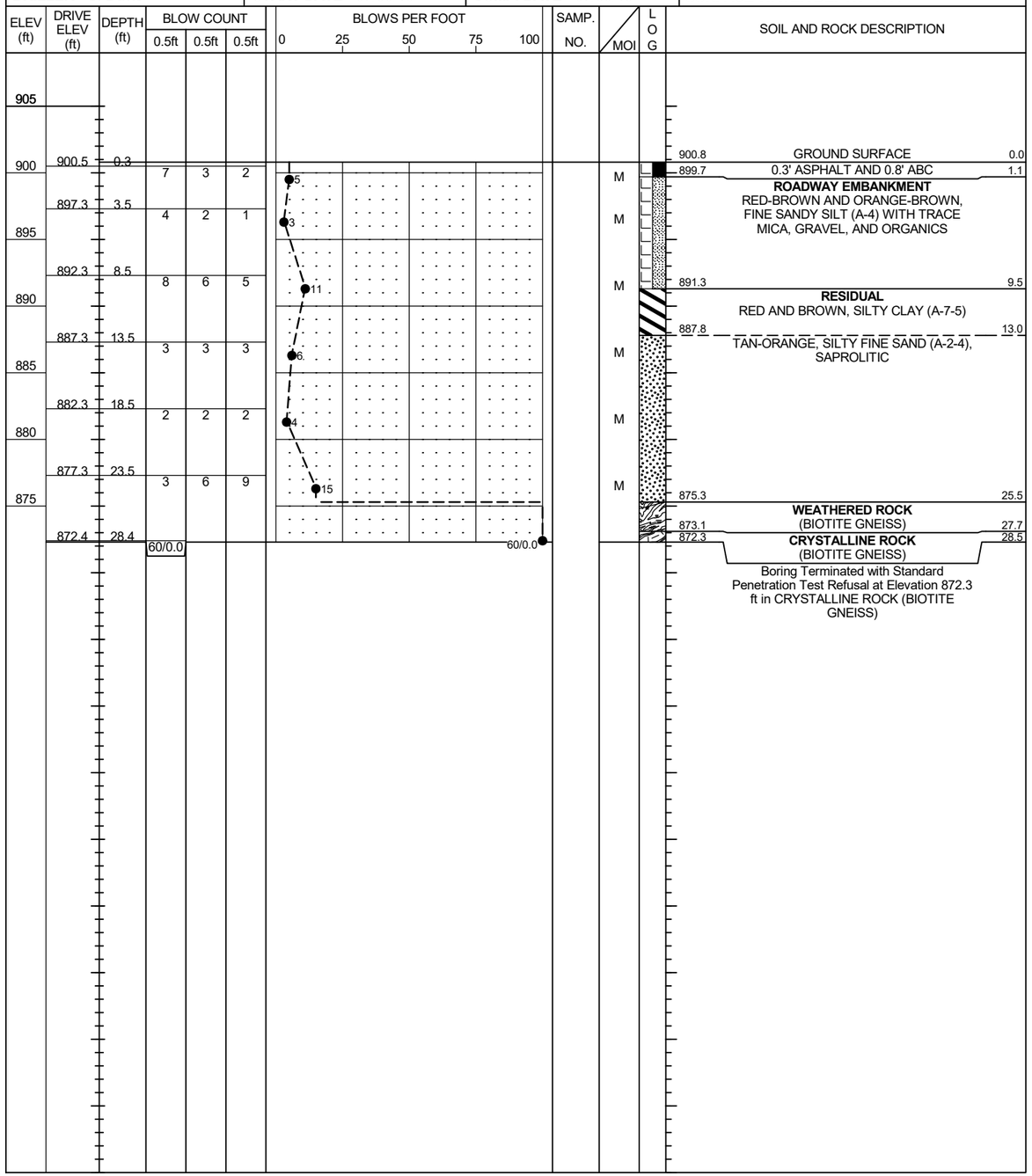
SCALE IN FEET

Begin Run 3
46.4 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang
SITE DESCRIPTION BRIDGE ON -Y3A- (PEDESTRIAN BRIDGE) OVER -L- (I-40 BUSINESS)			**GROUND WTR (ft)**
BORING NO. Y3A_EB2	**STATION** 12+07	**OFFSET** 9 ft LT	**ALIGNMENT** -Y3A-	**0 HR.** Dry
COLLAR ELEV. 900.8 ft	**TOTAL DEPTH** 28.5 ft	**NORTHING** 854,497	**EASTING** 1,629,957	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 07/30/15	**COMP. DATE** 07/30/15	**SURFACE WATER DEPTH** N/A



LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34872.1.1
TIP NO.: U-2827B
COUNTY: Forsyth
DESCRIPTION: US 158/US 421/NC 150/Business 40, west of Fourth Street to east of Church Street Bridge on -Y3A- (Pedestrian Bridge) over -L- (I-40 Business)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-6	Y3A_B1	-Y3A-	11+36	6' Rt.	45.7 - 46.0	Biotite Gneiss	CZbg	100%	3.82	1.77	165.6	13,911	ND	74

ND = Not Determined

SECTION 5

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	8

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y4- (BROAD ST.) OVER -L- (I-40 BUSINESS)*

INVENTORY

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by:
W. Patrick Alton
A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U–2827B	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	
	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 (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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 _____
- [X] -N 03

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

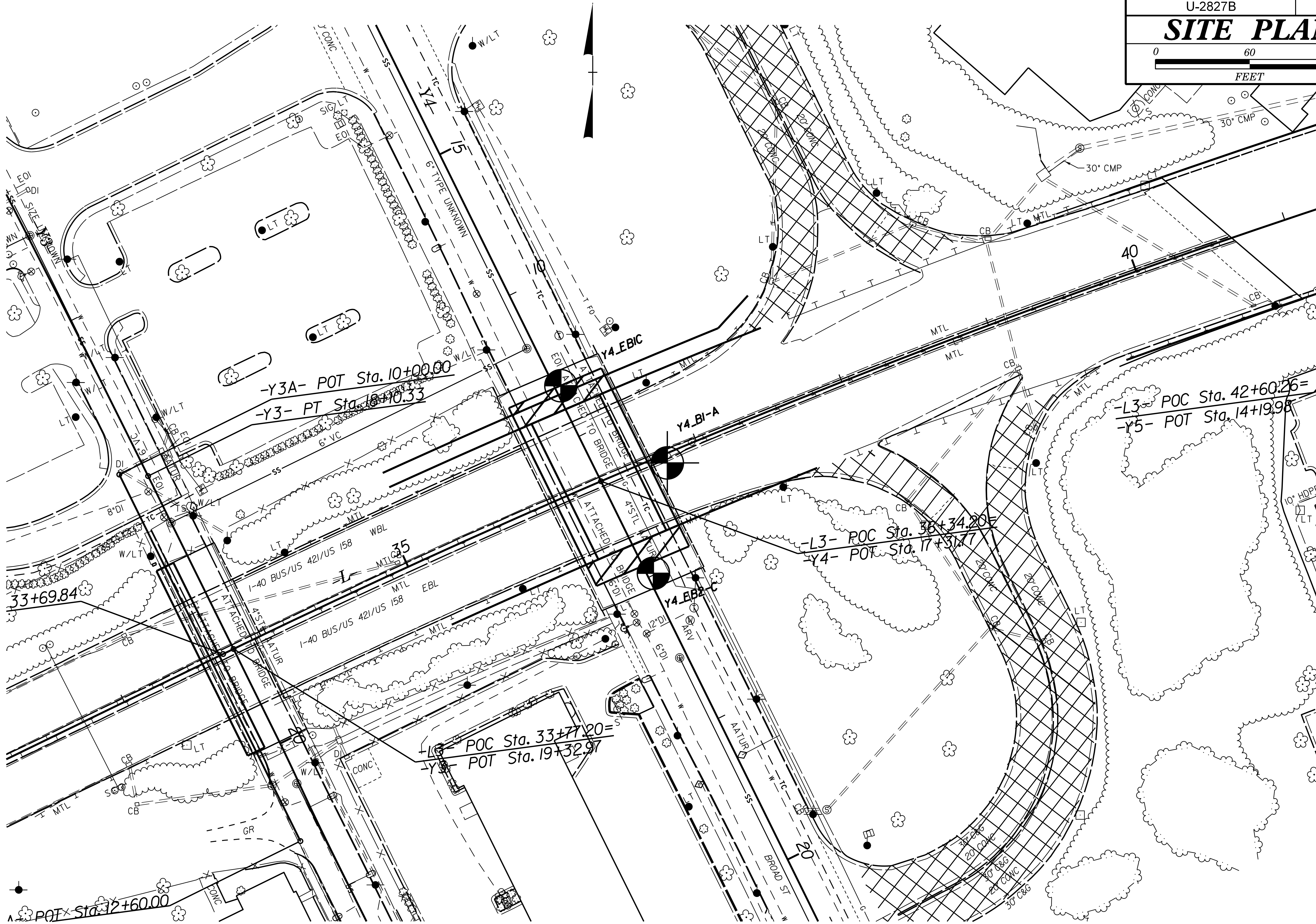
NOTES:

BRIDGES SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN



WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis
SITE DESCRIPTION BRIDGE ON -Y4- (BROAD ST.) OVER (I-40 BUSINESS)			**GROUND WTR (ft)**
BORING NO. Y4_EB1C	**STATION** 16+66	**OFFSET** 4 ft LT	**ALIGNMENT** -Y4- / **0 HR.** Dry
COLLAR ELEV. 901.5 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 854,735	**EASTING** 1,630,138 / **24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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
										901.5 GROUND SURFACE 0.0
900	901.5	0.0	WOH	WOH	3	3		M		900.7 **ROADWAY EMBANKMENT** 0.8 RED, FINE SANDY SILT (A-4) WITH TRACE GRAVEL
	898.0	3.5	4	4	4	8		M		**RESIDUAL** YELLOW-RED-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
895	893.0	8.5	2	3	4	7		M		
890	888.0	13.5	5	5	6	11		M		889.5 12.0 RED-YELLOW AND BROWN, FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
885	883.0	18.5	4	6	7	13		M		
880	878.0	23.5	4	6	5	11		M		
875	873.0	28.5	4	6	7	13		M		874.5 27.0 LIGHT BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
870	868.0	33.5	6	6	5	11		M		
865	863.0	38.5	10	12	13	25		M		864.5 37.0 RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
860	858.0	43.5	78	22/0.1		100/0.6				858.0 43.5 **WEATHERED ROCK**
	856.3	45.2	60/0.0			60/0.0				856.3 45.2 DARK GRAY (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 856.3 ft on CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y4- (BROAD ST.) OVER (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y4_B1-A	**STATION** 17+40	**OFFSET** 43 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/M
COLLAR ELEV. 890.5 ft	**TOTAL DEPTH** 51.4 ft	**NORTHING** 854,686	**EASTING** 1,630,205	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/11/15	**COMP. DATE** 08/13/15	**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)
895											
890										890.5 GROUND SURFACE	0.0
	889.5	1.0	5	6	6	12		M		889.5 0.1' ASPHALT AND 0.9' CONCRETE	1.0
	887.0	3.5	2	3	6	9		M		**RESIDUAL** ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
885											
	882.0	8.5	3	5	4	9		M			
880											
	877.0	13.5	5	5	8	13		M			
875											
	872.0	18.5	22	36	34	70		M		872.5 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4), SAPROLITIC	18.0
870											
	867.0	23.5	29	26	27	53		M			
865											
	862.0	28.5	60/0.1			60/0.1				862.5 **CRYSTALLINE ROCK** GRAY (BIOTITE GNEISS)	28.0
860											
	859.1	31.4	60/0.0			60/0.0				859.1 **CRYSTALLINE ROCK** GRAY (BIOTITE GNEISS)	31.4
855											
850							RS-4				
845											
840										839.1	51.4
										Boring Terminated at Elevation 839.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

NCDOT BORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y4- (BROAD ST.) OVER (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y4_B1-A	**STATION** 17+40	**OFFSET** 43 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/M
COLLAR ELEV. 890.5 ft	**TOTAL DEPTH** 51.4 ft	**NORTHING** 854,686	**EASTING** 1,630,205	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/11/15	**COMP. DATE** 08/13/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 20.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
859.1											Begin Coring @ 31.4 ft	
	859.1	31.4	5.0	1:25/1.0 1:30/1.0 1:30/1.0 1:30/1.0 1:28/1.0	(1.5) 30%	(0.0) 0%		(15.8) 79%	(9.6) 48%		859.1 **CRYSTALLINE ROCK** GRAY, MODERATELY WEATHERED TO FRESH, MODERATELY HARD TO HARD BIOTITE GNEISS WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING RS-4: 38.7'-39.0', qu=14,248 psi, R1=7, R2=8, R3=10, R4=20, R5=7 RMR=52, ROCK TYPE=E	31.4
855	854.1	36.4	5.0	1:27/1.0 1:50/1.0 1:50/1.0 1:40/1.0 1:40/1.0	(4.9) 98%	(2.6) 52%	RS-4					
850	849.1	41.4	5.0	2:20/1.0 1:20/1.0 1:30/1.0 1:35/1.0 2:05/1.0	(4.4) 88%	(2.0) 40%						
845	844.1	46.4	5.0	2:10/1.0 2:05/1.0 2:00/1.0 2:00/1.0 2:25/1.0	(5.0) 100%	(5.0) 100%						
840	839.1	51.4									839.1 Boring Terminated at Elevation 839.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	51.4

NCDOT CORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

CORE PHOTOGRAPHS: Bridge on -Y4- (Broad Street) over -L- (I-40 Business), Y4_B1A: -Y4- Station 17+40, 43’ LT

Begin Run 1
31.4 feet

End Run 1 &
Begin Run 2
36.4 feet

End Run 2
41.4 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

Begin Run 3
41.4 feet

End Run 3 &
Begin Run 4
46.4 feet

End Run 4
51.4 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y4- (BROAD ST.) OVER (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y4_EB2-C	**STATION** 17+99	**OFFSET** 4 ft LT	**ALIGNMENT** -Y4-	**0 HR.** Dry
COLLAR ELEV. 903.1 ft	**TOTAL DEPTH** 54.9 ft	**NORTHING** 854,616	**EASTING** 1,630,196	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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
905	903.1	0.0								903.1 GROUND SURFACE 0.0
			1	2	3	5		M		**RESIDUAL** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4)
900	899.6	3.5	8	9	7	16		M		
895	894.6	8.5	3	3	4	7		M		
890	889.6	13.5	9	16	8	24		M		890.1 13.0 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC
885	884.6	18.5	6	8	11	19		M		
880	879.6	23.5	10	10	14	24		M		
875	874.6	28.5	17	38	33	71		M		
870	869.6	33.5	22	27	20	47		M		
865	864.6	38.5	17	28	37	65		M		
860	859.6	43.5	35	36	64/0.4	100/0.9		M		859.1 44.0 **WEATHERED ROCK** GRAY, BROWN (BIOTITE GNEISS)
855	854.6	48.5	16	21	32	53		M		856.1 47.0 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4), SAPROLITIC
850	849.6	53.5	100/0.2			100/0.2				849.6 53.5
	848.2	54.9	60/0.0			60/0.0				848.2 54.9 **WEATHERED ROCK** GRAY (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 848.2 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34872.1.1
TIP NO.: U-2827B
COUNTY: Forsyth
DESCRIPTION: US 158/US 421/NC 150/Business 40, west of Fourth Street to east of Church Street
Bridge on -Y4- (Broad Street) over -L- (I-40 Business)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-4	Y4_B1A	-Y4-	17+40	43' Lt.	38.7 - 39.0	Biotite Gneiss	CZbg	52%	4.07	1.77	193.1	14,248	ND	52

ND = Not Determined

SECTION 6

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	7

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVENUE)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by:
W. Patrick Alton
A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U–2827B	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
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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:

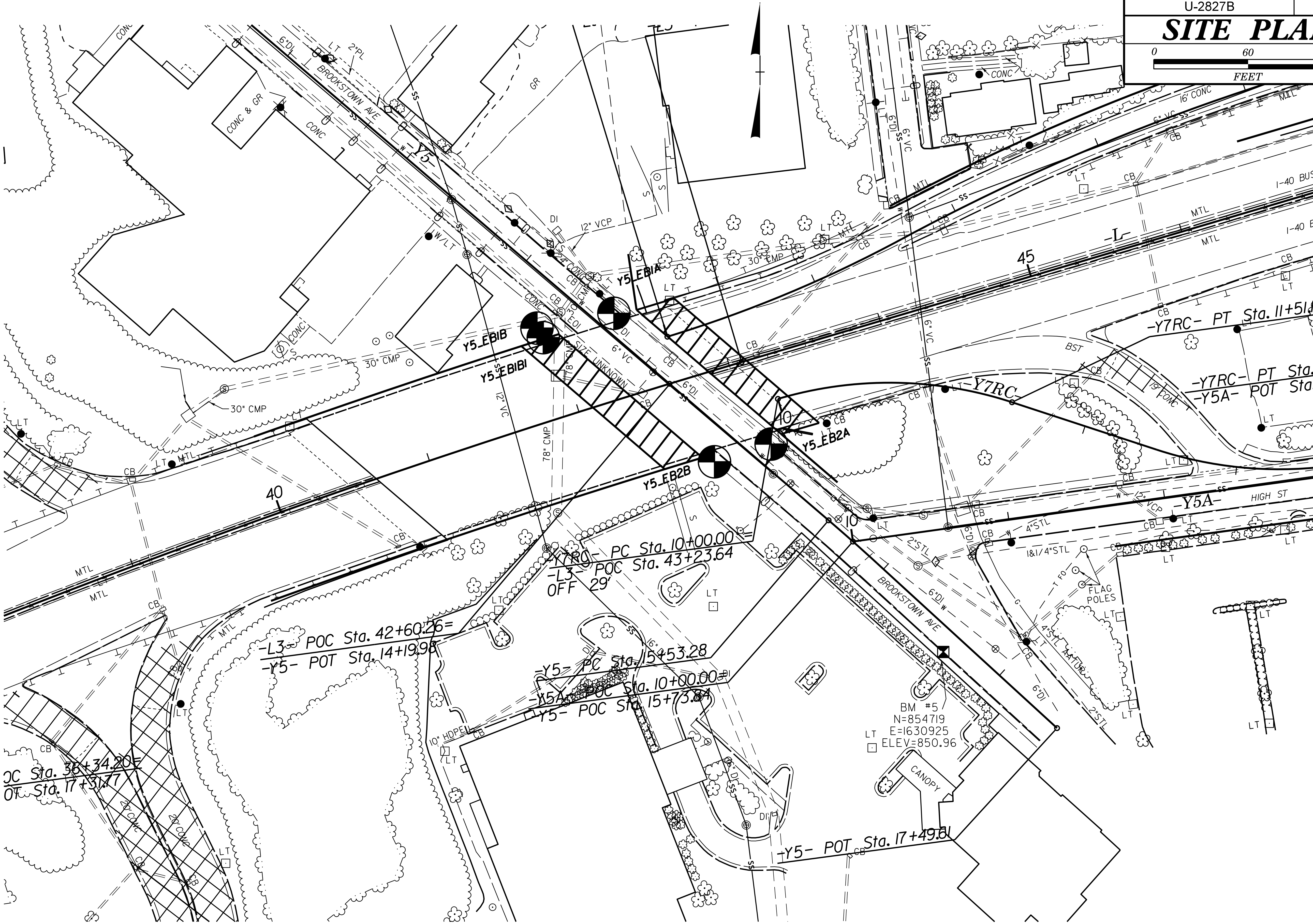
BRIDGE SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN

0 60 120
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB1A	**STATION** 13+64	**OFFSET** 11 ft LT	**ALIGNMENT** -Y5-	**0 HR.** 16.0
COLLAR ELEV. 846.5 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 854,934	**EASTING** 1,630,716	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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)
										846.5 GROUND SURFACE	0.0
	845.7	0.8								845.7 ASPHALT	0.8
			3	4	6	10		M		**ARTIFICIAL FILL** RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA	
	843.0	3.5								842.0	4.5
			3	6	6	12		M		ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL	
	838.0	8.5									
			3	5	6	11		M			
	833.0	13.5								833.5	13.0
			2	3	2	5		W		ORANGE-BROWN, FINE SANDY CLAY (A-6)	
	828.0	18.5								828.5	18.0
			6	9	9	18		W		**RESIDUAL** GRAY-BROWN, FINE TO COARSE SAND (A-1-b) WITH TRACE MICA	
	823.0	23.5								822.4	24.1
			2	3	3	6		W		GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	
	818.0	28.5									
			2	1	4	5		Sat.			
	813.0	33.5								813.5	33.0
			2	2	2	4		W		GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
	808.0	38.5									
			2	16	26	42		W			
	803.0	43.5								802.5	44.0
			24	100/0.2		100/0.2				802.0 **WEATHERED ROCK** GRAY (MICA SCHIST)	44.5
	798.0	48.5								**RESIDUAL** GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
			14	20	23	43					
	793.0	53.5								793.0	53.5
			100/0.2			100/0.2				**WEATHERED ROCK** GRAY (MICA SCHIST)	
	788.0	58.5								789.5	57.0
			100/0.1			100/0.1				**CRYSTALLINE ROCK** (MICA SCHIST)	
	783.0	63.5								782.9	63.6
			100/0.1			100/0.1				Boring Terminated with Standard Penetration Test Refusal at Elevation 782.9 ft in CRYSTALLINE ROCK (MICA SCHIST)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB1B	**STATION** 13+33	**OFFSET** 28 ft RT	**ALIGNMENT** -Y5-	**0 HR.** 27.0
COLLAR ELEV. 845.1 ft	**TOTAL DEPTH** 58.5 ft	**NORTHING** 854,925	**EASTING** 1,630,667	**24 HR.** 15.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/11/15	**COMP. DATE** 09/11/15	**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
	845.1	0.0								845.1 GROUND SURFACE 0.0
			4	10	7	17		M		**ROADWAY EMBANKMENT** BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE GRAVEL 843.1 2.0
	841.6	3.5								RED-BROWN AND YELLOW-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND GRAVEL
			2	1	2	3		M		
	836.6	8.5								
			1	2	2	4		W		
	831.6	13.5								833.1 DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL 12.0
			3	3	5	8		W		
	826.6	18.5								828.1 **ALLUVIAL** 17.0
			5	7	18	25		W		BLACK, SILTY CLAY (A-7-5) WITH TRACE ORGANICS, ORGANIC ODOR, AND TRACE GRAVEL 826.1 19.0
	821.6	23.5								LIGHT BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA NAD GRAVEL 821.6 23.5
			1	2	5	7		W		**RESIDUAL** DARK-BROWN-WHITE, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
	816.6	28.5								
			7	9	12	21		W		
	811.6	33.5								
			7	8	9	17		W		
	806.6	38.5								
			17	20	33	53		W		
	801.6	43.5								
			15	18	18	36		W		
	796.6	48.5								796.6 48.5
			100/0.3			100/0.3				**WEATHERED ROCK** DARK BROWN (BIOTITE GNEISS)
	791.6	53.5								791.6 53.5
			60/0.0			60/0.0				**CRYSTALLINE ROCK** (BIOTITE GNEISS)
	786.6	58.5								786.6 58.5
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 786.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB1B1	**STATION** 13+40	**OFFSET** 30 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 844.9 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 854,919	**EASTING** 1,630,671	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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
845	844.9	0.0	7	13	5	18		M		844.9 GROUND SURFACE 0.0 **ARTIFICIAL FILL** GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL
	841.4	3.5								841.9 3.0
840			1	1	1	2		W		ORANGE-GRAY-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND GRAVEL
	836.4	8.5								
835			2	WOH	1	1		M		830.9 14.0 Boring Terminated at Elevation 830.9 ft DUE TO POTENTIAL UTILITY

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB2A	**STATION** 14+94	**OFFSET** 13 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 74.3 ft	**NORTHING** 854,851	**EASTING** 1,630,816	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/03/15	**COMP. DATE** 08/03/15	**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											
860											
855											
850											
	847.3	0.8	3	10	9	19		M		848.1 GROUND SURFACE	0.0
845	844.6	3.5	3	2	2	4		M		847.3 0.4' ASPHALT AND 0.4' CONCRETE	0.8
840	839.6	8.5	2	2	3	5		M		**ROADWAY EMBANKMENT** RED AND BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE GRAVEL	
835	834.6	13.5	1	1	2	3		M		845.1 **RESIDUAL** ORANGE AND BROWN, FINE SANDY SILT (A-4) WITH TRACE CLAY, GRAVEL, AND MICA	3.0
830	829.6	18.5	3	1	2	3		W			
825	824.6	23.5	2	4	3	7		Sat.		825.1 ORANGE-BROWN AND GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	23.0
820	819.6	28.5	2	3	10	13		Sat.			
815	814.6	33.5	2	4	6	10		Sat.			
810	809.6	38.5	6	9	15	24		W			
805	804.6	43.5	13	22	24	46		W			
800	799.6	48.5	10	11	16	27		W			
795	794.6	53.5	34	24	22	46		W			
790	789.6	58.5	10	11	14	25		W			
785											

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB2A	**STATION** 14+94	**OFFSET** 13 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 74.3 ft	**NORTHING** 854,851	**EASTING** 1,630,816	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/03/15	**COMP. DATE** 08/03/15	**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
785						Match Line				
	784.6	63.5	28	24	44	68		W		ORANGE-BROWN AND GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC *(continued)*
780	779.6	68.5	43	42	58/0.5	100/1.0				780.7 67.4 **WEATHERED ROCK** GRAY (MICA SCHIST)
775	774.6	73.5	60/0.0			60/0.0				774.6 73.5
	773.8	74.3	60/0.0			60/0.0				773.8 74.3 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 773.8 ft in CRYSTALLINE ROCK (MICA SCHIST)

NCDOT BORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/3/15

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB2B	**STATION** 14+74	**OFFSET** 19 ft RT	**ALIGNMENT** -Y5-	**0 HR.** Dry
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 77.5 ft	**NORTHING** 854,840	**EASTING** 1,630,780	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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										
860										
855										
850										
	848.1	0.0								848.1 GROUND SURFACE 0.0
845	844.6	3.5	4	2	2	4		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS, GRAVEL, AND BRICK FRAGMENTS
			2	2	2	4		M		
840	839.6	8.5								
			4	4	4	8		M		
835	834.6	13.5								
			3	2	2	4		M		
830	829.6	18.5								
			1	1	1	2		W		
825	824.6	23.5								
			1	2	2	4		Sat.		
820	819.6	28.5								
			2	2	3	5		Sat.		
815	814.6	33.5								
			6	6	7	13		Sat.		
810	809.6	38.5								813.9 34.2
			4	5	10	15		Sat.		GRAY-BROWN, SILTY FINE SAND (A-2-4), SAPROLITIC
805	804.6	43.5								
			8	13	14	27		Sat.		
800	799.6	48.5								
			6	10	23	33		Sat.		
795	794.6	53.5								
			8	7	14	21		Sat.		
790	789.6	58.5								
			5	14	22	36		Sat.		
785										

RESIDUAL
ORANGE-BROWN, FINE SANDY CLAY (A-4) WITH TRACE GRAVEL AND MICA

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -L- (I-40 BUSINESS) OVER -Y5- (BROOKSTOWN AVE.)				**GROUND WTR (ft)**
BORING NO. Y5_EB2B	**STATION** 14+74	**OFFSET** 19 ft RT	**ALIGNMENT** -Y5-	**0 HR.** Dry
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 77.5 ft	**NORTHING** 854,840	**EASTING** 1,630,780	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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
785						Match Line				
	784.6	63.5	6	21	35	56		Sat.		GRAY-BROWN, SILTY FINE SAND (A-2-4), SAPROLITIC *(continued)*
780	779.6	68.5	100/0.2			100/0.2				781.3 66.8 **WEATHERED ROCK** GRAY AND BROWN (MICA SCHIST)
775	774.6	73.5	60/0.1			60/0.1				774.6 73.5 **CRYSTALLINE ROCK** GRAY (MICA SCHIST)
	770.7	77.4	60/0.1			60/0.1				770.6 77.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 770.6 ft in CRYSTALLINE ROCK (MICA SCHIST)

SECTION 7

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	8

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

NOTES:

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by:
W. Patrick Alton
A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	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, 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
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q3

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:

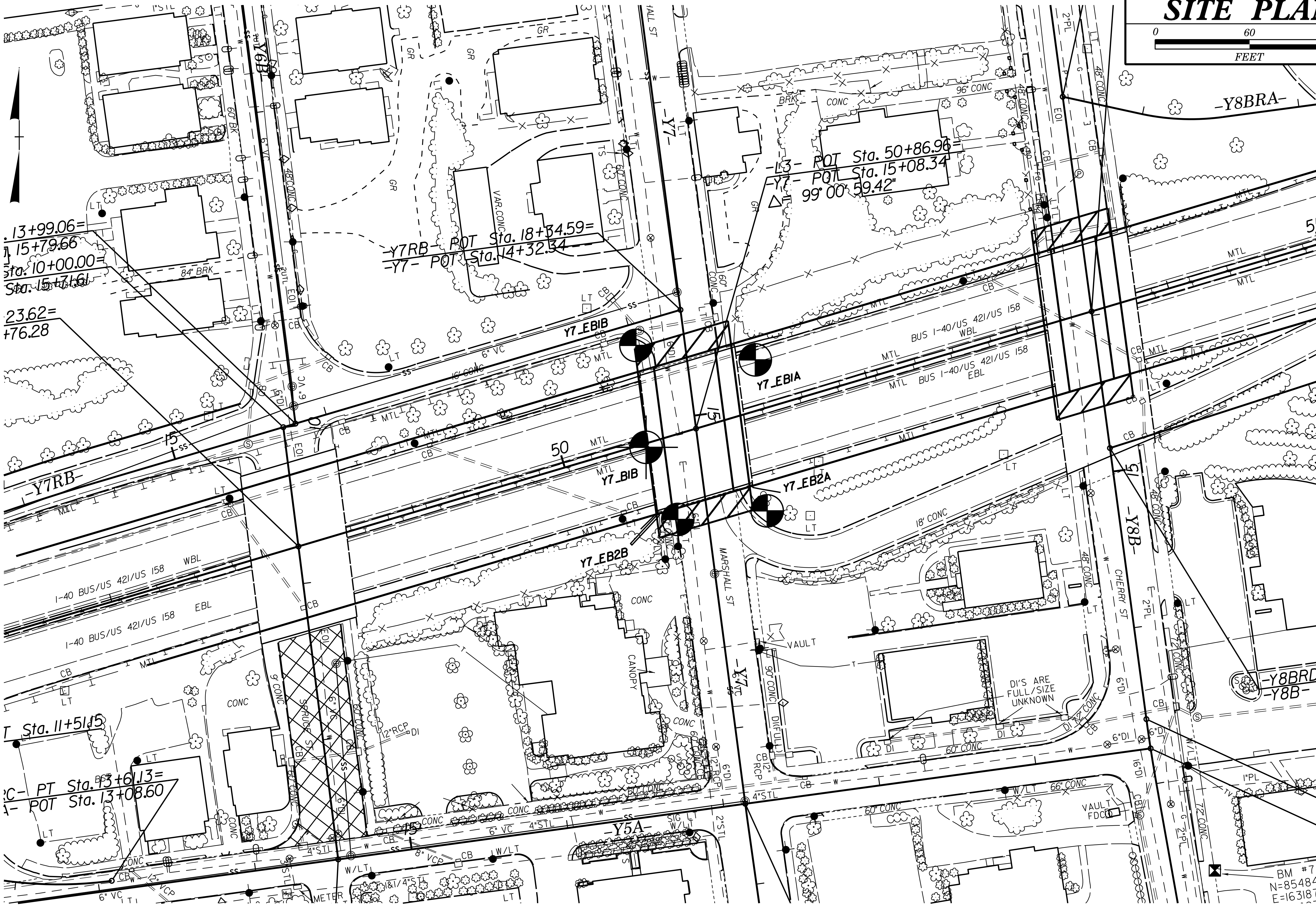
BRIDGE SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN

0 60 120
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_EB1A	**STATION** 14+70	**OFFSET** 43 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 18.3
COLLAR ELEV. 882.1 ft	**TOTAL DEPTH** 44.9 ft	**NORTHING** 855,168	**EASTING** 1,631,581	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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											
										882.1 GROUND SURFACE	0.0
	881.0	1.1								881.0 ASPHALT AND CONCRETE	1.1
880			6	13	11	24		M		**ROADWAY EMBANKMENT**	
	878.6	3.5								879.1 ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH SOME GRAVEL	3.0
			15	12	7	19		M		GRAY-TAN-BROWN, SILTY FINE TO	
875										COARSE SAND (A-2-4) WITH LITTLE	
	873.6	8.5								GRAVEL, TRACE MICA, AND ORGANICS	
			3	5	7	12		M			
870											
	868.6	13.5								869.1	13.0
			5	5	8	13		W		**RESIDUAL**	
865										GRAY-BROWN, SILTY FINE TO COARSE	
	863.6	18.5								SAND (A-2-4) WITH TRACE MICA	
			3	3	4	7		Sat.			
860											
	858.6	23.5									
			4	9	13	22		Sat.			
855											
	853.6	28.5								853.1	29.0
			21	70	30/0.1	100/0.6				**WEATHERED ROCK**	
850										GRAY-BROWN (BIOTITE GNEISS)	
	848.6	33.5								849.1	33.0
			23	23	23	46		Sat.		**RESIDUAL**	
845										GRAY-BROWN, SILTY FINE TO COARSE	
	843.6	38.5								SAND (A-2-4) WITH TRACE MICA	
			7	8	15	23		Sat.			
840											
	838.6	43.5								839.1	43.0
	837.2	44.9	100/0.3			100/0.3				**WEATHERED ROCK**	
			60/0.0			60/0.0				GRAY-BROWN (BIOTITE GNEISS)	
										837.4	44.7
										837.2	44.9
										CRYSTALLINE ROCK	
										(BIOTITE GNEISS)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 837.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_EB1B	**STATION** 14+51	**OFFSET** 31 ft RT	**ALIGNMENT** -Y7-	**0 HR.** 41.6
COLLAR ELEV. 902.2 ft	**TOTAL DEPTH** 55.4 ft	**NORTHING** 855,177	**EASTING** 1,631,505	**24 HR.** 33.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/08/15	**COMP. DATE** 09/08/15	**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
905										
	902.2	0.0								902.2 GROUND SURFACE 0.0
			1	2	2	4		M		**ROADWAY EMBANKMENT**
900										RED-BROWN, SILTY FINE TO COARSE
	898.7	3.5								SAND (A-2-4) WITH TRACE MICA, CLAY,
			3	3	3	6		M		TRACE TO LITTLE GRAVEL, AND TRACE
895										ORGANICS
	893.7	8.5								
			2	3	3	6		M		
890										
	888.7	13.5								
			2	1	3	4		M		
885										885.2 17.0
	883.7	18.5								**RESIDUAL**
			3	4	5	9		M		DARK-BROWN-BLACK, SILTY FINE SAND
880										(A-2-4) WITH TRACE MICA AND GRAVEL,
	878.7	23.5								SAPROLITIC
			7	6	6	12		M		
875										
	873.7	28.5								
			4	7	7	14		M		
870										
	868.7	33.5								
			6	7	8	15		W		
865										
	863.7	38.5								
			4	6	19	25		W		
860										
	858.7	43.5								
			9	9	17	26		W		
855										
	853.7	48.5								
			22	28	41	69		W		
850										
	848.7	53.5								
			12	40	100/0.2	100/0.2				
	846.8	55.4	60/0.0			60/0.0				847.7 54.5
										846.8 **WEATHERED ROCK** 55.4
										BROWN (BIOTITE GNEISS)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 846.8 ft on CRYSTALLINE ROCK (BIOTITE GNEISS AND SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_B1-B	**STATION** 15+16	**OFFSET** 33 ft RT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 881.0 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 855,113	**EASTING** 1,631,512	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/13/15	**COMP. DATE** 08/13/15	**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											
880	879.9	1.1	7	11	8	19		M		881.0 GROUND SURFACE	0.0
	877.5	3.5	3	10	16	26		M		879.9 ASPHALT AND CONCRETE	1.1
875										**ROADWAY EMBANKMENT**	
	872.5	8.5	60/0.1			60/0.1				878.0 YELLOW-BROWN-GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA	3.0
870										**RESIDUAL**	
	868.6	12.4	60/0.0			60/0.0				872.8 GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	8.2
865							RS-3			871.5 **CRYSTALLINE ROCK** DARK BROWN (BIOTITE GNEISS)	9.5
										869.7 **RESIDUAL** DARK BROWN, FINE SAND (A-3)	11.3
860										868.6 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	12.4
										(BIOTITE GNEISS)	
855											
850										849.6	31.4
										Boring Terminated at Elevation 849.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

NCDOT BORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_B1-B	**STATION** 15+16	**OFFSET** 33 ft RT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 881.0 ft	**TOTAL DEPTH** 31.4 ft	**NORTHING** 855,113	**EASTING** 1,631,512	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/13/15	**COMP. DATE** 08/13/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 19.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
868.6											Begin Coring @ 12.4 ft	
	868.6	12.4	4.0	2:55/1.0 2:58/1.0 3:03/1.0 2:36/1.0	(3.8) 95%	(2.2) 55%		(16.8) 88%	(14.1) 74%		868.6 GRAY, SLIGHTLY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD BIOTITE GNEISS WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING	12.4
865	864.6	16.4									RS-3: 16.0'-16.3', qu=7,225 psi, R1=4, R2=13, R3=10, R4=20, R5=7 RMR=54, ROCK TYPE=E	
			5.0	2:16/1.0 1:46/1.0 1:54/1.0 2:19/1.0 2:29/1.0	(4.3) 86%	(3.6) 72%	RS-3					
860	859.6	21.4										
			5.0	2:39/1.0 3:09/1.0 3:34/1.0 2:39/1.0 2:37/1.0	(3.7) 74%	(3.4) 68%						
855	854.6	26.4										
			5.0	3:10/1.0 3:15/1.0 3:48/1.0 4:19/1.0 3:31/1.0	(5.0) 100%	(4.9) 98%						
850	849.6	31.4									849.6	31.4
											Boring Terminated at Elevation 849.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

NCDOT CORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/2/15

CORE PHOTOGRAPHS: Bridge on -Y7- (Marshall Street) over -L- (I-40 Business), Y7_B1B: -Y7- Station 15+16, 33’ RT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_EB2A	**STATION** 15+66	**OFFSET** 38 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 36.0
COLLAR ELEV. 901.3 ft	**TOTAL DEPTH** 53.6 ft	**NORTHING** 855,072	**EASTING** 1,631,589	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/17/15	**COMP. DATE** 09/17/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
									GROUND SURFACE	901.3	0.0
									ROADWAY EMBANKMENT RED-BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE CLAY, TRACE TO SOME GRAVEL, AND TRACE ORGANICS		
	897.8	3.5									
	892.8	8.5									
	887.8	13.5									
	882.8	18.5									
	877.8	23.5									
	872.8	28.5									
	867.8	33.5									
	862.8	38.5									
	857.8	43.5									
	852.8	48.5									
	847.8	53.5									
905		0.0	8	13	13		M				
900			3	2	3		M				
895			2	4	3		M				
890			1	2	1		M				
885			2	1	2		M				
880			1	1	3		M				
875			13	21	28		M				
870			8	10	11		W				
865			9	9	11		W				
860			34	40	60/0.3						
855			40	80	20/0.1						
850			60/0.1								
									884.3	17.0	
									RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE CLAY, MICA, AND ORGANICS		
									874.3	27.0	
									RESIDUAL DARK BROWN TO YELLOW-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITC		
									857.3	44.0	
									WEATHERED ROCK YELLOW-BROWN (BIOTITE GNEISS)		
									847.8	53.5	
									847.7	53.6	
									CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 847.7 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)		

BLOWS PER FOOT: 0 25 50 75 100

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y7- (MARSHALL ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y7_EB2B	**STATION** 15+64	**OFFSET** 19 ft RT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 899.2 ft	**TOTAL DEPTH** 26.2 ft	**NORTHING** 855,067	**EASTING** 1,631,532	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/09/15	**COMP. DATE** 09/09/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
									GROUND SURFACE	899.2	0.0
									ROADWAY EMBANKMENT DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE TO SOME GRAVEL, TRACE MICA, AND ROOTS		
	895.7	3.5									
	890.7	8.5									
	885.7	13.5									
	880.7	18.5									
	875.7	23.5									
	873.0	26.2									
900		0.0	2	3	3		M				
895			1	2	1		M				
890			2	3	2		M				
885			2	1	2		M				
880			4	4	2		M				
875			3	3	3		M				
			60/0.0								
									873.0	26.2	
									Boring Terminated with Standard Penetration Test Refusal at Elevation 873.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)		

BLOWS PER FOOT: 0 25 50 75 100

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34872.1.1
TIP NO.: U-2827B
COUNTY: Forsyth
DESCRIPTION: US 158/US 421/NC 150/Business 40, west of Fourth Street to east of Church Street
Bridge on -Y7- (Marshall Street) over -L- (I-40 Business)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-3	Y7_B1B	-Y7-	15+16	33' Rt.	16.0 - 16.3	Biotite Gneiss	CZbg	55%	3.78	1.77	171.7	7,225	ND	54

ND = Not Determined

SECTION 8

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	9

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by:
W. Patrick Alton
A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	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, 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
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q3

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

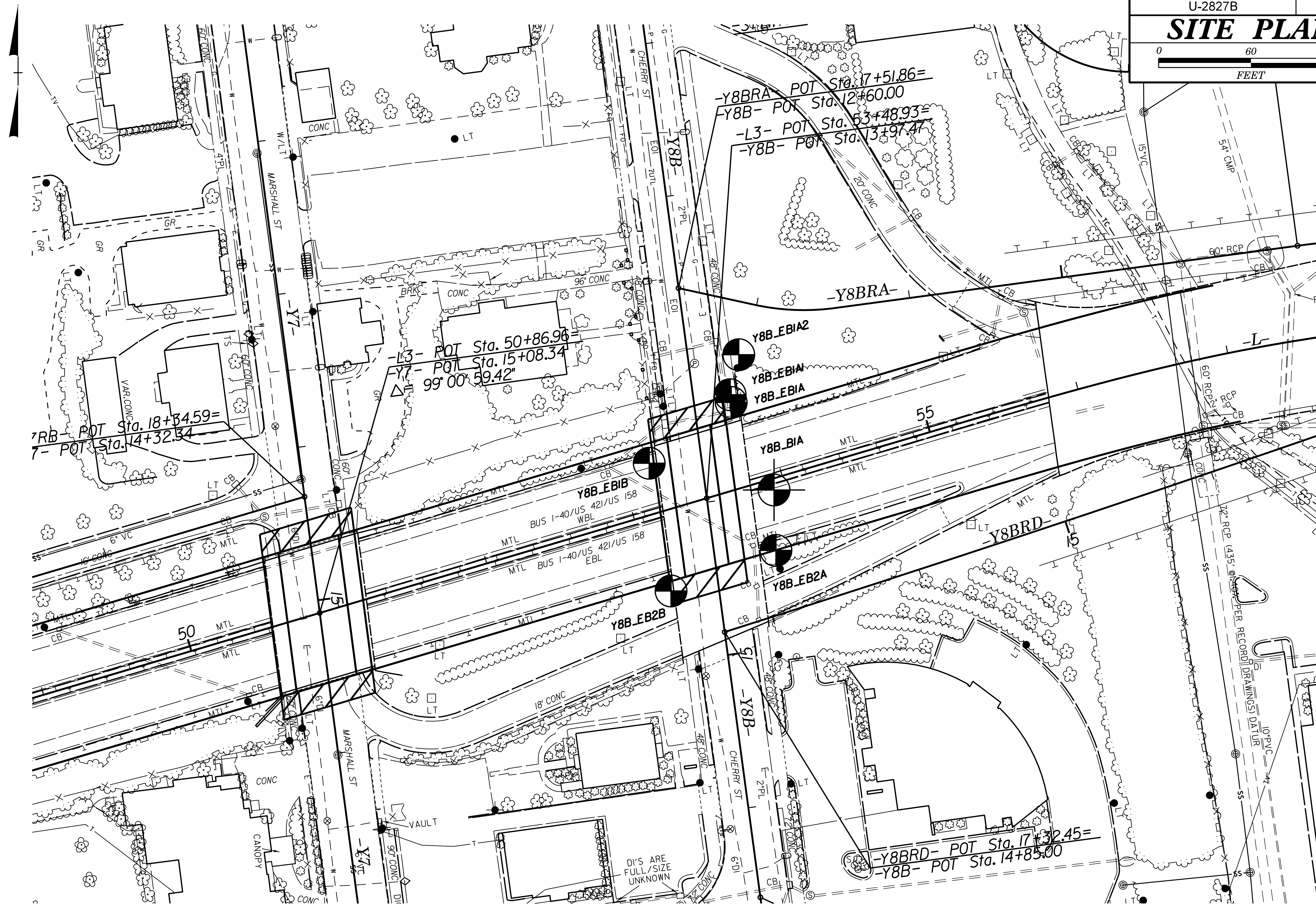
NOTES:

BRIDGE SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A	**STATION** 13+38	**OFFSET** 24 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.2 ft	**TOTAL DEPTH** 21.7 ft	**NORTHING** 855,261	**EASTING** 1,631,811	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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)
910											
	908.2	0.0	3	3	3	6		W		908.2 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
905	904.7	3.5	WOH	2	1	3		W		906.2 BROWN-BLACK AND RED, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND ORGANICS	2.0
										RED, SILTY CLAY (A-7-5) WITH TRACE GRAVEL AND MICA	
900	899.7	8.5	WOH	WOH	2	2		W		898.3	9.9
										DARK RED, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND CLAY	
895	894.7	13.5	3	4	5	9		W			
890	889.7	18.5	2	2	2	4		W		886.5	21.7
										Boring Terminated at Elevation 886.5 ft on CONCRETE	
										Note: Boring terminated on possible retaining wall footing	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A1	**STATION** 13+33	**OFFSET** 24 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.5 ft	**TOTAL DEPTH** 23.5 ft	**NORTHING** 855,266	**EASTING** 1,631,810	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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)
910											
	908.5	0.0	2	3	4	7		M		908.5 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
905	905.0	3.5	WOH	1	1	2		M		BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND ROOTS	3.0
										905.5 RED-YELLOW, SILTY CLAY (A-7-5) WITH TRACE GRAVEL	
900	900.0	8.5	2	1	3	4		M			
895	895.0	13.5	20	24	23	47		M		895.5 RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND LITTLE TO SOME GRAVEL	13.0
890	890.0	18.5	5	2	2	4		M			
885	885.0	23.5	60/0.0			60/0.0				887.0	21.5
										885.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 885.0 ft in CONCRETE	23.5
										Notes: 1. Boring terminated on possible retaining wall footing 2. 2nd Attempt at boring EB1A	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A2	**STATION** 13+08	**OFFSET** 33 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.6 ft	**TOTAL DEPTH** 22.5 ft	**NORTHING** 855,292	**EASTING** 1,631,815	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/04/15	**COMP. DATE** 09/04/15	**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)
910											
	908.6	0.0	4	7	9	16		M		908.6 GROUND SURFACE	0.0
905	905.1	3.5	6	7	5	12		M		**ROADWAY EMBANKMENT** BROWN, SILTY FINE SANDY CLAY (A-6) WITH TRACE MICA AND ORGANICS	
900	900.1	8.5	5	6	7	13		M		900.6 **RESIDUAL** RED-BROWN TO DARK BROWN-YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	8.0
895	895.1	13.5	7	11	15	26		M			
890	890.1	18.5	19	53	47/0.4	100/0.9				889.6 **WEATHERED ROCK** RED-BROWN (BIOTITE GNEISS)	19.0
	886.1	22.5	60/0.0			60/0.0				886.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 886.1 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	22.5

Note:
1. 3rd Attempt at boring Y8B_EB1A due to previous borings terminating on possible retaining wall footing

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB1B	**STATION** 13+70	**OFFSET** 34 ft RT	**ALIGNMENT** -Y8B-	**0 HR.** N/M
COLLAR ELEV. 890.0 ft	**TOTAL DEPTH** 4.7 ft	**NORTHING** 855,221	**EASTING** 1,631,757	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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)
890											
	889.1	0.9	7	12	15	27		M		890.0 GROUND SURFACE	0.0
	886.5	3.5	100/0.4			100/0.4				889.1 0.1' ASPHALT AND 0.8' CONCRETE	0.9
	885.3	4.7	60/0.0			60/0.0				**ROADWAY EMBANKMENT** 886.5 BROWN, FINE TO COARSE SANDY SILT (A-4) WITH SOME GRAVEL	3.5
										885.3 **WEATHERED ROCK** TAN AND GRAY (BIOTITE GNEISS)	4.7
										Boring Terminated with Standard Penetration Test Refusal at Elevation 885.3 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_B1A	**STATION** 13+98	**OFFSET** 44 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 901.4 ft	**TOTAL DEPTH** 16.2 ft	**NORTHING** 855,204	**EASTING** 1,631,838	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/12/15	**COMP. DATE** 08/12/15	**SURFACE WATER DEPTH** N/A	

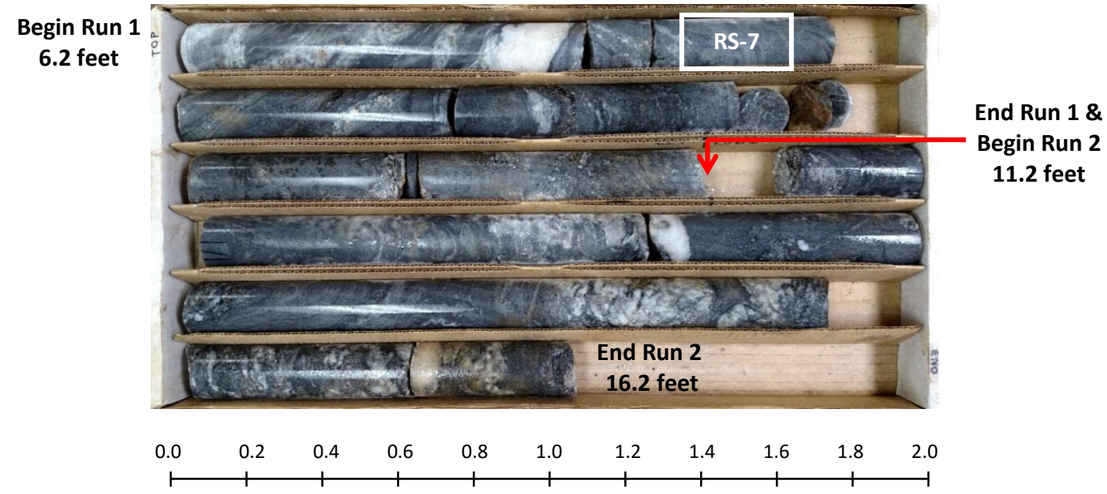
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
905										ELEV. (ft) / DEPTH (ft)
										901.4 GROUND SURFACE 0.0
900	900.4	1.0	5	10	9	19				900.4 ASPHALT AND CONCRETE 1.0
	897.9	3.5	14	100/0.4		100/0.4				**ROADWAY EMBANKMENT** RED-BROWN, CLAYEY SILT (A-5) WITH LITTLE GRAVEL, TRACE ROOTS/WOOD FRAGMENTS, AND MICA 897.9 3.5
895	895.2	6.2	60/0.0			60/0.0	RS-7			895.4 6.0 BROWN-GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL (POSSIBLE BOULDER) 895.2 6.2
890										**CRYSTALLINE ROCK** (BIOTITE GNEISS)
										CRYSTALLINE ROCK (BIOTITE GNEISS)
										885.2 16.2
										Boring Terminated at Elevation 885.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_B1A	**STATION** 13+98	**OFFSET** 44 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 901.4 ft	**TOTAL DEPTH** 16.2 ft	**NORTHING** 855,204	**EASTING** 1,631,838	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/12/15	**COMP. DATE** 08/12/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 10.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
~~895.2~~											Begin Coring @ 6.2 ft
	895.2	6.2	5.0	4:10/1.0 3:00/1.0 2:58/1.0 3:06/1.0 2:33/1.0	(4.7) 94%	(4.3) 86%	RS-7	(9.7) 97%	(9.3) 93%		895.2 **CRYSTALLINE ROCK** 6.2 GRAY, SLIGHTLY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD BIOTITE GNEISS WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING RS-7: 7.5'-7.8', qu=11,291 psi, R1=7, R2=20, R3=10, R4=20, R5=7 RMR=64, ROCK TYPE=E
890	890.2	11.2	5.0	3:47/1.0 3:24/1.0 2:52/1.0 3:08/1.0 2:53/1.0	(5.0) 100%	(5.0) 100%					
	885.2	16.2									885.2 16.2 Boring Terminated at Elevation 885.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

CORE PHOTOGRAPHS: Bridge on -Y8B- (Cherry Street) over -L- (I-40 Business), Y8B_B1A: -Y8B- Station 13+98, 44’ LT



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB2A	**STATION** 14+37	**OFFSET** 40 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 895.4 ft	**TOTAL DEPTH** 6.4 ft	**NORTHING** 855,165	**EASTING** 1,631,840	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/17/15	**COMP. DATE** 09/17/15	**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)
900											
895	895.4	0.0	4	6	7	13		M		895.4 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT RED-BROWN, CLAYEY FINE SAND (A-2-6) WITH TRACE ROOTS AND MICA	2.0
	891.9	3.5	22	30	29	59		M		893.4 **RESIDUAL** GRAY-LIGHT BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL	
890	889.0	6.4	60/0.0			60/0.0				889.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 889.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	6.4

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y8B- (CHERRY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y8B_EB2B	**STATION** 14+54	**OFFSET** 31 ft RT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 887.3 ft	**TOTAL DEPTH** 8.7 ft	**NORTHING** 855,139	**EASTING** 1,631,771	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/21/15	**COMP. DATE** 09/21/15	**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)
890											
	887.3	0.0	5	4	6	10		M		887.3 GROUND SURFACE	0.0
885										**ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL AND TRACE ORGANICS	
	883.8	3.5	13	13	8	21		M		885.3 **RESIDUAL** GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	2.0
880	878.8	8.5	60/0.0			60/0.0				881.3 **WEATHERED ROCK** LIGHT GRAY (BIOTITE GNEISS)	6.0
	878.6	8.7	60/0.0							878.8 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	8.5
										878.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 878.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	8.7

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34872.1.1
TIP NO.: U-2827B
COUNTY: Forsyth
DESCRIPTION: US 158/US 421/NC 150/Business 40, west of Fourth Street to east of Church Street Bridge on -Y8B- (Cherry Street) over -L- (I-40 Business)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-7	Y8B_B1A	-Y8B-	13+98	44' Lt.	7.5 - 7.8	Biotite Gneiss	CZbg	86%	3.78	1.77	166.9	11,291	ND	64

ND = Not Determined

SECTION 9

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	6

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by: W. Patrick Alton A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U–2827B	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/FT²)
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 (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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:

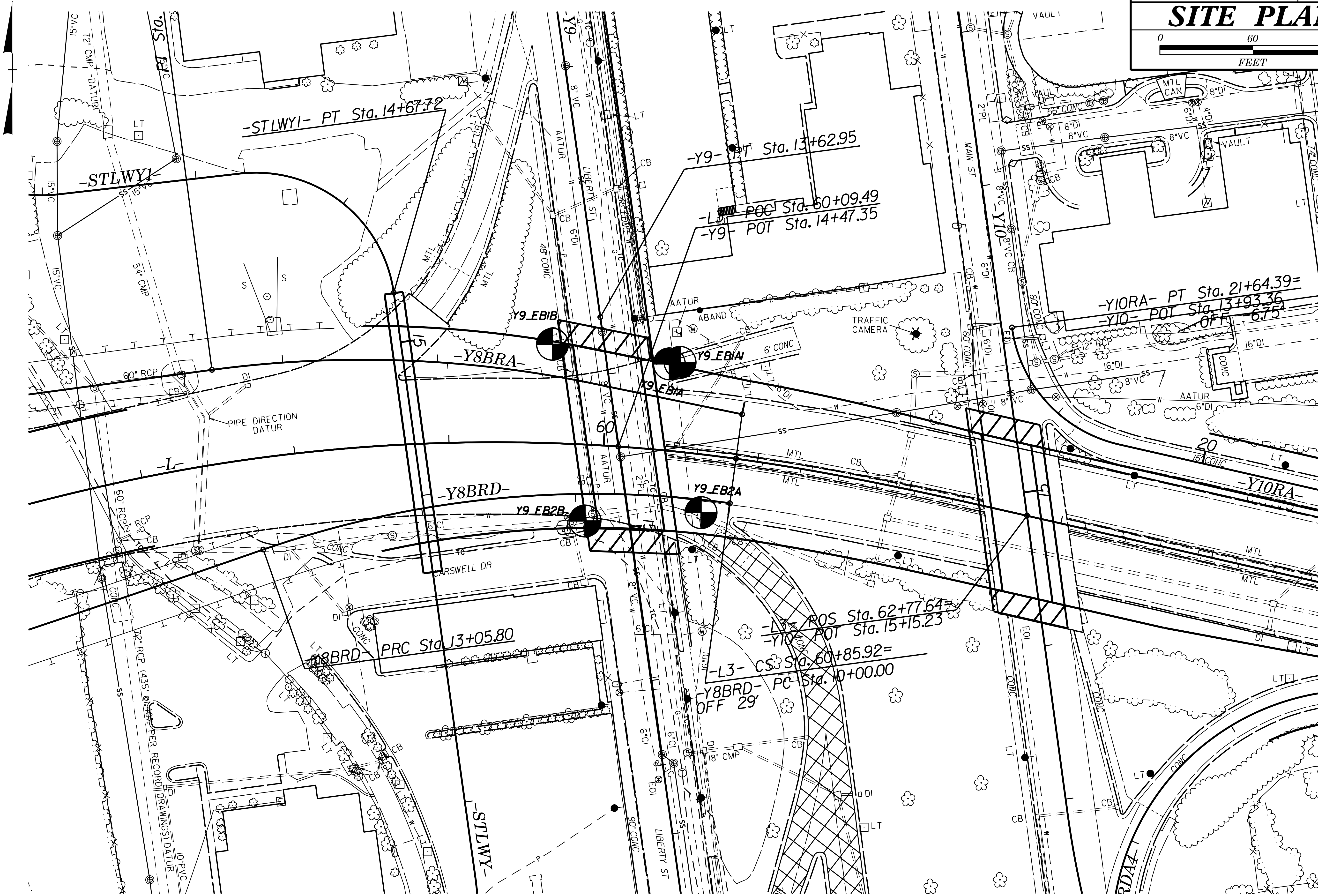
BRIDGE SURVEYED USING A SURVEY-GRADE GPS UNIT

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN

0 60 120
FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y9_EB1A	**STATION** 13+99	**OFFSET** 40 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 885.5 ft	**TOTAL DEPTH** 21.8 ft	**NORTHING** 855,366	**EASTING** 1,632,474	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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)
890											
885	884.5	1.0	2	2	2	4		M		885.5 GROUND SURFACE	0.0
										884.5 ASPHALT AND CONCRETE	1.0
	882.0	3.5	2	3	2	5		M		**ROADWAY EMBANKMENT** RED AND BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE GRAVEL AND MICA	3.0
880										RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL	
	877.0	8.5	2	1	2	3		M		877.5 BROWN, FINE SANDY SILT (A-4) WITH TRACE BRICK FRAGMENTS AND GRAVEL, HIGHLY MICACEOUS	8.0
875											
	872.0	13.5	2	1	2	3		M			
870											
	867.0	18.5	2	3	3	6		W		864.4	21.1
865	863.9	21.6	100/0.7			100/0.7				863.7 CONCRETE Boring Terminated at Elevation 863.7 ft DUE TO POSSIBLE BRIDGE FOUNDATION	21.8

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y9_EB1A1	**STATION** 13+99	**OFFSET** 47 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 40.0
COLLAR ELEV. 885.4 ft	**TOTAL DEPTH** 60.1 ft	**NORTHING** 855,367	**EASTING** 1,632,481	**24 HR.** 28.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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
890										
885	884.4	1.0	3	4	3	7		M		885.4 GROUND SURFACE 0.0 884.4 ASPHALT AND CONCRETE 1.0
	881.9	3.5	2	2	2	4		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY CLAY (A-6) WITH TRACE GRAVEL 3.0
880										RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND GRAVEL
	876.9	8.5	2	2	2	4		M		877.4 BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, CLAY, AND ORGANICS 8.0
875										
	871.9	13.5	1	1	2	3		M		
870										
	866.9	18.5	4	6	6	12		M		867.4 **RESIDUAL** BROWN, SILTY FINE SAND (A-2-4), HIGHLY MICACEOUS 18.0
865	861.9	23.5	2	4	3	7		W		862.4 YELLOW-LIGHT BROWN, FINE SANDY SILT (A-4), HIGHLY MICACEOUS, SAPROLITIC 23.0
860	856.9	28.5	1	2	3	5		W		855.9 BLACK-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND LITTLE GRAVEL 29.5
855	851.9	33.5	1	2	3	5		W		852.4 GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND LITTLE GRAVEL, SAPROLITIC 33.0
850	846.9	38.5	1	3	3	6		W		
845	841.9	43.5	2	3	4	7		W		
840	836.9	48.5	6	36	44	80		M		831.9 **WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS) 53.5
835	831.9	53.5	100/0.2			100/0.2				828.5 **CRYSTALLINE ROCK** DARK GRAY (BIOTITE GNEISS) 56.9
830	826.9	58.5	60/0.1			60/0.1				825.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 825.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS) 60.1
	825.3	60.1	60/0.0			60/0.0				Note: 1. 2nd Attempt at boring Y9_EB1A due to previous boring terminating on possible bridge foundation

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang
SITE DESCRIPTION BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)			**GROUND WTR (ft)**
BORING NO. Y9_EB1B	**STATION** 13+76	**OFFSET** 33 ft RT	**ALIGNMENT** -Y9-	**0 HR.** 20.8
COLLAR ELEV. 872.6 ft	**TOTAL DEPTH** 68.8 ft	**NORTHING** 855,379	**EASTING** 1,632,398	**24 HR.** 18.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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										
	872.6	0.0								872.6 GROUND SURFACE 0.0
			2	3	4	7		M		**ARTIFICIAL FILL** RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE ORGANICS AND GRAVEL
870	869.1	3.5								
			3	3	4	7		M		
865	864.1	8.5								
			3	3	3	6		M		
860	859.1	13.5								859.6 13.0
			2	1	2	3		W		**RESIDUAL** TAN BROWN, FINE SANDY CLAYEY SILT (A-5)
855	854.1	18.5						▼		854.6 18.0
			2	3	3	6		W		ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA
850	849.1	23.5								
			4	6	6	12		W		
845	844.1	28.5								844.6 28.0
			8	9	10	19		W		GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA
840	839.1	33.5								
			4	4	6	10		W		
835	834.1	38.5								
			8	7	11	18		W		
830	829.1	43.5								
			8	10	18	28		W		
825	824.1	48.5								
			20	25	30	55		W		
820	819.1	53.5								
			17	23	32	55		W		
815	814.1	58.5								814.1 58.5
			100/0.4			100/0.4				**WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
810	809.1	63.5								
			43	100/0.3		100/0.3				
805	804.1	68.5								803.8 68.8
			100/0.3			100/0.3				Boring Terminated at Elevation 803.8 ft in WEATHERED ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y9_EB2A	**STATION** 14+97	**OFFSET** 47 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 31.0
COLLAR ELEV. 882.9 ft	**TOTAL DEPTH** 57.3 ft	**NORTHING** 855,270	**EASTING** 1,632,494	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/24/15	**COMP. DATE** 08/24/15	**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											
	881.8	1.1								882.9 GROUND SURFACE	0.0
										881.8 ASPHALT AND CONCRETE	1.1
880	879.4	3.5	5	6	5	11		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, GRAVEL, BRICK FRAGMENTS, AND TRACE TO LITTLE CLAY	
			3	2	1	3		M			
875	874.4	8.5									
			2	2	2	4		M			
870	869.4	13.5									
			2	4	3	7		M			
865	864.4	18.5								865.9 RESIDUAL	17.0
			3	3	3	6		M		BROWN-YELLOW, FINE SANDY SILTY (A-4) WITH TRACE CLAY AND MICA	
860	859.4	23.5									
			2	4	4	8		M			
855	854.4	28.5									
			2	3	4	7		W			
850	849.4	33.5								850.9 YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CLAY AND MICA	32.0
			3	5	6	11		W			
845	844.4	38.5								845.9 GRAY-BROWN-YELLOW, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA	37.0
			2	3	6	9		W		843.2 DARK-GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CLAY AND MICA	39.7
840	839.4	43.5								840.9 YELLOW-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, CLAY, AND MICA	42.0
			1	2	1	3		W			
835	834.4	48.5								835.9 BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA	47.0
			2	3	4	7		W			
830	829.4	53.5								829.9 **WEATHERED ROCK** GRAY-BLACK (MICA SCHIST)	53.0
			73	27/0.3		100/0.8					
	825.6	57.3	60/0.0			60/0.0				825.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 825.6 ft on CRYSTALLINE ROCK (MICA SCHIST)	57.3

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y9- (LIBERTY ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y9_EB2B	**STATION** 14+92	**OFFSET** 28 ft RT	**ALIGNMENT** -Y9-	**0 HR.** 20.0
COLLAR ELEV. 866.5 ft	**TOTAL DEPTH** 68.7 ft	**NORTHING** 855,265	**EASTING** 1,632,419	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/06/15	**COMP. DATE** 08/06/15	**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											
	865.9	0.6								866.5 GROUND SURFACE	0.0
865			1	15	14	29		M		865.9 CONCRETE	0.6
	863.0	3.5								**ROADWAY EMBANKMENT**	
			1	2	2	4		M		863.5 ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL	3.0
860										**RESIDUAL**	
	858.0	8.5								ORANGE-BROWN AND GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC	
			2	2	4	6		M			
855	853.0	13.5									
			2	4	3	7		W			
850	848.0	18.5									
			3	3	2	5		W			
845	843.0	23.5									
			1	4	4	8		W			
840	838.0	28.5									
			4	6	8	14		Sat.			
835	833.0	33.5									
			2	8	10	18		Sat.			
830	828.0	38.5									
			4	5	8	13		Sat.			
825	823.0	43.5									
			5	7	9	16		Sat.			
820	818.0	48.5									
			5	7	10	17		Sat.			
815	813.0	53.5								813.5 GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA	53.0
			10	17	22	39		Sat.			
810	808.0	58.5								807.5 **WEATHERED ROCK** GRAY AND BROWN (BIOTITE GNEISS)	59.0
			39	41	59/0.5	100/1.0					
805	803.0	63.5								803.0 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	63.5
			60/0.1			60/0.1					
800	798.0	68.5								797.8 Boring Terminated at Elevation 797.8 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	68.7
			100/0.2			100/0.2					

SECTION 10

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	6

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by: W. Patrick Alton A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U–2827B	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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	> 50	N/A
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
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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: BL-154, N:855337.5460, E: 1632659.9920

ELEVATION: 890.17 FEET

NOTES:

BL-154=BRIDGES -Y10 & -Y11B-

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN

0 60 120

FEET

-Y9- POT Sta. 13+62.95

-L3- POC Sta. 60+09.49

-Y9- POT Sta. 14+47.35

-Y10RA- PT Sta. 21+64.39=

-Y10- POT Sta. 13+93.36

OFF -6.75'

-L3- POT Sta. 65+33.43=

-Y11B- POT Sta. 15+28.71

Δ = 69° 34' 45.10"

-L3- POS Sta. 62+77.64=

-Y10- POT Sta. 15+15.23

-L3- CS Sta. 60+85.92=

-Y8BRD- PC Sta. 10+00.00

OFF 29'

Sta. 13+05.80

-Y8BRA-

-Y8BRD-

-STLWY-

-Y10_EBIB

-Y10_EBIA

-Y10_BIA

-Y10_EB2B

-Y10_EB2A

-Y10RA-

-Y10RDA4-

-Y11B-

-Y10RDA4- POC Sta. 15+

-Y11B- POT Sta. 15+91.5

-Y10RDA4- POT Sta. 19+10.50=

-Y8BRD- POT Sta. 17+74.76

VAULT

TRAFFIC CAMERA

ABAND

BK SIGN

PARKING

8" SOIL

CARSWELL DR

LIBERTY ST

CHURCH ST

MAIN ST

ATTACHED BRIDGE

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y10_EB1A	**STATION** 14+66	**OFFSET** 17 ft LT	**ALIGNMENT** -Y10-	**0 HR.** 36.5
COLLAR ELEV. 890.6 ft	**TOTAL DEPTH** 52.3 ft	**NORTHING** 855,319	**EASTING** 1,632,715	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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)
895											
890	890.1	0.5	20	15	14	29				890.6 GROUND SURFACE	0.0
										0.5' ASPHALT AND 2.1' ABC STONE	
	887.1	3.5	2	2	2	4		W		888.0	2.6
885										**ROADWAY EMBANKMENT** RED-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE MICA	
	882.1	8.5	1	1	2	3		M		883.6	7.0
880										RED-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND LITTLE GRAVEL	
	877.1	13.5	2	2	2	4		M		878.6	12.0
875										RED AND BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA	
	872.1	18.5	5	100/0.3		100/0.3				871.6	19.0
870										871.1 **WEATHERED ROCK** (BOULDER)	19.5
	867.1	23.5	5	9	9	18		M		869.1 **CRYSTALLINE ROCK** (BOULDER)	21.5
865										**RESIDUAL** BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	
	862.1	28.5	5	6	7	13		M		863.6	27.0
860										BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL, SAPROLITIC	
	857.1	33.5	3	2	5	7		W		858.6	32.0
855										ORANGE AND RED, CLAYEY SILT (A-5) WITH TRACE FINE SAND AND MICA, SAPROLITIC	
	852.1	38.5	14	22	21	43		W		853.6	37.0
850										GRAY-BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC	
	847.1	43.5	28	44	39	83		W			
845											
	842.1	48.5	27	26	100/0.3	100/0.3				841.1 **WEATHERED ROCK** BROWN AND BLACK (MICA SCHIST)	49.5
840										838.5	52.1
										838.3 **CRYSTALLINE ROCK** (MICA SCHIST)	52.3
										Boring Terminated by Auger Refusal at Elevation 838.3 ft in CRYSTALLINE ROCK (MICA SCHIST)	
										NOTE: BORING TERMINATED AT 52.3' DUE TO BROKEN AUGER	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y10_EB1B	**STATION** 14+46	**OFFSET** 29 ft RT	**ALIGNMENT** -Y10-	**0 HR.** N/A
COLLAR ELEV. 890.6 ft	**TOTAL DEPTH** 55.2 ft	**NORTHING** 855,333	**EASTING** 1,632,667	**24 HR.** 37.6
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/20/15	**COMP. DATE** 08/20/15	**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
895										
890	890.6	0.0	WOH	1	1	2		W		890.6 GROUND SURFACE 0.0
	887.1	3.5	2	1	2	3		W		**ROADWAY EMBANKMENT** RED-GRAY-BROWN, FINE TO COARSE, SANDY CLAYEY SILT (A-5) WITH TRACE GRAVEL, DEBRIS (METAL), BRICK FRAGMENTS AND ORGANICS
885										
	882.1	8.5	1	1	1	2		M		
880										
	877.1	13.5	1	2	3	5		M		
875										
	872.1	18.5	5	2	3	5		M		871.4 19.2
870										**RESIDUAL** ORANGE-GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
	867.1	23.5	5	4	6	10		M		
865										
	862.1	28.5	3	5	5	10		M		
860										
	857.1	33.5	5	4	7	11		M		
855										
	852.1	38.5	35	45	55/0.1	100/0.6		M		852.3 38.3
850										**WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
	847.1	43.5	7	10	18	28		W		849.1 41.5
845										**RESIDUAL** GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4), SAPROLITIC
	842.1	48.5	17	19	26	45		W		
840										
	837.1	53.5	100/0.2			100/0.2				837.1 53.5
	835.4	55.2	60/0.0			60/0.0				835.6 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST) 55.0
										835.4 **CRYSTALLINE ROCK** (MICA SCHIST) 55.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 835.4 ft in CRYSTALLINE ROCK (MICA SCHIST)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang
SITE DESCRIPTION BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)			**GROUND WTR (ft)**
BORING NO. Y10_B1A	**STATION** 15+32	**OFFSET** 33 ft LT	**ALIGNMENT** -Y10- **0 HR.** 22.2
COLLAR ELEV. 872.0 ft	**TOTAL DEPTH** 49.5 ft	**NORTHING** 855,256	**EASTING** 1,632,740 **24 HR.** 17.4
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/13/15	**COMP. DATE** 08/13/15	**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
										872.0 GROUND SURFACE 0.0
	871.0	1.0								871.0 0.1' ASPHALT AND 0.9' CONCRETE 1.0
870			13	7	6	13		M		**RESIDUAL**
	868.5	3.5	5	5	7	12		M		ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
865										
	863.5	8.5	3	5	6	11		M		
860										
	858.5	13.5	23	45	37	82		M		859.0 13.0 GRAY-BROWN, SILTY FINE SAND (A-2-4)
855										
	853.5	18.5	5	7	11	18		M		854.0 18.0 GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
850										
	848.5	23.5	9	10	15	25		M		
845										
	843.5	28.5	7	11	13	24		W		
840										840.6 31.4 **WEATHERED ROCK** GRAY (MICA SCHIST)
	838.5	33.5	64	100/0.3		100/0.3				
835										
	833.5	38.5	100/0.3			100/0.3				
830										
	828.5	43.5	24	39	44	83		M		829.5 42.5 **RESIDUAL** TAN AND GRAY, SILTY FINE SAND (A-2-4) WITH TRACE COARSE SAND, SAPROLITIC
825										
	823.5	48.5								823.5 48.5
	822.5	49.5	100/0.1			100/0.1				822.5 49.5 **CRYSTALLINE ROCK** GRAY AND BROWN (MICA SCHIST)
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 822.5 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y10_EB2A	**STATION** 15+90	**OFFSET** 15 ft LT	**ALIGNMENT** -Y10-	**0 HR.** 44.5
COLLAR ELEV. 890.0 ft	**TOTAL DEPTH** 58.5 ft	**NORTHING** 855,196	**EASTING** 1,632,730	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/02/15	**COMP. DATE** 09/02/15	**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)
890										890.0 GROUND SURFACE	0.0
	889.5	0.5	8	7	7	14		M		0.5' ASPHALT AND 1.4' ABC STONE	
	886.5	3.5								888.1	1.9
885			3	3	4	7		M		**ROADWAY EMBANKMENT** GRAY-RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND LITTLE TO SOME GRAVEL	
	881.5	8.5									
880			6	9	4	13		M			
	876.5	13.5								878.0	12.0
875			3	5	6	11		M		**RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA, SAPROLITIC	
	871.5	18.5									
870			8	8	8	16		M			
	866.5	23.5									
865			5	5	12	17		M			
	861.5	28.5									
860			6	6	7	13		M			
	856.5	33.5									
855			12	12	11	23		W			
	851.5	38.5									
850			10	12	11	23		W			
	846.5	43.5									
845			17	29	22	51		W			
	844.3	45.7	100/0.4			100/0.4				844.9	45.1
	841.5	48.5								**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	
840			13	24	27	51		W		843.0	47.0
	836.5	53.5								**RESIDUAL** GRAY-BROWN, SILTY FINE COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA, SAPROLITIC	
835			16	23	100/0.4	100/0.4					
	831.5	58.5	60/0.0			60/0.0				835.5	54.5
										WEATHERED ROCK GRAY (BIOTITE GNEISS)	
										831.5	58.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 831.5 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y10- (MAIN ST.) OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y10_EB2B	**STATION** 15+85	**OFFSET** 13 ft RT	**ALIGNMENT** -Y10-	**0 HR.** Dry
COLLAR ELEV. 890.2 ft	**TOTAL DEPTH** 36.0 ft	**NORTHING** 855,197	**EASTING** 1,632,701	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/02/15	**COMP. DATE** 09/02/15	**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)
895										890.2 GROUND SURFACE	0.0
890	889.6	0.6	12	11	9	20				0.6' ASPHALT AND 1.5' ABC STONE	
	886.7	3.5								888.1	2.1
885			11	29	19	48		M		**ROADWAY EMBANKMENT** GRAY-RED, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL	
	881.7	8.5								883.2	7.0
880			7	13	16	29		M		**RESIDUAL** RED-GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL	
	876.7	13.5								876.7	13.5
875			92	8/0.1		100/0.6				**WEATHERED ROCK** GRAY-BLACK (BIOTITE GNEISS)	
	871.7	18.5								871.7	18.5
870			60/0.1			60/0.1				**CRYSTALLINE ROCK** GRAY-WHITE-BROWN (BIOTITE GNEISS)	
	866.7	23.5								867.7	22.5
865			6	8	9	17		M		**RESIDUAL** BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
	861.7	28.5	100/0.5			100/0.5				862.4	27.8
860	860.3	29.9	100/0.2			100/0.2				**WEATHERED ROCK** GRAY-BROWN AND BLACK (BIOTITE GNEISS)	
	856.7	33.5	100/0.4			100/0.4					
855	854.2	36.0	60/0.0			60/0.0				854.2	36.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 854.2 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	

SECTION 11

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	9

REFERENCE: U-2728B

PROJECT: 34872

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *BRIDGE ON -Y11B- (CHURCH ST.) OVER -L- (I-40 BUSINESS)*

CONTENTS

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THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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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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. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by:
W. Patrick Alton
A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	DENSE	30 TO 50	
	VERY DENSE	> 50	N/A
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
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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 _____
- [X] -N 03

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

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

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

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

BENCH MARK: BL-154, N:855337.5460, E: 1632659.9920

ELEVATION: 890.17 FEET

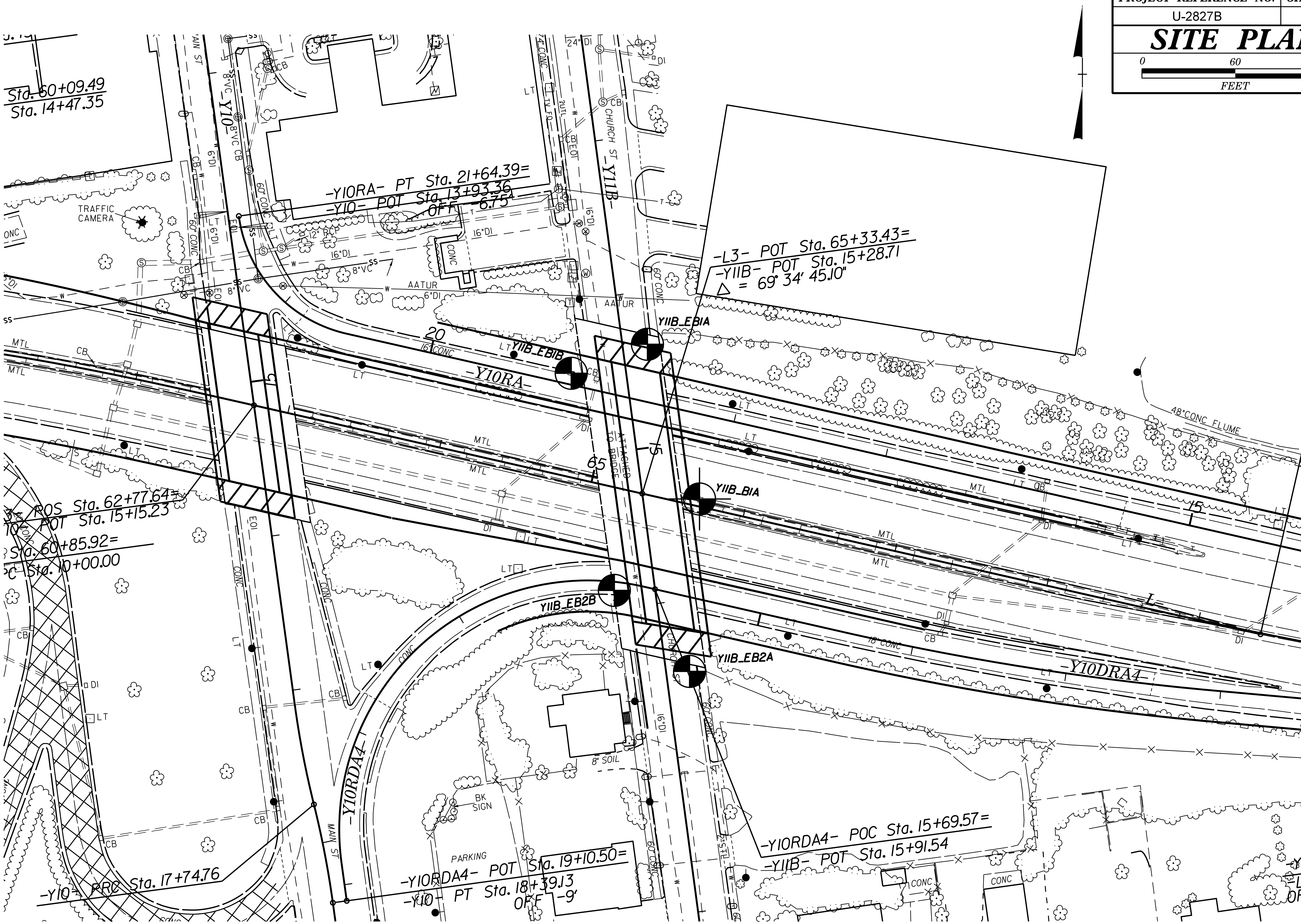
NOTES:

BL-154=BRIDGES -Y10 & -Y11B-

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3

SITE PLAN



GEOTECHNICAL BORING REPORT
BORE LOG

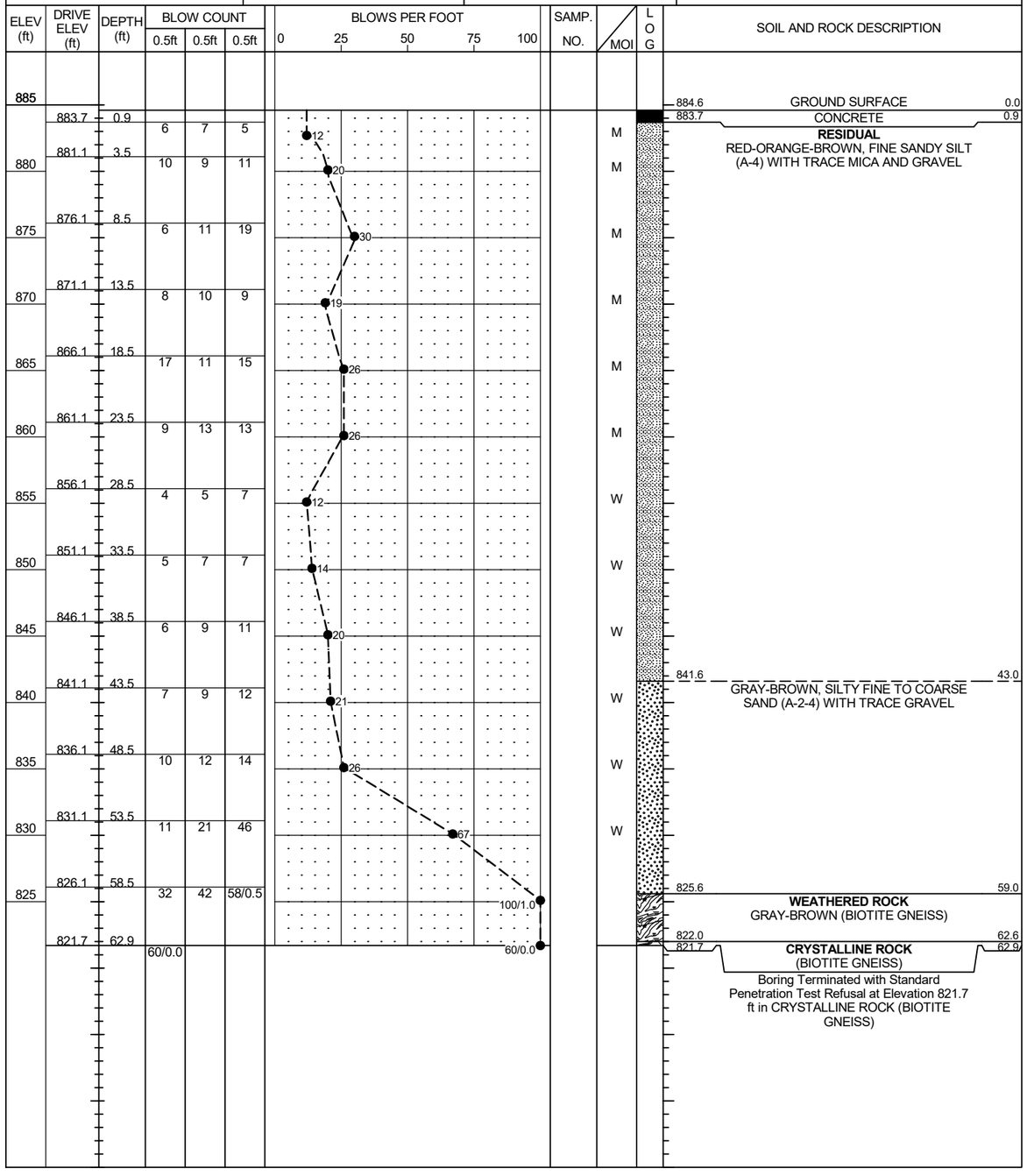
WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_EB1A	**STATION** 14+34	**OFFSET** 16 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 53.8
COLLAR ELEV. 898.5 ft	**TOTAL DEPTH** 75.2 ft	**NORTHING** 855,308	**EASTING** 1,632,958	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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)
905										
900	898.3	0.2	1	1	1	2		M		898.5 0.0 GROUND SURFACE CONCRETE
895	895.0	3.5	3	4	4	8		M		**RESIDUAL** DARK RED, SILTY FINE SAND (A-2-4) WITH TRACE ROOTS, MICA, AND GRAVEL SAPROLITIC
890	890.0	8.5	6	9	9	18		M		
885	885.0	13.5	8	9	11	20		M		
880	880.0	18.5	7	9	10	19		M		881.5 17.0 DARK RED, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
875	875.0	23.5	12	14	14	28		M		876.5 22.0 YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
870	870.0	28.5	15	18	17	35		M		
865	865.0	33.5	10	15	19	34		M		
860	860.0	38.5	17	18	26	44		M		
855	855.0	43.5	8	11	11	22		M		856.5 42.0 BROWN-GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
850	850.0	48.5	6	10	11	21		W		851.5 47.0 BROWN-GRAY-YELLOW, SILTY FINE TO COARSE SAND (A-2-4) TRACE MICA, SAPROLITIC
845	845.0	53.5	10	15	27	42		W		
840	840.0	58.5	28	36	27	63		W		
835	835.0	63.5	11	13	29	42		W		
830	830.0	68.5	24	100/0.3		100/0.3				829.5 69.0 **WEATHERED ROCK** BROWN (BIOTITE GNEISS)
825	825.0	73.5								825.0 73.5

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_EB1A	**STATION** 14+34	**OFFSET** 16 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 53.8
COLLAR ELEV. 898.5 ft	**TOTAL DEPTH** 75.2 ft	**NORTHING** 855,308	**EASTING** 1,632,958	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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
825	823.3	75.2	60/0.1	60/0.0		Match Line 60/0.1 60/0.0				823.3 75.2 **CRYSTALLINE ROCK** GRAY-BROWN (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 823.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_EB1B	**STATION** 14+46	**OFFSET** 35 ft RT	**ALIGNMENT** -Y11B-	**0 HR.** 38.0
COLLAR ELEV. 884.6 ft	**TOTAL DEPTH** 62.9 ft	**NORTHING** 855,289	**EASTING** 1,632,909	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**SURFACE WATER DEPTH** N/A	



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_B1A	**STATION** 15+37	**OFFSET** 36 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 18.2
COLLAR ELEV. 869.9 ft	**TOTAL DEPTH** 56.6 ft	**NORTHING** 855,208	**EASTING** 1,632,991	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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										869.9 GROUND SURFACE	0.0
	868.8	1.1								1.1' OF ASPHALT, CONCRETE, AND 0.6' ABC STONE	
	866.4	3.5	16	13	11	24		M		868.2	1.7
865			100/0.4			100/0.4				**ROADWAY EMBANKMENT** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA	
	861.4	8.5								866.9	3.0
860			59	41/0.1		100/0.6				GRAY-BROWN, FINE TO COARSE SAND (A-3) WITH SOME GRAVEL (POSSIBLE BOULDERS) DRILLER INDICATES SOFTER DRILLING FROM 6.3'-8.0' AND AT 10.5'	
	856.4	13.5								859.4	10.5
855			20	42	58/0.3	100/0.8				**RESIDUAL** YELLOW-BROWN, SAND (A-3)	
	851.4	18.5								855.9	14.0
850			17	31	35	66		W		**WEATHERED ROCK** DARK BROWN-YELLOW (BIOTITE GNEISS)	
	846.4	23.5								852.9	17.0
845			3	20	27	47		W		GRAY-YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
	841.4	28.5								843.6	26.3
840			100/0.4			100/0.4				**WEATHERED ROCK** YELLOW-BROWN (BIOTITE GNEISS)	
	836.4	33.5								836.4	33.5
	836.3	33.6	60/0.0			60/0.0				**CRYSTALLINE ROCK** (BIOTITE GNEISS)	33.6
835			60/0.0			60/0.0				**CRYSTALLINE ROCK** (BIOTITE GNEISS)	
830							RS-2			831.3	38.6
										(BIOTITE GNEISS)	
825										825.3	44.6
										(BIOTITE GNEISS)	
820										821.3	48.6
										(BIOTITE GNEISS)	
815										813.3	56.6
										Boring Terminated at Elevation 813.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

NCDOT BORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/21/15

GEOTECHNICAL BORING REPORT
CORE LOG

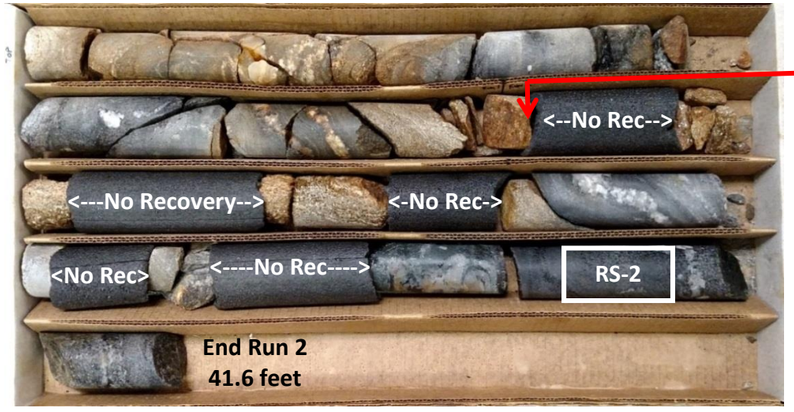
WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_B1A	**STATION** 15+37	**OFFSET** 36 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 18.2
COLLAR ELEV. 869.9 ft	**TOTAL DEPTH** 56.6 ft	**NORTHING** 855,208	**EASTING** 1,632,991	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 23.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
836.3											Begin Coring @ 33.6 ft	
835	836.3	33.6	3.0	2:58/1.0 3:00/1.0 2:26/1.0	(3.0) 100%	(0.0) 0%		(3.8) 76%	(0.0) 0%		836.3 **CRYSTALLINE ROCK** GRAY, MODERATELY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, (BIOTITE GNEISS) VERY CLOSE TO CLOSE FRACTURE SPACING	33.6
	833.3	36.6	5.0	1:38/1.0 2:13/1.0 3:40/1.0 3:35/1.0 3:00/1.0	(2.8) 56%	(1.0) 20%					831.3	38.6
830	828.3	41.6	5.0	2:36/1.0 2:50/1.0 3:07/1.0 2:13/1.0 1:31/1.0	(3.0) 60%	(2.3) 46%	RS-2	(5.0) 83%	(3.3) 55%		GRAY, SLIGHTLY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, (BIOTITE GNEISS) CLOSE TO MODERATELY CLOSE FRACTURE SPACING RS-2: 41.0'-41.3', qu=9,990 psi, R1=7, R2=13, R3=10, R4=12, R5=7 RMR=49, ROCK TYPE=E	
825	823.3	46.6	5.0	1:35/1.0 2:17/1.0 2:38/1.0 3:45/1.0 4:16/1.0	(3.7) 74%	(2.6) 52%		(0.7) 18%	(0.0) 0%		825.3 GRAY, BROWN, MODERATELY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, (BIOTITE GNEISS) VERY CLOSE TO CLOSE FRACTURE SPACING	44.6
820	818.3	51.6	5.0	3:25/1.0 2:33/1.0 2:54/1.0 2:53/1.0 2:20/1.0	(5.0) 100%	(3.6) 72%		(8.0) 100%	(6.2) 78%		821.3 GRAY, SLIGHTLY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, (BIOTITE GNEISS) CLOSE TO MODERATLEY CLOSE FRACTURE SPACING	48.6
815	813.3	56.6									813.3 Boring Terminated at Elevation 813.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	56.6

NCDOT CORE DOUBLE U2728B_GEO_BH.GPJ NC_DOT.GDT 12/21/15

CORE PHOTOGRAPHS: Bridge on -Y11B- (Church Street) over -L- (I-40 Business), Y11B_B1A: -Y11B- Station 15+37, 36' LT

Begin Run 1
33.6 feet



End Run 1 &
Begin Run 2
36.6 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

Begin Run 5
51.6 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

Begin Run 3
41.6

End Run 3 &
Begin Run 4
46.6 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_EB2A	**STATION** 16+46	**OFFSET** 15 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** Dry
COLLAR ELEV. 902.4 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 855,097	**EASTING** 1,632,985	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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)
905											
	901.9	0.5	13	7	3	10		M		902.4 GROUND SURFACE	0.0
900										900.7 0.5' ASPHALT AND 1.2' ABC STONE	1.7
	898.9	3.5	7	53	27	80		M		**ROADWAY EMBANKMENT** 898.5 RED-BROWN, FINE SANDY CLAY (A-6) WITH TRACE MICA AND ORGANICS	3.9
895										**RESIDUAL** YELLOW-GRAY, FINE SAND (A-3) WITH SOME GRAVEL	
	893.9	8.5	60/0.1			60/0.1				893.9	8.5
890										**CRYSTALLINE ROCK** GRAY-BLACK-YELLOW (BIOTITE GNEISS)	
	889.0	13.4								890.4	12.0
	888.4	14.0	100/0.2			100/0.2				**WEATHERED ROCK** 888.4 GRAY-WHITE (BIOTITE GNEISS)	14.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 888.4 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION BRIDGE ON -Y11B- (CHURCH ST. OVER -L- (I-40 BUSINESS)				**GROUND WTR (ft)**
BORING NO. Y11B_EB2B	**STATION** 15+88	**OFFSET** 26 ft RT	**ALIGNMENT** -Y11B-	**0 HR.** Dry
COLLAR ELEV. 883.3 ft	**TOTAL DEPTH** 16.7 ft	**NORTHING** 855,149	**EASTING** 1,632,936	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/15/15	**COMP. DATE** 08/15/15	**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	0.8	5	6	16	22		M		883.3 GROUND SURFACE	0.0
880										882.5 CONCRETE	0.8
	879.8	3.5	5	9	12	21		M		881.5 **ROADWAY EMBANKMENT** GRAY AND RED, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	1.8
875										**RESIDUAL** 876.3 GRAY-BROWN, FINE SANDY SILT (A-4), HIGHLY MICACEOUS, SAPROLITIC	7.0
	874.8	8.5	100/0.5			100/0.5				**WEATHERED ROCK** GRAY (MICA SCHIST)	
870										870.8	12.5
	869.8	13.5	28	40	35	75		M		**RESIDUAL** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC, SOME GRAVEL	
	866.6	16.7	60/0.0			60/0.0				866.8	16.5
										866.6 **CRYSTALLINE ROCK** GRAY (MICA SCHIST)	16.7
										Boring Terminated with Standard Penetration Test Refusal at Elevation 866.6 ft in CRYSTALLINE ROCK (MICA SCHIST)	

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34872.1.1
TIP NO.: U-2827B
COUNTY: Forsyth
DESCRIPTION: US 158/US 421/NC 150/Business 40, west of Fourth Street to east of Church Street
Bridge on -Y11B- (Church Street) over -L- (I-40 Business)

Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (pcf)	Unconfined Compressive Strength (psi)	Young's Modulus, E (ksf)	RMR
RS-2	Y11B_B1A	-Y11B-	15+37	36' Lt.	41.0 - 41.3	Biotite Gneiss	CZbg	20%	4.13	1.77	170.3	9,990	ND	49

ND = Not Determined

SECTION 12

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2827B	1	74

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH TO EAST OF CHURCH STREET*

SITE DESCRIPTION *VARIOUS RETAINING WALLS*

REFERENCE: U-2728B

PROJECT: 34872

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

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

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

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

PERSONNEL

D. RACEY

C. WANG

M. ELLIS

D. TIGNOR

M. RENZA

S. DAVIS

W. SHENBERGER

INVESTIGATED BY *F&R Inc.*

DRAWN BY *T.T. WALKER*

CHECKED BY *P. ALTON*

SUBMITTED BY *P. ALTON*

DATE *DECEMBER 2015*

NORTH CAROLINA PROFESSIONAL SEAL 033758 ENGINEER W. PATRICK ALTON

DocuSigned by: W. Patrick Alton A270EF78A6DF442...

1/7/2016

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	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
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [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 [X] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N 03

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:

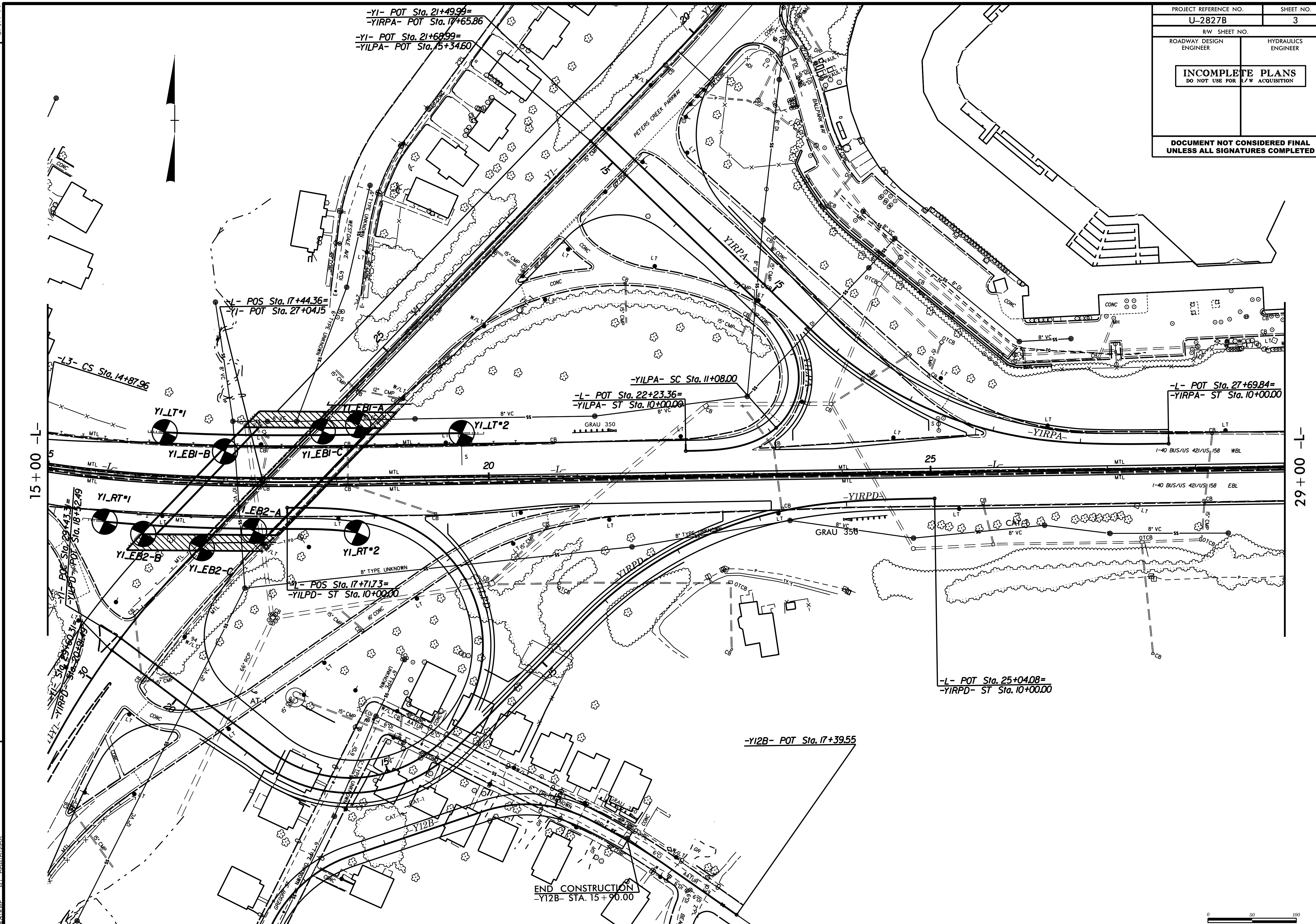
RETAINING WALL BORING ELEVATIONS OBTAINED USING .TIN FILE

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	3
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

8/17/99

04-DEC-2015 15:49
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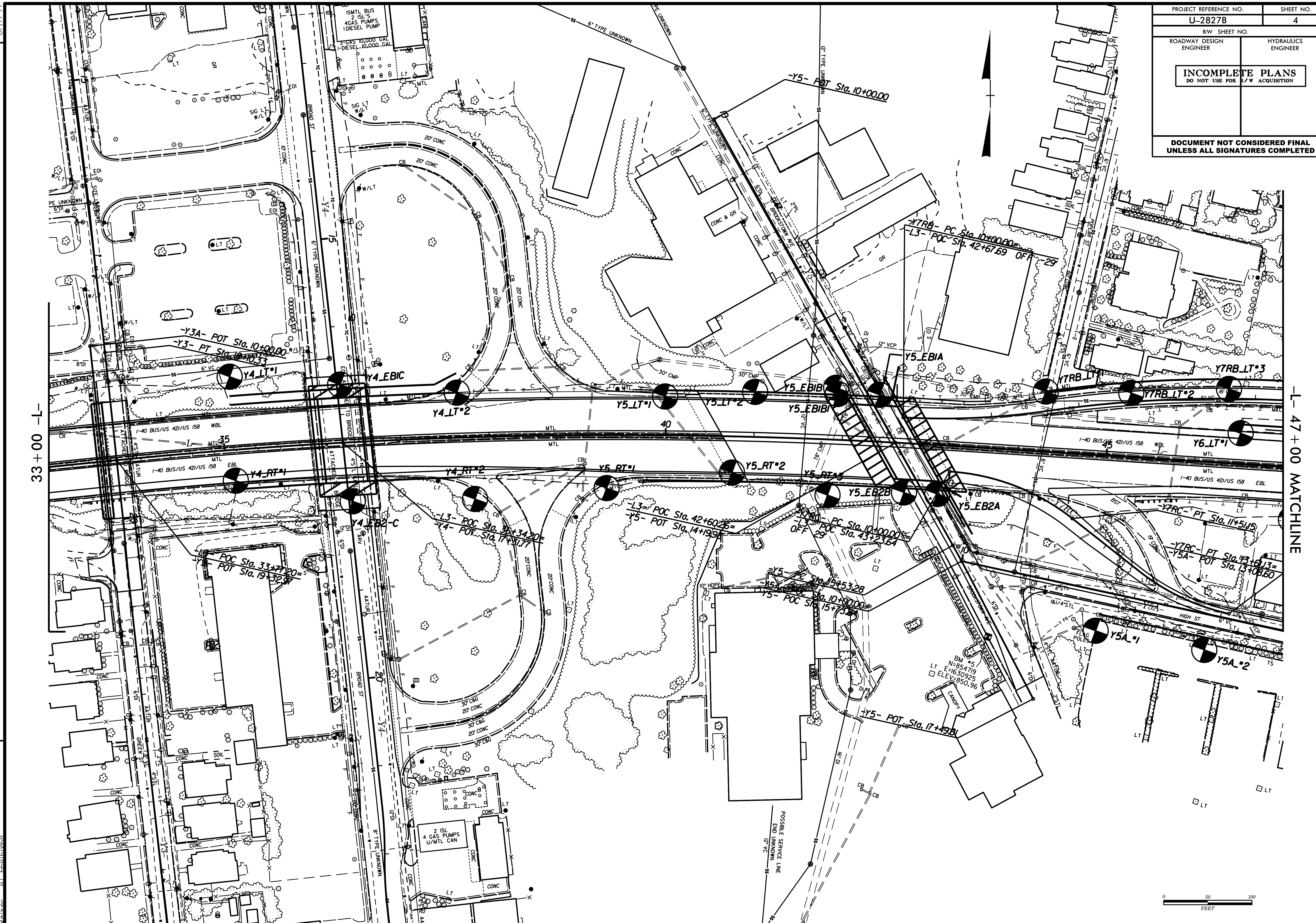
PROJECT REFERENCE NO.	SHEET NO.
U-2827B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

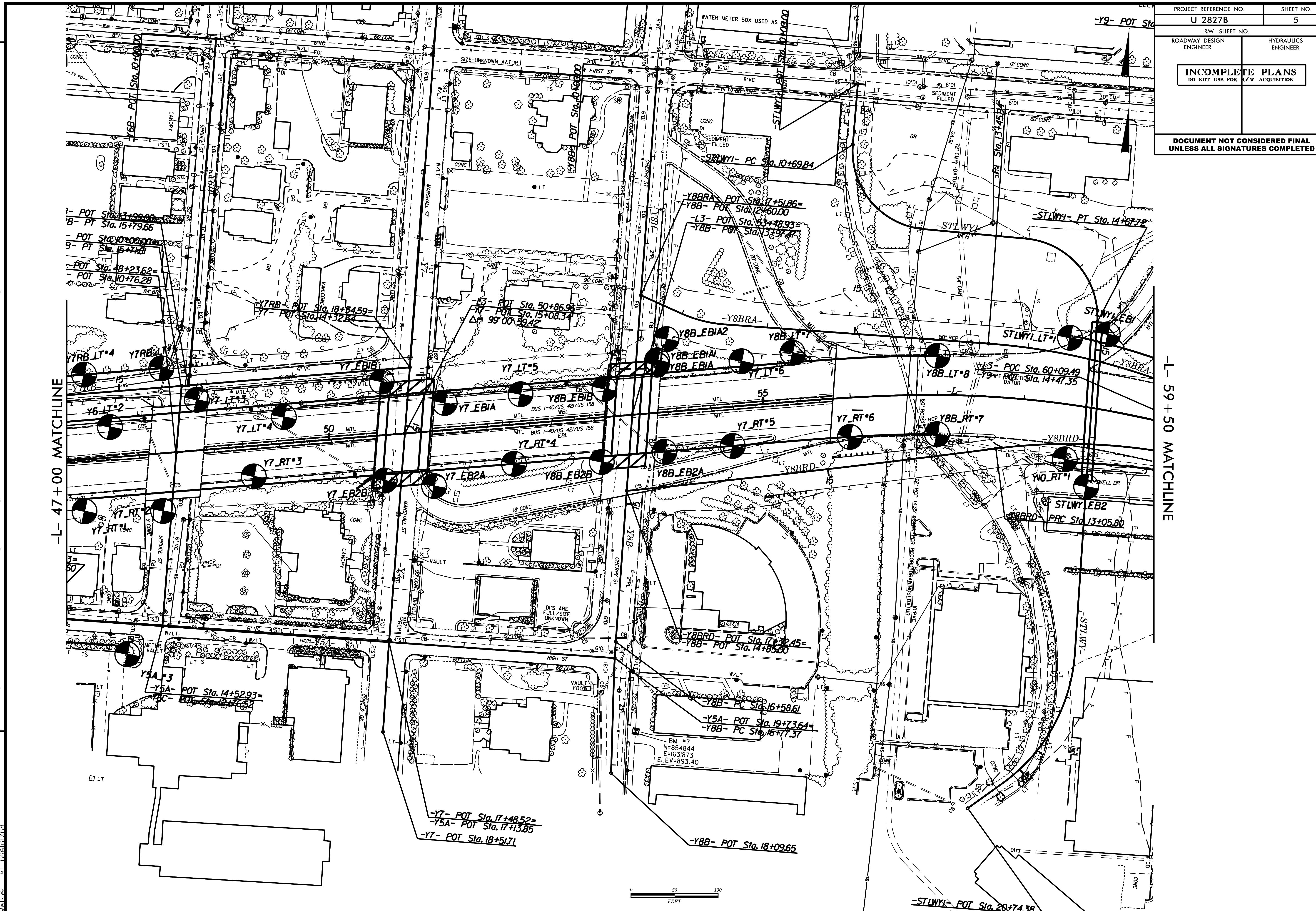
8/17/99

04-DEC-2015 16:09 F:\Projects 96\96T-0086 (NCDOT-U-2827B Forsyth Co Rdwy)\CADD_GEOTECH\Site&Sub\Retaining walls along -L- (I-40 Bus)\CADD_GEOTECH\Site&Sub\PSH WALL4.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

8/17/99

04-DEC-2015 16:35 F:\Projects\...\CADD_GEOTECH\Site&Sub\PSH WALL5.dgn

PROJECT REFERENCE NO.	SHEET NO.
U-2827B	6

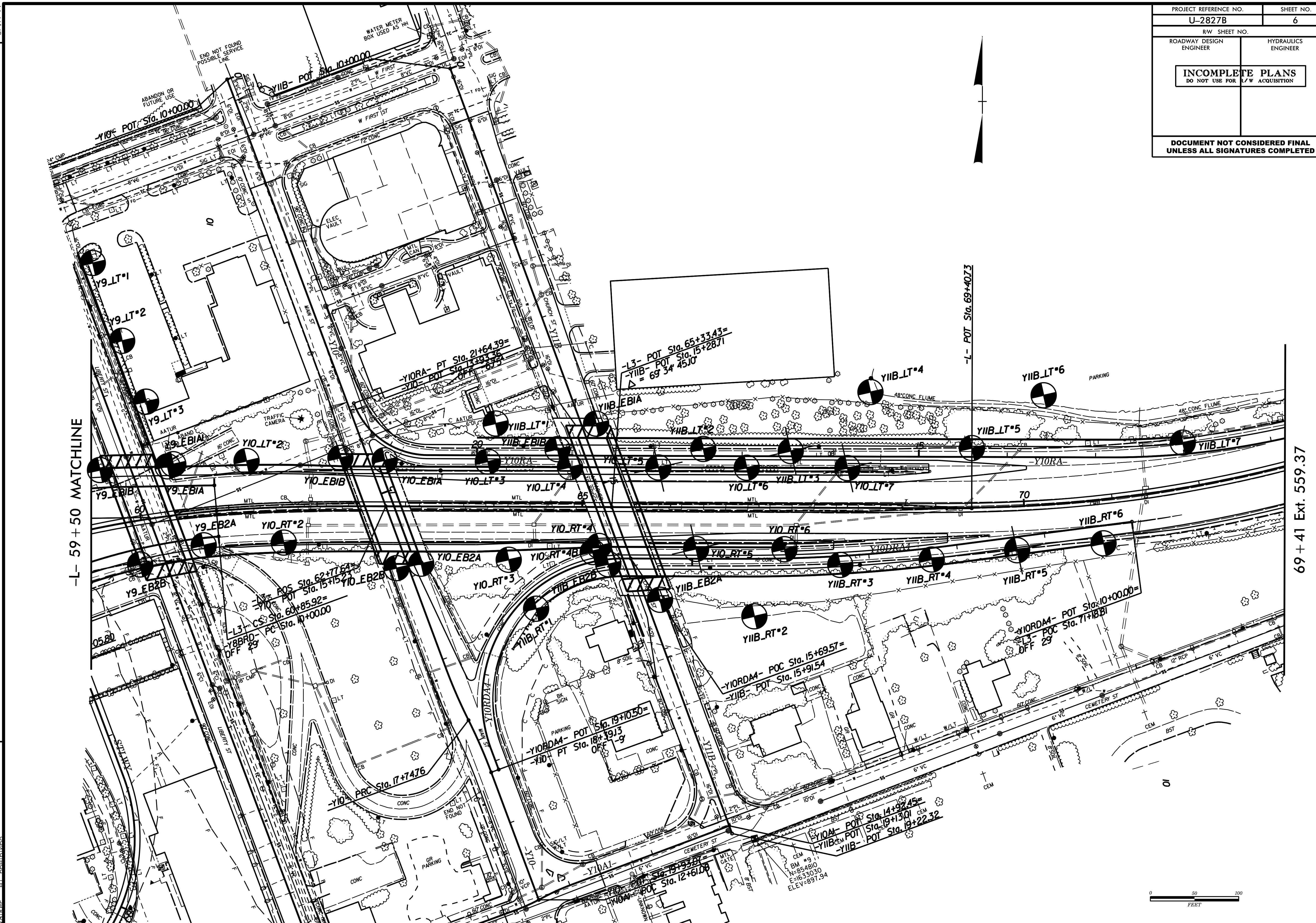
R/W SHEET NO.

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



REVISIONS

8/17/99

04-DEC-2015 16:40
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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_LT#1	**STATION** 16+30	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 881.9 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 853,860	**EASTING** 1,628,335	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 07/28/15	**COMP. DATE** 07/28/15	**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										
	881.9	0.0	WOH	1	2	3		M		881.9 — GROUND SURFACE — 0.0
880	878.4	3.5	4	3	4	7		M		**RESIDUAL** RED-ORANGE-BROWN, FINE SANDY CLAY (A-6) WITH TRACE ORGANICS, MICA, AND GRAVEL 877.4 — 4.5
875	873.4	8.5	3	3	2	5		W		ORANGE-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA
870	868.4	13.5	8	11	60	71		W		866.9 — 15.0 Boring Terminated at Elevation 866.9 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB1-B	**STATION** 27+09	**OFFSET** 55 ft RT	**ALIGNMENT** -Y1-	**0 HR.** Dry
COLLAR ELEV. 808.9 ft	**TOTAL DEPTH** 20.1 ft	**NORTHING** 853,869	**EASTING** 1,628,406	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/15/15	**COMP. DATE** 08/15/15	**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										
	807.7	1.2	4	2	2	4		M		808.9 — GROUND SURFACE — 0.0 807.7 — ASPHALT AND CONCRETE — 1.2
805	805.4	3.5	8	5	3	8		M		**ROADWAY EMBANKMENT** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA 804.9 — 4.0 RED-BROWN, SILTY CLAY (A-7-5) WITH SOME GRAVEL AND TRACE ORGANICS
800	800.4	8.5	4	3	8	11		M		800.9 — 8.0 GRAY-BROWN AND BLACK, CLAYEY COARSE TO FINE SANDY SILT (A-4) WITH TRACE GRAVEL, ORGANICS, AND CONCRETE
795	795.4	13.5	1	2	2	4		M		
790	790.4	18.5	20	28	72/0.1	100/0.6				790.9 — 18.0 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
	788.8	20.1	60/0.0			60/0.0				788.9 — 20.0 788.8 — 20.1 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 788.8 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB1-C	**STATION** 26+16	**OFFSET** 9 ft LT	**ALIGNMENT** -Y1-	**0 HR.** Dry
COLLAR ELEV. 816.2 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 853,937	**EASTING** 1,628,497	**24 HR.** 21.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/06/15	**COMP. DATE** 08/06/15	**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)
820										
	816.2	0.0								816.2 GROUND SURFACE 0.0
815			1	1	1	2		M		**ROADWAY EMBANKMENT** 814.2 BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND ORGANICS 2.0
	812.7	3.5	1	2	3	5		M		811.7 BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA 4.5
810										809.2 RED, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE MICA 7.0
	807.7	8.5	1	2	3	5		W		806.7 RED-YELLOW-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE MICA 9.5
805										RED-YELLOW, SILTY CLAY (A-7-5) WITH TRACE MICA AND ORGANICS
	802.7	13.5	3	5	7	12		M		
800										798.2 18.0
	797.7	18.5	23	26	11	37		M		797.0 **RESIDUAL** 19.2 DARK BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
795										GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND SOME GRAVEL, SAPROLITIC
	792.7	23.5	4	6	6	12		W		
790										787.7 28.5
	787.7	28.5	100/0.4			100/0.4				786.5 **WEATHERED ROCK** 29.7
	786.2	30.0	60/0.0			60/0.0				786.2 YELLOW-WHITE (MICA SCHIST) 30.0
										CRYSTALLINE ROCK (MICA SCHIST)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 786.2 ft in CRYSTALLINE ROCK (MICA SCHIST)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB1-A	**STATION** 25+83	**OFFSET** 33 ft LT	**ALIGNMENT** -Y1-	**0 HR.** Dry
COLLAR ELEV. 822.9 ft	**TOTAL DEPTH** 34.2 ft	**NORTHING** 853,960	**EASTING** 1,628,530	**24 HR.** 27.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/06/15	**COMP. DATE** 08/06/15	**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
825										
	822.9	0.0								822.9 GROUND SURFACE 0.0
820			2	1	1	2		M		**ROADWAY EMBANKMENT** BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA
	819.4	3.5	2	2	3	5		M		
815										815.9 7.0
	814.4	8.5	2	2	2	4		W		RED-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA
810										810.9 12.0
	809.9	13.0	10	23	29	52		M		809.0 RED-YELLOW, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA 13.9
805										**RESIDUAL** GRAY-YELLOW TO BROWN AND WHITE, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
	804.4	18.5	4	8	6	14		M		
800										
	799.4	23.5	13	11	8	19		M		
795										
	794.4	28.5	30	31	19	50		M		
790										789.4 33.5
	789.4	33.5	100/0.2			100/0.2				788.7 **WEATHERED ROCK** 34.2
	788.7	34.2	60/0.0			60/0.0				GRAY-BLACK (MICA SCHIST)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 788.7 ft on CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_LT#2	**STATION** 19+70	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 866.4 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,001	**EASTING** 1,628,640	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 07/30/15	**COMP. DATE** 07/30/15	**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											
	866.4	0.0	1	2	3	5		M		866.4 GROUND SURFACE	0.0
865										864.4 **RESIDUAL** RED-BROWN, FINE TO COARSE SANDY SILT CLAY (A-7-5) WITH TRACE MICA	2.0
	862.9	3.5	3	5	4	9		M		RED-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL, MICACEOUS, SAPROLITIC	
860											
	857.9	8.5	3	3	4	7		W		856.4	10.0
										Boring Terminated at Elevation 856.4 ft in RESIDUAL (SILT)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_RT#1	**STATION** 15+70	**OFFSET** 53 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 883.9 ft	**TOTAL DEPTH** 9.9 ft	**NORTHING** 853,740	**EASTING** 1,628,317	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 07/27/15	**COMP. DATE** 07/27/15	**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											
	883.9	0.0	6	7	6	13		M		883.9 GROUND SURFACE	0.0
880										881.9 **RESIDUAL** RED-TAN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE CLAY AND ROOTS	2.0
	880.4	3.5	19	21	9	30		M		GRAY AND WHITE, SILTY FINE TO COARSE SAND (A-2-4) SAPROLITIC	
875										876.9	7.0
	875.4	8.5	2	6	100/0.4	100/0.4		M		DARK BROWN, FINE SANDY SILT (A-4), MICACEOUS	
										874.4	9.5
										874.0 **WEATHERED ROCK** GRAY AND BROWN (MICA SCHIST)	9.9
										Boring Terminated at Elevation 874.0 ft in WEATHERED ROCK (MICA SCHIST)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB2-B	**STATION** 28+40	**OFFSET** 57 ft RT	**ALIGNMENT** -Yl-	**0 HR.** Dry
COLLAR ELEV. 810.9 ft	**TOTAL DEPTH** 13.7 ft	**NORTHING** 853,746	**EASTING** 1,628,362	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 07/27/15	**COMP. DATE** 07/27/15	**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											
	810.9	0.0	3	8	7	15		D		810.9 GROUND SURFACE	0.0
810										**RESIDUAL** RED-TAN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE ROOTS AND MICA	
	807.4	3.5	4	3	3	6		M			
805										803.9 GRAY AND WHITE, SILTY FINE TO COARSE SAND (A-2-4), SAPROLITIC	7.0
	802.4	8.5	15	17	11	28		M			
800										798.4	12.5
	797.4	13.5	60/0.0			60/0.0				797.4 **WEATHERED ROCK** GRAY-WHITE-BLACK (MICA SCHIST)	13.5
	797.2	13.7	60/0.0							797.2 **CRYSTALLINE ROCK** (MICA SCHIST)	13.7
										Boring Terminated with Standard Penetration Test Refusal at Elevation 797.2 ft in CRYSTALLINE ROCK (MICA SCHIST)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB2-C	**STATION** 28+06	**OFFSET** 2 ft LT	**ALIGNMENT** -Y1-	**0 HR.** Dry
COLLAR ELEV. 826.4 ft	**TOTAL DEPTH** 35.7 ft	**NORTHING** 853,759	**EASTING** 1,628,429	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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	1	4	4	8		M		826.4 GROUND SURFACE 0.0
825										**ROADWAY EMBANKMENT** RED AND BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL 2.0
	822.9	3.5	2	3	4	7		M		824.4 RED-BROWN, SILTY CLAY (A-7-5) WITH TRACE FINE SAND AND MICA 7.0
820										819.4 RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH LITTLE CLAY AND GRAVEL
	817.9	8.5	2	3	4	7		M		814.4 RED-BROWN, SILTY CLAY (A-7-5) WITH TRACE FINE SAND, MICA, AND ORGANICS 12.0
815										809.4 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, MICACEOUS 17.0
	812.9	13.5	3	3	6	9		M		HARD DRILLING NOTED FROM 22.3' TO 23.0'
810										803.4 GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL 23.0
	807.9	18.5	5	6	6	12		M		799.4 RED-BROWN, SILTY CLAY (A-7-5) WITH TRACE FINE SAND, SAPROLITIC 27.0
805										796.7 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) 29.7
	802.9	23.5	1	7	7	14		W		792.4 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST) 34.0
800										790.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 790.7 ft on CRYSTALLINE ROCK (MICA SCHIST) 35.7
	797.9	28.5	3	5	14	19		W		
795										
	792.9	33.5	16	82	18/0.0	100/0.5				
	790.7	35.7	60/0.0			60/0.0				

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_EB2-A	**STATION** 27+51	**OFFSET** 31 ft LT	**ALIGNMENT** -Y1-	**0 HR.** 29.0
COLLAR ELEV. 817.7 ft	**TOTAL DEPTH** 32.3 ft	**NORTHING** 853,802	**EASTING** 1,628,474	**24 HR.** 26.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/03/15	**COMP. DATE** 08/03/15	**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)
820											
	817.7	0.0	WOH	1	3	4		M		817.7 GROUND SURFACE	0.0
815										**ROADWAY EMBANKMENT** RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA	
	814.2	3.5	5	4	5	9		M		813.2	4.5
810										RED-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE GRAVEL AND MICA	
	809.2	8.5	2	6	24	30		M		808.8	8.9
805										807.7 RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH HIGH AMOUNT OF GRAVEL AND TRACE MICA	10.0
	804.2	13.5	2	3	2	5		M		BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL 803.7	14.0
800										RED-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA 800.7	17.0
	799.2	18.5	1	1	2	3		W		RED, SILTY FINE SANDY CLAY (A-6) WITH TRACE GRAVEL, MICACEOUS	
795										795.7	22.0
	794.2	23.5	1	2	1	3		W		BROWN-GRAY-RED, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA 793.1	24.6
790										**ALLUVIAL** BROWN AND BLACK, FINE SANDY SILT (A-4) WITH TRACE TO HIGH AMOUNT OF GRAVEL AND TRACE ORGANICS	
	789.2	28.5	5	1	1	2		Sat.		786.4	31.3
	786.3	31.4								785.4 **CRYSTALLINE ROCK** GRAY-BLACK (MICA SCHIST)	32.3
	785.4	32.3	60/0.1			60/0.1				Boring Terminated with Standard Penetration Test Refusal at Elevation 785.4 ft in CRYSTALLINE ROCK (MICA SCHIST)	
			60/0.0			60/0.0					

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y1_RT#2	**STATION** 18+50	**OFFSET** 58 ft RT	**ALIGNMENT** -L-	**0 HR.** 15.0
COLLAR ELEV. 863.3 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 853,849	**EASTING** 1,628,581	**24 HR.** 12.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 07/28/15	**COMP. DATE** 07/28/15	**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	
865											
	863.3	0.0	2	2	2	4		W		863.3 GROUND SURFACE	0.0
860										**ARTIFICIAL FILL**	
	859.8	3.5	1	2	2	4		M		861.3 RED-TAN, SILTY FINE SAND (A-2-4) WITH TRACE BRICK AND ASPHALT FRAGMENTS	2.0
855										RED, FINE TO COARSE SILTY CLAY (A-7-6) WITH TRACE BRICK FRAGMENTS	
	854.8	8.5	WOH	1	2	3	SS-309	32%			
850										851.3 **ALLUVIAL**	12.0
	849.8	13.5	2	1	3	4	SS-310	25%		GRAY-TAN,SILTY FINE TO COARSE SANDY CLAY (A-7-6) WITH TRACE GRAVEL AND ORGANICS	
845										846.3 **RESIDUAL**	17.0
	844.8	18.5	2	1	2	3		W		BROWN AND WHITE, FINE SANDY SILT (A-4), MICACEOUS	
840											
	839.8	23.5	1	2	2	4		W			
835											
	834.8	28.5	2	4	6	10		W		833.3 Boring Terminated at Elevation 833.3 ft in RESIDUAL (SILT)	30.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_LT#1	**STATION** 35+12	**OFFSET** 83 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 904.5 ft	**TOTAL DEPTH** 29.7 ft	**NORTHING** 854,700	**EASTING** 1,630,017	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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)
905											
	904.5	0.0	2	5	7	12		M		904.5 GROUND SURFACE	0.0
										902.5 **ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY SILT (A-4) WITH LITTLE CLAY, TRACE GRAVEL, AND ORGANICS	2.0
900	901.0	3.5	6	8	12	20	SS-483	26%		RED, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE MICA AND ORGANICS	
										897.5 **RESIDUAL** WHITE-GRAY, SILTY FINE SAND (A-2-4) WITH TRACE MICA	7.0
895	896.0	8.5	3	4	6	10		M			
										892.5 DARK RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	12.0
890	891.0	13.5	3	6	5	11		M			
885	886.0	18.5	2	4	5	9		M			
880	881.0	23.5	6	4	6	10		M			
	876.0	28.5	96	4/0.0		100/0.5		M		876.0	28.5
875	874.8	29.7	60/0.0			60/0.0				874.8 **WEATHERED ROCK** GRAY-WHITE (MICA SCHIST)	29.7
										Boring Terminated with Standard Penetration Test Refusal at Elevation 874.8 ft on CRYSTALLINE ROCK (MICA SCHIST)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_EB1C	**STATION** 16+66	**OFFSET** 4 ft LT	**ALIGNMENT** -Y4-	**0 HR.** Dry
COLLAR ELEV. 901.5 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 854,735	**EASTING** 1,630,138	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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	
905											
	901.5	0.0								901.5 GROUND SURFACE	0.0
900	900.7	0.8	WOH	WOH	3	3		M		**ROADWAY EMBANKMENT** RED, FINE SANDY SILT (A-4) WITH TRACE GRAVEL	0.8
	898.0	3.5	4	4	4	8		M		**RESIDUAL** YELLOW-RED-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	
895	893.0	8.5	2	3	4	7		M			
890	888.0	13.5	5	5	6	11		M		889.5 RED-YELLOW AND BROWN, FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	12.0
885	883.0	18.5	4	6	7	13		M			
880	878.0	23.5	4	6	5	11		M			
875	873.0	28.5	4	6	7	13		M		874.5 LIGHT BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	27.0
870	868.0	33.5	6	6	5	11		M			
865	863.0	38.5	10	12	13	25		M		864.5 RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	37.0
860	858.0	43.5	78	22/0.1		100/0.6				858.0	43.5
	856.3	45.2	60/0.0			60/0.0				856.3 **WEATHERED ROCK** DARK GRAY (MICA SCHIST)	45.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 856.3 ft on CRYSTALLINE ROCK (MICA SCHIST)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_LT#2	**STATION** 37+65	**OFFSET** 51 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 887.2 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,772	**EASTING** 1,630,265	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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
890										
	887.2	0.0	1	1	2	3		M		887.2 GROUND SURFACE 0.0 **ROADWAY EMBANKMENT** RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
885										884.2 3.0
	883.7	3.5	2	4	3	7		M		**RESIDUAL** RED-ORANGE-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
880										
	878.7	8.5	2	3	3	6		M		877.2 10.0 Boring Terminated at Elevation 877.2 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_RT#1	**STATION** 35+10	**OFFSET** 35 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 887.9 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 854,592	**EASTING** 1,630,064	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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
890										
	886.8	1.1	9	7	9	16		M		887.9 GROUND SURFACE 0.0 886.8 ASPHALT AND CONCRETE 1.1
885	884.4	3.5	4	6	4	10		M		**ROADWAY EMBANKMENT** 884.9 RED-ORANGE, FINE SANDY SILT (A-4), WITH TRACE COARSE SAND 3.0
880	879.4	8.5	100/0.5			100/0.5				**RESIDUAL** 881.4 BROWN-ORANGE, FINE SANDY SILT (A-4), SAPROLITIC 6.5
										WEATHERED ROCK GRAY (BIOTITE GNEISS)
875	874.4	13.5	33	35	27	62		D		876.6 11.3 **RESIDUAL** GRAY, SILTY FINE SAND (A-2-4)
870	869.4	18.5	11	13	13	26		M		870.9 17.0 GRAY-TAN, FINE SANDY SILT (A-4) 867.9 20.0 Boring Terminated at Elevation 867.9 ft in RESIDUAL (SILT)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_EB2-C	**STATION** 17+99	**OFFSET** 4 ft LT	**ALIGNMENT** -Y4-	**0 HR.** Dry
COLLAR ELEV. 903.1 ft	**TOTAL DEPTH** 54.9 ft	**NORTHING** 854,616	**EASTING** 1,630,196	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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)
905											
	903.1	0.0	1	2	3	5		M		903.1 GROUND SURFACE	0.0
900	899.6	3.5	8	9	7	16		M		**RESIDUAL** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4)	
895	894.6	8.5	3	3	4	7		M			
890	889.6	13.5	9	16	8	24		M		890.1 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	13.0
885	884.6	18.5	6	8	11	19		M			
880	879.6	23.5	10	10	14	24		M			
875	874.6	28.5	17	38	33	71		M			
870	869.6	33.5	22	27	20	47		M			
865	864.6	38.5	17	28	37	65		M			
860	859.6	43.5	35	36	64/0.4	100/0.9		M		859.1 **WEATHERED ROCK** GRAY, BROWN (BIOTITE GNEISS)	44.0
855	854.6	48.5	16	21	32	53		M		856.1 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4), SAPROLITIC	47.0
850	849.6	53.5	100/0.2			100/0.2				849.6	53.5
	848.2	54.9	60/0.0			60/0.0				848.2 **WEATHERED ROCK** GRAY (BIOTITE GNEISS)	54.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 848.2 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y4_RT#2	**STATION** 37+82	**OFFSET** 70 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 887.1 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,666	**EASTING** 1,630,326	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 07/30/15	**COMP. DATE** 07/30/15	**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
890										
	887.1	0.0	1	6	6	12		M		887.1 GROUND SURFACE 0.0
885	883.6	3.5	3	5	6	11		M		**RESIDUAL** ORANGE-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND ORGANICS 884.1 3.0
880	878.6	8.5	4	4	4	8		M		ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE ORGANICS 879.1 8.0
										TAN, SILTY FINE SAND (A-2-4) 877.1 10.0
										Boring Terminated at Elevation 877.1 ft in RESIDUAL (SAND)

NCDOT BORE DOUBLE U2728B_GEO_BH WALLS.GPJ NC_DOT.GDT 12/21/15

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_LT#1	**STATION** 39+99	**OFFSET** 44 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 880.0 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 854,849	**EASTING** 1,630,488	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/15/15	**COMP. DATE** 08/15/15	**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										880.0 GROUND SURFACE	0.0
	878.7	1.3	2	2	2	4		W		878.7 ASPHALT	1.3
	876.5	3.5								**ROADWAY EMBANKMENT** RED-ORANGE-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
875			3	2	2	4		M			
	871.5	8.5								872.0	8.0
870			2	2	2	4	SS-134	30%		RED-BROWN AND GRAY, SILTY FINE TO COARSE SANDY CLAY (A-7-6) WITH TRACE ORGANICS	
	866.5	13.5									
865			2	1	2	3		W			
	861.5	18.5								863.0	17.0
860			3	4	4	8		M		**RESIDUAL** RED-ORANGE-BROWN, FINE SANDY SILT (A-4)	
										860.0 Boring Terminated at Elevation 860.0 ft in RESIDUAL (SILT)	20.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_LT#2	**STATION** 41+00	**OFFSET** 51 ft LT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 848.0 ft	**TOTAL DEPTH** 63.9 ft	**NORTHING** 854,889	**EASTING** 1,630,582	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/28/15	**COMP. DATE** 08/28/15	**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	
850										848.0 GROUND SURFACE	0.0
	848.0	0.0	1	3	10	13	SS-215	19%		**ARTIFICIAL FILL** GRAY-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS AND GRAVEL	
845	844.5	3.5	1	2	3	5		M			
840	839.5	8.5	WOH	WOH	1	1		W			
835	834.5	13.5	1	2	1	3		W		835.0 **RESIDUAL** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	13.0
830	829.5	18.5	WOH	1	1	2		W			
825	824.5	23.5	1	1	2	3		W			
820	819.5	28.5	2	3	5	8		W			
815	814.5	33.5	2	3	6	9		W			
810	809.5	38.5	5	9	9	18		W			
805	804.5	43.5	19	26	41	67		W		805.0 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4)	43.0
800	799.5	48.5	25	27	42	69		W			
795	794.5	53.5	15	27	35	62		W			
790	789.5	58.5	42	51	49/0.5	100/1.0				789.0 **WEATHERED ROCK** (MICA SCHIST)	59.0
785	784.5	63.5	100/0.4			100/0.4				784.1 Boring Terminated at Elevation 784.1 ft in WEATHERED ROCK (MICA SCHIST)	63.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB1B	**STATION** 13+33	**OFFSET** 28 ft RT	**ALIGNMENT** -Y5-	**0 HR.** 27.0
COLLAR ELEV. 845.1 ft	**TOTAL DEPTH** 58.5 ft	**NORTHING** 854,925	**EASTING** 1,630,667	**24 HR.** 15.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/11/15	**COMP. DATE** 09/11/15	**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)
850											
845	845.1	0.0	4	10	7	17		M		845.1 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
	841.6	3.5	2	1	2	3		M		843.1 BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE GRAVEL	2.0
840										RED-BROWN AND YELLOW-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND GRAVEL	
	836.6	8.5	1	2	2	4		W			
835											
	831.6	13.5	3	3	5	8		W		833.1 DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL	12.0
830											
	826.6	18.5	5	7	18	25		W		828.1 **ALLUVIAL**	17.0
825										826.1 BLACK, SILTY CLAY (A-7-5) WITH TRACE ORGANICS, ORGANIC ODOR, AND TRACE GRAVEL	19.0
	821.6	23.5	1	2	5	7		W		LIGHT BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA NAD GRAVEL	
820										821.6 **RESIDUAL**	23.5
	816.6	28.5	7	9	12	21		W		DARK-BROWN-WHITE, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
815											
	811.6	33.5	7	8	9	17		W			
810											
	806.6	38.5	17	20	33	53		W			
805											
	801.6	43.5	15	18	18	36		W			
800											
	796.6	48.5	100/0.3			100/0.3				796.6 **WEATHERED ROCK**	48.5
795										DARK BROWN (BIOTITE GNEISS)	
	791.6	53.5	60/0.0			60/0.0				791.6 **CRYSTALLINE ROCK**	53.5
790										(BIOTITE GNEISS)	
	786.6	58.5	60/0.0			60/0.0				786.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 786.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	58.5

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB1B1	**STATION** 13+40	**OFFSET** 30 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 844.9 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 854,919	**EASTING** 1,630,671	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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	
845											
	844.9	0.0	7	13	5	18		M		844.9 GROUND SURFACE	0.0
										ARTIFICIAL FILL	
	841.4	3.5	1	1	1	2		W		841.9 GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL	3.0
840										ORANGE-GRAY-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND GRAVEL	
	836.4	8.5	2	WOH	1	1		M			
835										830.9	14.0
										Boring Terminated at Elevation 830.9 ft DUE TO POTENTIAL UTILITY	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB1A	**STATION** 13+64	**OFFSET** 11 ft LT	**ALIGNMENT** -Y5-	**0 HR.** 16.0
COLLAR ELEV. 846.5 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 854,934	**EASTING** 1,630,716	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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)
										846.5 GROUND SURFACE	0.0
	845.7	0.8								845.7 ASPHALT	0.8
	843.0	3.5	3	4	6	10		M		**ARTIFICIAL FILL** RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA	
			3	6	6	12		M		842.0 ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL	4.5
	838.0	8.5	3	5	6	11		M			
	833.0	13.5	2	3	2	5		W		833.5 ORANGE-BROWN, FINE SANDY CLAY (A-6)	13.0
	828.0	18.5	6	9	9	18		W		828.5 **RESIDUAL** GRAY-BROWN, FINE TO COARSE SAND (A-1-b) WITH TRACE MICA	18.0
	823.0	23.5	2	3	3	6		W		822.4 GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	24.1
	818.0	28.5	2	1	4	5		Sat.			
	813.0	33.5	2	2	2	4		W		813.5 GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	33.0
	808.0	38.5	2	16	26	42		W			
	803.0	43.5	24	100/0.2		100/0.2				802.5	44.0
										802.0 **WEATHERED ROCK** GRAY (MICA SCHIST)	44.5
	798.0	48.5	14	20	23	43				**RESIDUAL** GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	
	793.0	53.5	100/0.2			100/0.2				793.0 **WEATHERED ROCK** GRAY (MICA SCHIST)	53.5
	788.0	58.5	100/0.1			100/0.1				789.5 **CRYSTALLINE ROCK** (MICA SCHIST)	57.0
	783.0	63.5	100/0.1			100/0.1				782.9 Boring Terminated with Standard Penetration Test Refusal at Elevation 782.9 ft in CRYSTALLINE ROCK (MICA SCHIST)	63.6

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_RT#1	**STATION** 39+33	**OFFSET** 60 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 881.2 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,729	**EASTING** 1,630,461	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/12/15	**COMP. DATE** 08/12/15	**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)
	881.2	0.0								881.2 GROUND SURFACE	0.0
			1	5	5	10		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND ASPHALT	
	877.7	3.5	2	3	3	6	SS-111	24%		878.2 RED-ORANGE-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA, GRAVEL, AND ORGANICS	3.0
	872.7	8.5	5	6	6	12		M		871.2	10.0
										Boring Terminated at Elevation 871.2 ft in ROADWAY EMBANKMENT (CLAY)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_RT#2	**STATION** 40+76	**OFFSET** 41 ft RT	**ALIGNMENT** -L-	**0 HR.** FIAD
COLLAR ELEV. 875.1 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 854,794	**EASTING** 1,630,589	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/12/15	**COMP. DATE** 08/12/15	**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										
875										875.1 GROUND SURFACE 0.0 0.8' ASPHALT AND 1.0' ABC STONE 873.3 1.8
	873.3	1.8	5	4	3	7		M		**ROADWAY EMBANKMENT** RED-ORANGE-BROWN, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, GRAVEL, AND ASPHALT
870	871.6	3.5	2	2	2	4		M		
	866.6	8.5	1	2	2	4		M		
865										
	861.6	13.5	2	2	1	3		M		
860										
	856.6	18.5	2	2	3	5		M		
855										
	851.6	23.5	2	3	3	6		M		850.1 25.0 Boring Terminated at Elevation 850.1 ft in ROADWAY EMBANKMENT (SILT)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_RT#3	**STATION** 41+86	**OFFSET** 63 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 839.4 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 854,807	**EASTING** 1,630,699	**24 HR.** 17.3
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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
840										
	839.4	0.0	2	2	2	4		M		839.4 GROUND SURFACE 0.0 **ARTIFICIAL FILL** GRAY-BROWN AND BLACK, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL, ORGANICS, AND PLASTIC
835	835.9	3.5	7	12	9	21		M		
	830.9	8.5	1	2	1	3		M		
830										
	825.9	13.5	WOH	WOH	1	1		M		826.4 13.0 **ALLUVIAL** BLACK-GRAY, FINE TO COARSE SANDY CLAY (A-7-5) WITH TRACE ORGANICS AND ORGANIC ODOR
825										
	820.9	18.5	17	2	3	5		M		821.4 18.0 **RESIDUAL** GRAY-BROWN AND ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
820										
	815.9	23.5	2	3	2	5		W		
815										
	810.9	28.5	11	11	17	28		W		811.4 28.0 TAN-BROWN, SILTY FINE TO COARSE SAND (A-2-4)
810										
	805.9	33.5	3	4	5	9		W		806.4 33.0 GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
805										
	800.9	38.5	5	6	8	14		W		
800										
	795.9	43.5	6	9	14	23		W		
795										
	790.9	48.5	4	6	10	16		W		
790										
	785.9	53.5	75	25/0.2		100/0.7				787.4 52.0 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
785										
	780.9	58.5	23	100/0.5		100/0.5				
780										
	775.9	63.5	60/0.1			60/0.1				775.8 63.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 775.8 ft on CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB2B	**STATION** 14+74	**OFFSET** 19 ft RT	**ALIGNMENT** -Y5-	**0 HR.** Dry
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 77.5 ft	**NORTHING** 854,840	**EASTING** 1,630,780	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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										
860										
855										
850										
	848.1	0.0								848.1 GROUND SURFACE 0.0
845			4	2	2	4		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS, GRAVEL, AND BRICK FRAGMENTS
	844.6	3.5								
840			2	2	2	4		M		
	839.6	8.5								838.6 9.5
835			4	4	4	8		M		**RESIDUAL** ORANGE-BROWN, FINE SANDY CLAY (A-4) WITH TRACE GRAVEL AND MICA
	834.6	13.5								
830			3	2	2	4		M		
	829.6	18.5								
825			1	1	1	2		W		
	824.6	23.5								
820			1	2	2	4		Sat.		
	819.6	28.5								
815			2	2	3	5		Sat.		
	814.6	33.5								813.9 34.2
810			6	6	7	13		Sat.		GRAY-BROWN, SILTY FINE SAND (A-2-4), SAPROLITIC
	809.6	38.5								
805			4	5	10	15		Sat.		
	804.6	43.5								
800			8	13	14	27		Sat.		
	799.6	48.5								
795			6	10	23	33		Sat.		
	794.6	53.5								
790			8	7	14	21		Sat.		
	789.6	58.5								
785			5	14	22	36		Sat.		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB2B	**STATION** 14+74	**OFFSET** 19 ft RT	**ALIGNMENT** -Y5-	**0 HR.** Dry
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 77.5 ft	**NORTHING** 854,840	**EASTING** 1,630,780	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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
785						Match Line				
	784.6	63.5	6	21	35	56		Sat.		GRAY-BROWN, SILTY FINE SAND (A-2-4), SAPROLITIC *(continued)*
780										781.3 66.8
	779.6	68.5	100/0.2			100/0.2				**WEATHERED ROCK** GRAY AND BROWN (MICA SCHIST)
775										774.6 73.5
	774.6	73.5	60/0.1			60/0.1				**CRYSTALLINE ROCK** GRAY (MICA SCHIST)
	770.7	77.4	60/0.1			60/0.1				770.6 77.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 770.6 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB2A	**STATION** 14+94	**OFFSET** 13 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 74.3 ft	**NORTHING** 854,851	**EASTING** 1,630,816	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/03/15	**COMP. DATE** 08/03/15	**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										
860										
855										
850										
	847.3	0.8	3	10	9	19		M		848.1 — GROUND SURFACE — 0.0 847.3 — 0.4' ASPHALT AND 0.4' CONCRETE — 0.8 **ROADWAY EMBANKMENT** RED AND BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE GRAVEL
845	844.6	3.5	3	2	2	4		M		845.1 — 3.0 **RESIDUAL** ORANGE AND BROWN, FINE SANDY SILT (A-4) WITH TRACE CLAY, GRAVEL, AND MICA
840	839.6	8.5	2	2	3	5		M		
835	834.6	13.5	1	1	2	3		M		
830	829.6	18.5	3	1	2	3		W		
825	824.6	23.5	2	4	3	7		Sat.		825.1 — 23.0 ORANGE-BROWN AND GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
820	819.6	28.5	2	3	10	13		Sat.		
815	814.6	33.5	2	4	6	10		Sat.		
810	809.6	38.5	6	9	15	24		W		
805	804.6	43.5	13	22	24	46		W		
800	799.6	48.5	10	11	16	27		W		
795	794.6	53.5	34	24	22	46		W		
790	789.6	58.5	10	11	14	25		W		
785										

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5_EB2A	**STATION** 14+94	**OFFSET** 13 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/M
COLLAR ELEV. 848.1 ft	**TOTAL DEPTH** 74.3 ft	**NORTHING** 854,851	**EASTING** 1,630,816	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/03/15	**COMP. DATE** 08/03/15	**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
785						Match Line				
	784.6	63.5	28	24	44	68		W		ORANGE-BROWN AND GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC *(continued)*
780	779.6	68.5	43	42	58/0.5	100/1.0				780.7 — 67.4 **WEATHERED ROCK** GRAY (MICA SCHIST)
775	774.6	73.5	60/0.0			60/0.0				774.6 — 73.5
	773.8	74.3	60/0.0			60/0.0				773.8 — 74.3 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 773.8 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5A_#1	**STATION** 11+65	**OFFSET** 45 ft RT	**ALIGNMENT** -Y5A-	**0 HR.** Dry
COLLAR ELEV. 862.1 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 854,767	**EASTING** 1,631,037	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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
865										
	862.1	0.0	1	3	2	5		M		ELEV. (ft) 862.1 — GROUND SURFACE — DEPTH (ft) 0.0 **ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY SILTY CLAY (A-7-5)
860	858.6	3.5	1	2	2	4		M		
855	853.6	8.5	1	1	1	2	SS-225	16%		854.1 — 8.0 ORANGE-BROWN, SILTY CLAYEY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
850	848.6	13.5	4	5	6	11		W		847.1 — 15.0 Boring Terminated at Elevation 847.1 ft in ROADWAY EMBANKMENT (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5A_#2	**STATION** 12+90	**OFFSET** 40 ft RT	**ALIGNMENT** -Y5A-	**0 HR.** Dry
COLLAR ELEV. 874.1 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,789	**EASTING** 1,631,160	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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										
	873.8	0.3	4	3	3	6		M		874.1 — GROUND SURFACE — 0.0 873.8 — ASPHALT — 0.3 **ROADWAY EMBANKMENT** RED-BROWN, SILTY CLAY (A-7-5)
870	870.6	3.5	4	4	3	7		M		
865	865.6	8.5	4	6	5	11		M		866.1 — 8.0 RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) 864.1 — 10.0 Boring Terminated at Elevation 864.1 ft in ROADWAY EMBANKMENT (CLAY)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y5A_#3	**STATION** 14+15	**OFFSET** 35 ft RT	**ALIGNMENT** -Y5A-	**0 HR.** Dry
COLLAR ELEV. 884.4 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 854,811	**EASTING** 1,631,283	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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
885										
	884.0	0.4	4	3	3	6	SS-222	21%		884.4 GROUND SURFACE 0.0 884.0 ASPHALT 0.4 **ROADWAY EMBANKMENT**
880	880.9	3.5	3	4	5	9		M		881.4 RED-BROWN, FINE SANDY SILTY CLAY (A-7-5) 3.0 ORANGE-RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA
875	875.9	8.5	7	12	15	27		M		876.4 **RESIDUAL** 8.0 874.4 ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH SOME GRAVEL 10.0 Boring Terminated at Elevation 874.4 ft in RESIDUAL (SILT)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7RB_LT#1	**STATION** 11+65	**OFFSET** 22 ft LT	**ALIGNMENT** -Y7RB-	**0 HR.** Dry
COLLAR ELEV. 862.5 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,002	**EASTING** 1,630,891	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/28/15	**COMP. DATE** 08/28/15	**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
865										
	862.5	0.0								862.5 GROUND SURFACE 0.0
			5	9	9	18		D		**ROADWAY EMBANKMENT**
860										860.5 BROWN, SILTY FINE SAND (A-2-4) WITH TRACE ROOTS 2.0
	859.0	3.5								RED, FINE TO COARSE SANDY SILTY CLAY (A-7-5) WITH TRACE GRAVEL
			6	14	14	28		D		
855										855.5 7.0
	854.0	8.5								**RESIDUAL**
			8	6	7	13		M		RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA 10.0
										852.5 Boring Terminated at Elevation 852.5 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7RB_LT#2	**STATION** 12+60	**OFFSET** 10 ft LT	**ALIGNMENT** -Y7RB-	**0 HR.** Dry
COLLAR ELEV. 864.8 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,034	**EASTING** 1,630,983	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/27/15	**COMP. DATE** 08/27/15	**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
865										
	864.0	0.8								864.8 GROUND SURFACE 0.0
			7	3	4	7		M		864.0 ASPHALT AND CONCRETE 0.8
	861.3	3.5								**ROADWAY EMBANKMENT**
860			2	1	2	3		M		RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL
										857.8 7.0
	856.3	8.5								**RESIDUAL**
855			5	6	8	14		M		GRAY-DARK BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC 10.0
										854.8 Boring Terminated at Elevation 854.8 ft in RESIDUAL (SAND)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7RB_LT#3	**STATION** 13+70	**OFFSET** 11 ft LT	**ALIGNMENT** -Y7RB-	**0 HR.** Dry
COLLAR ELEV. 873.7 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 855,076	**EASTING** 1,631,085	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/27/15	**COMP. DATE** 08/27/15	**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)
	872.9	0.8								873.7 GROUND SURFACE 0.0
			7	5	5	10		M		872.9 ASPHALT AND CONCRETE 0.8
870	870.2	3.5								**ROADWAY EMBANKMENT**
			4	4	4	8		M		870.7 RED-YELLOW, FINE SANDY SILT (A-4) WITH TRACE GRAVEL 3.0
865	865.2	8.5								**RESIDUAL**
			4	5	6	11		M		RED-YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL
860	860.2	13.5								
			5	7	7	14		M		858.7 15.0
										Boring Terminated at Elevation 858.7 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7RB_LT#4	**STATION** 14+61	**OFFSET** 22 ft LT	**ALIGNMENT** -Y7RB-	**0 HR.** Dry
COLLAR ELEV. 882.0 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 855,115	**EASTING** 1,631,169	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/28/15	**COMP. DATE** 08/28/15	**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
885										
	882.0	0.0								882.0 GROUND SURFACE 0.0
			2	3	6	9		M		**ROADWAY EMBANKMENT**
880										880.0 RED, FINE SANDY SILT (A-4) WITH LITTLE TO SOME CLAY, TRACE ROOTS, AND MICA 2.0
	878.5	3.5								878.0 RED, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE MICA AND ORGANICS 4.0
			3	6	9	15	SS-476	37%		875.0 **RESIDUAL** 7.0
875	873.5	8.5								RED-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE MICA
			4	6	6	12		M		YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
870	868.5	13.5								
			4	6	9	15		M		867.0 15.0
										Boring Terminated at Elevation 867.0 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7RB_LT#5	**STATION** 15+50	**OFFSET** 22 ft LT	**ALIGNMENT** -Y7RB-	**0 HR.** Dry
COLLAR ELEV. 887.3 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,140	**EASTING** 1,631,254	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 08/28/15	**COMP. DATE** 08/28/15	**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
890										
	887.3	0.0								887.3 GROUND SURFACE 0.0
			3	9	4	13		M		**ROADWAY EMBANKMENT** BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS AND BRICK FRAGMENTS
885	883.8	3.5	6	6	7	13		M		
880	878.8	8.5								880.3 7.0
			6	9	12	21		M		**RESIDUAL** BROWN-RED, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
										877.3 10.0
										Boring Terminated at Elevation 877.3 ft in RESIDUAL (SAND)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y6_LT#1	**STATION** 46+50	**OFFSET** 35 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 859.1 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,034	**EASTING** 1,631,115	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/15/15	**COMP. DATE** 08/15/15	**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										GROUND SURFACE	859.1	0.0
	858.0	1.1								ASPHALT AND CONCRETE	858.0	1.1
			7	3	5	8		M		**RESIDUAL** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA		
855	855.6	3.5	4	4	4	8		M				
	850.6	8.5										
850			2	4	6	10		M			849.1	10.0
										Boring Terminated at Elevation 849.1 ft in RESIDUAL (SILT)		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y6_LT#2	**STATION** 47+50	**OFFSET** 35 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 861.5 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,062	**EASTING** 1,631,211	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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										GROUND SURFACE	861.5	0.0
860	860.4	1.1								0.1' ASPHALT, 1.0' CONCRETE, AND 0.5' ABC STONE	859.9	1.6
			5	4	3	7		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA	858.0	3.5
	858.0	3.5	2	10	9	19		M		**RESIDUAL** ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA		
855	853.0	8.5										
			5	7	8	15		M			851.5	10.0
										Boring Terminated at Elevation 851.5 ft in RESIDUAL (SILT)		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_LT#3	**STATION** 48+52	**OFFSET** 58 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 886.5 ft	**TOTAL DEPTH** 10.2 ft	**NORTHING** 855,113	**EASTING** 1,631,302	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/04/15	**COMP. DATE** 08/04/15	**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)
890										
	885.8	0.7	3	3	2	5		W		886.5 0.0 GROUND SURFACE 885.8 0.7 CONCRETE 0.0'-0.7'
885	883.0	3.5	3	1	2	3		W		**ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE CLAY AND SOME GRAVEL
	879.3	7.2								879.5 7.0
880	878.0	8.5	42	58/0.0		100/0.5		D		878.0 8.5 **WEATHERED ROCK** GRAY-WHITE (BIOTITE GNEISS)
	876.3	10.2	12 60/0.0	25	100/0.4	100/0.4 60/0.0		D		877.0 9.5 876.3 10.2 **RESIDUAL** RED-YELLOW, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL **WEATHERED ROCK** GRAY-WHITE (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 876.3 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_LT#4	**STATION** 49+50	**OFFSET** 30 ft LT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 871.5 ft	**TOTAL DEPTH** 5.9 ft	**NORTHING** 855,114	**EASTING** 1,631,404	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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										
	870.5	1.0		9	13	7		M		871.5 0.0 GROUND SURFACE 870.0 1.5 0.1' ASPHALT, 0.9' CONCRETE, AND 0.5' ABC STONE
870	868.0	3.5	100/0.5			20 100/0.5		M		868.0 3.5 **ROADWAY EMBANKMENT** GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA
	865.6	5.9	60/0.0			60/0.0		M		865.7 5.8 865.6 5.9 **WEATHERED ROCK** GRAY AND TAN (MICA SCHIST) **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 865.6 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_EB1B	**STATION** 14+51	**OFFSET** 31 ft RT	**ALIGNMENT** -Y7-	**0 HR.** 41.6
COLLAR ELEV. 902.2 ft	**TOTAL DEPTH** 55.4 ft	**NORTHING** 855,177	**EASTING** 1,631,505	**24 HR.** 33.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/08/15	**COMP. DATE** 09/08/15	**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)
905											
	902.2	0.0	1	2	2	4		M		902.2 GROUND SURFACE	0.0
900	898.7	3.5	3	3	3	6		M		**ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, CLAY, TRACE TO LITTLE GRAVEL, AND TRACE ORGANICS	
895	893.7	8.5	2	3	3	6		M			
890	888.7	13.5	2	1	3	4		M			
885	883.7	18.5	3	4	5	9		M		885.2 **RESIDUAL** DARK-BROWN-BLACK, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC	17.0
880	878.7	23.5	7	6	6	12		M			
875	873.7	28.5	4	7	7	14		M			
870	868.7	33.5	6	7	8	15		W			
865	863.7	38.5	4	6	19	25		W			
860	858.7	43.5	9	9	17	26		W			
855	853.7	48.5	22	28	41	69		W			
850	848.7	53.5	12	40	100/0.2	100/0.2					
	846.8	55.4	60/0.0			60/0.0				847.7 **WEATHERED ROCK** BROWN (BIOTITE GNEISS) 846.8 Boring Terminated with Standard Penetration Test Refusal at Elevation 846.8 ft on CRYSTALLINE ROCK (BIOTITE GNEISS AND SCHIST)	54.5 55.4

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_EB1A	**STATION** 14+70	**OFFSET** 43 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 18.3
COLLAR ELEV. 882.1 ft	**TOTAL DEPTH** 44.9 ft	**NORTHING** 855,168	**EASTING** 1,631,581	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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	
885											
	881.0	1.1	6	13	11	24		M		882.1 GROUND SURFACE	0.0
880	878.6	3.5	15	12	7	19		M		881.0 ASPHALT AND CONCRETE	1.1
875	873.6	8.5	3	5	7	12		M		879.1 **ROADWAY EMBANKMENT** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH SOME GRAVEL GRAY-TAN-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL, TRACE MICA, AND ORGANICS	3.0
870	868.6	13.5	5	5	8	13		W		869.1 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA	13.0
865	863.6	18.5	3	3	4	7		Sat.			
860	858.6	23.5	4	9	13	22		Sat.			
855	853.6	28.5	21	70	30/0.1	100/0.6		Sat.		853.1 **WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	29.0
850	848.6	33.5	23	23	23	46		Sat.		849.1 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA	33.0
845	843.6	38.5	7	8	15	23		Sat.		839.1 **WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	43.0
840	838.6	43.5	100/0.3			100/0.3				837.4 **CRYSTALLINE ROCK** (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 837.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	44.7
	837.2	44.9	60/0.0			60/0.0				837.2	44.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_LT#5	**STATION** 52+23	**OFFSET** 34 ft LT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 885.3 ft	**TOTAL DEPTH** 7.7 ft	**NORTHING** 855,196	**EASTING** 1,631,664	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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)
890										
885										885.3 GROUND SURFACE 0.0
	884.4	0.9	7	8	5	13		M		884.4 0.1' ASPHALT AND 0.8' CONCRETE 0.9
	881.8	3.5	2	5	8	13		M		**ROADWAY EMBANKMENT** BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE ORGANICS AND MICA
880	877.7	7.6	60/0.1			60/0.1				877.8 7.5 877.6 7.7 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 877.6 ft in CRYSTALLINE ROCK (MICA SCHIST)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB1B	**STATION** 13+70	**OFFSET** 34 ft RT	**ALIGNMENT** -Y8B-	**0 HR.** N/M
COLLAR ELEV. 890.0 ft	**TOTAL DEPTH** 4.7 ft	**NORTHING** 855,221	**EASTING** 1,631,757	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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
890										
	889.1	0.9	7	12	15	27		M		890.0 GROUND SURFACE 0.0 889.1 0.1' ASPHALT AND 0.8' CONCRETE 0.9 **ROADWAY EMBANKMENT** 886.5 BROWN, FINE TO COARSE SANDY SILT (A-4) WITH SOME GRAVEL 3.5
	886.5	3.5	100/0.4			100/0.4				885.3 4.7 **WEATHERED ROCK** TAN AND GRAY (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 885.3 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)
	885.3	4.7	60/0.0			60/0.0				

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A	**STATION** 13+38	**OFFSET** 24 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.2 ft	**TOTAL DEPTH** 21.7 ft	**NORTHING** 855,261	**EASTING** 1,631,811	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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)
910												
	908.2	0.0	3	3	3	6		W		GROUND SURFACE	908.2	0.0
										ROADWAY EMBANKMENT BROWN-BLACK AND RED, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND ORGANICS	906.2	2.0
905	904.7	3.5	WOH	2	1	3		W		RED, SILTY CLAY (A-7-5) WITH TRACE GRAVEL AND MICA		
900	899.7	8.5	WOH	WOH	2	2		W			898.3	9.9
895	894.7	13.5	3	4	5	9		W		DARK RED, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND CLAY		
890	889.7	18.5	2	2	2	4		W			886.5	21.7
										Boring Terminated at Elevation 886.5 ft on CONCRETE Note: Boring terminated on possible retaining wall footing		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A1	**STATION** 13+33	**OFFSET** 24 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.5 ft	**TOTAL DEPTH** 23.5 ft	**NORTHING** 855,266	**EASTING** 1,631,810	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/01/15	**COMP. DATE** 09/01/15	**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)
910												
	908.5	0.0	2	3	4	7		M		GROUND SURFACE	908.5	0.0
										ROADWAY EMBANKMENT BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND ROOTS	905.5	3.0
905	905.0	3.5	WOH	1	1	2		M		RED-YELLOW, SILTY CLAY (A-7-5) WITH TRACE GRAVEL		
900	900.0	8.5	2	1	3	4		M				
895	895.0	13.5	20	24	23	47		M			895.5	13.0
890	890.0	18.5	5	2	2	4		M		RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND LITTLE TO SOME GRAVEL		
885	885.0	23.5	60/0.0			60/0.0					887.0	21.5
											885.0	23.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 885.0 ft in CONCRETE Notes: 1. Boring terminated on possible retaining wall footing 2. 2nd Attempt at boring Y8B_EB1A		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB1A2	**STATION** 13+08	**OFFSET** 33 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 908.6 ft	**TOTAL DEPTH** 22.5 ft	**NORTHING** 855,292	**EASTING** 1,631,815	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/04/15	**COMP. DATE** 09/04/15	**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)
910											
	908.6	0.0	4	7	9	16		M		908.6 GROUND SURFACE	0.0
905	905.1	3.5	6	7	5	12		M		**ROADWAY EMBANKMENT** BROWN, SILTY FINE SANDY CLAY (A-6) WITH TRACE MICA AND ORGANICS	
900	900.1	8.5	5	6	7	13		M		900.6 **RESIDUAL** RED-BROWN TO DARK BROWN-YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	8.0
895	895.1	13.5	7	11	15	26		M			
890	890.1	18.5	19	53	47/0.4	100/0.9				889.6 **WEATHERED ROCK** RED-BROWN (BIOTITE GNEISS)	19.0
	886.1	22.5	60/0.0			60/0.0				886.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 886.1 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	22.5

Note:
1. 3rd Attempt at boring Y8B_EB1A due to previous borings terminating on possible retaining wall footing

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_LT#6	**STATION** 54+79	**OFFSET** 51 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 895.5 ft	**TOTAL DEPTH** 11.9 ft	**NORTHING** 855,285	**EASTING** 1,631,905	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/02/15	**COMP. DATE** 09/02/15	**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
900										
	895.5	0.0	2	4	8	12		M		895.5 GROUND SURFACE 0.0
895	892.0	3.5	5	20	75	95		M		**ROADWAY EMBANKMENT** 893.5 RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, MICA, AND ORGANICS 2.0
890	887.0	8.5	100/0.3			100/0.3				891.4 RED, CLAYEY SILT (A-5) WITH LITLE FINE SAND, TRACE MICA, AND ORGANICS 4.1
885	883.6	11.9	60/0.0			60/0.0				**RESIDUAL** 887.0 BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC 8.5
										WEATHERED ROCK 883.6 BROWN (BIOTITE GNEISS) 11.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 883.6 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_LT#7	**STATION** 55+38	**OFFSET** 56 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 894.7 ft	**TOTAL DEPTH** 21.7 ft	**NORTHING** 855,306	**EASTING** 1,631,960	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 09/08/15	**COMP. DATE** 09/08/15	**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)
895	894.7	0.0	3	5	6	11		M		894.7 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
	891.2	3.5	3	4	2	6		M		BROWN, SILTY FINE SANDY CLAY (A-6) WITH LITTLE GRAVEL AND TRACE ORGANICS	
890										891.7	3.0
										RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	
	886.2	8.5	15	19	40	59		M		887.7	7.0
885										**RESIDUAL**	
										RED-BROWN-GRAY, SILTY FINE SAND (A-2-4) WIH TRACE MICA, SAPROLITIC	
	881.2	13.5	88	12/0.0		100/0.5				881.2	13.5
880										**WEATHERED ROCK**	
										WHITE-GRAY-BROWN (BIOTITE GNEISS)	
	876.2	18.5	60/0.0			60/0.0				876.2	18.5
875										**CRYSTALLINE ROCK**	
	873.0	21.7	60/0.0			60/0.0				(BIOTITE GNEISS)	
										873.0	21.7
										Boring Terminated with Standard Penetration Test Refusal at Elevation 873.0 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_LT#8	**STATION** 57+00	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** 24.8
COLLAR ELEV. 856.5 ft	**TOTAL DEPTH** 28.0 ft	**NORTHING** 855,337	**EASTING** 1,632,124	**24 HR.** 14.0
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/07/15	**COMP. DATE** 08/07/15	**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	
860										856.5 GROUND SURFACE	0.0
	856.3	0.2								856.3 ASPHALT	0.2
855			7	5	7	12		M		**ARTIFICIAL FILL**	
	853.0	3.5								853.5 ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL	3.0
			6	4	3	7		M		GRAY-BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS AND GRAVEL	
850										848.5	8.0
	848.0	8.5	7	8	6	14		M		GRAY-BROWN, SILTY CLAY (A-7-5) WITH TRACE WOOD FRAGMENTS	
845											
	843.0	13.5	1	1	11	12		W		843.5 GRAY-BROWN, COARSE SAND (A-1-b) WITH SOME GRAVEL, CLAY, AND TRACE ORGANICS	13.0
840										838.5	18.0
	838.0	18.5	32	42	16	58		Sat.		**RESIDUAL**	
										GRAY-BROWN, COARSE SAND (A-1-b) WITH SOME GRAVEL	
835										832.0	24.5
	833.0	23.5	1	11	100/0.4	100/0.4				**WEATHERED ROCK**	
830										GRAY AND BROWN (BIOTITE GNEISS)	
	828.5	28.0	60/0.0			60/0.0				828.9	27.6
										828.5 **CRYSTALLINE ROCK**	28.0
										GRAY AND BROWN (BIOTITE GNEISS)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 828.5 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#1	**STATION** 47+13	**OFFSET** 59 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 867.4 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 854,962	**EASTING** 1,631,202	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/31/15	**COMP. DATE** 08/31/15	**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
870										ELEV. (ft) DEPTH (ft)
	867.4	0.0	2	7	5	12		M		867.4 GROUND SURFACE 0.0
865										**ROADWAY EMBANKMENT**
	863.9	3.5	11	12	19	31		D		865.4 DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, BRICK, CLAY AND ORGANICS 2.0
860										RED, FINE TO COARSE SANDY SILTY CLAY (A-7-5) WITH TRACE GRAVEL 860.4 7.0
	858.9	8.5	6	5	6	11		M		**RESIDUAL**
855										RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL
	853.9	13.5	11	14	14	28		M		852.4 15.0
										Boring Terminated at Elevation 852.4 ft in RESIDUAL (SAND)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#2	**STATION** 48+03	**OFFSET** 66 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 884.3 ft	**TOTAL DEPTH** 15.2 ft	**NORTHING** 854,981	**EASTING** 1,631,290	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/09/15	**COMP. DATE** 09/09/15	**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
885										
	884.1	0.2	8	4	3	7		M		884.3 GROUND SURFACE 0.0
880										883.1 0.2' ASPHALT AND 1.0' ABC STONE 1.2
	880.8	3.5	3	3	2	5		W		882.3 **ROADWAY EMBANKMENT** 2.0
875										GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
	875.8	8.5	5	6	8	14		M		RED-BROWN, FINE SANDY CLAY (A-6) WITH TRACE GRAVEL AND ORGANICS 877.3 7.0
870										RED-BROWN, CLAYEY FINE TO COARSE SAND (A-2-6) WITH LITTLE GRAVEL
	870.8	13.5	49	51/0.2		100/0.7				870.8 13.5
	869.1	15.2	60/0.0			60/0.0				**WEATHERED ROCK**
										869.1 GRAY-BROWN (BIOTITE GNEISS) 15.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 869.1 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#3	**STATION** 49+10	**OFFSET** 35 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 869.0 ft	**TOTAL DEPTH** 2.6 ft	**NORTHING** 855,034	**EASTING** 1,630,983	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/14/15	**COMP. DATE** 08/14/15	**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
870										ELEV. (ft) DEPTH (ft)
										869.0 GROUND SURFACE 0.0
										ASPHALT AND CONCRETE
	868.2	0.8	7	5	100/0.2			M		868.2 0.8
										ROADWAY EMBANKMENT RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE COARSE SAND AND GRAVEL
						100/0.2				867.2 1.8
										866.9 2.1 **WEATHERED ROCK** GRAY (BIOTITE GNEISS)
	866.4	2.6	60/0.0			60/0.0				866.4 2.6 **CRYSTALLINE ROCK** (BIOTITE GNEISS)
										Boring Terminated at Elevation 866.4 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_EB2B	**STATION** 15+64	**OFFSET** 19 ft RT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 899.2 ft	**TOTAL DEPTH** 26.2 ft	**NORTHING** 855,067	**EASTING** 1,631,532	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/09/15	**COMP. DATE** 09/09/15	**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
900										
	899.2	0.0	2	3	3	6		M		899.2 GROUND SURFACE 0.0
895	895.7	3.5	1	2	1	3		M		**ROADWAY EMBANKMENT** DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE TO SOME GRAVEL, TRACE MICA, AND ROOTS
890	890.7	8.5	2	3	2	5		M		
885	885.7	13.5	2	1	2	3		M		
880	880.7	18.5	4	4	2	6		M		
875	875.7	23.5	3	3	3	6		M		
	873.0	26.2	60/0.0			60/0.0				873.0 26.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 873.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_EB2A	**STATION** 15+66	**OFFSET** 38 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 36.0
COLLAR ELEV. 901.3 ft	**TOTAL DEPTH** 53.6 ft	**NORTHING** 855,072	**EASTING** 1,631,589	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/17/15	**COMP. DATE** 09/17/15	**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)
	901.3	0.0								901.3 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
										RED-BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE CLAY, TRACE TO SOME GRAVEL, AND TRACE ORGANICS	
	897.8	3.5	8	13	13	26		M			
			3	2	3	5		M			
	892.8	8.5	2	4	3	7		M			
	887.8	13.5	1	2	1	3		M			
	882.8	18.5	2	1	2	3		M		884.3 RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE CLAY, MICA, AND ORGANICS	17.0
	877.8	23.5	1	1	3	4		M			
	872.8	28.5	13	21	28	49		M		874.3 **RESIDUAL** DARK BROWN TO YELLOW-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITC	27.0
	867.8	33.5	8	10	11	21		W			
	862.8	38.5	9	9	11	20		W			
	857.8	43.5	34	40	60/0.3	100/0.8				857.3 **WEATHERED ROCK** YELLOW-BROWN (BIOTITE GNEISS)	44.0
	852.8	48.5	40	80	20/0.1	100/0.6					
	847.8	53.5	60/0.1			60/0.1				847.8 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	53.5
										847.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 847.7 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	53.6

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#4	**STATION** 52+09	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 885.7 ft	**TOTAL DEPTH** 8.4 ft	**NORTHING** 855,116	**EASTING** 1,631,673	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/17/15	**COMP. DATE** 09/17/15	**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	
	885.7	0.0								885.7 GROUND SURFACE	0.0
										884.9 **ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND GRAVEL	0.8
	882.2	3.5	WOH	4	20	24		M		**RESIDUAL** GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL, AND MICA, SAPROLITIC	
			11	9	10	19		M			
	877.3	8.4	60/0.0			60/0.0				877.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 877.3 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	8.4

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB2B	**STATION** 14+54	**OFFSET** 31 ft RT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 887.3 ft	**TOTAL DEPTH** 8.7 ft	**NORTHING** 855,139	**EASTING** 1,631,771	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/21/15	**COMP. DATE** 09/21/15	**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)
890												
	887.3	0.0	5	4	6	10		M		GROUND SURFACE	887.3	0.0
885										**ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL AND TRACE ORGANICS	885.3	2.0
	883.8	3.5	13	13	8	21		M		**RESIDUAL** GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	881.3	6.0
880										**WEATHERED ROCK** LIGHT GRAY (BIOTITE GNEISS)	878.8	8.5
	878.8	8.5	60/0.0			60/0.0				**CRYSTALLINE ROCK** (BIOTITE GNEISS)	878.6	8.7
	878.6	8.7	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 878.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_EB2A	**STATION** 14+37	**OFFSET** 40 ft LT	**ALIGNMENT** -Y8B-	**0 HR.** Dry
COLLAR ELEV. 895.4 ft	**TOTAL DEPTH** 6.4 ft	**NORTHING** 855,165	**EASTING** 1,631,840	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/17/15	**COMP. DATE** 09/17/15	**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)
900												
895	895.4	0.0	4	6	7	13		M		GROUND SURFACE	895.4	0.0
	891.9	3.5	22	30	29	59		M		**ROADWAY EMBANKMENT** RED-BROWN, CLAYEY FINE SAND (A-2-6) WITH TRACE ROOTS AND MICA	893.4	2.0
890	889.0	6.4	60/0.0			60/0.0				**RESIDUAL** GRAY-LIGHT BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL	889.0	6.4
										Boring Terminated with Standard Penetration Test Refusal at Elevation 889.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#5	**STATION** 54+61	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 892.3 ft	**TOTAL DEPTH** 10.3 ft	**NORTHING** 855,187	**EASTING** 1,631,915	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/18/15	**COMP. DATE** 09/18/15	**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)
895											
	892.3	0.0	4	4	11	15		M		892.3 GROUND SURFACE	0.0
890										**ROADWAY EMBANKMENT** RED-BROWN, CLAYEY FINE SAND (A-2-6) WITH TRACE GRAVEL	
	888.8	3.5	38	92	8/0.0	100/0.5				890.3 GRAY-DARK BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL	2.0
										888.3 **WEATHERED ROCK** BROWN-WHITE (BIOTITE GNEISS)	4.0
885										885.3 **RESIDUAL** RED-DARK BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE MICA, SAPROLITIC	7.0
	883.8	8.5	8	18	100/0.4	100/0.4		M		882.8 **WEATHERED ROCK** BROWN (BIOTITE GNEISS)	9.5
	882.0	10.3	60/0.0			60/0.0				882.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 882.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	10.3

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y7_RT#6	**STATION** 55+97	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 880.4 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 855,194	**EASTING** 1,632,001	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/18/15	**COMP. DATE** 09/18/15	**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											
880	880.4	0.0	8	19	10	29		M		880.4 GROUND SURFACE	0.0
	876.9	3.5	4	6	6	12		M		**ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL, TRACE ORGANICS	
875										875.8 **RESIDUAL** DARK RED TO LIGHT BROWN-GRAY, SILTY FINE SAND (A-2-4) WITH LITTLE MICA AND TRACE TO LITTLE GRAVEL, SAPROLITIC	4.6
	871.9	8.5	30	9	7	16		M			
870											
	866.9	13.5	7	32	68/0.3	100/0.8				866.4 **WEATHERED ROCK** LIGHT BROWN (BIOTITE GNEISS)	14.0
865	865.0	15.4	60/0.0			60/0.0				865.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 865.0 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	15.4

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y8B_RT#7	**STATION** 57+00	**OFFSET** 45 ft RT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 853.5 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 855,245	**EASTING** 1,632,131	**24 HR.** 13.0
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/20/15	**COMP. DATE** 08/20/15	**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
855										
	853.4	0.1								853.5 GROUND SURFACE 0.0
			12	4	4	8		M		852.9 0.1' ASPHALT AND 0.5' ABC STONE 0.6
850	850.0	3.5								**ARTIFICIAL FILL**
			4	5	6	11		M		850.5 RED-ORANGE-BROWN, FINE SANDY CLAYEY SILT (A-5) WITH TRACE ORGANICS AND MICA 3.0
845	845.0	8.5								ORANGE-GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA 845.5 8.0
			1	1	1	2	SS-160	32%		**RESIDUAL**
840	840.0	13.5								GRAY-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE ORGANICS
			2	1	2	3				840.5 13.0
835	835.0	18.5						Sat.		ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA
			2	3	3	6		W		
830	830.0	23.5								
			2	4	4	8		W		
825	825.0	28.5								
			2	2	12	14		W		
820	820.0	33.5								820.0 33.5
			42	52	48/0.2	100/0.7				**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)
815	815.0	38.5								816.0 37.5
			8	10	17	27		Sat.		**RESIDUAL** ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL 813.5 40.0
										Boring Terminated at Elevation 813.5 ft in RESIDUAL (SILT)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_LT#1	**STATION** 11+54	**OFFSET** 42 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 889.5 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,609	**EASTING** 1,632,442	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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)
890												
	889.2	0.3	3	5	5	10		M		GROUND SURFACE	889.5	0.0
										ASPHALT	889.2	0.3
	886.0	3.5								**ARTIFICIAL FILL** RED-BROWN, FINE SANDY SILTY CLAY (A-7-5) WITH TRACE MICA	886.5	3.0
885			3	4	5	9		M		RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA		
	881.0	8.5										
880			5	5	5	10		M			879.5	10.0
										Boring Terminated at Elevation 879.5 ft in ARTIFICIAL FILL (SILT)		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_LT#2	**STATION** 12+48	**OFFSET** 42 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 883.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 855,516	**EASTING** 1,632,455	**24 HR.** 23.2
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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												
	883.4	0.2	3	3	4	7		M		GROUND SURFACE	883.6	0.0
										ASPHALT	883.4	0.2
880	880.1	3.5	2	3	3	6		M		**ARTIFICIAL FILL** RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA		
875	875.1	8.5	2	4	5	9		M			870.6	13.0
870	870.1	13.5	4	7	7	14		M		**RESIDUAL** RED-GRAY-BROWN AND TAN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA		
865	865.1	18.5	2	2	2	4		M				
860	860.1	23.5	1	1	1	2		W			856.6	27.0
855	855.1	28.5	7	8	9	17		W		GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4)	853.6	30.0
										Boring Terminated at Elevation 853.6 ft in RESIDUAL (SAND)		

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_LT#3	**STATION** 13+22	**OFFSET** 43 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 28.5
COLLAR ELEV. 878.6 ft	**TOTAL DEPTH** 45.0 ft	**NORTHING** 855,443	**EASTING** 1,632,466	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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
880										
	878.6	0.0								GROUND SURFACE
	878.0	0.6	4	2	2	4		M		0.3' ASPHALT AND 0.3' ABC STONE
875	875.1	3.5	WOH	WOH	WOH	0		M		**ARTIFICIAL FILL** RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
870	870.1	8.5	2	2	6	8	SS-148	21%		**RESIDUAL** ORANGE-BROWN-GRAY, CLAYEY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND SILT
865	865.1	13.5	2	4	6	10		M		
860	860.1	18.5	3	4	6	10		M		
855	855.1	23.5	2	4	4	8		W		TAN-WHITE, FINE COARSE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
850	850.1	28.5	2	2	2	4		W		
845	845.1	33.5	4	3	2	5		Sat.		
840	840.1	38.5	2	4	7	11		Sat.		
835	835.1	43.5	8	15	32	47		Sat.		GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
										Boring Terminated at Elevation 833.6 ft in RESIDUAL (SAND)

878.6 0.0
878.0 0.6
870.6 8.0
855.6 23.0
834.1 44.5
833.6 45.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. STLWY1_LT#1	**STATION** 58+43	**OFFSET** 76 ft LT	**ALIGNMENT** -L-	**0 HR.** 9.9
COLLAR ELEV. 861.1 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 855,388	**EASTING** 1,632,269	**24 HR.** 7.2
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/15/15	**COMP. DATE** 09/15/15	**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)
	861.1	0.0	3	6	7	13		M		861.1 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, ORGANICS, AND PLASTIC	
	857.6	3.5	4	4	3	7		W		858.1	3.0
										BROWN, CLAYEY FINE SAND (A-2-6) WITH TRACE GRAVEL	
	852.6	8.5	2	2	2	4		W		856.4	4.7
										RESIDUAL YELLOW-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE MICA	
	847.6	13.5	2	1	3	4		W			
	842.6	18.5	2	2	4	6		W		841.1	20.0
										Boring Terminated at Elevation 841.1 ft in RESIDUAL (SILT)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. STLWY1_EB1	**STATION** 14+81	**OFFSET** 13 ft LT	**ALIGNMENT** -STLWY1-	**0 HR.** 27.4
COLLAR ELEV. 881.8 ft	**TOTAL DEPTH** 50.9 ft	**NORTHING** 855,401	**EASTING** 1,632,310	**24 HR.** 27.2
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/15/15	**COMP. DATE** 09/15/15	**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
	881.8	0.0	WOH	1	WOH	1		M		881.8 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
	878.3	3.5	2	3	3	6		M		
										874.8 7.0
	873.3	8.5	2	2	2	4		M		RED-BROWN, COARSE TO FINE SANDY SILT (A-4) WITH TRACE GRAVEL, CLAY, AND BRICK FRAGMENTS
	868.3	13.5	3	4	4	8		M		
	863.3	18.5	2	3	4	7		M		864.8 17.0
										BROWN, FINE TO COARSE SANDY SILTY CLAY (A-7-5)
	858.3	23.5	4	3	4	7		M		859.8 22.0
	853.3	28.5	2	2	2	4		W		**RESIDUAL** BROWN-GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA
	848.3	33.5	5	7	8	15		W		849.8 32.0
	843.3	38.5	8	7	10	17		W		GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL
	838.3	43.5	13	35	63	98		M		
	833.3	48.5	40	100/0.3		100/0.3				832.8 49.0
	831.0	50.8	60/0.1			60/0.1				**WEATHERED ROCK** GRAY (MICA SCHIST) 830.9 50.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 830.9 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_EB1B	**STATION** 13+76	**OFFSET** 33 ft RT	**ALIGNMENT** -Y9-	**0 HR.** 20.8
COLLAR ELEV. 872.6 ft	**TOTAL DEPTH** 68.8 ft	**NORTHING** 855,379	**EASTING** 1,632,398	**24 HR.** 18.5
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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											
	872.6	0.0	2	3	4	7		M		872.6 GROUND SURFACE	0.0
870										**ARTIFICIAL FILL** RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE ORGANICS AND GRAVEL	
	869.1	3.5	3	3	4	7		M			
865											
	864.1	8.5	3	3	3	6		M			
860											
	859.1	13.5	2	1	2	3		W		859.6 **RESIDUAL** TAN BROWN, FINE SANDY CLAYEY SILT (A-5)	13.0
855											
	854.1	18.5	2	3	3	6		W		854.6 ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA	18.0
850											
	849.1	23.5	4	6	6	12		W			
845											
	844.1	28.5	8	9	10	19		W		844.6 GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA	28.0
840											
	839.1	33.5	4	4	6	10		W			
835											
	834.1	38.5	8	7	11	18		W			
830											
	829.1	43.5	8	10	18	28		W			
825											
	824.1	48.5	20	25	30	55		W			
820											
	819.1	53.5	17	23	32	55		W			
815											
	814.1	58.5	100/0.4			100/0.4		W		814.1 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)	58.5
810											
	809.1	63.5	43	100/0.3		100/0.3		W			
805											
	804.1	68.5	100/0.3			100/0.3		W		803.8 Boring Terminated at Elevation 803.8 ft in WEATHERED ROCK (MICA SCHIST)	68.8

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_EB1A	**STATION** 13+99	**OFFSET** 40 ft LT	**ALIGNMENT** -Y9-	**0 HR.** Dry
COLLAR ELEV. 885.5 ft	**TOTAL DEPTH** 21.8 ft	**NORTHING** 855,366	**EASTING** 1,632,474	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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
890										
	885.5	0.0								885.5 GROUND SURFACE 0.0
885										
	884.5	1.0	2	2	2	4		M		884.5 ASPHALT AND CONCRETE 1.0
	882.0	3.5	2	3	2	5		M		882.5 **ROADWAY EMBANKMENT** 3.0 RED AND BROWN, FINE TO COARSE SANDY CLAY (A-6) WITH TRACE GRAVEL AND MICA
880										
	877.0	8.5	2	1	2	3		M		877.5 RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL 8.0
875										
	872.0	13.5	2	1	2	3		M		BROWN, FINE SANDY SILT (A-4) WITH TRACE BRICK FRAGMENTS AND GRAVEL, HIGHLY MICACEOUS
870										
	867.0	18.5	2	3	3	6		W		
865										
	863.9	21.6	100/0.7			100/0.7		W		864.4 21.1 863.7 CONCRETE 21.8 Boring Terminated at Elevation 863.7 ft DUE TO POSSIBLE BRIDGE FOUNDATION

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_EB1A1	**STATION** 13+99	**OFFSET** 47 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 40.0
COLLAR ELEV. 885.4 ft	**TOTAL DEPTH** 60.1 ft	**NORTHING** 855,367	**EASTING** 1,632,481	**24 HR.** 28.5
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/19/15	**COMP. DATE** 08/19/15	**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)
885.4										GROUND SURFACE	0.0
	884.4	1.0								ASPHALT AND CONCRETE	1.0
			3	4	3	7		M		**ROADWAY EMBANKMENT** RED-ORANGE-BROWN, FINE SANDY CLAY (A-6) WITH TRACE GRAVEL	3.0
	881.9	3.5	2	2	2	4		M		RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND GRAVEL	
	876.9	8.5	2	2	2	4		M		BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, CLAY, AND ORGANICS	8.0
	871.9	13.5	1	1	2	3		M			
	866.9	18.5	4	6	6	12		M		**RESIDUAL** BROWN, SILTY FINE SAND (A-2-4), HIGHLY MICACEOUS	18.0
	861.9	23.5	2	4	3	7		W		YELLOW-LIGHT BROWN, FINE SANDY SILT (A-4), HIGHLY MICACEOUS, SAPROLITIC	23.0
	856.9	28.5	1	2	3	5		W			
	851.9	33.5	1	2	3	5		W		BLACK-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND LITTLE GRAVEL	29.5
	846.9	38.5	1	3	3	6		W		GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND LITTLE GRAVEL, SAPROLITIC	33.0
	841.9	43.5	2	3	4	7		W			
	836.9	48.5	6	36	44	80		M			
	831.9	53.5	100/0.2			100/0.2				**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	53.5
	826.9	58.5	60/0.1			60/0.1				**CRYSTALLINE ROCK** DARK GRAY (BIOTITE GNEISS)	56.9
	825.3	60.1	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 825.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	60.1

Note:
1. 2nd Attempt at boring Y9_EB1A due to previous boring terminating on possible bridge foundation

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#2	**STATION** 61+23	**OFFSET** 54 ft LT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 883.2 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 855,353	**EASTING** 1,632,562	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/21/15	**COMP. DATE** 08/21/15	**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	
883.2										GROUND SURFACE	0.0
	883.2	0.0	1	5	4	9		M		**ROADWAY EMBANKMENT** RED-ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL AND ORGANICS	
	879.7	3.5	10	6	4	10		M			
	874.7	8.5	4	5	3	8		M			
	869.7	13.5	4	4	4	8	SS-177	18%			13.0
	864.7	18.5	5	6	8	14		M		**RESIDUAL** RED-ORANGE-BROWN, CLAYEY SILTY COARSE TO FINE SAND (A-2-5) WITH TRACE GRAVEL AND MICA	
	859.7	23.5	4	5	5	10		W			
	854.7	28.5	4	5	7	12		W			
	849.7	33.5	6	8	11	19		W			35.0
										Boring Terminated at Elevation 848.2 ft in RESIDUAL (SAND)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_EB1B	**STATION** 14+46	**OFFSET** 29 ft RT	**ALIGNMENT** -Y10-	**0 HR.** N/A
COLLAR ELEV. 890.6 ft	**TOTAL DEPTH** 55.2 ft	**NORTHING** 855,333	**EASTING** 1,632,667	**24 HR.** 37.6
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/20/15	**COMP. DATE** 08/20/15	**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)
895										
890	890.6	0.0	WOH	1	1	2		W		890.6 GROUND SURFACE 0.0
	887.1	3.5	2	1	2	3		W		**ROADWAY EMBANKMENT** RED-GRAY-BROWN, FINE TO COARSE, SANDY CLAYEY SILT (A-5) WITH TRACE GRAVEL, DEBRIS (METAL), BRICK FRAGMENTS AND ORGANICS
885										
	882.1	8.5	1	1	1	2		M		
880										
	877.1	13.5	1	2	3	5		M		
875										
	872.1	18.5	5	2	3	5		M		871.4 19.2 **RESIDUAL** ORANGE-GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
870										
	867.1	23.5	5	4	6	10		M		
865										
	862.1	28.5	3	5	5	10		M		
860										
	857.1	33.5	5	4	7	11		M		
855										
	852.1	38.5	35	45	55/0.1	100/0.6		M		852.3 38.3 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
850										
	847.1	43.5	7	10	18	28 45		W		849.1 41.5 **RESIDUAL** GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4), SAPROLITIC
845										
	842.1	48.5	17	19	26			W		
840										
	837.1	53.5	100/0.2			100/0.2				837.1 53.5 **WEATHERED ROCK** GRAY-BROWN (MICA SCHIST)
	835.4	55.2	60/0.0			60/0.0				835.6 55.0 835.4 55.2 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 835.4 ft in CRYSTALLINE ROCK (MICA SCHIST)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_EB1A	**STATION** 14+66	**OFFSET** 17 ft LT	**ALIGNMENT** -Y10-	**0 HR.** 36.5
COLLAR ELEV. 890.6 ft	**TOTAL DEPTH** 52.3 ft	**NORTHING** 855,319	**EASTING** 1,632,715	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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
895										
890	890.1	0.5	20	15	14	29				890.6 GROUND SURFACE 0.0 0.5' ASPHALT AND 2.1' ABC STONE 888.0 2.6
	887.1	3.5	2	2	2	4		W		**ROADWAY EMBANKMENT** RED-BROWN, CLAYEY FINE SANDY SILT (A-4) WITH TRACE MICA
885										883.6 7.0
	882.1	8.5	1	1	2	3		M		RED-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND LITTLE GRAVEL
880										878.6 12.0
	877.1	13.5	2	2	2	4		M		RED AND BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
875										
	872.1	18.5	5	100/0.3		100/0.3				871.6 19.0 871.1 19.5 **WEATHERED ROCK** (BOULDER)
870										869.1 21.5 **CRYSTALLINE ROCK** (BOULDER)
	867.1	23.5	5	9	9	18		M		**RESIDUAL** BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC
865										863.6 27.0
	862.1	28.5	5	6	7	13		M		BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE GRAVEL, SAPROLITIC
860										858.6 32.0
	857.1	33.5	3	2	5	7		W		ORANGE AND RED, CLAYEY SILT (A-5) WITH TRACE FINE SAND AND MICA, SAPROLITIC
855										853.6 37.0
	852.1	38.5	14	22	21	43		W		GRAY-BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC
850										
	847.1	43.5	28	44	39	83		W		
845										
	842.1	48.5	27	26	100/0.3	100/0.3				841.1 49.5 **WEATHERED ROCK** BROWN AND BLACK (MICA SCHIST)
840										838.5 52.1 838.3 52.3 **CRYSTALLINE ROCK** (MICA SCHIST) Boring Terminated by Auger Refusal at Elevation 838.3 ft in CRYSTALLINE ROCK (MICA SCHIST) NOTE: BORING TERMINATED AT 52.3' DUE TO BROKEN AUGER

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#3	**STATION** 63+93	**OFFSET** 51 ft LT	**ALIGNMENT** -L-	**0 HR.** 30.8
COLLAR ELEV. 888.5 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 855,292	**EASTING** 1,632,829	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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)
890										888.5 GROUND SURFACE	0.0
	887.7	0.8								887.7 CONCRETE	0.8
885	885.0	3.5	5	5	5	10		M		**ROADWAY EMBANKMENT** RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
880	880.0	8.5	4	3	4	7		M			
875	875.0	13.5	2	3	4	7		M			
870	870.0	18.5	4	2	4	6		M			
865	865.0	23.5	2	3	7	10		M		865.5 **RESIDUAL** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA	23.0
860	860.0	28.5	4	7	8	15		M			
855	855.0	33.5	10	8	9	17		M			
850	850.0	38.5	7	6	8	14		W			
845	845.0	43.5	6	8	11	19		W		845.5 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA	43.0
840	840.0	48.5	12	14	17	31		W			
			12	12	12	24		W		838.5 Boring Terminated at Elevation 838.5 ft in RESIDUAL (SAND)	50.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#4	**STATION** 64+86	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** N/M
COLLAR ELEV. 884.1 ft	**TOTAL DEPTH** 40.0 ft	**NORTHING** 855,266	**EASTING** 1,632,918	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/27/15	**COMP. DATE** 08/27/15	**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	
885										884.1 GROUND SURFACE	0.0
	883.3	0.8								883.3 CONCRETE	0.8
880	880.6	3.5	7	5	5	10		M		**ROADWAY EMBANKMENT** RED-GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	3.5
875	875.6	8.5	3	6	6	12		M		878.6 GRAY, ROCK FRAGMENTS (A-1-a)	5.5
870	870.6	13.5	5	5	3	8		M		GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL AND ORGANICS	
865	865.6	18.5	3	2	2	4		M			
860	860.6	23.5	2	2	5	7		M		866.1 **RESIDUAL** GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA	18.0
855	855.6	28.5	6	8	12	20		M			
850	850.6	33.5	9	11	13	24		M			
845	845.6	38.5	5	9	13	22		M			
			24	20	16	36		M		846.1 GRAY, SILTY FINE TO COARSE SAND (A-2-4)	38.0
								M		844.1 Boring Terminated at Elevation 844.1 ft in RESIDUAL (SAND)	40.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#5	**STATION** 65+86	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 881.3 ft	**TOTAL DEPTH** 33.5 ft	**NORTHING** 855,244	**EASTING** 1,633,015	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**SURFACE WATER DEPTH** N/A	

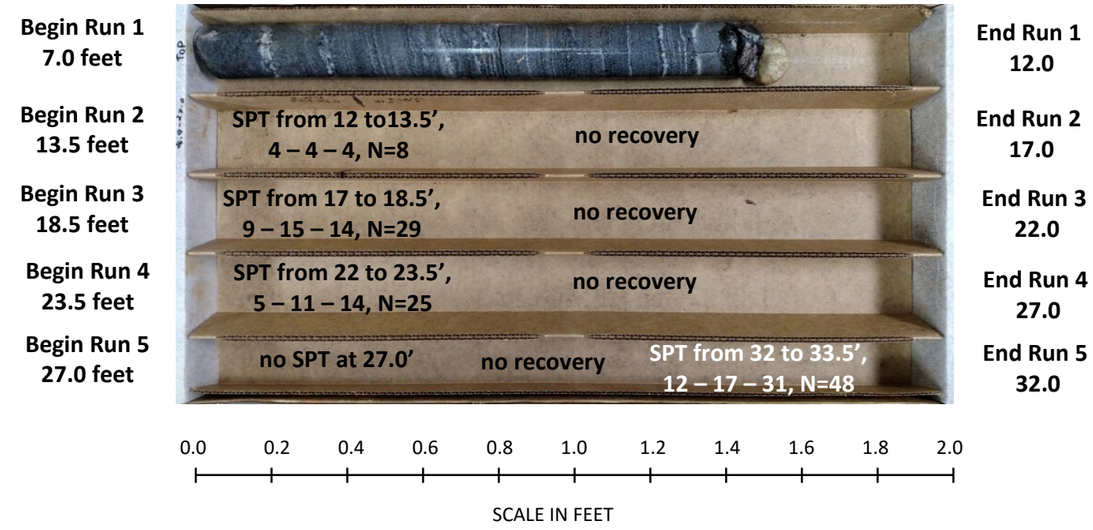
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
885											
										881.3 GROUND SURFACE	0.0
880	880.5	0.8								880.5 CONCRETE	0.8
			7	6	4	10		M		**ROADWAY EMBANKMENT** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
	877.8	3.5									
			8	4	4	8		M			
875	874.5	6.8								874.5	6.8
			60/0.0			60/0.0				872.7 CRYSTALLINE ROCK (BOULDER)	8.6
										RESIDUAL YELLOW-BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	
870	869.3	12.0									
			4	4	4	8		M			
865	864.3	17.0									
			9	15	14	29		M			
860	859.3	22.0								858.9	22.4
			5	11	14	25		W		YELLOW-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, SAPROLITIC	
855										854.3	27.0
										YELLOW-BROWN-BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	
850	849.3	32.0									
			12	17	31	48				847.8	33.5
										Boring Terminated at Elevation 847.8 ft in RESIDUAL (SAND)	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#5	**STATION** 65+86	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 881.3 ft	**TOTAL DEPTH** 33.5 ft	**NORTHING** 855,244	**EASTING** 1,633,015	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 20.5 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)
874.5											Begin Coring @ 6.8 ft	
	874.5	6.8	5.0	2:43/1.0 2:02/1.0 1:03/1.0 1:04/1.0 0:55/1.0	(1.6) 32%	(1.5) 30%		(1.6) 89%	(1.5) 83%		874.5 CRYSTALLINE ROCK	6.8
870	869.5	11.8									872.7 (BOULDER)	8.6
	867.8	13.5		*N=8*				(0.0) 0%	(0.0) 0%		**RESIDUAL** YELLOW-BROWN AND BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	
			3.5	1:09/0.5 1:29/1.0 1:21/1.0 1:04/1.0	(0.0) 0%	(0.0) 0%						
865	864.3	17.0										
	862.8	18.5		*N=29*								
			3.5	1:04/0.5 2:09/1.0 2:09/1.0 1:40/1.0	(0.0) 0%	(0.0) 0%						
860	859.3	22.0									858.9	22.4
	857.8	23.5		*N=25*				(0.1) 2%	(0.0) 0%		YELLOW-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, SAPROLITIC	
			3.5	1:15/0.5 1:22/1.0 0:34/1.0 1:03/1.0	(0.1) 3%	(0.0) 0%						
855	854.3	27.0									854.3	27.0
			5.0	0:57/1.0 0:45/1.0 0:51/1.0 0:37/1.0 0:46/1.0	(0.0) 0%	(0.0) 0%		(0.0) 0%	(0.0) 0%		YELLOW-BROWN-BLACK, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	
850	849.3	32.0										
				N=48							847.8	33.5
											Boring Terminated at Elevation 847.8 ft in RESIDUAL (SAND)	

CORE PHOTOGRAPHS: US 158/US 421/NC 150/Bus 40, west of Fourth Street to east of Church Street, Y10_LT#5: -L- Station 65+86, 45’ LT



WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#6	**STATION** 66+86	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 878.8 ft	**TOTAL DEPTH** 8.1 ft	**NORTHING** 855,222	**EASTING** 1,633,113	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**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
880										
	878.8									GROUND SURFACE 0.0
	877.9	0.9								CONCRETE 0.9
			6	6	5	11		M		**RESIDUAL** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA
875	875.3	3.5	6	6	2	8		M		
	870.7	8.1	60/0.0			60/0.0				870.7 8.1 Boring Terminated with Standard Penetration Test Refusal at Elevation 870.7 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_LT#7	**STATION** 68+00	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 878.1 ft	**TOTAL DEPTH** 10.9 ft	**NORTHING** 855,196	**EASTING** 1,633,224	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**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											
	877.2	0.9	10	7	9	16		M		878.1 GROUND SURFACE	0.0
										876.8 0.9' CONCRETE AND 0.4' ABC STONE	1.3
875	874.6	3.5	100/0.4			100/0.4				**ROADWAY EMBANKMENT** 874.6 RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA	3.5
	872.6	5.5	60/0.0			60/0.0				872.2	5.9
870										**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	
							RS-9			**CRYSTALLINE ROCK** (BIOTITE GNEISS)	
										867.2	10.9
										Boring Terminated at Elevation 867.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET			**GROUND WTR (ft)**
BORING NO. Y10_LT#7	**STATION** 68+00	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 878.1 ft	**TOTAL DEPTH** 10.9 ft	**NORTHING** 855,196	**EASTING** 1,633,224	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
872.2											Begin Coring @ 5.9 ft	
870	872.2	5.9	5.0	2:49/1.0 2:18/1.0 1:58/1.0 2:35/1.0 1:57/1.0	(4.2) 84%	(1.9) 38%	RS-9	(4.2) 84%	(1.9) 38%		872.2 **CRYSTALLINE ROCK** GRAY-WHITE-BROWN, MODERATELY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, (BIOTITE GNEISS) VERY CLOSE TO CLOSE FRACTURE SPACING	5.9
	867.2	10.9									867.2 RS-9: 9.5'-9.8', qu=15,893 psi, R1=12, R2=8, R3=10, R4=12, R5=7 RMR=49, ROCK TYPE=E	10.9
											Boring Terminated at Elevation 867.2 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

CORE PHOTOGRAPHS: US 158/US 421/NC 150/Bus 40, west of Fourth Street to east of Church Street, Y10_LT#7: -L- Station 68+00, 45’ LT

Begin Run 1
5.9 feet

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#1	**STATION** 58+56	**OFFSET** 63 ft RT	**ALIGNMENT** -L-	**0 HR.** 9.5
COLLAR ELEV. 857.0 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 855,251	**EASTING** 1,632,291	**24 HR.** 5.8
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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											
	857.0	0.0								857.0 GROUND SURFACE	0.0
			2	3	3	6		M		**ARTIFICIAL FILL** BROWN-RED, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND GRAVEL	
855	853.5	3.5	2	1	1	2		M		855.0 BROWN-RED, FINE TO COARSE SANDY SILT (A-4) WITH TRACE CLAY, MICA, AND GRAVEL	2.0
850	848.5	8.5	2	2	3	5		M		850.0 **RESIDUAL** YELLOW-GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA	7.0
845	843.5	13.5	4	2	2	4		W		845.0 YELLOW-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA	12.0
840	838.5	18.5	WOH	1	1	2		Sat.			
835	833.5	23.5	WOH	2	1	3		Sat.			
830	828.5	28.5	1	2	2	4		Sat.			
825	823.5	33.5	4	5	7	12		Sat.		822.0 Boring Terminated at Elevation 822.0 ft in RESIDUAL (SAND)	35.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. STLWY_EB2	**STATION** 16+57	**OFFSET** CL	**ALIGNMENT** -STLWY1-	**0 HR.** N/A
COLLAR ELEV. 858.5 ft	**TOTAL DEPTH** 59.0 ft	**NORTHING** 855,225	**EASTING** 1,632,322	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/05/15	**COMP. DATE** 08/05/15	**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	
860											
	858.5	0.0								858.5 GROUND SURFACE	0.0
			2	4	20	24		M		857.7 0.2' ASPHALT AND 0.6' ABC STONE	0.8
855	855.0	3.5	6	13	4	17		M		**ARTIFICIAL FILL** RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE ASPHALT FRAGMENTS	
850	850.0	8.5	1	2	2	4		Sat.		850.5 TAN-GRAY-BROWN, FINE SANDY CLAY (A-6) WITH TRACE ORGANICS	3.0
845	845.0	13.5	WOH	1	2	3		W		**ALLUVIAL** GRAY-BROWN, SILTY FINE SANDY CLAY (A-6)	8.0
840	840.0	18.5	1	1	2	3		Sat.		845.5 **RESIDUAL** GRAY-ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA	13.0
835	835.0	23.5	4	5	7	12		Sat.			
830	830.0	28.5	7	9	10	19		W		829.4 GRAY-BROWN, SILTY FINE SAND (A-2-4)	29.1
825	825.0	33.5	4	5	4	9		W		825.5 GRAY-ORANGE-BROWN, FINE TO COARSE SANDY SILT (A-4)	33.0
820	820.0	38.5	4	8	12	20		W		819.5 GRAY, SILTY FINE SAND (A-2-4), SAPROLITIC	39.0
815	815.0	43.5	11	15	24	39		Sat.			
810	810.0	48.5	14	42	58/0.5	100/1.0				809.5 **WEATHERED ROCK** GRAY AND BROWN (MICA SCHIST)	49.0
805	805.0	53.5	29	47	53/0.3	100/0.8					
800	800.0	58.5	100/0.5			100/0.5				799.5 Boring Terminated at Elevation 799.5 ft in WEATHERED ROCK (MICA SCHIST)	59.0

NOTE: A LAYER OF ASPHALT, BOLTS, METAL AND OTHER DEBRIS ENCOUNTERED FROM 2' TO 3'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_EB2B	**STATION** 14+92	**OFFSET** 28 ft RT	**ALIGNMENT** -Y9-	**0 HR.** 20.0
COLLAR ELEV. 866.5 ft	**TOTAL DEPTH** 68.7 ft	**NORTHING** 855,265	**EASTING** 1,632,419	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/06/15	**COMP. DATE** 08/06/15	**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											
	865.9	0.6	1	15	14	29		M		866.5 GROUND SURFACE	0.0
865	863.0	3.5	1	2	2	4		M		865.9 CONCRETE	0.6
860	858.0	8.5	2	2	4	6		M		863.5 **ROADWAY EMBANKMENT** ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL	3.0
855	853.0	13.5	2	4	3	7		W		**RESIDUAL** ORANGE-BROWN AND GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL, SAPROLITIC	
850	848.0	18.5	3	3	2	5		W			
845	843.0	23.5	1	4	4	8		W			
840	838.0	28.5	4	6	8	14		Sat.			
835	833.0	33.5	2	8	10	18		Sat.			
830	828.0	38.5	4	5	8	13		Sat.			
825	823.0	43.5	5	7	9	16		Sat.			
820	818.0	48.5	5	7	10	17		Sat.			
815	813.0	53.5	10	17	22	39		Sat.		813.5 GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA	53.0
810	808.0	58.5	39	41	59/0.5	100/1.0				807.5 **WEATHERED ROCK** GRAY AND BROWN (BIOTITE GNEISS)	59.0
805	803.0	63.5	60/0.1			60/0.1				803.0 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	63.5
800	798.0	68.5	100/0.2			100/0.2				797.8 Boring Terminated at Elevation 797.8 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	68.7

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y9_EB2A	**STATION** 14+97	**OFFSET** 47 ft LT	**ALIGNMENT** -Y9-	**0 HR.** 31.0
COLLAR ELEV. 882.9 ft	**TOTAL DEPTH** 57.3 ft	**NORTHING** 855,270	**EASTING** 1,632,494	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/24/15	**COMP. DATE** 08/24/15	**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	
885											
	881.8	1.1	5	6	5	11		M		882.9 GROUND SURFACE	0.0
880	879.4	3.5	3	2	1	3		M		881.8 ASPHALT AND CONCRETE	1.1
875	874.4	8.5	2	2	2	4		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA, GRAVEL, BRICK FRAGMENTS, AND TRACE TO LITTLE CLAY	
870	869.4	13.5	2	4	3	7		M			
865	864.4	18.5	3	3	3	6		M		865.9 **RESIDUAL** BROWN-YELLOW, FINE SANDY SILTY (A-4) WITH TRACE CLAY AND MICA	17.0
860	859.4	23.5	2	4	4	8		M			
855	854.4	28.5	2	3	4	7		W			
850	849.4	33.5	3	5	6	11		W		850.9 YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CLAY AND MICA	32.0
845	844.4	38.5	2	3	6	9		W		845.9 GRAY-BROWN-YELLOW, CLAYEY FINE TO COARSE SANDY SILT (A-4) WITH TRACE MICA	37.0
840	839.4	43.5	1	2	1	3		W		843.2 DARK-GRAY, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CLAY AND MICA	39.7
835	834.4	48.5	2	3	4	7		W		840.9 YELLOW-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL, CLAY, AND MICA	42.0
830	829.4	53.5	73	27/0.3		100/0.8				835.9 BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA	47.0
	825.6	57.3	60/0.0			60/0.0				829.9 **WEATHERED ROCK** GRAY-BLACK (MICA SCHIST)	53.0
										825.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 825.6 ft on CRYSTALLINE ROCK (MICA SCHIST)	57.3

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#2	**STATION** 61+61	**OFFSET** 40 ft RT	**ALIGNMENT** -L	**0 HR.** 26.0
COLLAR ELEV. 879.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 855,254	**EASTING** 1,632,583	**24 HR.** 24.3
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/09/15	**COMP. DATE** 09/09/15	**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											
	879.0	0.0	2	2	5	7	SS-540	22%		879.0 GROUND SURFACE	0.0
875	875.5	3.5	4	5	5	10		M		**ROADWAY EMBANKMENT** YELLOW-RED, FINE TO COARSE SANDY SILTY CLAY (A-7-6) WITH TRACE GRAVEL, GLASS, AND BRICK FRAGMENTS	
870	870.5	8.5	4	3	6	9		W			
865	865.5	13.5	6	5	4	9		M		867.0 **RESIDUAL** DARK BROWN AND GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA	12.0
860	860.5	18.5	2	3	5	8		M			
855	855.5	23.5	3	4	5	9		W		857.0 DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA	22.0
850	850.5	28.5	4	4	4	8		W		849.0 Boring Terminated at Elevation 849.0 ft in RESIDUAL (SAND)	30.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_EB2B	**STATION** 15+85	**OFFSET** 13 ft RT	**ALIGNMENT** -Y10-	**0 HR.** Dry
COLLAR ELEV. 890.2 ft	**TOTAL DEPTH** 36.0 ft	**NORTHING** 855,197	**EASTING** 1,632,701	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/02/15	**COMP. DATE** 09/02/15	**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	
895											
890	889.6	0.6	12	11	9	20				890.2 GROUND SURFACE	0.0
	886.7	3.5	11	29	19	48		M		0.6' ASPHALT AND 1.5' ABC STONE	
885	881.7	8.5	7	13	16	29		M		888.1 **ROADWAY EMBANKMENT** GRAY-RED, SILTY FINE TO COARSE SAND (A-2-4) WITH LITTLE GRAVEL	2.1
880	876.7	13.5	92	8/0.1		100/0.6				883.2 **RESIDUAL** RED-GRAY-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA AND GRAVEL	7.0
875	871.7	18.5	60/0.1			60/0.1				876.7 **WEATHERED ROCK** GRAY-BLACK (BIOTITE GNEISS)	13.5
870	866.7	23.5	6	8	9	17		M		871.7 **CRYSTALLINE ROCK** GRAY-WHITE-BROWN (BIOTITE GNEISS)	18.5
865	861.7	28.5	100/0.5			100/0.5				867.7 **RESIDUAL** BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC	22.5
860	860.3	29.9	100/0.2			100/0.2				862.4 **WEATHERED ROCK** GRAY-BROWN AND BLACK (BIOTITE GNEISS)	27.8
	856.7	33.5	100/0.4			100/0.4					
855	854.2	36.0	60/0.0			60/0.0				854.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 854.2 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	36.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_EB2A	**STATION** 15+90	**OFFSET** 15 ft LT	**ALIGNMENT** -Y10-	**0 HR.** 44.5
COLLAR ELEV. 890.0 ft	**TOTAL DEPTH** 58.5 ft	**NORTHING** 855,196	**EASTING** 1,632,730	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/02/15	**COMP. DATE** 09/02/15	**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)
890										890.0 GROUND SURFACE	0.0
	889.5	0.5	8	7	7	14		M		0.5' ASPHALT AND 1.4' ABC STONE	
	886.5	3.5								888.1 **ROADWAY EMBANKMENT** GRAY-RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE CLAY AND LITTLE TO SOME GRAVEL	1.9
885			3	3	4	7		M			
	881.5	8.5									
880			6	9	4	13		M			
	876.5	13.5								878.0 **RESIDUAL** GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA, SAPROLITIC	12.0
875			3	5	6	11		M			
	871.5	18.5									
870			8	8	8	16		M			
	866.5	23.5									
865			5	5	12	17		M			
	861.5	28.5									
860			6	6	7	13		M			
	856.5	33.5									
855			12	12	11	23		W			
	851.5	38.5									
850			10	12	11	23		W			
	846.5	43.5									
845			17	29	22	51		W			
	844.3	45.7	100/0.4			100/0.4				844.9 **WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	45.1
	841.5	48.5								843.0 **RESIDUAL** GRAY-BROWN, SILTY FINE COARSE SAND (A-2-4) WITH TRACE GRAVEL AND MICA, SAPROLITIC	47.0
840			13	24	27	51		W			
	836.5	53.5									
835			16	23	100/0.4	100/0.4				835.5 **WEATHERED ROCK** GRAY (BIOTITE GNEISS)	54.5
	831.5	58.5	60/0.0			60/0.0				831.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 831.5 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	58.5

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#3	**STATION** 64+17	**OFFSET** 60 ft RT	**ALIGNMENT** -L	**0 HR.** Dry
COLLAR ELEV. 883.4 ft	**TOTAL DEPTH** 21.9 ft	**NORTHING** 855,179	**EASTING** 1,632,827	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/14/15	**COMP. DATE** 09/14/15	**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										883.4 GROUND SURFACE	0.0
	883.4	0.0	4	5	5	10		M		881.4 **ROADWAY EMBANKMENT** BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE CLAY, GRAVEL, AND ROOTS	2.0
880	879.9	3.5	4	5	5	10		M		876.4 **RESIDUAL** RED, BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA	7.0
875	874.9	8.5	12	13	16	29		M		GRAY-BROWN TO DARK BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	
870	869.9	13.5	28	100/0.3		100/0.3				869.4 **WEATHERED ROCK** GRAY-BLACK (BIOTITE GNEISS)	14.0
865	864.9	18.5	5	8	10	18		M		866.4 **RESIDUAL** DARK BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	17.0
	861.5	21.9	60/0.0			60/0.0				861.5 Boring Terminated with Standard Penetration Test Refusal at Elevation 861.5 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)	21.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#4	**STATION** 65+19	**OFFSET** 44 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 884.8 ft	**TOTAL DEPTH** 10.4 ft	**NORTHING** 855,172	**EASTING** 1,632,930	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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											
	883.9	0.9	5	5	5	10		M		884.8 GROUND SURFACE 883.9 CONCRETE	0.0 0.9
	881.3	3.5								**ROADWAY EMBANKMENT** ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
880			3	2	5	7		M			
	876.3	8.5								876.8 **RESIDUAL**	8.0
875	874.6	10.2	11	12	21	33		M		874.6 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL 874.4 **CRYSTALLINE ROCK**	10.2 10.4
			60/0.2			60/0.2				(BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 874.4 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#4B	**STATION** 65+12	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 884.7 ft	**TOTAL DEPTH** 10.3 ft	**NORTHING** 855,167	**EASTING** 1,632,922	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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	
885											
	884.7	0.0	1	1	1	2		M		884.7 GROUND SURFACE 884.2 MULCH	0.0 0.5
	881.2	3.5								**ROADWAY EMBANKMENT** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL	
880			2	3	2	5		M			
	876.2	8.5								876.7 **RESIDUAL**	8.0
875	874.5	10.2	25	44	17	61		M		874.5 GRAY, COARSE TO FINE SAND AND GRAVEL (A-1-a) 874.4 **CRYSTALLINE ROCK**	10.2 10.3
			60/0.1			60/0.1				(BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 874.4 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#5	**STATION** 66+29	**OFFSET** 47 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 879.7 ft	**TOTAL DEPTH** 21.6 ft	**NORTHING** 855,145	**EASTING** 1,633,037	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**SURFACE WATER DEPTH** N/A	

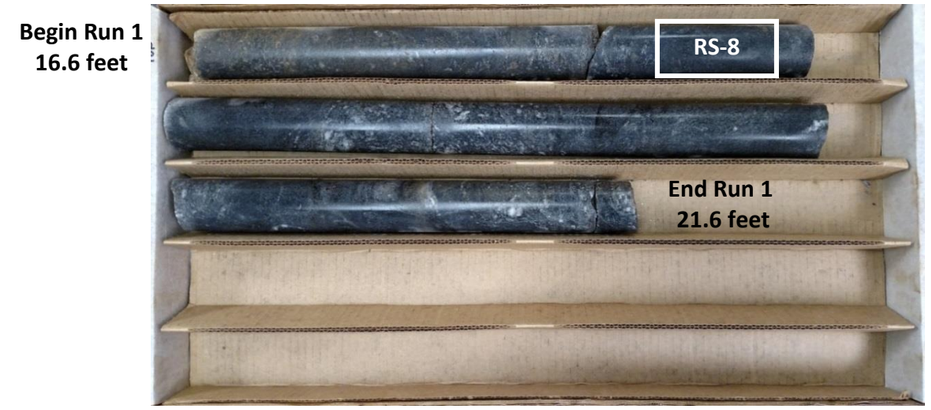
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
880											
	879.0	0.7	7	8	9	17		M		879.7 GROUND SURFACE	0.0
										878.5 0.0'-0.7' ASPHALT, CONCRETE, AND 0.5' ABC STONE	1.2
	876.2	3.5								876.7 **ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA AND CLAY	3.0
875			3	4	3	7		M		RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
	871.2	8.5								870.7	9.0
870			36	90	10/0.0	100/1.0				**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	
	866.2	13.5								867.7	12.0
865			17	21	26	47		M		GRAY-BROWN-YELLOW, SILTY FINE SAND (A-2-4) WITH LITTLE GRAVEL	
	863.1	16.6	60/0.0			60/0.0				863.1	16.6
860							RS-8			**CRYSTALLINE ROCK** (BIOTITE GNEISS)	
										858.1	21.6
										Boring Terminated at Elevation 858.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#5	**STATION** 66+29	**OFFSET** 47 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 879.7 ft	**TOTAL DEPTH** 21.6 ft	**NORTHING** 855,145	**EASTING** 1,633,037	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
863.1											Begin Coring @ 16.6 ft	
	863.1	16.6	5.0	2:22/1.0 2:36/1.0 2:53/1.0 3:22/1.0 4:26/1.0	(4.7) 94%	(4.3) 86%	RS-8	(4.7) 94%	(4.3) 86%		863.1 **CRYSTALLINE ROCK** GRAY-BLUE, SLIGHTLY TO VERY SLIGHTLY WEATHERED, HARD (BIOTITE GNEISS), VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING	16.6
860											858.1 RS8: 18.0'-18.3', qu=13,698 psi, R1=7, R2=17, R3=20, R4=20, R5=7 RMR=71, ROCK TYPE=E	21.6
	858.1	21.6									Boring Terminated at Elevation 858.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

CORE PHOTOGRAPHS: US 158/US 421/NC 150/Bus 40, west of Fourth Street to east of Church Street, Y10_RT#5: -L- Station 66+29, 47’ RT



WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y10_RT#6	**STATION** 67+29	**OFFSET** 47 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 877.9 ft	**TOTAL DEPTH** 20.0 ft	**NORTHING** 855,122	**EASTING** 1,633,134	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER D.Tignor	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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
880										
	877.9	0.0								GROUND SURFACE
	877.1	0.8	34	14	11	25		M		0.0'-0.8' ASPHALT, CONCRETE, AND 0.5' ABC STONE (876.6, 1.3)
875	874.4	3.5	10	8	8	16		M		**ROADWAY EMBANKMENT** RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA
870	869.4	8.5	13	8	8	16		M		**RESIDUAL** BROWN-YELLOW-RED, SILTY FINE SAND (A-2-4) WITH TRACE MICA (870.9, 7.0)
865	864.4	13.5	8	6	7	13		M		BROWN-YELLOW, FINE SANDY SILT (A-4) WITH TRACE CLAY AND MICA (865.9, 12.0)
860	859.4	18.5	5	12	14	26		M		DARK BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC (860.9, 17.0)
	857.9	20.0								Boring Terminated at Elevation 857.9 ft in RESIDUAL (SAND)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#1	**STATION** 19+79	**OFFSET** 36 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** 49.4
COLLAR ELEV. 900.8 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 855,332	**EASTING** 1,632,847	**24 HR.** 45.1
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/14/15	**COMP. DATE** 09/14/15	**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)
905											
900	900.8	0.0	6	11	11	22		M		900.8 GROUND SURFACE	0.0
	897.3	3.5								898.8 **ROADWAY EMBANKMENT** BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL AND ORGANICS (ROOTS)	2.0
895			7	8	9	17		M		**RESIDUAL** RED-YELLOW-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
	892.3	8.5									
890			5	5	6	11		M			
	887.3	13.5									
885			10	18	13	31		M			
	882.3	18.5									
880			5	5	7	12		M			
	877.3	23.5									
875			6	7	5	12		M			
	872.3	28.5									
870			6	8	7	15		M			
	867.3	33.5									
865			7	9	10	19		M			
	862.3	38.5									
860			3	4	3	7		M			
	857.3	43.5									
855			5	6	7	13		M			
	852.3	48.5									
			5	8	11	19		W		850.8	50.0
										Boring Terminated at Elevation 850.8 ft in RESIDUAL (SILT)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_EB1B	**STATION** 14+46	**OFFSET** 35 ft RT	**ALIGNMENT** -Y11B-	**0 HR.** 38.0
COLLAR ELEV. 884.6 ft	**TOTAL DEPTH** 62.9 ft	**NORTHING** 855,289	**EASTING** 1,632,909	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**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											
	883.7	0.9								884.6 GROUND SURFACE	0.0
			6	7	5	12		M		883.7 CONCRETE	0.9
880	881.1	3.5								**RESIDUAL** RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
			10	9	11	20		M			
875	876.1	8.5									
			6	11	19	30		M			
870	871.1	13.5									
			8	10	9	19		M			
865	866.1	18.5									
			17	11	15	26		M			
860	861.1	23.5									
			9	13	13	26		M			
855	856.1	28.5									
			4	5	7	12		W			
850	851.1	33.5									
			5	7	7	14		W			
845	846.1	38.5									
			6	9	11	20		W			
840	841.1	43.5								841.6	43.0
			7	9	12	21		W		GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL	
835	836.1	48.5									
			10	12	14	26		W			
830	831.1	53.5									
			11	21	46	67		W			
825	826.1	58.5								825.6	59.0
			32	42	58/0.5	100/1.0				**WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	
	821.7	62.9	60/0.0			60/0.0				822.0 / 821.7	62.6 / 62.9
										CRYSTALLINE ROCK (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 821.7 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_EB1A	**STATION** 14+34	**OFFSET** 16 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 53.8
COLLAR ELEV. 898.5 ft	**TOTAL DEPTH** 75.2 ft	**NORTHING** 855,308	**EASTING** 1,632,958	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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)
905										
900										
	898.3	0.2								898.5 0.0 GROUND SURFACE
			1	1	1	2		M		CONCRETE
895	895.0	3.5								**RESIDUAL** DARK RED, SILTY FINE SAND (A-2-4) WITH TRACE ROOTS, MICA, AND GRAVEL SAPROLITIC
			3	4	4	8		M		
890	890.0	8.5								
			6	9	9	18		M		
885	885.0	13.5								
			8	9	11	20		M		
880	880.0	18.5								881.5 17.0 DARK RED, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
			7	9	10	19		M		
875	875.0	23.5								876.5 22.0 YELLOW-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
			12	14	14	28		M		
870	870.0	28.5								
			15	18	17	35		M		
865	865.0	33.5								
			10	15	19	34		M		
860	860.0	38.5								
			17	18	26	44		M		
855	855.0	43.5								856.5 42.0 BROWN-GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC
			8	11	11	22		M		
850	850.0	48.5								851.5 47.0 BROWN-GRAY-YELLOW, SILTY FINE TO COARSE SAND (A-2-4) TRACE MICA, SAPROLITIC
			6	10	11	21		W		
845	845.0	53.5								
			10	15	27	42		W		
840	840.0	58.5								
			28	36	27	63		W		
835	835.0	63.5								
			11	13	29	42		W		
830	830.0	68.5								829.5 69.0 **WEATHERED ROCK** BROWN (BIOTITE GNEISS)
			24	100/0.3		100/0.3				
825	825.0	73.5								825.0 73.5

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_EB1A	**STATION** 14+34	**OFFSET** 16 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** 53.8
COLLAR ELEV. 898.5 ft	**TOTAL DEPTH** 75.2 ft	**NORTHING** 855,308	**EASTING** 1,632,958	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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
825						Match Line				
	823.3	75.2	60/0.1			60/0.1				**CRYSTALLINE ROCK** 823.3 GRAY-BROWN (BIOTITE GNEISS) 75.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 823.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)
			60/0.0			60/0.0				

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET			**GROUND WTR (ft)**
BORING NO. Y11B_LT#2	**STATION** 17+44	**OFFSET** 8 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 880.2 ft	**TOTAL DEPTH** 18.6 ft	**NORTHING** 855,253	**EASTING** 1,633,070	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**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
885										
880										880.2 GROUND SURFACE 0.0
	879.3	0.9								879.3 CONCRETE 0.9
			6	6	4	10		M		**RESIDUAL** GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, AND GRAVEL, SAPROLITIC
	876.7	3.5								
875			5	5	6	11		M		
	871.7	8.5								
870			5	5	5	10		M		
	866.7	13.5								
865			13	16	27	43		M		
	861.7	18.5	60/0.1			60/0.1				862.4 17.8 861.6 **CRYSTALLINE ROCK** 18.6 (BIOTITE GNEISS) Boring Terminated with Standard Penetration Test Refusal at Elevation 861.6 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#3	**STATION** 16+45	**OFFSET** 6 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 877.9 ft	**TOTAL DEPTH** 12.4 ft	**NORTHING** 855,229	**EASTING** 1,633,166	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/27/15	**SURFACE WATER DEPTH** N/A	

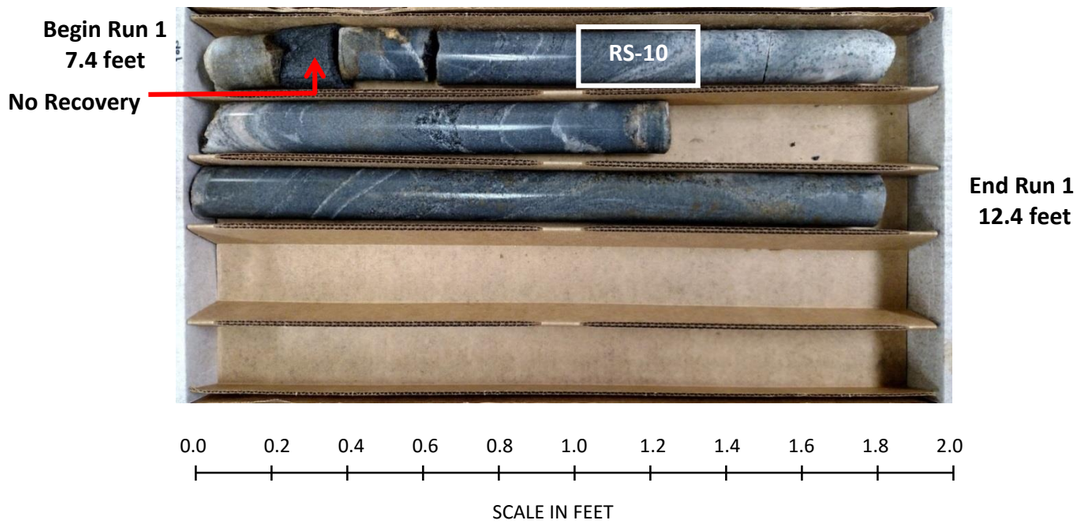
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
880											
	877.0	0.9								877.9 GROUND SURFACE	0.0
			10	13	35	48		M		877.0 CONCRETE	0.9
875										**RESIDUAL**	
	874.4	3.5	14	5	20	25		M		874.4 GRAY-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL	3.5
										GRAY, FINE TO COARSE SAND AND ROCK FRAGMENTS (A-1-a)	
870	870.5	7.4	60/0.0			60/0.0	RS-10			870.5 **CRYSTALLINE ROCK** (BIOTITE GNEISS)	7.4
										865.5	12.4
										Boring Terminated at Elevation 865.5 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#3	**STATION** 16+45	**OFFSET** 6 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 877.9 ft	**TOTAL DEPTH** 12.4 ft	**NORTHING** 855,229	**EASTING** 1,633,166	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/26/15	**COMP. DATE** 08/27/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
870.5											Begin Coring @ 7.4 ft	
870	870.5	7.4	5.0	3:45/1.0	(4.8)	(4.0)		(4.8)	(4.0)		870.5 **CRYSTALLINE ROCK**	7.4
				4:09/1.0	96%	80%		96%	80%		GRAY-WHITE, SLIGHTLY TO VERY SLIGHTLY WEATHERED,	
				3:56/1.0							MODERATELY HARD TO HARD (BIOTITE GNEISS), CLOSE TO	
				4:19/1.0							MODERATELY CLOSE FRACTURE SPACING	
	865.5	12.4		3:44/1.0			RS-10				RS-10: 8.5'-8.8', qu=15,385 psi, R1=12, R2=17, R3=20, R4=20, R5=7	12.4
											RMR=76, ROCK TYPE=E	
											865.5 Boring Terminated at Elevation 865.5 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

CORE PHOTOGRAPHS: US 158/US 421/NC 150/Bus 40, west of Fourth St. to east of Church St., Y11B_LT#3: -Y10A- Station 16+45, 6’ RT



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#4	**STATION** 15+55	**OFFSET** 73 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 912.4 ft	**TOTAL DEPTH** 45.0 ft	**NORTHING** 855,275	**EASTING** 1,633,268	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/10/15	**COMP. DATE** 09/10/15	**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)
915											
	912.4	0.0	3	8	9	17 32		M		912.4 GROUND SURFACE	0.0
910	908.9	3.5	21	16	16			M		**ROADWAY EMBANKMENT** BROWN AND LIGHT RED, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL, ORGANICS, AND CLAY	
905	903.9	8.5	7	5	5	10		M		905.4 **RESIDUAL** LIGHT RED, SILTY FINE SAND (A-2-4) WITH TRACE MICA, CLAY, AND GRAVEL, SAPROLITIC	7.0
900	898.9	13.5	3	4	5	9		M			
895	893.9	18.5	100/0.3			100/0.3		M		893.9 **WEATHERED ROCK** GRAY-WHITE (BIOTITE GNEISS)	18.5
890	888.9	23.5	5	12	42	54		M		890.4 **RESIDUAL** RED-BROWN TO GRAY, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	22.0
885	886.1	26.3	62	38/0.2		100/0.7				886.1 **WEATHERED ROCK** GRAY-WHITE (BIOTITE GNEISS)	26.3
	883.9	28.5	27	29	16	45				884.9 **RESIDUAL** GRAY-BROWN AND WHITE, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE MICA , SAPROLITIC	27.5
880	878.9	33.5	15	18	37	55		M			
875	873.9	38.5	16	24	27	51		M			
870	868.9	43.5	13	14	23	37		M		867.4 Boring Terminated at Elevation 867.4 ft in RESIDUAL (SAND)	45.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#5	**STATION** 14+40	**OFFSET** 10 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 880.6 ft	**TOTAL DEPTH** 28.6 ft	**NORTHING** 855,188	**EASTING** 1,633,367	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/26/15	**COMP. DATE** 08/26/15	**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
885										
880	879.3	1.3	7	7	5	12		M		880.6 GROUND SURFACE 0.0
875	877.1	3.5	5	7	18	25		M		879.3 ASPHALT AND CONCRETE 1.3
870	872.1	8.5	10	11	13	24		M		877.6 **ROADWAY EMBANKMENT** RED-BROWN-YELLOW, FINE SANDY SILT (A-4) WITH TRACE MICA 3.0
865	867.1	13.5	8	9	11	20		M		**RESIDUAL** BROWN-YELLOW, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND MICA, SAPROLITIC
860	862.1	18.5	8	10	13	23		M		
855	857.1	23.5	25	35	65/0.4	100/0.9				856.6 **WEATHERED ROCK** DARK GRAY-BROWN (BIOTITE GNEISS) 24.0
	852.1	28.5	60/0.1			60/0.1				852.1 **CRYSTALLINE ROCK** GRAY-BROWN (BIOTITE GNEISS) 28.5 / 852.0 28.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 852.0 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#6	**STATION** 13+59	**OFFSET** 70 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 906.2 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 855,228	**EASTING** 1,633,459	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/10/15	**COMP. DATE** 09/11/15	**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)
910											
	905.9	0.3	9	7	6	13		M		906.2 GROUND SURFACE	0.0
905										905.2 0.3' ASPHALT AND 0.7' ABC STONE	1.0
	902.7	3.5	1	1	2	3		M		904.2 **ROADWAY EMBANKMENT** BROWN, FINE SANDY SILT (A-4) WITH TRACE GRAVEL	2.0
900										DARK BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL AND WOOD FRAGMENTS	
	897.7	8.5	4	2	1	3	SS-554	28%		899.2 BROWN-BLACK, SILTY FINE TO COARSE SANDY CLAY (A-7-6) WITH LITTLE GRAVEL AND TRACE ORGANICS	7.0
895										894.2	12.0
	892.7	13.5	1	2	1	3	SS-555	21%		DARK BROWN-BLACK PEAT (86% ORGANIC)	
890										889.2	17.0
	887.7	18.5	3	5	5	10		M		**RESIDUAL** 887.4 DARK GRAY, CLAYEY SILT (A-7-5)	18.8
885										RED-BROWN, SILTY FINE SAND (A-2-4) WITH TRACE MICA	
	882.7	23.5	6	7	7	14		M			
880											
	877.7	28.5	7	8	10	18		M		876.2	30.0
										Boring Terminated at Elevation 876.2 ft in RESIDUAL (SAND)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_LT#7	**STATION** 12+00	**OFFSET** 13 ft RT	**ALIGNMENT** -Y10RA-	**0 HR.** Dry
COLLAR ELEV. 890.8 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,141	**EASTING** 1,633,601	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/27/15	**COMP. DATE** 08/27/15	**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	
895											
										890.8 GROUND SURFACE	0.0
890										889.2 ASPHALT AND CONCRETE	1.6
	889.2	1.6	9	11	6	17	SS-208	10%		**RESIDUAL** ORANGE-BROWN, SILTY FINE TO COARSE SAND (A-2-4)	
	887.3	3.5	3	6	4	10		M			
885											
	882.3	8.5	3	4	6	10		M		880.8	10.0
										Boring Terminated at Elevation 880.8 ft in RESIDUAL (SAND)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#1	**STATION** 17+00	**OFFSET** 17 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 887.8 ft	**TOTAL DEPTH** 20.5 ft	**NORTHING** 855,118	**EASTING** 1,632,846	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/14/15	**COMP. DATE** 09/14/15	**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)
890											
	887.8	0.0								887.8 GROUND SURFACE	0.0
			1	3	3	6		M		**ROADWAY EMBANKMENT**	
885										885.8 RED-BROWN, SILTY FINE TO COARSE SANDY CLAY (A-6) WITH TRACE MICA AND GRAVEL	2.0
	884.3	3.5	5	8	23	31		M		**RESIDUAL**	
										RED-BROWN TO DARK BROWN, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL, SAPROLITIC	
880											
	879.3	8.5	8	11	13	24		M			
875											
	874.3	13.5	8	9	9	18		M			
870											
	869.3	18.5	60/0.1			60/0.1				869.3	18.5
	867.3	20.5	60/0.0			60/0.0				867.3 **CRYSTALLINE ROCK** (BIOTITE GNEISS	20.5
										Boring Terminated with Standard Penetration Test Refusal at Elevation 867.3 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** D. Racey	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_EB2B	**STATION** 15+88	**OFFSET** 26 ft RT	**ALIGNMENT** -Y11B-	**0 HR.** Dry
COLLAR ELEV. 883.3 ft	**TOTAL DEPTH** 16.7 ft	**NORTHING** 855,149	**EASTING** 1,632,936	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 08/15/15	**COMP. DATE** 08/15/15	**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
885										
	882.5	0.8								883.3 GROUND SURFACE 0.0
			5	6	16	22		M		882.5 CONCRETE 0.8
880										881.5 **ROADWAY EMBANKMENT** 1.8
	879.8	3.5	5	9	12	21		M		GRAY AND RED, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE GRAVEL
875										**RESIDUAL**
	874.8	8.5	100/0.5			100/0.5				876.3 GRAY-BROWN, FINE SANDY SILT (A-4), HIGHLY MICACEOUS, SAPROLITIC 7.0
870										**WEATHERED ROCK**
	869.8	13.5	28	40	35	75		M		GRAY (MICA SCHIST)
	866.6	16.7	60/0.0			60/0.0				870.8 12.5
										RESIDUAL
										GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC, SOME GRAVEL
										866.8 16.5
										866.6 16.7 **CRYSTALLINE ROCK**
										GRAY (MICA SCHIST)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 866.6 ft in CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/ BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_EB2A	**STATION** 16+46	**OFFSET** 15 ft LT	**ALIGNMENT** -Y11B-	**0 HR.** Dry
COLLAR ELEV. 902.4 ft	**TOTAL DEPTH** 14.0 ft	**NORTHING** 855,097	**EASTING** 1,632,985	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/03/15	**COMP. DATE** 09/03/15	**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
905										ELEV. (ft) DEPTH (ft)
	901.9	0.5	13	7	3	10				902.4 GROUND SURFACE 0.0 0.5' ASPHALT AND 1.2' ABC STONE 900.7 1.7
900	898.9	3.5	7	53	27	80		M		**ROADWAY EMBANKMENT** RED-BROWN, FINE SANDY CLAY (A-6) WITH TRACE MICA AND ORGANICS 898.5 3.9
895	893.9	8.5	60/0.1			60/0.1		M		**RESIDUAL** YELLOW-GRAY, FINE SAND (A-3) WITH SOME GRAVEL 893.9 8.5
890	889.0	13.4	100/0.2			100/0.2				**CRYSTALLINE ROCK** GRAY-BLACK-YELLOW (BIOTITE GNEISS) 890.4 12.0
	888.4	14.0	60/0.0			60/0.0				**WEATHERED ROCK** GRAY-WHITE (BIOTITE GNEISS) 14.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 888.4 ft on CRYSTALLINE ROCK (BIOTITE GNEISS)

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** M. Ellis	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#2	**STATION** 14+30	**OFFSET** 65 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 905.0 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 855,056	**EASTING** 1,633,085	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER D.Tignor	**START DATE** 09/09/15	**COMP. DATE** 09/09/15	**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
905										905.0 GROUND SURFACE 0.0
	904.8	0.2	12	11	9	20		M		903.9 0.2' ASPHALT AND 0.9' ABC STONE 1.1 903.0 **ROADWAY EMBANKMENT** 2.0
900	901.5	3.5	5	5	5	10		M		DARK RED-YELLOW, FINE SANDY SILTY CLAY (A-7-5) **RESIDUAL** BROWN-YELLOW-RED, SILTY FINE SAND (A-2-4) WITH TRACE MICA, SAPROLITIC
895	896.5	8.5	11	12	33	45		D		
890	891.5	13.5	14	100/0.3		100/0.3				891.0 14.0
	889.6	15.4	60/0.0			60/0.0				**WEATHERED ROCK** 15.4 GRAY-WHITE (MICA SCHIST) Boring Terminated with Standard Penetration Test Refusal at Elevation 889.6 ft on CRYSTALLINE ROCK (MICA SCHIST)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#3	**STATION** 13+33	**OFFSET** 10 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 880.3 ft	**TOTAL DEPTH** 25.0 ft	**NORTHING** 855,091	**EASTING** 1,633,192	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/24/15	**COMP. DATE** 08/24/15	**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											
880	879.4	0.9	7	7	9	16		M		880.3 GROUND SURFACE	0.0
	876.8	3.5	7	8	7	15		M		879.4 ASPHALT AND CONCRETE	0.9
875	871.8	8.5	7	12	14	26		M		**RESIDUAL** TAN-BROWN AND GRAY-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA, SAPROLITIC	
870	866.8	13.5	9	12	7	19		M			
865	861.8	18.5	100/0.5			100/0.5		M		861.8 **WEATHERED ROCK** GRAY-BROWN (BIOTITE GNEISS)	18.5
860	856.8	23.5	22	7	43	50		M		857.3 **RESIDUAL** GRAY, SILTY FINE SAND (A-2-4) WITH TRACE GRAVEL	23.0
										855.3 Boring Terminated at Elevation 855.3 ft in RESIDUAL (SAND)	25.0

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#4	**STATION** 12+30	**OFFSET** 13 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 882.5 ft	**TOTAL DEPTH** 10.0 ft	**NORTHING** 855,074	**EASTING** 1,633,295	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/24/15	**COMP. DATE** 08/24/15	**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
885										
	881.9	0.6								882.5 GROUND SURFACE 0.0
880			24	8	8	16		M		881.4 ASPHALT AND CONCRETE 1.1
	879.0	3.5	7	9	8	17	SS-184	21%		**ROADWAY EMBANKMENT** 879.5 RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA 3.0
875										RED-BROWN,SILTY FINE TO COARSE SANDY CLAY (A-7-6) WITH TRACE
	874.0	8.5	7	6	12	18		M		874.5 GRAVEL AND ORGANICS 8.0
										RESIDUAL 872.5 TAN-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA 10.0
										Boring Terminated at Elevation 872.5 ft in RESIDUAL (SILT)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#5	**STATION** 11+33	**OFFSET** 15 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 886.6 ft	**TOTAL DEPTH** 13.0 ft	**NORTHING** 855,064	**EASTING** 1,633,391	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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)
890											
										886.6 GROUND SURFACE	0.0
885	885.3	1.3								885.3 ASPHALT AND CONCRETE	1.3
			6	10	9	19		M		**ROADWAY EMBANKMENT**	
	883.1	3.5								RED-ORANGE-BROWN, FINE SANDY SILT (A-4) WITH TRACE MICA AND GRAVEL	
			10	7	7	14		M			
880	880.1	6.5								880.1	6.5
			60/0.0			60/0.0				**CRYSTALLINE ROCK** (MICA SCHIST)	
										877.6	9.0
875	875.0	11.6								**RESIDUAL** BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL	
			5	5	7	12		Sat.		873.6	13.0
										Boring Terminated at Elevation 873.6 ft in RESIDUAL (SAND)	

NCDOT BORE DOUBLE U2728B_GEO_BH EB - Y11B - COPY.GPJ NC_DOT.GDT 12/4/15

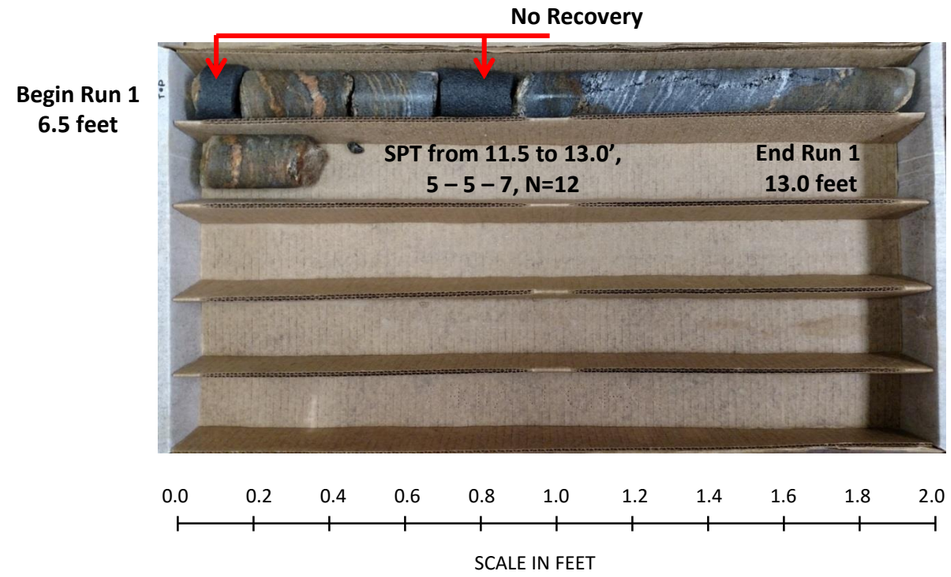
GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#5	**STATION** 11+33	**OFFSET** 15 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 886.6 ft	**TOTAL DEPTH** 13.0 ft	**NORTHING** 855,064	**EASTING** 1,633,391	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** SPT Core Boring	**HAMMER TYPE** Automatic	
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ3	**TOTAL RUN** 5.0 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
											Begin Coring @ 6.5 ft	
	880.1	6.5	5.0	*N=60/0.0* 3:08/1.0 2:36/1.0 1:31/1.0 0:28/1.0	(1.9) 38%	(0.9) 18%		(1.9) 76%	(0.9) 36%		880.1 **CRYSTALLINE ROCK**	6.5
											877.6 GRAY-WHITE, SLIGHTLY TO VERY SLIGHTLY WEATHERED, MODERATELY HARD TO HARD MICA SCHIST WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING	9.0
875	875.1	11.5		0:22/1.0 *N=12*				(0.0) 0%	(0.0) 0%		**RESIDUAL**	
											873.6 BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH SOME GRAVEL	13.0
											Boring Terminated at Elevation 873.6 ft in RESIDUAL (SAND)	

NCDOT CORE DOUBLE U2728B_GEO_BH EB - Y11B - COPY.GPJ NC_DOT.GDT 12/4/15

CORE PHOTOGRAPHS: US 158/US 421/NC 150/Bus 40, west of Fourth St. to east of Church St., Y11B_RT#5: -Y10RDA4- Station 11+33, 15’ LT



WBS 34872.1.1	**TIP** U-2827B	**COUNTY** FORSYTH	**GEOLOGIST** C. Wang	
SITE DESCRIPTION US 158/US 421/NC 150/BUSINESS 40, WEST OF FOURTH STREET TO EAST OF CHURCH STREET				**GROUND WTR (ft)**
BORING NO. Y11B_RT#6	**STATION** 10+35	**OFFSET** 20 ft LT	**ALIGNMENT** -Y10RDA4-	**0 HR.** Dry
COLLAR ELEV. 891.6 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 855,050	**EASTING** 1,633,488	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 76% 02/25/2015		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER S. Davis	**START DATE** 08/25/15	**COMP. DATE** 08/25/15	**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
895										
	891.6	0.0								891.6 GROUND SURFACE 0.0
890			7	4	4	8		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, SILTY FINE TO COARSE SAND (A-2-4) WITH TRACE ORGANICS AND BRICK FRAGMENTS
	888.1	3.5								
			2	2	2	4		M		
885										
	883.1	8.5								883.6 8.0
			4	2	2	4		M		RED-BROWN, FINE SANDY SILT (A-4) WITH TRACE BRICK FRAGMENTS
880										
	878.1	13.5								878.6 13.0
			5	3	5	8		M		RED-BROWN, SILTY CLAY (A-7-5) WITH TRACE ORGANICS 876.6 15.0
										Boring Terminated at Elevation 876.6 ft in ROADWAY EMBANKMENT (CLAY)