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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	22

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP I-85 BYPASS (-L-) FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE

SITE DESCRIPTION MSE WALLS AT END BENT 1 AND END BENT 2 - SITE NO. 5 (STRUCTURE NO. 7) BRIDGE NO. 1246 ON SR 1001 (NORTH CHURCH STREET) (-Y5-) OVER GREENSBORO EASTERN LOOP I-85 BYPASS (-L-)

RETAINING WALL INVESTIGATION

CONTENTS

CAUTION NOTICE

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

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

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2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

C.R. PASTRANA

Trigon Exploration

INVESTIGATED BY ESP Associates, P.A.

DRAWN BY C.R. PASTRANA

CHECKED BY P. WEAVER

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10/3/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] TRICONE 3 7/8 " STEEL TEETH

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-42: N 870879.9347, E 1766681.5242

ELEVATION: 854.34 FEET

NOTES:

F.I.A.D.= FILLED IMMEDIATELY AFTER DRILLING

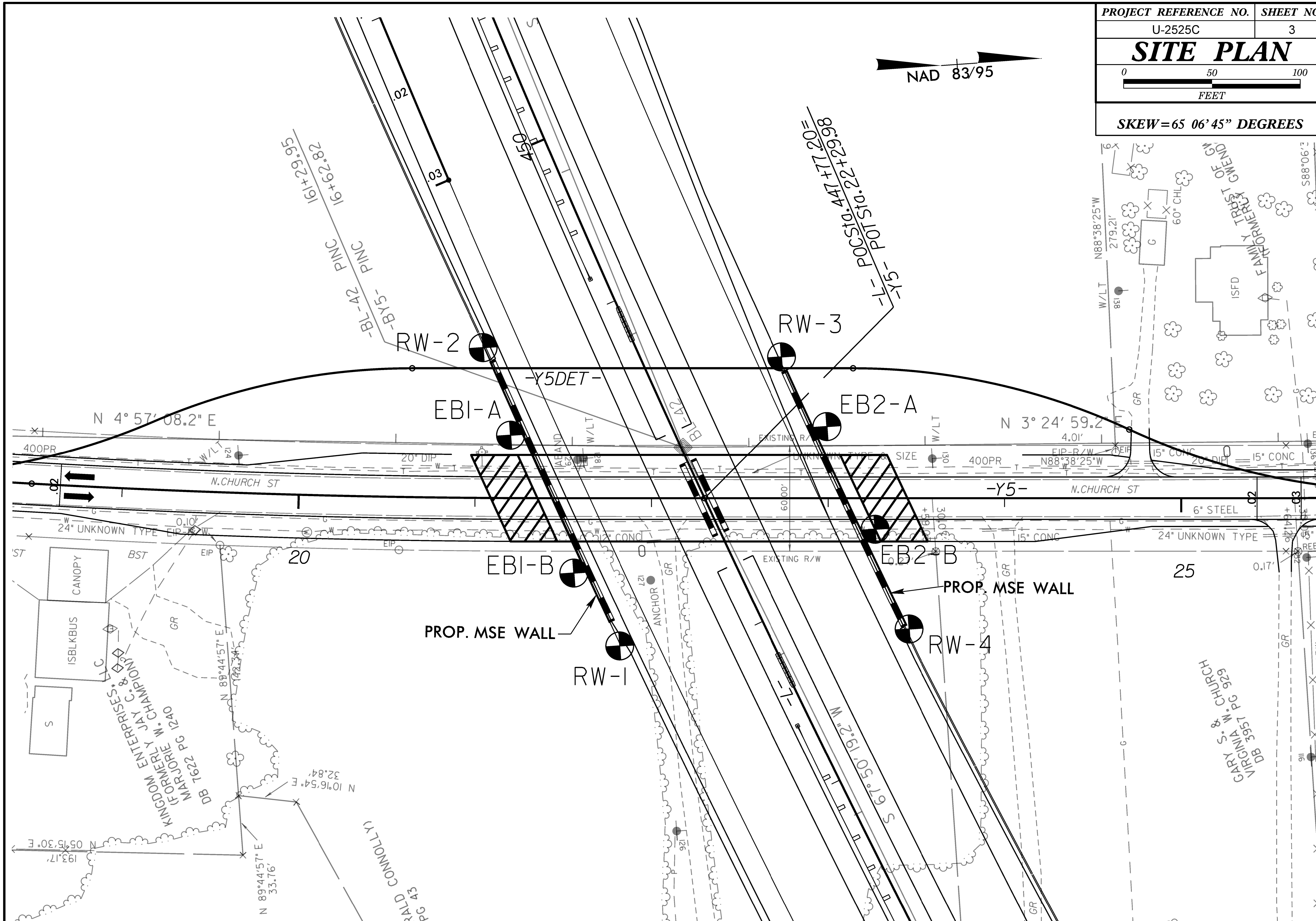
DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 50 100
FEET

SKEW=65 06' 45" DEGREES



PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

END BENT 1 (-Y5-) PROPOSED WALL PROFILE
PROJECTED ALONG -L- AT 78.5' LT
SKEW ON -Y5- =65 06'45" DEGREES

0 20 40
FEET
VE = 2:1

℄
-Y5-

BEGIN WALL
-L- 447+22.24
78.5 LT

RW-1
447+22
79' LT

EB1-B
447+70
85' LT

EB1-A
448+55
85' LT

RW-2
449+06
79' LT

END WALL
-L- 449+06.20
78.5 LT

EXISTING GROUND

Residual:
Moist, Red, Very Stiff, Silty CLAY (A-7-5),
Trace Organics (Tree Roots)

Moist to Wet, Reddish
SILT and Fine Sandy SILT

Brown to Greenish Brown to Red to Tan Brown to
(A-4) and Clayey SILT (A-5) With Manganese Seams,

Greenish Gray, Soft to Hard,
Trace Mica

Weathered Rock: Greenish
METAMORPHOSED GRANITIC
Brown
ROCK

Weathered Rock: Greenish Gray to Greenish Brown METAMORPHOSED GRANITIC ROCK

Residual: Dry, Greenish Brown, Hard,
Fine Sandy SILT (A-4)

BT
DRY
12/16

-L-

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/19/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE PROPOSED WALL PROFILE

860 850 840 830 820 810 800 790 780 770

447+00 448+00 449+00

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	5

END BENT 2 (-Y5-) PROPOSED WALL PROFILE
PROJECTED ALONG -L- AT 72.5' RT
SKEW ON -Y5- =65° 06' 45" DEGREES

0 20 40
FEET
VE = 2:1

BEGIN WALL
-L- 448+32.66
72.5 RT

RW-3
448+32
73' RT

EB2-A
447+85
80' RT

℄
-Y5-

EB2-B
447+20
80' RT

RW-4
446+60
73' RT

END WALL
-L- 446+55.91
72.5 RT

EXISTING GROUND

Residual:
Moist, Red, Stiff to Very Stiff, Silty CLAY (A-7-5)

Dry to Wet, Red to Reddish SILT and Fine Sandy

Brown to Tan Brown to Brown to SILT (A-4) and Clayey SILT (A-5)

Greenish Brown, Soft to Hard, with Manganese Seams, Trace Mica

Wet, Reddish Brown to Tan Brown to Greenish Brown, Soft to Stiff, Coarse to Fine Sandy Silty CLAY (A-7-5) with Manganese Seams, Trace Mica

ST-1

12/16

BT
DRY
12/16

BT

BT
FIAD

Weathered Rock: Greenish Brown METAMORPHOSED GRANITIC ROCK

Crystalline Rock: METAMORPHOSED GRANITIC ROCK

-L-

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/19/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROPOSED WALL PROFILE

850 840 830 820 810 800 790 780 770 760

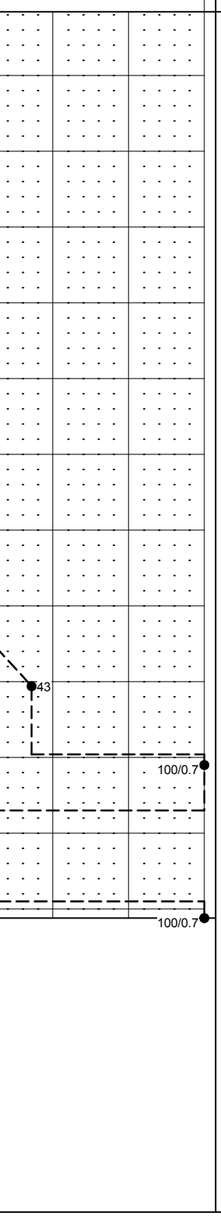
448+00 447+00 446+00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. RW-1	**STATION** 447+22	**OFFSET** 79 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 854.2 ft	**TOTAL DEPTH** 59.8 ft	**NORTHING** 870,836	**EASTING** 1,766,791	**24 HR.** 26.6
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/09/16	**COMP. DATE** 12/09/16	**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
855									854.2 GROUND SURFACE 0.0
	850.7	3.5	6	8	9		M		**RESIDUAL** Red, Very Stiff, Clayey SILT (A-5)
850									
	845.7	8.5	3	5	6		M		845.4 8.8
845									Red to Tan Brown to Greenish Brown, Medium Stiff to Hard, SILT (A-4) with Manganese Seams, Some Fine Sand, Trace Clay, and Trace Mica
	840.7	13.5	3	5	5		M		
840									
	835.7	18.5	2	3	3		M		
835									
	830.7	23.5	5	3	5		M		
830									
	825.7	28.5	3	5	6		M		
825									
	820.7	33.5	4	4	9		M		
820									
	815.7	38.5	5	9	11		M		
815									
	810.7	43.5	9	13	30		M		
810									
	805.7	48.5	21	60	40/0.2				805.2 49.0
805									**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
	800.7	53.5	9	12	14		M		801.5 52.7
800									**RESIDUAL** Greenish Brown, Very Stiff, Fine Sandy SILT (A-4) with Manganese Seams
	795.7	58.5	23	49	51/0.3				795.5 58.7
795									794.4 59.8 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
									Boring Terminated at Elevation 794.4 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK

BLOWS PER FOOT: 0 25 50 75 100



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 447+70	**OFFSET** 85 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 855.8 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 870,813	**EASTING** 1,766,748	**24 HR.** 26.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/12/16	**COMP. DATE** 12/13/16	**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										
855										855.8 GROUND SURFACE 0.0 **RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5), Trace Organics (Roots)
	852.3	3.5	8	9	12	21		M		
850	847.3	8.5	4	4	7	11		M		846.2 9.6 Reddish Brown to Tan Brown to Greenish Brown, Soft to Very Stiff, Fine Sandy Clayey SILT (A-5) with Manganese Seams
845	842.3	13.5	2	3	4	7		W		
840	837.3	18.5	2	1	2	3		W		
835	832.3	23.5	1	2	2	4		W		
830	827.3	28.5	1	5	6	11		W		
825	822.3	33.5	3	6	7	13	SS-2	51%		
820	817.3	38.5	4	7	11	18		W		
815	812.3	43.5	16	15	18	33		M		813.2 42.6 Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Rock Fragments and Trace Manganese Seams
810	807.3	48.5	7	9	14	23		M		
805	802.3	53.5	5	11	19	30		M		
800	797.3	58.5	18	31	48	79		D		
795	792.3	63.5	100/0.4			100/0.4		D		793.1 62.7 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
790	787.3	68.5	78	22/0.1		100/0.6		D		
785	782.3	73.5	22	21	24	45		D		783.5 72.3 **RESIDUAL** Greenish Brown, Hard, Fine Sandy SILT (A-4)
780										780.6 75.2

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 447+70	**OFFSET** 85 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 855.8 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 870,813	**EASTING** 1,766,748	**24 HR.** 26.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/12/16	**COMP. DATE** 12/13/16	**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
780						Match Line				
	777.3	78.5	100/0.2			100/0.2				777.1 78.7 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK *(continued)* Boring Terminated at Elevation 777.1 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK Equivalent -Y5- Sta: 21+56, 42' RT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 448+55	**OFFSET** 85 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 856.9 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 870,783	**EASTING** 1,766,668	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/08/16	**COMP. DATE** 12/09/16	**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										
										856.9 GROUND SURFACE 0.0
855	853.4	3.5	6	9	11	20		M		**RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5)
850	848.4	8.5	3	4	7	11		M		849.0 7.9 Red to Tan Brown to Greenish Gray to Greenish Brown, Medium Stiff to Very Stiff, Fine Sandy Clayey SILT (A-5) with Manganese Seams, Trace Mica Note: Rock Fragments from 44.1' to 44.3'
845	843.4	13.5	2	3	4	7		W		
840	838.4	18.5	2	3	3	6		W		
835	833.4	23.5	2	3	4	7		W		
830	828.4	28.5	2	3	4	7		W		
825	823.4	33.5	3	7	10	17	SS-1	47%		
820	818.4	38.5	1	2	6	8		W		
815	813.4	43.5	6	16	12	28		M		
810	808.4	48.5	14	14	15	29		M		810.8 46.1 Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams, Trace Mica
805	803.4	53.5	12	14	20	34		M		
800	798.4	58.5	53	47/0.2		100/0.7				799.1 57.8 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
795	793.4	63.5	100/0.2			100/0.2				
790	788.4	68.5	100/0.3			100/0.3				
785	783.4	73.5	100/0.4			100/0.4				783.0 73.9 Boring Terminated at Elevation 783.0 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 448+55	**OFFSET** 85 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 856.9 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 870,783	**EASTING** 1,766,668	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/08/16	**COMP. DATE** 12/09/16	**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
780						Match Line				Caved In at 25.8' Equivalent -Y5- Sta: 21+20, 36' LT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. RW-2	**STATION** 449+06	**OFFSET** 79 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 856.3 ft	**TOTAL DEPTH** 58.6 ft	**NORTHING** 870,771	**EASTING** 1,766,617	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/05/16	**COMP. DATE** 12/05/16	**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										
	856.3	0.0								GROUND SURFACE
855										**RESIDUAL** Red, Very Stiff, Clayey SILT (A-5)
	852.9	3.4	6	9	10	19		M		
850										
	847.9	8.4	5	6	8	14		M		
845										
	848.2	8.1								Reddish Brown to Greenish Brown with Light Gray and Tan Brown, Medium Stiff to Hard, SILT (A-4) with Manganese Seams, Trace Fine Sand, and Trace Mica
	842.9	13.4	2	3	5	8		M		
840										
	837.9	18.4	2	2	4	6		M		
835										
	832.9	23.4	2	2	4	6		M		
830										
	827.9	28.4	3	5	7	12		M		
825										
	822.9	33.4	3	7	10	17		M		
820										
	817.9	38.4	2	3	4	7		M		
815										
	812.9	43.4	2	2	4	6		M		
810										
	807.9	48.4	12	15	21	36		M		
805										
	802.9	53.4	8	9	8	17		M		
800										
	798.7	57.6								**WEATHERED ROCK** Greenish Gray METAMORPHOSED GRANITIC ROCK
	797.9	58.4	100/0.2			100/0.2		M		Boring Terminated at Elevation 797.7 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK Caved In at 23.2'

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. RW-3	**STATION** 448+32	**OFFSET** 73 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 852.4 ft	**TOTAL DEPTH** 49.9 ft	**NORTHING** 870,939	**EASTING** 1,766,634	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/05/16	**COMP. DATE** 12/05/16	**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										
	852.4	0.0								GROUND SURFACE
850										**RESIDUAL** Red, Very Stiff, Clayey SILT (A-5)
	849.0	3.4	6	8	11	19		M		
845										
	844.6	7.8								Red to Brown to Greenish Brown, Soft to Very Stiff, SILT (A-4) with Manganese Seams, Trace Mica, and Trace Fine Sand
	844.0	8.4	3	4	5	9		M		
840										
	839.0	13.4	2	3	4	7		M		
835										
	834.0	18.4	1	2	1	3		M		
830										
	829.0	23.4	3	3	5	8		M		
825										
	824.0	28.4	3	3	6	9		M		
820										
	819.0	33.4	3	5	7	12		M		
815										
	814.0	38.4	3	4	6	10		M		
810										
	809.0	43.4	3	4	10	14		M		
805										
	804.0	48.4	5	6	10	16		M		
	802.5	49.9								Boring Terminated at Elevation 802.5 ft In Residual Soil: Silt (A-4) Caved In at 21.4'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 447+85	**OFFSET** 80 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 852.2 ft	**TOTAL DEPTH** 81.4 ft	**NORTHING** 870,962	**EASTING** 1,766,675	**24 HR.** 23.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/07/16	**COMP. DATE** 12/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
855										
								GROUND SURFACE	852.2	0.0
850	848.8	3.4	6	9	12		M	**RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5)		
845	843.8	8.4	3	3	5		M		842.6	9.6
840	838.8	13.4	2	3	4		W	Red to Reddish Brown, Medium Stiff, Fine Sandy Clayey SILT (A-5) with Manganese Seams, Trace Mica		
835	833.8	18.4	2	2	3		W			
830	828.8	23.4	WOH	1	2		W		830.1	22.1
825	823.8	28.4	1	2	2		W	Reddish Brown to Tan Brown, Soft to Medium Stiff, Fine Sandy Silty CLAY (A-7-5) with Manganese Seams, Trace Mica		
820	818.8	33.4	WOH	1	2	SS-5	66% 80%			
815	813.8	38.4	2	3	4		W			
810	808.8	43.4	3	6	10		M		809.3	42.9
805	803.8	48.4	6	8	11		M	Tan Brown to Greenish Brown with White, Very Stiff to Hard, Fine Sandy SILT (A-4) with Managese Seams, Trace Mica		
800	798.8	53.4	7	12	18		M			
795	793.8	58.4	10	17	27		D			
790	788.8	63.4	14	34	53		D			
785	783.8	68.4	12	20	24		D			
780	778.8	73.4	13	19	26		D		775.0	77.2
775										

BLOWS PER FOOT: 0 25 50 75 100

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 447+85	**OFFSET** 80 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 852.2 ft	**TOTAL DEPTH** 81.4 ft	**NORTHING** 870,962	**EASTING** 1,766,675	**24 HR.** 23.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/07/16	**COMP. DATE** 12/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	SAMP. NO.	MOI	SOIL AND ROCK DESCRIPTION
775								Match Line
	773.8	78.4	100/0.4					**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
	771.5	80.7						
	770.9	81.3	60/0.1					**CRYSTALLINE ROCK** METAMORPHOSED GRANITIC ROCK
	770.8	81.4						Boring Terminated with Standard Penetration Test Refusal at Elevation 770.8 ft In Crystalline Rock: METAMORPHOSED GRANITIC ROCK

BLOWS PER FOOT: 0 25 50 75 100

100/0.4

60/0.1

Equivalent -Y5- Sta: 22+99, 41' LT

Other Samples:
ST-1 (29.5 - 31.6)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 447+20	**OFFSET** 80 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 850.1 ft	**TOTAL DEPTH** 68.3 ft	**NORTHING** 870,985	**EASTING** 1,766,735	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/15/16	**COMP. DATE** 12/15/16	**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)
855											
850										850.1 GROUND SURFACE	0.0
										RESIDUAL Red, Stiff, Silty CLAY (A-7-5) Note: No sample taken due to potential underground utilities	
845	842.0	8.1	3	3	4	7		M		842.2	7.9
840										Red to Tan Brown, Soft to Medium Stiff, Fine Sandy Clayey SILT (A-5) with Manganese Seams	
835	837.0	13.1	3	3	3	6		M			
830	832.0	18.1	1	1	2	3		W			
825	827.0	23.1	1	2	2	4		W		827.8	22.3
820	822.0	28.1	2	5	5	10	SS-6	60%		Tan Brown to Greenish Brown, Soft to Stiff, Coarse to Fine Sandy Silty CLAY (A-7-5) with Manganese Seams	
815	817.0	33.1	2	4	6	10		W			
810	812.0	38.1	3	5	7	12		W			
805	807.0	43.1	5	8	9	17		M		807.4	42.7
800	802.0	48.1	9	15	20	35		D		Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams	
795	797.0	53.1	53	47/0.3		100/0.8				798.3 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK	51.8
790	792.0	58.1	100/0.4			100/0.4					
785	787.0	63.1	28	72/0.4		100/0.9					
	782.0	68.1	100/0.2			100/0.2				781.8 Boring Terminated at Elevation 781.8 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK Equivalent -Y5- Sta: 23+26, 17' RT	68.3

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. RW-4	**STATION** 446+60	**OFFSET** 73 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 850.4 ft	**TOTAL DEPTH** 49.5 ft	**NORTHING** 871,001	**EASTING** 1,766,793	**24 HR.** 19.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**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										
850										850.4 GROUND SURFACE 0.0
										RESIDUAL Red, Stiff to Very Stiff, Clayey SILT (A-5)
845	846.8	3.6	5	7	8	15		M		
840	841.8	8.6	3	4	6	10		M		840.8 9.6
835	836.8	13.6	2	4	4	8		M		Red to Tan Brown to Greenish Brown, Medium Stiff to Hard, SILT (A-4) with Manganese Seams, Trace Clay, and Trace to Some Fine Sand
830	831.8	18.6	2	3	4	7		M		
825	826.8	23.6	2	2	4	6		M		
820	821.8	28.6	3	3	5	8		M		
815	816.8	33.6	4	6	11	17		M		
810	811.8	38.6	9	13	19	32		M		808.6 41.8
805	806.8	43.6	75	25/0.1		100/0.6				**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
	801.8	48.6	32	68/0.4		100/0.9				800.9 49.5 Boring Terminated at Elevation 800.9 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK

SOILS LABORATORY TESTS RESULTS

WBS NO.: 34821.1.1

TIP NO.: U-2525C

COUNTY: Guilford

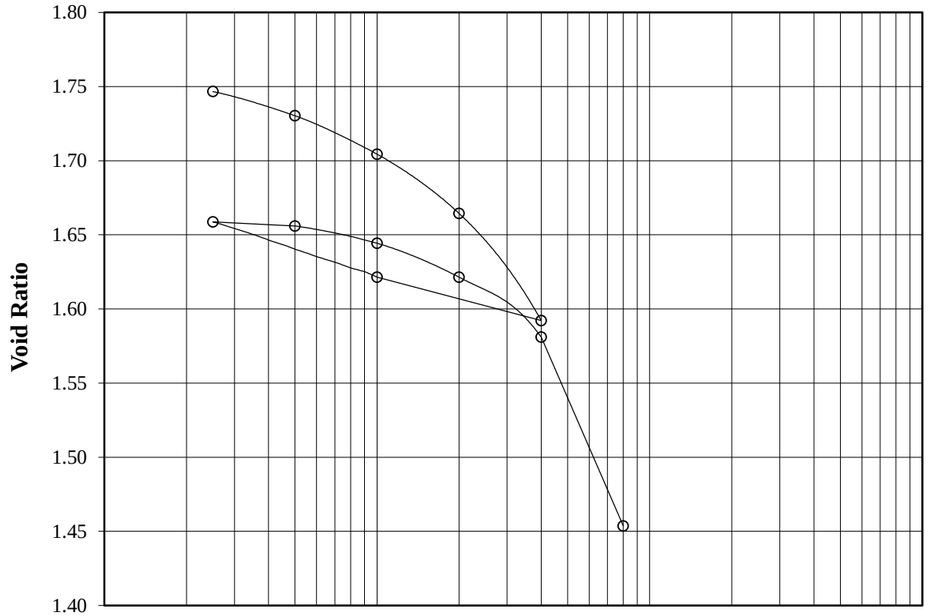
SITE DESCRIPTION: Site #5, (Structure #7 - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over Greensboro Eastern Loop, I-85 Bypass (-L-)

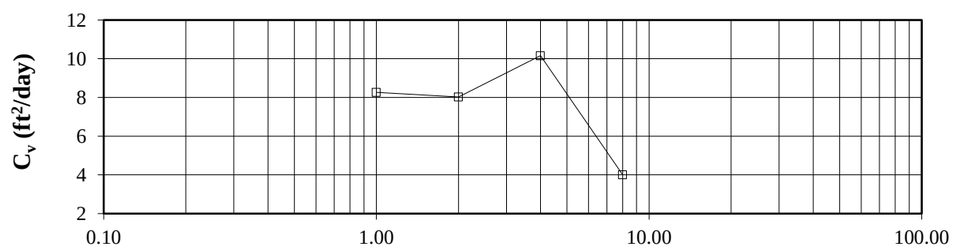
SAMPLE NO.	Boring	DEPTH INTERVAL (ft.)	AASHTO CLASS	N	L.L	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							CSE. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	EB1-A	33.5-35.0	A-5 (4)	17	51	7	8	51	35	6	99	96	56	47.2	-
SS-2	EB1-B	33.5-35.0	A-5 (2)	13	45	3	13	43	38	6	98	90	58	50.8	-
SS-3	B1-A	38.3-39.8	A-5 (6)	12	41	8	5	42	47	6	100	99	70	31.2	-
SS-4	B1-B	38.3-39.8	A-7-5 (10)	9	50	11	9	30	49	12	99	94	73	38.9	-
SS-5	EB2-A	33.4-34.9	A-7-5 (24)	3	72	16	2	16	57	25	100	99	90	80.3	-
SS-6	EB2-B	28.1-29.6	A-7-5 (14)	10	58	12	7	23	51	19	99	95	79	60.3	-
ST-1	EB2-A1	29.5-31.6	A-7-5 (23)	N/A	67	17	3	16	54	27	100	98	89	65.5	-

Tony Dumoulin

Certification No. 121-01-1108

Consolidation Test - ASTM D2435
SUMMARY REPORT





	Before	After				
Moisture (%):	65.46	63.56	**Liquid Limits:**	67	**Test Date:**	1/5/2017
Dry Density (pcf):	61.20	62.20	**Plastic Limits:**	50		
Saturation (%):	100.75	100.36	**Plasticity Index (%):**	17		
Void Ratio:	1.7513	1.6990	**Specific Gravity:**	2.700	Assumed	
C_c	0.45	-	**Sample Type:**	Undisturbed		
C_r	0.051	-				
P_c (ksf)	2.95	-				

Soil Classification:	A-7-5 (Clayey Soils)/ MH (Elastic Silt)		
Project:	U2525C	**Depth:**	29.5'-31.6'
Sample Number:	ST-1	**Boring Number:**	EB2-A1

Project: U2525C
Client: NCDOT
Location: EB-2-A1 (29.5'-31.6")

Consolidation Test Results
(Sequence 1) Load 0.250 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3528	0.0000	0.0000	1.7513
1	00:00:01	0.3528	0.0000	0.0000	1.7513
2	00:00:02	0.3528	0.0001	0.0085	1.7511
3	00:00:03	0.3528	0.0001	0.0085	1.7511
4	00:00:04	0.3528	0.0001	0.0085	1.7511
5	00:00:05	0.3527	0.0002	0.0170	1.7508
6	00:00:06	0.3527	0.0002	0.0170	1.7508
7	00:00:12	0.3527	0.0002	0.0170	1.7508
8	00:00:15	0.3527	0.0002	0.0170	1.7508
9	00:00:30	0.3526	0.0003	0.0255	1.7506
10	00:01:00	0.3525	0.0003	0.0340	1.7504
11	00:02:00	0.3524	0.0004	0.0425	1.7501
12	00:04:00	0.3523	0.0005	0.0510	1.7499
13	00:08:00	0.3523	0.0005	0.0510	1.7499
14	00:10:00	0.3523	0.0005	0.0510	1.7499
15	00:15:01	0.3523	0.0005	0.0510	1.7499
16	00:30:01	0.3522	0.0007	0.0680	1.7494
17	01:00:03	0.3521	0.0008	0.0765	1.7492
18	02:00:06	0.3519	0.0009	0.0935	1.7487
19	04:00:13	0.3518	0.0010	0.1020	1.7485
20	08:00:26	0.3518	0.0010	0.1020	1.7485
21	12:00:40	0.3519	0.0009	0.0935	1.7487
22	16:00:53	0.3519	0.0009	0.0935	1.7487
23	20:01:06	0.3519	0.0009	0.0935	1.7487
24	23:59:57	0.3518	0.0010	0.1020	1.7485

Tested By: TS

Consolidation Test Results
(Sequence 2) Load 0.500 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Numbe 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3518	0.0010	0.1020	1.7485
1	00:00:01	0.3477	0.0052	0.5183	1.7370
2	00:00:02	0.3475	0.0054	0.5353	1.7366
3	00:00:03	0.3474	0.0054	0.5438	1.7363
4	00:00:04	0.3473	0.0055	0.5523	1.7361
5	00:00:05	0.3472	0.0056	0.5607	1.7359
6	00:00:06	0.3472	0.0056	0.5607	1.7359
7	00:00:12	0.3472	0.0057	0.5692	1.7356
8	00:00:15	0.3472	0.0057	0.5692	1.7356
9	00:00:30	0.3470	0.0059	0.5862	1.7352
10	00:01:00	0.3469	0.0059	0.5947	1.7349
11	00:02:00	0.3468	0.0060	0.6032	1.7347
12	00:04:00	0.3468	0.0060	0.6032	1.7347
13	00:08:00	0.3467	0.0061	0.6117	1.7345
14	00:10:00	0.3467	0.0061	0.6117	1.7345
15	00:15:01	0.3466	0.0063	0.6287	1.7340
16	00:30:02	0.3464	0.0065	0.6457	1.7335
17	01:00:03	0.3463	0.0065	0.6542	1.7333
18	02:00:07	0.3462	0.0066	0.6627	1.7331
19	04:00:13	0.3459	0.0070	0.6967	1.7321
20	08:00:26	0.3459	0.0070	0.6967	1.7321
21	12:00:40	0.3459	0.0070	0.6967	1.7321
22	16:00:53	0.3460	0.0069	0.6882	1.7324
23	20:01:06	0.3460	0.0069	0.6882	1.7324
24	23:59:57	0.3459	0.0070	0.6967	1.7321

Tested By:
Checked By:

Consolidation Test Results
(Sequence 3) Load 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

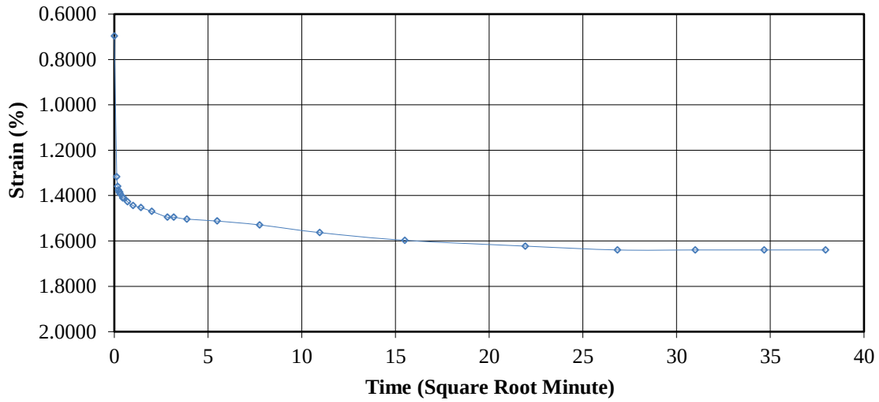
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.3459	0.0070	0.6967	1.7321
1	00:00:01	0.02	0.13	0.3397	0.0132	1.3169	1.7151
2	00:00:02	0.03	0.18	0.3393	0.0136	1.3594	1.7139
3	00:00:03	0.05	0.22	0.3391	0.0138	1.3764	1.7134
4	00:00:04	0.07	0.26	0.3390	0.0138	1.3849	1.7132
5	00:00:05	0.08	0.29	0.3390	0.0138	1.3849	1.7132
6	00:00:06	0.10	0.32	0.3389	0.0139	1.3934	1.7129
7	00:00:12	0.20	0.45	0.3387	0.0141	1.4104	1.7125
8	00:00:15	0.25	0.50	0.3387	0.0141	1.4104	1.7125
9	00:00:30	0.50	0.71	0.3386	0.0143	1.4274	1.7120
10	00:01:00	1.00	1.00	0.3384	0.0144	1.4443	1.7115
11	00:02:00	2.00	1.41	0.3383	0.0145	1.4528	1.7113
12	00:04:00	4.00	2.00	0.3381	0.0147	1.4698	1.7108
13	00:08:01	8.02	2.83	0.3379	0.0150	1.4953	1.7101
14	00:10:01	10.02	3.16	0.3379	0.0150	1.4953	1.7101
15	00:15:01	15.02	3.88	0.3378	0.0150	1.5038	1.7099
16	00:30:02	30.03	5.48	0.3377	0.0151	1.5123	1.7097
17	01:00:03	60.05	7.75	0.3376	0.0153	1.5293	1.7092
18	02:00:07	120.12	10.96	0.3372	0.0156	1.5633	1.7083
19	04:00:13	240.22	15.50	0.3369	0.0160	1.5973	1.7073
20	08:00:27	480.45	21.92	0.3366	0.0162	1.6228	1.7066
21	12:00:40	720.67	26.85	0.3364	0.0164	1.6398	1.7062
22	16:00:53	960.88	31.00	0.3364	0.0164	1.6398	1.7062
23	20:01:06	1201.88	34.67	0.3364	0.0164	1.6398	1.7062
24	23:59:57	1439.95	37.95	0.3364	0.0164	1.6398	1.7062

Tested By: TS

Consolidation Test Results
(Sequence 3) Load 1.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 4) Load 2.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

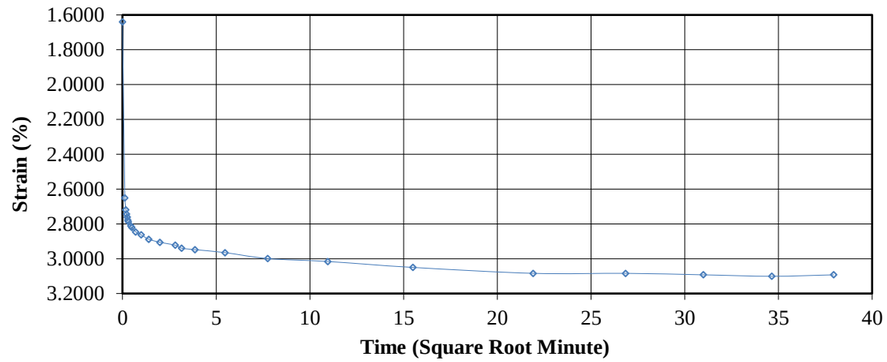
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.3364	0.0164	1.6398	1.7062
1	00:00:01	0.02	0.13	0.3263	0.0265	2.6508	1.6784
2	00:00:02	0.03	0.18	0.3257	0.0272	2.7188	1.6765
3	00:00:03	0.05	0.22	0.3254	0.0274	2.7443	1.6758
4	00:00:04	0.07	0.26	0.3252	0.0276	2.7613	1.6753
5	00:00:05	0.08	0.29	0.3251	0.0278	2.7782	1.6748
6	00:00:06	0.10	0.32	0.3250	0.0279	2.7867	1.6746
7	00:00:12	0.20	0.45	0.3247	0.0281	2.8122	1.6739
8	00:00:15	0.25	0.50	0.3246	0.0282	2.8207	1.6737
9	00:00:30	0.50	0.71	0.3244	0.0285	2.8462	1.6730
10	00:01:00	1.00	1.00	0.3242	0.0286	2.8632	1.6725
11	00:02:00	2.00	1.41	0.3240	0.0289	2.8887	1.6718
12	00:04:00	4.00	2.00	0.3238	0.0291	2.9057	1.6713
13	00:08:00	8.00	2.83	0.3236	0.0292	2.9227	1.6709
14	00:10:00	10.00	3.16	0.3234	0.0294	2.9397	1.6704
15	00:15:00	15.00	3.87	0.3234	0.0295	2.9482	1.6702
16	00:30:01	30.02	5.48	0.3232	0.0297	2.9652	1.6697
17	01:00:03	60.05	7.75	0.3229	0.0300	2.9992	1.6688
18	02:00:06	120.10	10.96	0.3227	0.0302	3.0161	1.6683
19	04:00:13	240.22	15.50	0.3223	0.0305	3.0501	1.6674
20	08:00:26	480.43	21.92	0.3220	0.0308	3.0841	1.6664
21	12:00:39	720.65	26.84	0.3220	0.0308	3.0841	1.6664
22	16:00:53	960.88	31.00	0.3219	0.0309	3.0926	1.6662
23	20:01:06	1201.10	34.66	0.3218	0.0310	3.1011	1.6660
24	23:59:59	1439.98	37.95	0.3219	0.0309	3.0926	1.6662

Tested By: TS

Consolidation Test Results
(Sequence 4) Load 2.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 5) Load 4.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

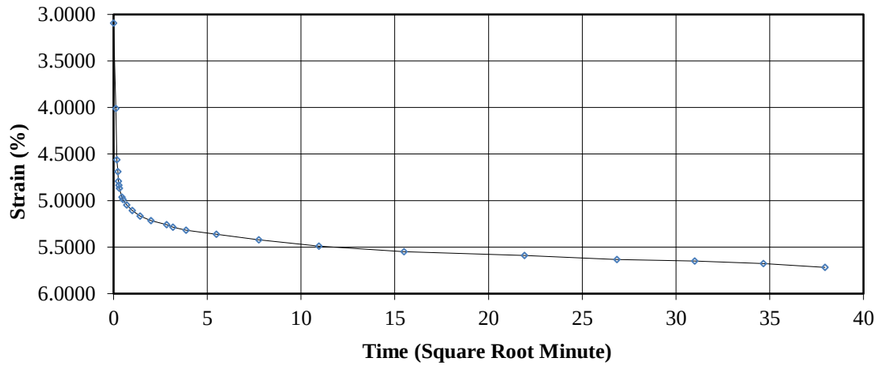
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time √min	Displacement (in)	Settlement (in)	Axial Strain (in)	Void Ratio
0	00:00:00	0.00	0.00	0.3219	0.0309	3.0926	1.6662
1	00:00:01	0.02	0.13	0.3127	0.0401	4.0102	1.6410
2	00:00:02	0.03	0.18	0.3072	0.0456	4.5624	1.6258
3	00:00:03	0.05	0.22	0.3059	0.0469	4.6899	1.6223
4	00:00:04	0.07	0.26	0.3049	0.0479	4.7918	1.6194
5	00:00:05	0.08	0.29	0.3045	0.0483	4.8343	1.6183
6	00:00:06	0.10	0.32	0.3042	0.0487	4.8683	1.6173
7	00:00:12	0.20	0.45	0.3032	0.0496	4.9618	1.6148
8	00:00:15	0.25	0.50	0.3030	0.0499	4.9873	1.6141
9	00:00:30	0.50	0.71	0.3024	0.0505	5.0467	1.6124
10	00:01:00	1.00	1.00	0.3018	0.0511	5.1062	1.6108
11	00:02:00	2.00	1.41	0.3012	0.0517	5.1657	1.6092
12	00:04:00	4.00	2.00	0.3007	0.0522	5.2167	1.6078
13	00:08:00	8.00	2.83	0.3003	0.0526	5.2591	1.6066
14	00:10:00	10.00	3.16	0.3000	0.0528	5.2846	1.6059
15	00:15:00	15.00	3.87	0.2997	0.0532	5.3186	1.6050
16	00:30:01	30.02	5.48	0.2992	0.0536	5.3611	1.6038
17	01:00:03	60.05	7.75	0.2986	0.0542	5.4206	1.6022
18	02:00:06	120.10	10.96	0.2980	0.0549	5.4885	1.6003
19	04:00:13	240.22	15.50	0.2974	0.0555	5.5480	1.5986
20	08:00:26	480.43	21.92	0.2969	0.0559	5.5905	1.5975
21	12:00:39	720.65	26.84	0.2965	0.0563	5.6330	1.5963
22	16:00:53	960.88	31.00	0.2963	0.0565	5.6500	1.5958
23	20:01:06	1201.10	34.66	0.2961	0.0568	5.6754	1.5951
24	23:59:57	1439.95	37.95	0.2957	0.0572	5.7179	1.5940

Tested By: TS

Consolidation Test Results
(Sequence 5) Load 4.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 6) Rebound 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.2957	0.0572	5.7179	1.5940
1	00:00:01	0.3038	0.0490	4.9023	1.6164
2	00:00:02	0.3043	0.0485	4.8513	1.6178
3	00:00:03	0.3045	0.0483	4.8343	1.6183
4	00:00:04	0.3047	0.0482	4.8173	1.6187
5	00:00:05	0.3047	0.0482	4.8173	1.6187
6	00:00:06	0.3048	0.0481	4.8088	1.6190
7	00:00:12	0.3049	0.0479	4.7918	1.6194
8	00:00:15	0.3050	0.0478	4.7833	1.6197
9	00:00:30	0.3052	0.0477	4.7664	1.6201
10	00:01:00	0.3053	0.0476	4.7579	1.6204
11	00:02:00	0.3054	0.0474	4.7409	1.6209
12	00:04:00	0.3056	0.0472	4.7239	1.6213
13	00:08:00	0.3058	0.0471	4.7069	1.6218
14	00:10:00	0.3057	0.0472	4.7154	1.6216
15	00:15:00	0.3058	0.0471	4.7069	1.6218
16	00:30:01	0.3059	0.0469	4.6899	1.6223
17	01:00:03	0.3059	0.0470	4.6984	1.6220
18	02:00:06	0.3061	0.0467	4.6729	1.6227
19	04:00:13	0.3062	0.0466	4.6644	1.6230
20	08:00:26	0.3062	0.0466	4.6644	1.6230
21	12:00:39	0.3063	0.0466	4.6559	1.6232
22	16:00:53	0.3063	0.0466	4.6559	1.6232
23	20:01:06	0.3065	0.0463	4.6304	1.6239
24	23:59:57	0.3063	0.0466	4.6559	1.6232

Tested By: TS

Consolidation Test Results
(Sequence 7) Rebound 0.250 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Numbe 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3063	0.0466	4.6559	1.6232
1	00:00:01	0.3129	0.0399	3.9932	1.6414
2	00:00:02	0.3139	0.0389	3.8912	1.6442
3	00:00:03	0.3146	0.0382	3.8233	1.6461
4	00:00:04	0.3152	0.0376	3.7638	1.6477
5	00:00:05	0.3155	0.0374	3.7383	1.6484
6	00:00:06	0.3156	0.0372	3.7213	1.6489
7	00:00:12	0.3162	0.0366	3.6619	1.6505
8	00:00:15	0.3163	0.0365	3.6534	1.6508
9	00:00:30	0.3167	0.0361	3.6109	1.6519
10	00:01:00	0.3170	0.0359	3.5854	1.6526
11	00:02:00	0.3173	0.0355	3.5514	1.6536
12	00:04:00	0.3177	0.0352	3.5174	1.6545
13	00:08:01	0.3180	0.0348	3.4834	1.6554
14	00:10:01	0.3181	0.0347	3.4749	1.6557
15	00:15:01	0.3182	0.0347	3.4664	1.6559
16	00:30:02	0.3184	0.0344	3.4410	1.6566
17	01:00:03	0.3187	0.0342	3.4155	1.6573
18	02:00:07	0.3189	0.0339	3.3900	1.6580
19	04:00:13	0.3192	0.0336	3.3645	1.6587
20	08:00:27	0.3195	0.0334	3.3390	1.6594
21	12:00:40	0.3196	0.0332	3.3220	1.6599
22	16:00:53	0.3197	0.0331	3.3135	1.6601
23	56:01:06	0.3198	0.0331	3.3050	1.6604
24	23:59:59	0.3199	0.0330	3.2965	1.6606

Tested By: TS

Consolidation Test Results
(Sequence 8) Load 0.500 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3199	0.0330	3.2965	1.6606
1	00:00:01	0.3193	0.0336	3.3560	1.6590
2	00:00:02	0.3193	0.0336	3.3560	1.6590
3	00:00:03	0.3193	0.0336	3.3560	1.6590
4	00:00:04	0.3193	0.0336	3.3560	1.6590
5	00:00:05	0.3193	0.0336	3.3560	1.6590
6	00:00:06	0.3193	0.0336	3.3560	1.6590
7	00:00:12	0.3193	0.0336	3.3560	1.6590
8	00:00:15	0.3193	0.0336	3.3560	1.6590
9	00:00:30	0.3193	0.0336	3.3560	1.6590
10	00:01:00	0.3192	0.0336	3.3645	1.6587
11	00:02:01	0.3192	0.0336	3.3645	1.6587
12	00:04:01	0.3192	0.0336	3.3645	1.6587
13	00:08:01	0.3191	0.0337	3.3730	1.6585
14	00:10:01	0.3190	0.0338	3.3815	1.6583
15	00:15:01	0.3190	0.0338	3.3815	1.6583
16	00:30:02	0.3191	0.0337	3.3730	1.6585
17	01:00:04	0.3190	0.0338	3.3815	1.6583
18	02:00:07	0.3190	0.0338	3.3815	1.6583
19	04:00:14	0.3189	0.0339	3.3900	1.6580
20	08:00:27	0.3189	0.0340	3.3985	1.6578
21	12:00:40	0.3189	0.0340	3.3985	1.6578
22	16:00:53	0.3189	0.0340	3.3985	1.6578
23	20:01:07	0.3189	0.0340	3.3985	1.6578
24	23:59:59	0.3189	0.0340	3.3985	1.6578

Tested By: TS

Consolidation Test Results
(Sequence 9) Load 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number:

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3189	0.0340	3.3985	1.6578
1	00:00:01	0.3161	0.0368	3.6788	1.6501
2	00:00:02	0.3159	0.0370	3.6958	1.6496
3	00:00:03	0.3158	0.0370	3.7043	1.6494
4	00:00:04	0.3157	0.0371	3.7128	1.6491
5	00:00:05	0.3157	0.0371	3.7128	1.6491
6	00:00:06	0.3157	0.0371	3.7128	1.6491
7	00:00:12	0.3156	0.0372	3.7213	1.6489
8	00:00:15	0.3155	0.0373	3.7298	1.6487
9	00:00:30	0.3155	0.0373	3.7298	1.6487
10	00:01:00	0.3155	0.0374	3.7383	1.6484
11	00:02:01	0.3155	0.0374	3.7383	1.6484
12	00:04:01	0.3154	0.0375	3.7468	1.6482
13	00:08:01	0.3153	0.0376	3.7553	1.6480
14	00:10:01	0.3152	0.0376	3.7638	1.6477
15	00:15:01	0.3152	0.0376	3.7638	1.6477
16	00:30:02	0.3153	0.0376	3.7553	1.6480
17	01:00:04	0.3151	0.0377	3.7723	1.6475
18	02:00:07	0.3150	0.0378	3.7808	1.6473
19	04:00:14	0.3150	0.0379	3.7893	1.6470
20	08:00:27	0.3148	0.0381	3.8063	1.6466
21	12:00:40	0.3148	0.0381	3.8063	1.6466
22	16:00:53	0.3148	0.0381	3.8063	1.6466
23	20:01:07	0.3147	0.0381	3.8148	1.6463
24	23:59:58	0.3146	0.0382	3.8233	1.6461

Tested By: TS

Consolidation Test Results
(Sequence 10) Load 2.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3146	0.0382	3.8233	1.6461
1	00:00:01	0.3085	0.0444	4.4350	1.6293
2	00:00:02	0.3082	0.0447	4.4690	1.6283
3	00:00:03	0.3080	0.0449	4.4860	1.6279
4	00:00:04	0.3079	0.0449	4.4945	1.6276
5	00:00:05	0.3078	0.0450	4.5030	1.6274
6	00:00:06	0.3078	0.0450	4.5030	1.6274
7	00:00:12	0.3076	0.0452	4.5200	1.6269
8	00:00:15	0.3076	0.0452	4.5200	1.6269
9	00:00:30	0.3076	0.0453	4.5285	1.6267
10	00:01:00	0.3075	0.0454	4.5370	1.6265
11	00:02:00	0.3073	0.0455	4.5539	1.6260
12	00:04:01	0.3072	0.0456	4.5624	1.6258
13	00:08:01	0.3071	0.0457	4.5709	1.6255
14	00:10:01	0.3071	0.0457	4.5709	1.6255
15	00:15:01	0.3071	0.0458	4.5794	1.6253
16	00:30:02	0.3070	0.0459	4.5879	1.6251
17	01:00:04	0.3068	0.0460	4.6049	1.6246
18	02:00:07	0.3066	0.0462	4.6219	1.6241
19	04:00:14	0.3066	0.0462	4.6219	1.6241
20	08:00:27	0.3065	0.0463	4.6304	1.6239
21	12:00:40	0.3065	0.0464	4.6389	1.6237
22	16:00:53	0.3065	0.0463	4.6304	1.6239
23	20:01:07	0.3065	0.0464	4.6389	1.6237
24	23:59:57	0.3063	0.0466	4.6559	1.6232

Tested By: TS

Consolidation Test Results
(Sequence 11) Load 4.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3063	0.0466	4.6559	1.6232
1	00:00:01	0.2981	0.0547	5.4715	1.6007
2	00:00:02	0.2967	0.0562	5.6160	1.5968
3	00:00:03	0.2963	0.0565	5.6500	1.5958
4	00:00:04	0.2962	0.0567	5.6670	1.5954
5	00:00:05	0.2960	0.0568	5.6839	1.5949
6	00:00:06	0.2959	0.0569	5.6924	1.5947
7	00:00:12	0.2956	0.0573	5.7264	1.5937
8	00:00:15	0.2955	0.0573	5.7349	1.5935
9	00:00:30	0.2952	0.0577	5.7689	1.5926
10	00:01:00	0.2950	0.0579	5.7859	1.5921
11	00:02:00	0.2946	0.0582	5.8199	1.5912
12	00:04:01	0.2944	0.0585	5.8454	1.5905
13	00:08:01	0.2941	0.0587	5.8709	1.5898
14	00:10:01	0.2941	0.0588	5.8794	1.5895
15	00:15:01	0.2939	0.0590	5.8963	1.5891
16	00:30:02	0.2936	0.0592	5.9218	1.5884
17	01:00:04	0.2933	0.0596	5.9558	1.5874
18	02:00:07	0.2929	0.0599	5.9898	1.5865
19	04:00:14	0.2926	0.0602	6.0238	1.5856
20	08:00:27	0.2923	0.0606	6.0578	1.5846
21	12:00:40	0.2920	0.0608	6.0833	1.5839
22	16:00:53	0.2919	0.0609	6.0918	1.5837
23	20:01:07	0.2918	0.0611	6.1088	1.5832
24	23:59:57	0.2916	0.0613	6.1257	1.5827

Tested By: TS

Consolidation Test Results
(Sequence 12) Load 8.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

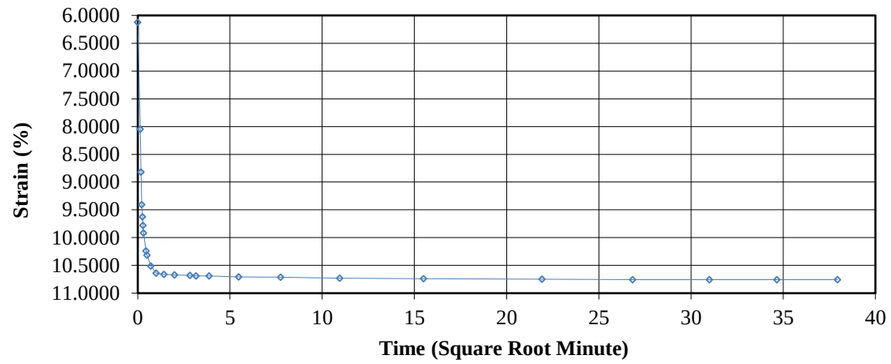
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.2916	0.0613	6.1257	1.5827
1	00:00:01	0.02	0.13	0.2724	0.0805	8.0459	1.5299
2	00:00:02	0.03	0.18	0.2647	0.0882	8.8190	1.5086
3	00:00:03	0.05	0.22	0.2588	0.0941	9.4053	1.4925
4	00:00:04	0.07	0.26	0.2566	0.0963	9.6262	1.4864
5	00:00:05	0.08	0.29	0.2551	0.0978	9.7791	1.4822
6	00:00:06	0.10	0.32	0.2537	0.0992	9.9150	1.4785
7	00:00:12	0.20	0.45	0.2505	0.1024	10.2379	1.4696
8	00:00:15	0.25	0.50	0.2497	0.1031	10.3144	1.4675
9	00:00:30	0.50	0.71	0.2477	0.1051	10.5098	1.4621
10	00:01:00	1.00	1.00	0.2465	0.1064	10.6372	1.4586
11	00:02:01	2.02	1.42	0.2462	0.1066	10.6627	1.4579
12	00:04:01	4.02	2.00	0.2461	0.1067	10.6712	1.4577
13	00:08:01	8.02	2.83	0.2460	0.1068	10.6797	1.4575
14	00:10:01	10.02	3.16	0.2460	0.1069	10.6882	1.4572
15	00:15:01	15.02	3.88	0.2460	0.1069	10.6882	1.4572
16	00:30:02	30.03	5.48	0.2458	0.1071	10.7052	1.4568
17	01:00:04	60.07	7.75	0.2457	0.1071	10.7137	1.4565
18	02:00:07	120.12	10.96	0.2455	0.1073	10.7307	1.4561
19	04:00:14	240.23	15.50	0.2455	0.1074	10.7392	1.4558
20	08:00:27	480.45	21.92	0.2454	0.1075	10.7477	1.4556
21	12:00:40	720.67	26.85	0.2453	0.1076	10.7562	1.4554
22	16:00:53	960.88	31.00	0.2453	0.1076	10.7562	1.4554
23	20:01:07	1201.12	34.66	0.2453	0.1076	10.7562	1.4554
24	23:59:58	1439.97	37.95	0.2453	0.1076	10.7562	1.4554

Tested By: TS

Consolidation Test Results
(Sequence 12) Load 8.000 ksf

Consolidation Graph (Squareroot Time)



SITE PHOTOGRAPHS

State Project No. 34821 – TIP No. U-2525C – Site # 5 (Structure # 7) Bridge No. 1246 on SR 1001 (N. Church Street) (-Y5-) over Greensboro Eastern Loop, I-85 Bypass (-L-) - Guilford County, NC

View Looking Upstation Along -Y5-

View Looking Downstation Along -Y5-

View Looking Upstation Along -L-

View Looking Downstation Along -L-

REFERENCE: U-2525C

PROJECT: 34821

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	14

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP I-85 BYPASS FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE

SITE DESCRIPTION SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) – BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

CONTENTS

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DATE OCTOBER 2017

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5228073BBA4E432...
SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50 (TER373)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2⅝ " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BL-47; N: 870,408; E: 1,764,474 - 36" REBAR WITH ALUMINUM CAP
ELEVATION: 784.40 FEET

NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

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0 40 80
FEET

-Y6LPA- 10+00 =
-L- 472+05.24

183+94.94
22+60.94

-BL-47 PINC
-BY6 PINC

W-1
W-3
EB1-A (LL)
EB2-A (LL)
EB1-C
EB2-C
EB1-B (RL)
EB2-B (RL)
W-2
W-4

-Y6- 10+00 =
-L- 469+18.30

TYPICAL SKEW ANGLE 87° 5' END BENT 1
TYPICAL SKEW ANGLE 86° 15' END BENT 2

PROJECT REFERENCE NO.	SHEET NO.
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0 20 40
FEET
VE = 2:1

CROSS SECTION THROUGH END BENT 1 AT STA. 469 + 89 –L–

SOUTH (TO KENNETH ROAD) ← → NORTH

–L–
℄

SS-1
W-1
469+85
106' LT -L-

SS-2
EB1-A (LL)
469+88
74' LT -L-

SS-3
EB1-C
469+92
℄

SS-4
EB1-B (RL)
469+82
87' RT -L-

SS-5
W-2
469+80
113' RT -L-

EXISTING GROUND SURFACE

Ⓐ 17 15 52 100/0.9 100/0.4 60/0.1 AR DRY 09/16

RESIDUAL, TAN, BROWN

WEATHERED ROCK (META-GABBRO) CRYSTALLINE

22 68 100/0.4 100/0.6 60/0.1 AR DRY 09/16

RED-ORANGE, TAN-BROWN, AND GRAY, STIFF TO HARD, AND GRAY, VERY STIFF TO HARD, DRY TO MOIST, FINE SANDY SILT

ROCK (META-GABBRO)

13 16 26 40 100/0.2 100/0.5 100/0.4 BT DRY 09/16

12 21 12 15 60/0.1 AR DRY 09/16

WEATHERED ROCK (META-GABBRO) CRYSTALLINE

18 11 11 9 100/0.9 60/0.1 AR DRY 09/16

TO SILTY CLAY

TYPICAL SKEW ANGLE 87° 5' END BENT 1

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/16

Ⓐ ROADWAY EMBANKMENT, RED-BROWN, VERY STIFF, MOIST, SILTY CLAY

SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	5

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0 20 40
FEET
VE = 2:1

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

← SOUTH (TO KENNETH ROAD)

CROSS SECTION THROUGH END BENT 2 AT STA. 470+98 –L–

NORTH →

–L–

℄

810 800 790 780 770 760 750 740 730

SS-6
W-3
470+96
107' LT -L-

SS-7
EB2-A (LL)
471+05
77' LT -L-

SS-8
EB2-C
471+02
3' RT -L

SS-9
EB2-B (RL)
471+15
84' RT -L-

SS-10
W-4
471+10
112' RT -L-

EXISTING GROUND SURFACE

ROADWAY
Ⓒ
18 12 100/0.7 100/0.8 60/0.0
EMBANKMENT,
09/16
RESIDUAL,
AR

9 25 97 41 100/0.3 100/0.3 60/0.1
09/16
LIGHT BROWN, TAN AND BROWN, STIFF TO VERY
CLAYEY AND SILTY FINE TO COARSE
WEATHERED ROCK (META-GABBRO)
CRYSTALLINE ROCK
AR

15 13 11 30 100/0.8 60/0.1
STIFF, MOIST, FINE SANDY CLAY WITH ROCK
09/16
GRAY, MEDIUM DENSE TO VERY DENSE, SAND, WITH ROCK FRAGMENTS,
(META-GABBRO)
AR

13 16 22 60/0.0
FRAGMENTS
MOIST TO WET, SAPROLITIC
WEATHERED ROCK
REC=100%
RQD=100%
CRYSTALLINE ROCK, FRESH, VERY HARD, DARK GRAY (META-GABBRO) NO FRACTURES
BT
DRY
09/16

15 13 18 12 100/0.4 60/0.1
Ⓓ
09/16
(META-GABBRO)
AR

TYPICAL SKEW ANGLE 86° 15' END BENT 2

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE CROSS SECTION GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/16

Ⓒ ALLUVIAL, DARK GRAY, MEDIUM DENSE, WET, CLAYEY FINE SAND

Ⓓ RESIDUAL, RED-BROWN AND ORANGE, STIFF, DRY TO MOIST, FINE SANDY CLAY

SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-1	**STATION** 469+85	**OFFSET** 106 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 786.1 ft	**TOTAL DEPTH** 16.1 ft	**NORTHING** 870,309	**EASTING** 1,764,571	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790												
										GROUND SURFACE	786.1	0.0
785	785.2	0.9	6	8	9	17		M		**ROADWAY EMBANKMENT** RED-BROWN, SILTY CLAY	785.1	1.0
	782.3	3.8	5	5	10	15	SS-1	18.1		**RESIDUAL** TAN-BROWN, FINE SANDY CLAY		
780	780.4	5.7	11	24	28	52		M		TAN AND GRAY, FINE SANDY SILT	780.6	5.5
	777.3	8.8	33	67/0.4		100/0.9				**WEATHERED ROCK** (META-GABBRO)	776.8	9.3
775												
	772.3	13.8	100/0.4			100/0.4						
770	770.1	16.0	60/0.1			60/0.1				**CRYSTALLINE ROCK** (META-GABBRO)	770.1 / 770.0	16.0 / 16.1
										Boring Terminated with Standard Penetration Test Refusal at Elevation 770.0 ft IN CRYSTALLINE ROCK (META-GABBRO)		
										0 Hr. Ground Water Caved Dry at 11.0 Ft. 24 Hr. Ground Water Caved Dry at 8.6 Ft.		

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-A (LL)	**STATION** 469+88	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 870,341	**EASTING** 1,764,565	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790												
										GROUND SURFACE	787.2	0.0
785	786.2	1.0	7	10	12	22		M		**RESIDUAL** BROWN, TAN AND GRAY, SILTY CLAY	785.7	1.5
	783.4	3.8	6	24	44	68	SS-2	7.2		TAN, FINE SANDY SILT		
	781.7	5.5	100/0.4			100/0.4				**WEATHERED ROCK** (META-GABBRO)	781.7	5.5
780	778.4	8.8	100/0.6			100/0.6						
775												
	773.4	13.8	60/0.1			60/0.1				**CRYSTALLINE ROCK** (META-GABBRO)	773.4 / 773.3	13.8 / 13.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 773.3 ft IN CRYSTALLINE ROCK (META-GABBRO)		
										0 Hr. Ground Water Caved Dry at 9.5 Ft. 24 Hr. Ground Water Caved Dry at 9.2 Ft.		

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 469+92	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 788.6 ft	**TOTAL DEPTH** 24.4 ft	**NORTHING** 870,415	**EASTING** 1,764,556	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790												
	787.8	0.8	3	5	8	13	SS-3	30.4		GROUND SURFACE **RESIDUAL** TAN-BROWN, SILTY CLAY	788.6	0.0
785	784.6	4.0	6	7	9	16		M		TAN-BROWN AND GRAY, FINE SANDY SILT	784.1	4.5
	783.0	5.6	6	11	15	26		M				
780	779.6	9.0	11	17	23	40		D			776.1	12.5
775	774.6	14.0	100/0.2			100/0.2				**WEATHERED ROCK** (META-GABBRO)		
770	769.6	19.0	100/0.5			100/0.5						
765	764.6	24.0	100/0.4			100/0.4					764.2	24.4

Boring Terminated at Elevation 764.2 ft IN WEATHERED ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 18.1 Ft.
24 Hr. Ground Water Caved Dry at 18.1 Ft.

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-B (RL)	**STATION** 469+82	**OFFSET** 87 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 792.7 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 870,502	**EASTING** 1,764,560	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
795												
	791.9	0.8	7	6	6	12				GROUND SURFACE	792.7	0.0
790	788.9	3.8	7	9	12	21		M		**RESIDUAL** BROWN TO TAN-BROWN, SILTY CLAY		
	787.0	5.7	6	6	6	12	SS-4	D				
785	783.9	8.8	10	7	8	15		16.1			784.7	8.0
780	778.9	13.8	60/0.1			60/0.1		M		TAN-BROWN, FINE SANDY SILT	778.9	13.8
										CRYSTALLINE ROCK (META-GABBRO)	778.8	13.9

Boring Terminated with Standard Penetration Test Refusal at Elevation 778.8 ft IN CRYSTALLINE ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 11.0 Ft.
24 Hr. Ground Water Caved Dry at 10.8 Ft.

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)			**GROUND WTR (ft)**
BORING NO. W-2	**STATION** 469+80	**OFFSET** 113 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 792.9 ft	**TOTAL DEPTH** 17.2 ft	**NORTHING** 870,528	**EASTING** 1,764,560	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
795											
	792.2	0.7	11	10	8	18		D		792.9 GROUND SURFACE	0.0
790										791.2 **ARTIFICIAL FILL** BROWN-TAN, FINE SANDY SILT	1.7
	789.1	3.8	7	5	6	11		M		**RESIDUAL** RED-ORANGE AND BROWN, SILTY CLAY	
	787.2	5.7	5	5	6	11		M			
785											
	784.1	8.8	4	4	5	9	SS-5	35.3			
780										779.4	13.5
	779.1	13.8	9	6	94/0.4	100/0.9				778.1 TAN-GRAY, FINE SANDY SILT	14.8
	775.8	17.1	60/0.1			60/0.1				**WEATHERED ROCK** (META-GABBRO) 775.8	17.1
										775.7 **CRYSTALLINE ROCK** (META-GABBRO)	17.2

Boring Terminated with Standard Penetration Test Refusal at Elevation 775.7 ft IN CRYSTALLINE ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 13.5 Ft.
24 Hr. Ground Water Caved Dry at 13.5 Ft.

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)			**GROUND WTR (ft)**
BORING NO. W-3	**STATION** 470+96	**OFFSET** 107 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 13.0 ft	**NORTHING** 870,301	**EASTING** 1,764,458	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**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
780										
	777.9	0.9	10	9	9	18				778.8 GROUND SURFACE 0.0
775	775.4	3.4	2	2	10	12	SS-6	9.6		**ROADWAY EMBANKMENT** TAN AND BROWN, FINE SANDY CLAY 776.3 2.5
	772.9	5.9	44	56/0.2		100/0.7				**ALLUVIAL** DARK GRAY, CLAYEY FINE SAND 774.4 4.4
770	770.4	8.4	42	55	45/0.3	100/0.8				**RESIDUAL** BROWN AND GRAY CLAYEY FINE TO COARSE SAND 772.4 6.4
	765.8	13.0	60/0.0			60/0.0				**WEATHERED ROCK** (META-GABBRO) 765.8 13.0

Boring Terminated with Standard Penetration Test Refusal at Elevation 765.8 ft ON CRYSTALLINE ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 11.0 Ft.

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB2-A (LL)	**STATION** 471+05	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 778.2 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 870,331	**EASTING** 1,764,448	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
780												
	777.3	0.9	4	4	5	9		M		GROUND SURFACE	778.2	0.0
775	774.8	3.4	11	12	13	25 97		M		**ROADWAY EMBANKMENT** TAN, BROWN, FINE SANDY CLAY	775.2	3.0
	772.8	5.4	6	17	80					**RESIDUAL** BROWN AND GRAY, CLAYEY FINE TO COARSE SAND, SAPROLITIC		
770	769.8	8.4	26	18	23	41	SS-7	W			767.8	10.4
765	764.8	13.4								**WEATHERED ROCK** (META-GABBRO)		
	764.2	14.0	100/0.3			100/0.3					763.7	14.5
	763.7	14.5	100/0.3			100/0.3				**CRYSTALLINE ROCK** (META-GABBRO)	763.6	14.6
			60/0.1			60/0.1				Boring Terminated with Standard Penetration Test Refusal at Elevation 763.6 ft IN CRYSTALLINE ROCK (META-GABBRO)		

0 Hr. Ground Water Caved Dry at 11.0 Ft.

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 471+02	**OFFSET** 3 ft RT	**ALIGNMENT** -L-	**0 HR.** 7.5
COLLAR ELEV. 777.3 ft	**TOTAL DEPTH** 16.4 ft	**NORTHING** 870,411	**EASTING** 1,764,446	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
780												
	777.3	0.0	6	7	8	15		M		GROUND SURFACE	777.3	0.0
775	773.5	3.8	4	4	9	13		M		**ROADWAY EMBANKMENT** TAN TO BROWN, FINE SANDY CLAY	775.3	2.0
	771.9	5.4	5	4	7	11	SS-8	W		**RESIDUAL** GRAY-BROWN, FINE SANDY CLAY	773.0	4.3
770	768.5	8.8	9	12	18	30		W		GRAY-BROWN, SILTY FINE SAND WITH ROCK FRAGMENTS		
765	763.5	13.8	31	43	57/0.3	100/0.8					762.5	14.8
	761.0	16.3	60/0.1			60/0.1				**WEATHERED ROCK** (META-GABBRO)	761.0	16.3
										CRYSTALLINE ROCK (META-GABBRO)	760.9	16.4
										Boring Terminated with Standard Penetration Test Refusal at Elevation 760.9 ft IN CRYSTALLINE ROCK (META-GABBRO)		

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB2-B (RL)	**STATION** 471+15	**OFFSET** 84 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 870,491	**EASTING** 1,764,429	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780										778.8	
										GROUND SURFACE	0.0
	777.8	1.0								**ROADWAY EMBANKMENT**	
			4	7	6	13	SS-9	10.4		LIGHT BROWN, FINE SANDY CLAY WITH ROCK FRAGMENTS	
775	774.9	3.9								775.3	3.5
			7	8	8	16		M		**RESIDUAL**	
	773.4	5.4								BROWN, GRAY AND LIGHT TAN, SILTY FINE SAND	
			7	9	13	22		M		771.4	7.4
770	771.0	7.8								771.0	7.8
			60/0.0			60/0.0				**WEATHERED ROCK** (META-GABBRO)	
										770.8	8.0
										CRYSTALLINE ROCK (META-GABBRO)	
765										763.3	15.5
										Boring Terminated at Elevation 763.3 ft IN CRYSTALLINE ROCK (META-GABBRO)	

1) Advanced 2-15/16" Tricone Roller Bit to Refusal at 8.0 FT.
2) NW Casing Advanced to 7.4 FT.
3) Water used as Drilling Fluid

24 Hr. Ground Water Caved Dry at 4.4 Ft.

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)			**GROUND WTR (ft)**
BORING NO. EB2-B (RL)	**STATION** 471+15	**OFFSET** 84 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 870,491	**EASTING** 1,764,429	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 7.5 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)
770.8											Begin Coring @ 8.0 ft	
770	770.8	8.0	2.5	2:75/1.0 2:50/1.0 0:75/0.5	(2.5) 100%	(2.5) 100%		(7.5) 100%	(7.5) 100%		770.8	8.0
	768.3	10.5									**CRYSTALLINE ROCK** FRESH, VERY HARD, DARK GRAY (META-GABBRO) NO FRACTURES	
			5.0	2:25/1.0 2:75/1.0 2:00/1.0 2:25/1.0 2:09/1.0	(5.0) 100%	(5.0) 100%						
765	763.3	15.5									763.3	15.5
											Boring Terminated at Elevation 763.3 ft IN CRYSTALLINE ROCK (META-GABBRO)	

1) Advanced 2-15/16" Tricone Roller Bit to Refusal at 8.0 FT.
2) NW Casing Advanced to 7.4 FT.
3) Water used as Drilling Fluid

24 Hr. Ground Water Caved Dry at 4.4 Ft.

Project No. 34821 (U-2525C)
SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

CORE PHOTOGRAPHS

EB2-B

BOX 1: 8.0-15.5 FEET

Terracon
Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-4	**STATION** 471+10	**OFFSET** 112 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 781.4 ft	**TOTAL DEPTH** 17.2 ft	**NORTHING** 870,519	**EASTING** 1,764,432	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
785										
	781.4	0.0								GROUND SURFACE
780	780.6	0.8	5	6	9	15	SS-10	16.7		**ROADWAY EMBANKMENT** BROWN AND TAN, FINE SANDY CLAY
	778.9	2.5								**RESIDUAL** RED-BROWN AND ORANGE, FINE SANDY CLAY
	777.7	3.7	5	7	6	13		D		
	775.5	5.9								LIGHT BROWN, SILTY FINE SAND
775	776.0	5.4	4	7	11	18		M		
	772.7	8.7	7	5	7	12				
770	768.7	12.7								**WEATHERED ROCK** (META-GABBRO)
	767.7	13.7	100/0.4			100/0.4				
765	764.3	17.1								
	764.2	17.2	60/0.1			60/0.1				**CRYSTALLINE ROCK** (META-GABBRO)

Boring Terminated with Standard Penetration Test Refusal at Elevation 764.2 ft IN CRYSTALLINE ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 13.0 Ft.

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 34821.1.1 **TIP:** U-2525C **COUNTY:** GUILFORD

DESCRIPTION: SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200		
SS-1	-L-	469+85	106 LT	3.8-5.3	A-6 (13)	37	20	10.5	23.6	40.2	25.7	0	100	94	74	18.1	N/D
SS-2	-L-	469+88	74 LT	3.8-5.3	A-4 (0)	28	NP	3.7	18.4	70.3	7.6	0	100	98	86	7.2	N/D
SS-3	-L-	469+92	0'	0.8-2.3	A-7-6 (29)	56	33	5.7	17.9	43.3	33.1	0	100	97	83	30.4	N/D
SS-4	-L-	469+82	87 RT	5.7-7.2	A-7-6 (17)	42	17	1.5	15.2	60.6	22.7	0	100	99	90	16.1	N/D
SS-5	-L-	469+80	113 RT	8.8-10.3	A-7-6 (25)	55	28	3.4	25.2	40.3	31.1	0	100	98	81	35.3	N/D
SS-6	-L-	470+96	107 LT	0.9-2.4	A-6 (6)	29	12	14.7	19.4	41.8	24.1	1	98	89	71	9.6	N/D
SS-7	-L-	471+05	77 LT	8.4-9.9	A-2-6 (0)	30	13	53.0	26.0	13.6	7.4	0	100	60	26	N/A	N/D
SS-8	-L-	471+02	3 RT	5.4-6.9	A-2-4 (0)	27	NP	26.0	22.2	45.4	6.4	43	55	44	32	N/A	N/D
SS-9	-L-	471+15	84 RT	1.0-2.5	A-6 (6)	29	12	9.4	14.1	45.9	30.6	16	82	76	68	10.4	N/D
SS-10	-L-	471+10	112 RT	0.8-2.3	A-7-6 (19)	41	23	7.2	14.4	39.5	38.9	0	98	93	83	16.7	N/D

NP - NONPLASTIC

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

SITE PHOTOGRAPHS
SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) – BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

Photograph No. 1: Right of the I-85 Bypass -L- alignment, looking South along proposed End Bent No. 1

Photograph No. 3: Right of the I-85 Bypass -L- alignment, looking South along proposed End Bent No. 2.

Photograph No. 2: Left of the I-85 Bypass -L- alignment, looking North along the proposed End Bent No. 1

Photograph No. 4: Left of the I-85 Bypass -L- alignment, looking North along proposed End Bent No. 2.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	12

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP I-85 BYPASS FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE

SITE DESCRIPTION MSE WALLS AT END BENT 1 AND END BENT 2 - SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

CONTENTS

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

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PERSONNEL

SCHLEMM, T. S.

RIGGS, JR., A. F.

TURNAGE, J. R.

COGAR, T. E.

INVESTIGATED BY TERRACON CONSULTANTS

DRAWN BY FIELDS, W. D.

CHECKED BY RIGGS, JR., A. F.

SUBMITTED BY TERRACON CONSULTANTS

DATE DECEMBER 2017

Prepared in the Office of:

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NC REGISTERED GEOLOGIC FIRM: C-367

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DocuSigned by:
Abner Riggs Jr.
5228073BBA4F482...
SIGNATURE

12/15/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50 (TER373)
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2⅝ " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BL-47; N: 870,408; E: 1,764,474 - 36" REBAR WITH ALUMINUM CAP
ELEVATION: 784.40 FEET

NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

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

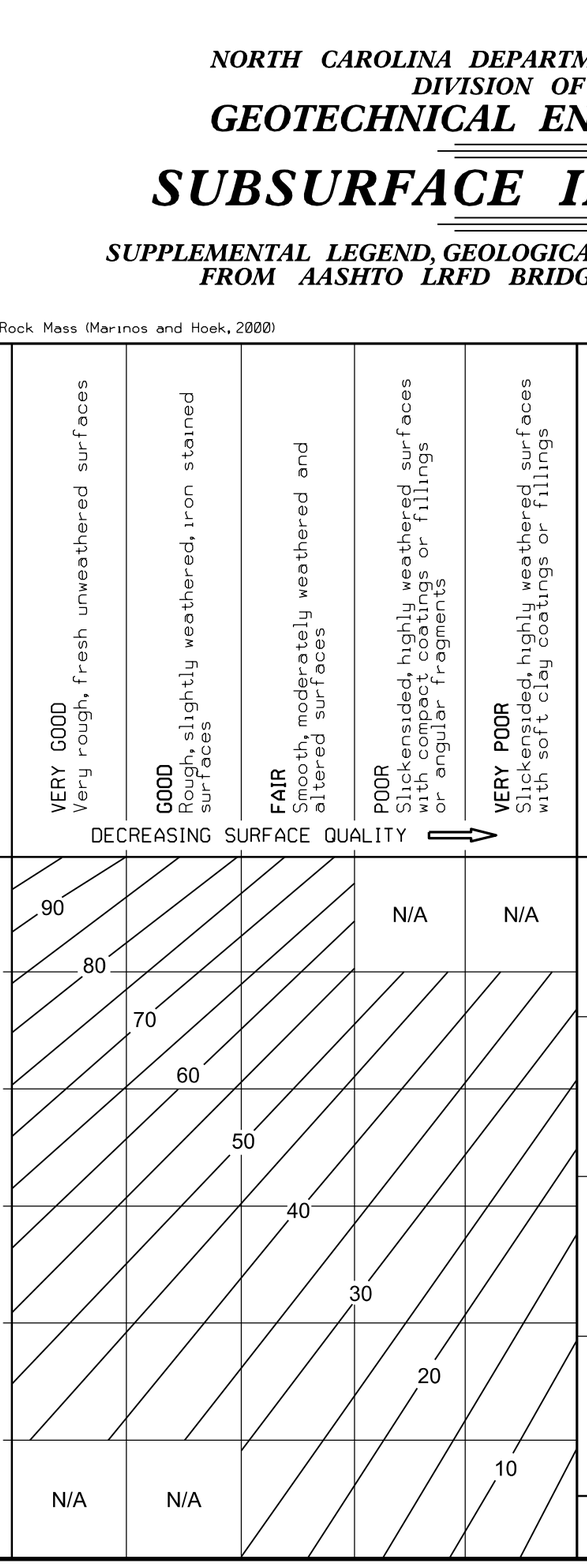
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

STRUCTURE

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

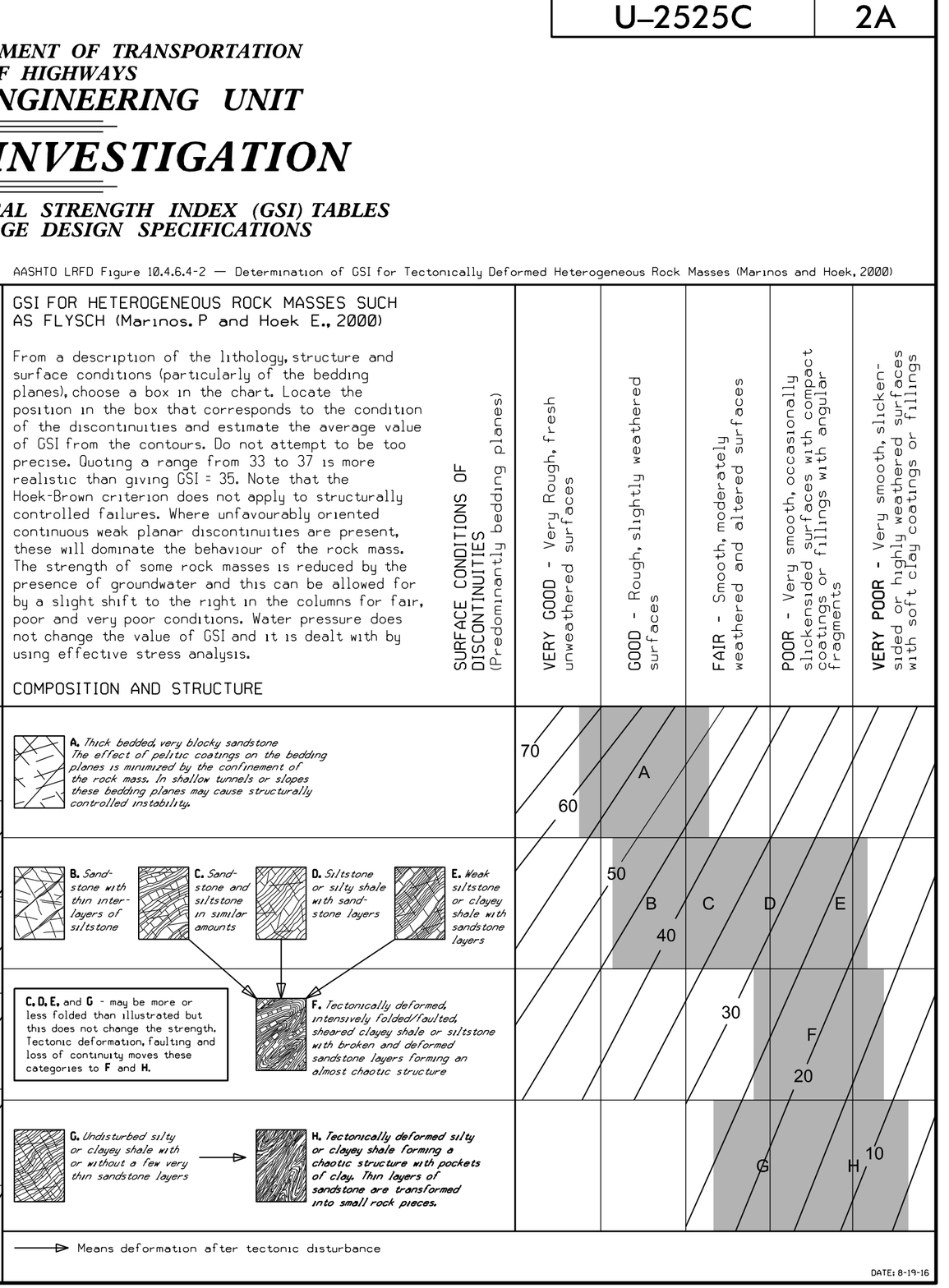


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

COMPOSITION AND STRUCTURE



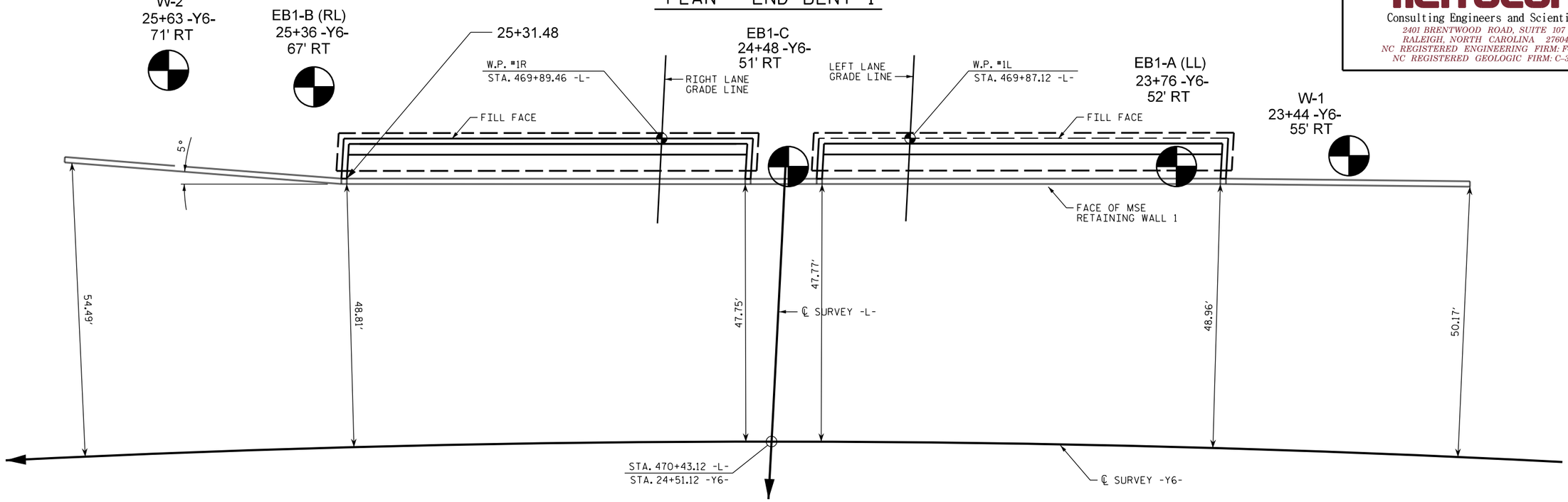
DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

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

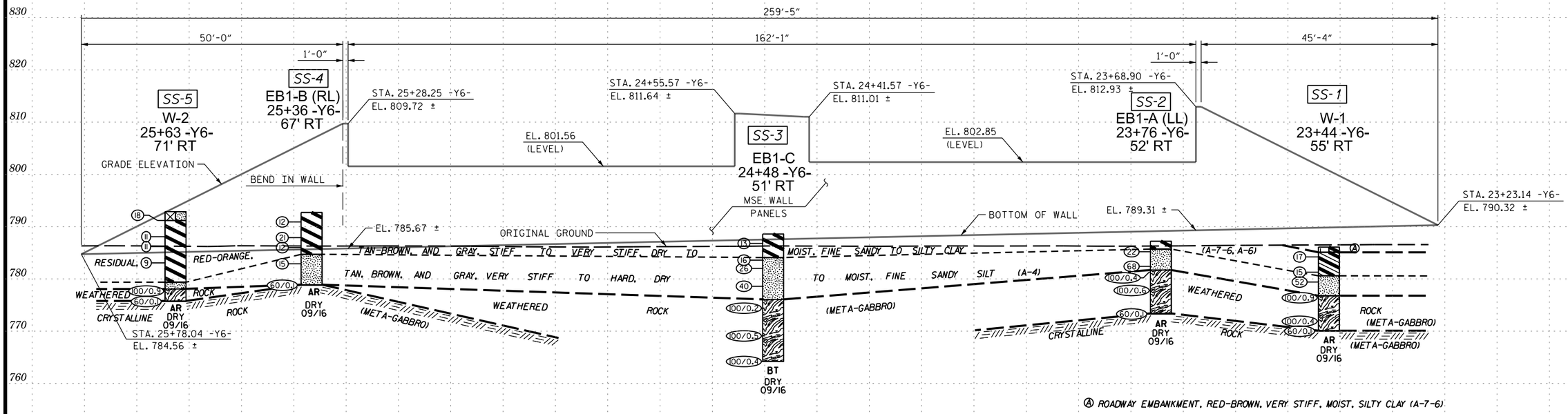
0 20 40
FEET

PLAN - END BENT 1



ELEVATION - END BENT 1

(LOOKING AT EXPOSED FRONT FACE OF MSE RETAINING WALL)



PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

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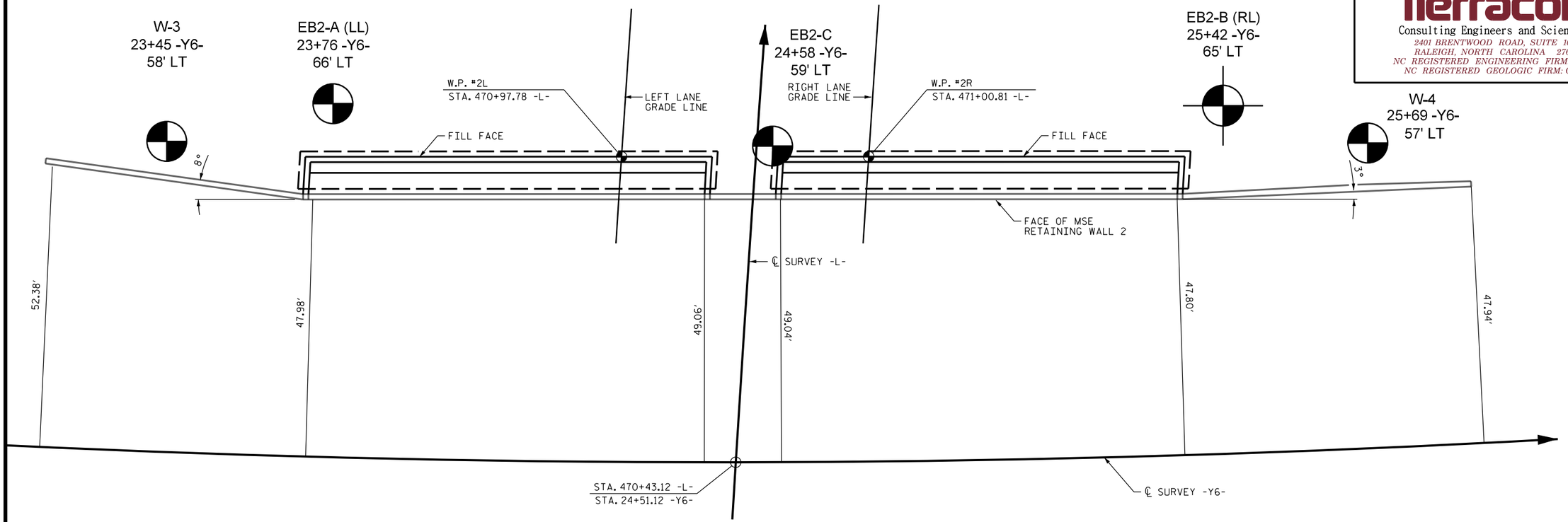
Consulting Engineers and Scientists
2401 BRENTWOOD ROAD, SUITE 107
RALEIGH, NORTH CAROLINA 27604
NC REGISTERED ENGINEERING FIRM: F-0869
NC REGISTERED GEOLOGIC FIRM: C-367

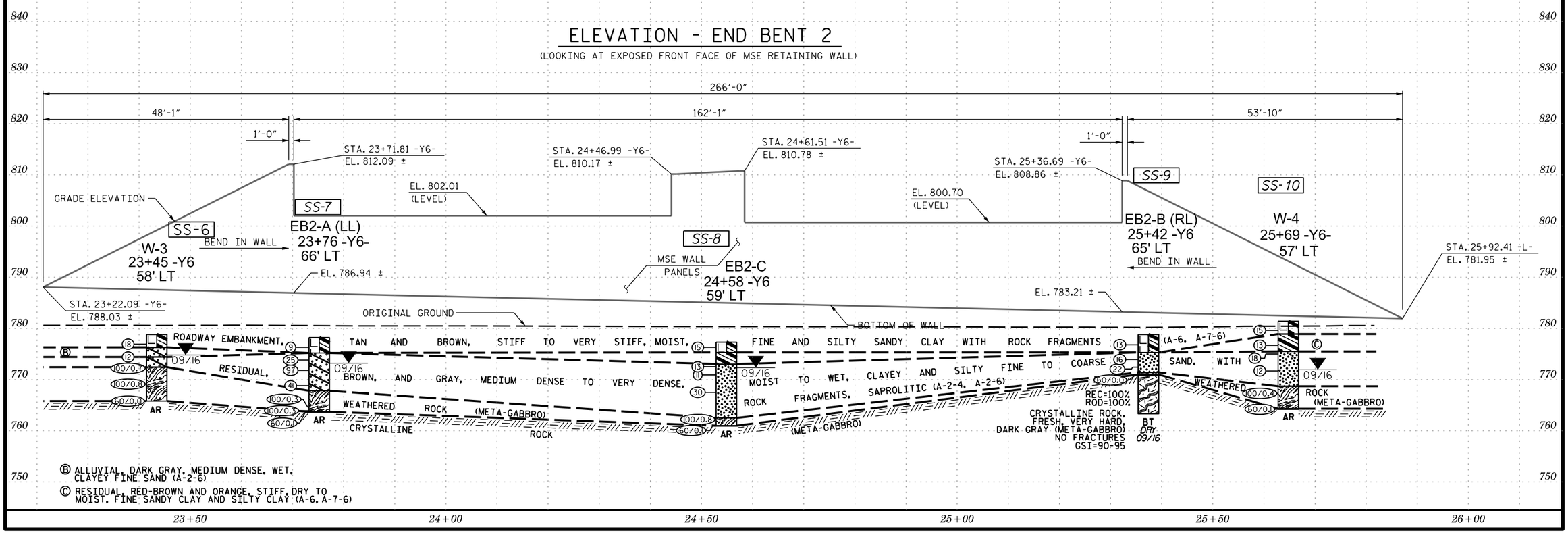
0 20 40
FEET

PLAN - END BENT 2



ELEVATION - END BENT 2

(LOOKING AT EXPOSED FRONT FACE OF MSE RETAINING WALL)



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Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-1	**STATION** 23+44	**OFFSET** 55 ft RT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 786.1 ft	**TOTAL DEPTH** 16.1 ft	**NORTHING** 870,309	**EASTING** 1,764,571	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790											
785	785.2	0.9	6	8	9	17		M		786.1 GROUND SURFACE	0.0
	782.3	3.8	5	5	10	15 52	SS-1	18.1		785.1 **ROADWAY EMBANKMENT** RED-BROWN, SILTY CLAY	1.0
780	780.4	5.7	11	24	28			M		**RESIDUAL** TAN-BROWN, FINE SANDY CLAY	
	777.3	8.8	33	67/0.4		100/0.9				780.6 TAN AND GRAY, FINE SANDY SILT	5.5
775										776.8 **WEATHERED ROCK** (META-GABBRO)	9.3
	772.3	13.8	100/0.4			100/0.4					
770	770.1	16.0	60/0.1			60/0.1				770.1 **CRYSTALLINE ROCK** (META-GABBRO)	16.0
										770.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 770.0 ft IN CRYSTALLINE ROCK (META-GABBRO)	16.1

0 Hr. Ground Water Caved Dry at 11.0 Ft.
24 Hr. Ground Water Caved Dry at 8.6 Ft.

NCDOT BORE SINGLE U2525C_GEO_BRDG1247-1248_SITE6.GPJ NC_DOT.GDT 11/17/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-A (LL)	**STATION** 23+76	**OFFSET** 52 ft RT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 787.2 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 870,341	**EASTING** 1,764,565	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790											
785	786.2	1.0	7	10	12	22		M		787.2 GROUND SURFACE	0.0
	783.4	3.8	6	24	44	68	SS-2	7.2		785.7 **RESIDUAL** BROWN, TAN AND GRAY, SILTY CLAY	1.5
780	781.7	5.5	100/0.4			100/0.4				TAN, FINE SANDY SILT	
	778.4	8.8	100/0.6			100/0.6				781.7 **WEATHERED ROCK** (META-GABBRO)	5.5
775	773.4	13.8	60/0.1			60/0.1				773.4	13.8
										773.3 **CRYSTALLINE ROCK** (META-GABBRO)	13.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 773.3 ft IN CRYSTALLINE ROCK (META-GABBRO)	

0 Hr. Ground Water Caved Dry at 9.5 Ft.
24 Hr. Ground Water Caved Dry at 9.2 Ft.

NCDOT BORE SINGLE U2525C_GEO_BRDG1247-1248_SITE6.GPJ NC_DOT.GDT 11/17/17

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 24+48	**OFFSET** 51 ft RT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 788.6 ft	**TOTAL DEPTH** 24.4 ft	**NORTHING** 870,415	**EASTING** 1,764,556	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
790										788.6 GROUND SURFACE	0.0
	787.8	0.8	3	5	8	13	SS-3	30.4		**RESIDUAL** TAN-BROWN, SILTY CLAY	
785	784.6	4.0	6	7	9	16		M		784.1	4.5
	783.0	5.6	6	11	15	26		M		TAN-BROWN AND GRAY, FINE SANDY SILT	
780	779.6	9.0	11	17	23	40		D			
	774.6	14.0	100/0.2			100/0.2				776.1 **WEATHERED ROCK** (META-GABBRO)	12.5
775											
770	769.6	19.0	100/0.5			100/0.5					
765	764.6	24.0	100/0.4			100/0.4				764.2	24.4

Boring Terminated at Elevation 764.2 ft IN WEATHERED ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 18.1 Ft.
24 Hr. Ground Water Caved Dry at 18.1 Ft.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB1-B (RL)	**STATION** 25+36	**OFFSET** 67 ft RT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 792.7 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 870,502	**EASTING** 1,764,560	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-51 99% 03/09/2017		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
795										792.7 GROUND SURFACE	0.0
	791.9	0.8	7	6	6	12		M		**RESIDUAL** BROWN TO TAN-BROWN, SILTY CLAY	
790	788.9	3.8	7	9	12	21		D			
	787.0	5.7	6	6	6	12	SS-4	16.1		784.7	8.0
785	783.9	8.8	10	7	8	15		M		TAN-BROWN, FINE SANDY SILT	
	778.9	13.8	60/0.1			60/0.1				778.9	13.8
780										778.8 **CRYSTALLINE ROCK** (META-GABBRO)	13.9

Boring Terminated with Standard Penetration Test Refusal at Elevation 778.8 ft IN CRYSTALLINE ROCK (META-GABBRO)

0 Hr. Ground Water Caved Dry at 11.0 Ft.
24 Hr. Ground Water Caved Dry at 10.8 Ft.

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-2	**STATION** 25+63	**OFFSET** 71 ft RT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 792.9 ft	**TOTAL DEPTH** 17.2 ft	**NORTHING** 870,528	**EASTING** 1,764,560	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/29/16	**COMP. DATE** 09/29/16	**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)
795											
	792.2	0.7	11	10	8	18		D		792.9 GROUND SURFACE	0.0
790										791.2 **ARTIFICIAL FILL** BROWN-TAN, FINE SANDY SILT	1.7
	789.1	3.8	7	5	6	11		M		**RESIDUAL** RED-ORANGE AND BROWN, SILTY CLAY	
	787.2	5.7	5	5	6	11		M			
785											
	784.1	8.8	4	4	5	9	SS-5	35.3			
780										779.4	13.5
	779.1	13.8	9	6	94/0.4	100/0.9				778.1 TAN-GRAY, FINE SANDY SILT	14.8
	775.8	17.1	60/0.1			60/0.1				**WEATHERED ROCK** (META-GABBRO)	17.1
										775.7 **CRYSTALLINE ROCK** (META-GABBRO)	17.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 775.7 ft IN CRYSTALLINE ROCK (META-GABBRO)	
										0 Hr. Ground Water Caved Dry at 13.5 Ft. 24 Hr. Ground Water Caved Dry at 13.5 Ft.	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-3	**STATION** 23+45	**OFFSET** 58 ft LT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 13.0 ft	**NORTHING** 870,301	**EASTING** 1,764,458	**24 HR.** 4.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
	777.9	0.9								778.8 GROUND SURFACE	0.0
			10	9	9	18	SS-6	9.6		**ROADWAY EMBANKMENT** TAN AND BROWN, FINE SANDY CLAY	
775	775.4	3.4								776.3	2.5
			2	2	10	12				**ALLUVIAL** DARK GRAY, CLAYEY FINE SAND	
	772.9	5.9								774.4	4.4
			44	56/0.2		100/0.7				**RESIDUAL** BROWN AND GRAY CLAYEY FINE TO COARSE SAND	
770	770.4	8.4								772.4	6.4
			42	55	45/0.3	100/0.8				**WEATHERED ROCK** (META-GABBRO)	
	765.8	13.0	60/0.0			60/0.0				765.8	13.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 765.8 ft ON CRYSTALLINE ROCK (META-GABBRO)	
										0 Hr. Ground Water Caved Dry at 11.0 Ft.	

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)			**GROUND WTR (ft)**
BORING NO. EB2-A (LL)	**STATION** 23+76	**OFFSET** 66 ft LT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 778.2 ft	**TOTAL DEPTH** 14.6 ft	**NORTHING** 870,331	**EASTING** 1,764,448	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
	777.3	0.9	4	4	5	9		M		778.2 GROUND SURFACE	0.0
775	774.8	3.4	11	12	13	25				**ROADWAY EMBANKMENT** TAN, BROWN, FINE SANDY CLAY 775.2	3.0
	772.8	5.4	6	17	80	97		M		**RESIDUAL** BROWN AND GRAY, CLAYEY FINE TO COARSE SAND, SAPROLITIC	
770	769.8	8.4	26	18	23	41	SS-7	W		767.8	10.4
765	764.8	13.4								**WEATHERED ROCK** (META-GABBRO)	
	764.2	14.0	100/0.3			100/0.3				763.7	14.5
	763.7	14.5	100/0.3			100/0.3				763.6	14.6
			60/0.1			60/0.1				**CRYSTALLINE ROCK** (META-GABBRO) Boring Terminated with Standard Penetration Test Refusal at Elevation 763.6 ft IN CRYSTALLINE ROCK (META-GABBRO)	

0 Hr. Ground Water Caved Dry at 11.0 Ft.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)			**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 24+58	**OFFSET** 59 ft LT	**ALIGNMENT** -Y6-	**0 HR.** 7.5
COLLAR ELEV. 777.3 ft	**TOTAL DEPTH** 16.4 ft	**NORTHING** 870,411	**EASTING** 1,764,446	**24 HR.** 5.0
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	**START DATE** 09/27/16	**COMP. DATE** 09/27/16	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
	777.3	0.0	6	7	8	15		M		777.3 GROUND SURFACE	0.0
775	773.5	3.8	4	4	9	13				**ROADWAY EMBANKMENT** 775.3 TAN TO BROWN, FINE SANDY CLAY	2.0
	771.9	5.4	5	4	7	11	SS-8	M		**RESIDUAL** 773.0 GRAY-BROWN, FINE SANDY CLAY	4.3
770	768.5	8.8	9	12	18	30		W		GRAY-BROWN, SILTY FINE SAND WITH ROCK FRAGMENTS	
765	763.5	13.8	31	43	57/0.3	100/0.8		W		762.5	14.8
	761.0	16.3	60/0.1			60/0.1				**WEATHERED ROCK** (META-GABBRO) 760.9	16.3 16.4
										CRYSTALLINE ROCK (META-GABBRO) Boring Terminated with Standard Penetration Test Refusal at Elevation 760.9 ft IN CRYSTALLINE ROCK (META-GABBRO)	

NCDOT BORE SINGLE U2525C_GEO_BRDG1247-1248_SITE6.GPJ NC_DOT.GDT 11/17/17

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB2-B (RL)	**STATION** 25+42	**OFFSET** 65 ft LT	**ALIGNMENT** -Y6-	**0 HR.** N/A
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 870,491	**EASTING** 1,764,429	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
780											
										778.8	
	777.8	1.0								GROUND SURFACE	0.0
			4	7	6	13	SS-9	10.4		**ROADWAY EMBANKMENT** LIGHT BROWN, FINE SANDY CLAY WITH ROCK FRAGMENTS	
775	774.9	3.9								775.3	3.5
	773.4	5.4	7	8	8	16 22		M		**RESIDUAL** BROWN, GRAY AND LIGHT TAN, SILTY FINE SAND	
			7	9	13			M			
	771.0	7.8								771.4	7.4
770			60/0.0			60/0.0				771.0	7.8
										WEATHERED ROCK (META-GABBRO)	
										770.8	8.0
										CRYSTALLINE ROCK (META-GABBRO)	
765											
										763.3	15.5
										Boring Terminated at Elevation 763.3 ft IN CRYSTALLINE ROCK (META-GABBRO)	

1) Advanced 2-15/16" Tricone Roller Bit to Refusal at 8.0 FT.
2) NW Casing Advanced to 7.4 FT.
3) Water used as Drilling Fluid

24 Hr. Ground Water Caved Dry at 4.4 Ft.

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. EB2-B (RL)	**STATION** 25+42	**OFFSET** 65 ft LT	**ALIGNMENT** -Y6-	**0 HR.** N/A
COLLAR ELEV. 778.8 ft	**TOTAL DEPTH** 15.5 ft	**NORTHING** 870,491	**EASTING** 1,764,429	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD SPT Core Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ2	**TOTAL RUN** 7.5 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)
770.8												
770											Begin Coring @ 8.0 ft	
	770.8	8.0	2.5	2:75/1.0 2:50/1.0 0:75/0.5	(2.5) 100%	(2.5) 100%		(7.5) 100%	(7.5) 100%		770.8	
	768.3	10.5									**CRYSTALLINE ROCK** FRESH, VERY HARD, DARK GRAY (META-GABBRO) NO FRACTURES	8.0
			5.0	2:25/1.0 2:75/1.0 2:00/1.0 2:25/1.0 2:09/1.0	(5.0) 100%	(5.0) 100%						
765	763.3	15.5									763.3	15.5
											Boring Terminated at Elevation 763.3 ft IN CRYSTALLINE ROCK (META-GABBRO)	

1) Advanced 2-15/16" Tricone Roller Bit to Refusal at 8.0 FT.
2) NW Casing Advanced to 7.4 FT.
3) Water used as Drilling Fluid

24 Hr. Ground Water Caved Dry at 4.4 Ft.

Project No. 34821 (U-2525C)
SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM STREET (-Y6-)

CORE PHOTOGRAPHS

EB2-B

BOX 1: 8.0-15.5 FEET

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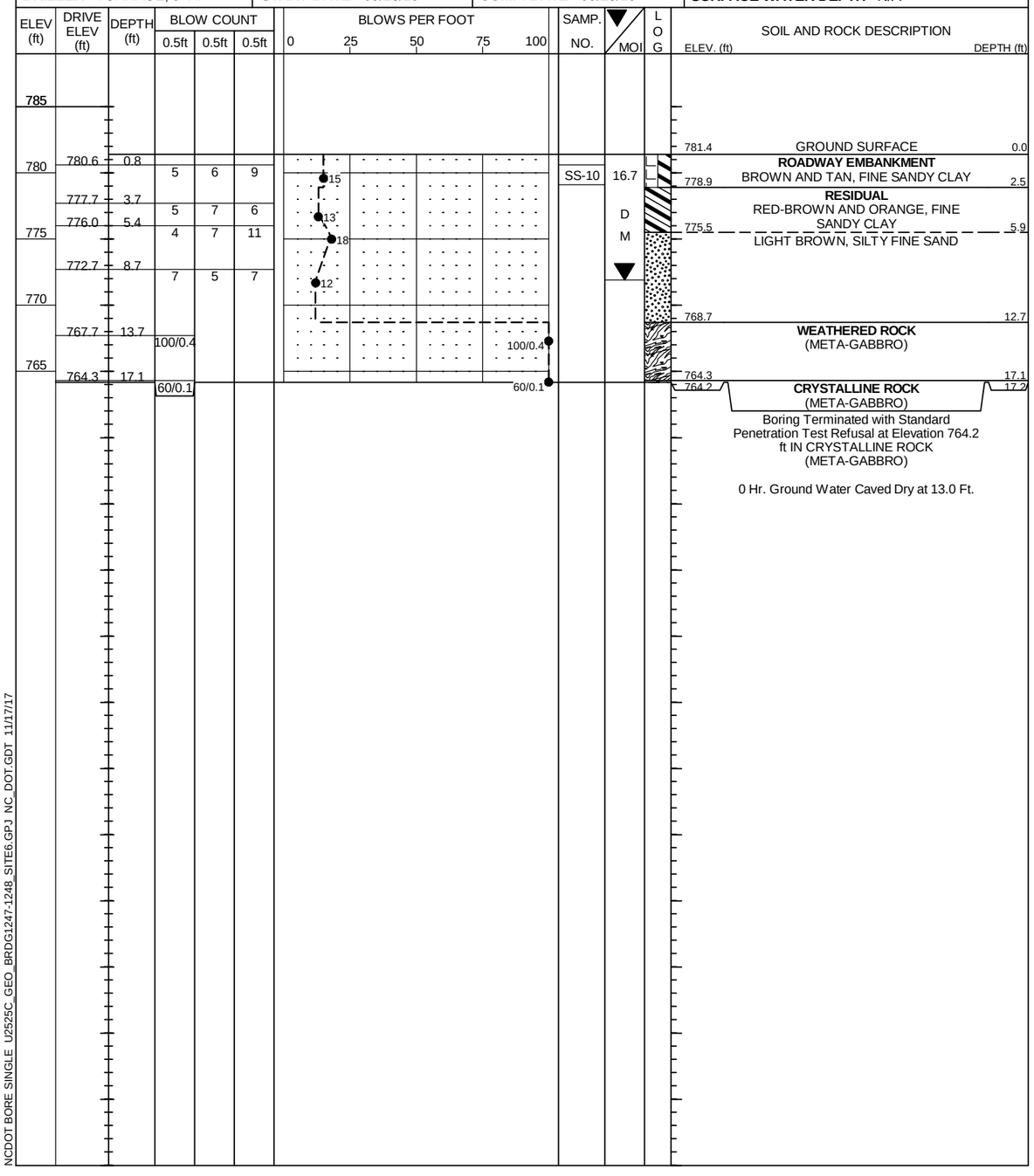
GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T. S.	
SITE DESCRIPTION SITE NO. 6 (STRUC. #8 & #9) - BRDG. NO. 1247 & 1248 ON I-85 BYPASS (-L-) OVER NORTH ELM ST. (-Y6-)				**GROUND WTR (ft)**
BORING NO. W-4	**STATION** 25+69	**OFFSET** 57 ft LT	**ALIGNMENT** -Y6-	**0 HR.** Dry
COLLAR ELEV. 781.4 ft	**TOTAL DEPTH** 17.2 ft	**NORTHING** 870,519	**EASTING** 1,764,432	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic
DRILLER TURNAGE, J. R.	**START DATE** 09/28/16	**COMP. DATE** 09/28/16	**SURFACE WATER DEPTH** N/A	



LABORATORY TESTING SUMMARY

PROJECT NUMBER: 34821.1.1 **TIP:** U-2525C **COUNTY:** GUILFORD

DESCRIPTION: SITE NO. 6 (STRUCTURE NO. 8 AND NO. 9) - BRIDGE NO. 1247 AND 1248 ON I-85 BYPASS (-Y6-) OVER NORTH ELM STREET (-Y6-)

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200		
SS-1	-Y6-	23+44	55 RT	3.8-5.3	A-6 (13)	37	20	10.5	23.6	40.2	25.7	0	100	94	74	18.1	N/D
SS-2	-Y6-	23+76	52 RT	3.8-5.3	A-4 (0)	28	NP	3.7	18.4	70.3	7.6	0	100	98	86	7.2	N/D
SS-3	-Y6-	24+48	51 RT	0.8-2.3	A-7-6 (29)	56	33	5.7	17.9	43.3	33.1	0	100	97	83	30.4	N/D
SS-4	-Y6-	25+36	67 RT	5.7-7.2	A-7-6 (17)	42	17	1.5	15.2	60.6	22.7	0	100	99	90	16.1	N/D
SS-5	-Y6-	25+63	71 RT	8.8-10.3	A-7-6 (25)	55	28	3.4	25.2	40.3	31.1	0	100	98	81	35.3	N/D
SS-6	-Y6-	23+45	58 LT	0.9-2.4	A-6 (6)	29	12	14.7	19.4	41.8	24.1	1	98	89	71	9.6	N/D
SS-7	-Y6-	23+76	66 LT	8.4-9.9	A-2-6 (0)	30	13	53.0	26.0	13.6	7.4	0	100	60	26	N/A	N/D
SS-8	-Y6-	24+58	59 LT	5.4-6.9	A-2-4 (0)	27	NP	26.0	22.2	45.4	6.4	43	55	44	32	N/A	N/D
SS-9	-Y6-	25+42	65 LT	1.0-2.5	A-6 (6)	29	12	9.4	14.1	45.9	30.6	16	82	76	68	10.4	N/D
SS-10	-Y6-	25+69	57 LT	0.8-2.3	A-7-6 (19)	41	23	7.2	14.4	39.5	38.9	0	98	93	83	16.7	N/D

NP - NONPLASTIC

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	15

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP I-85 BYPASS (-L-) FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE

SITE DESCRIPTION SITE #7 (STRUCTURE #10), BRIDGE NO. 1249 ON LAKE JEANETTE ROAD (-Y7-) OVER I-85 BYPASS (-L-)

CONTENTS

CAUTION NOTICE

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

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

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NOTES:
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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

M. BAHIRADHAN

J. WHITT

C. BUTLER

FROEHLING AND ROBERTSON

INVESTIGATED BY J. WHITT

DRAWN BY C. BUTLER

CHECKED BY M. BAHIRADHAN

SUBMITTED BY SCHNABEL ENG.

DATE SEPTEMBER 2017

DocuSigned by:
Mahalingam Bahiradhan
FC52EEB5B5E6459...

NORTH CAROLINA PROFESSIONAL SEAL 036072 ENGINEER MAHALINGHAM BAHIRADHAN

DocuSigned by:
Mahalingam Bahiradhan 10/2/2017
FC52EEB5B5E6459...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10	50 MX													
#40	30 MX		50 MX	51 MN										
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40														
LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN			
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 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-257 N 1759409.4 E 871517.4, -Y7-

ELEVATION: 855.45 FEET

NOTES:

FIAD = FILLED IN AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 40 80

FEET

NAD 83/95

EB1-B

EB13-L

B1-A

B1-B

EB14-R

EB2-A

EASTERN LOOP
I-85 BYPASS

EASTERN LOOP
I-85 BYPASS

TO LAWNDALE DR

LAKE JEANETTE RD (SR 2490)

TO N ELM ST

24

25

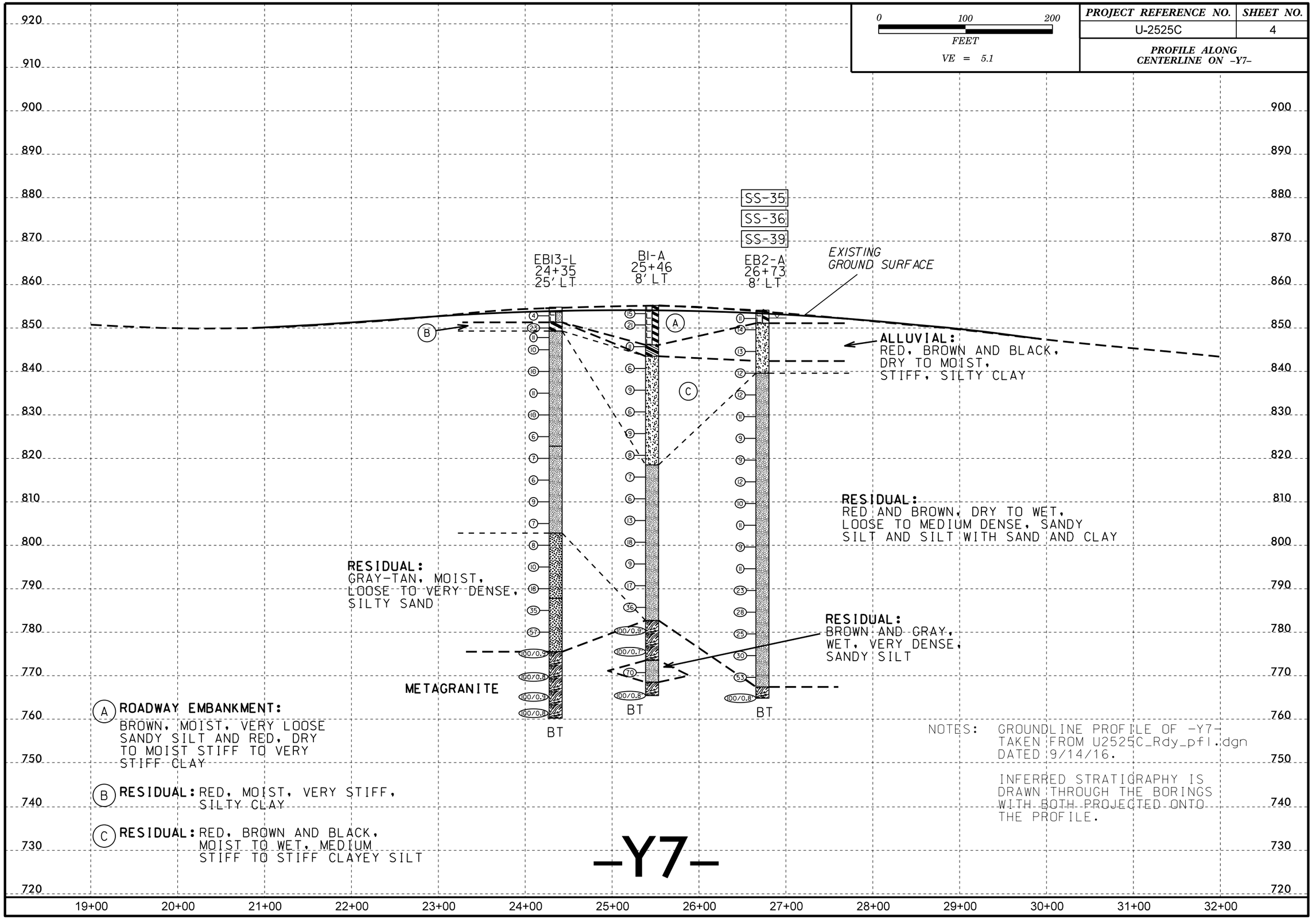
26

27

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

PROFILE ALONG CENTERLINE ON –Y7–

0 100 200
FEET
VE = 5.1

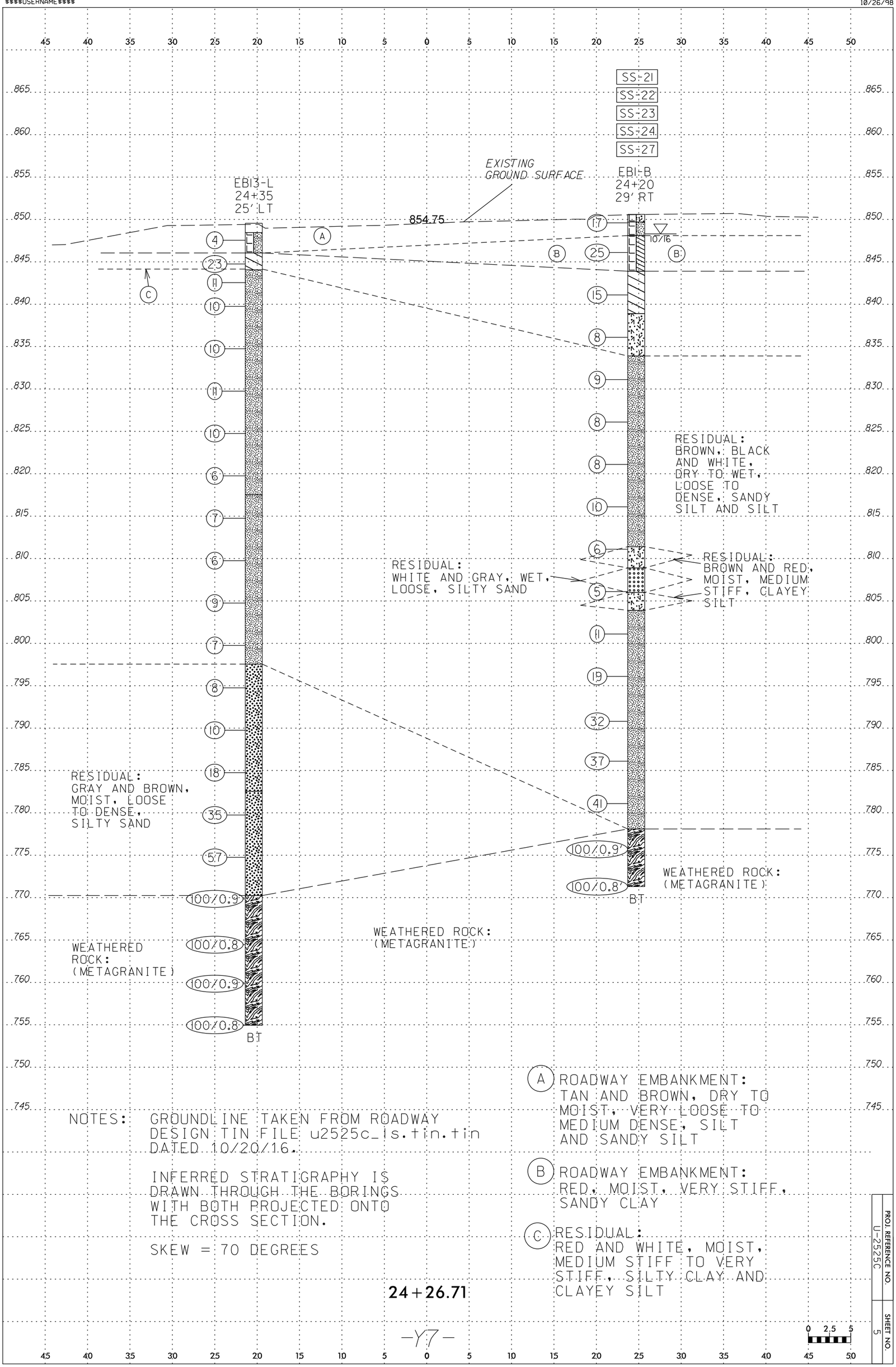


NOTES: GROUNDLINE PROFILE OF –Y7– TAKEN FROM U2525C_Rdy_pfl.dgn DATED 9/14/16.

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

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$$

10/26/98



NOTES: GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE u2525c_is.tin.tin DATED 10/20/16.

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

SKEW = 70 DEGREES

24+26.71

(A) ROADWAY EMBANKMENT: TAN AND BROWN, DRY TO MOIST, VERY LOOSE TO MEDIUM DENSE, SILT AND SANDY SILT

(B) ROADWAY EMBANKMENT: RED, MOIST, VERY STIFF, SANDY CLAY

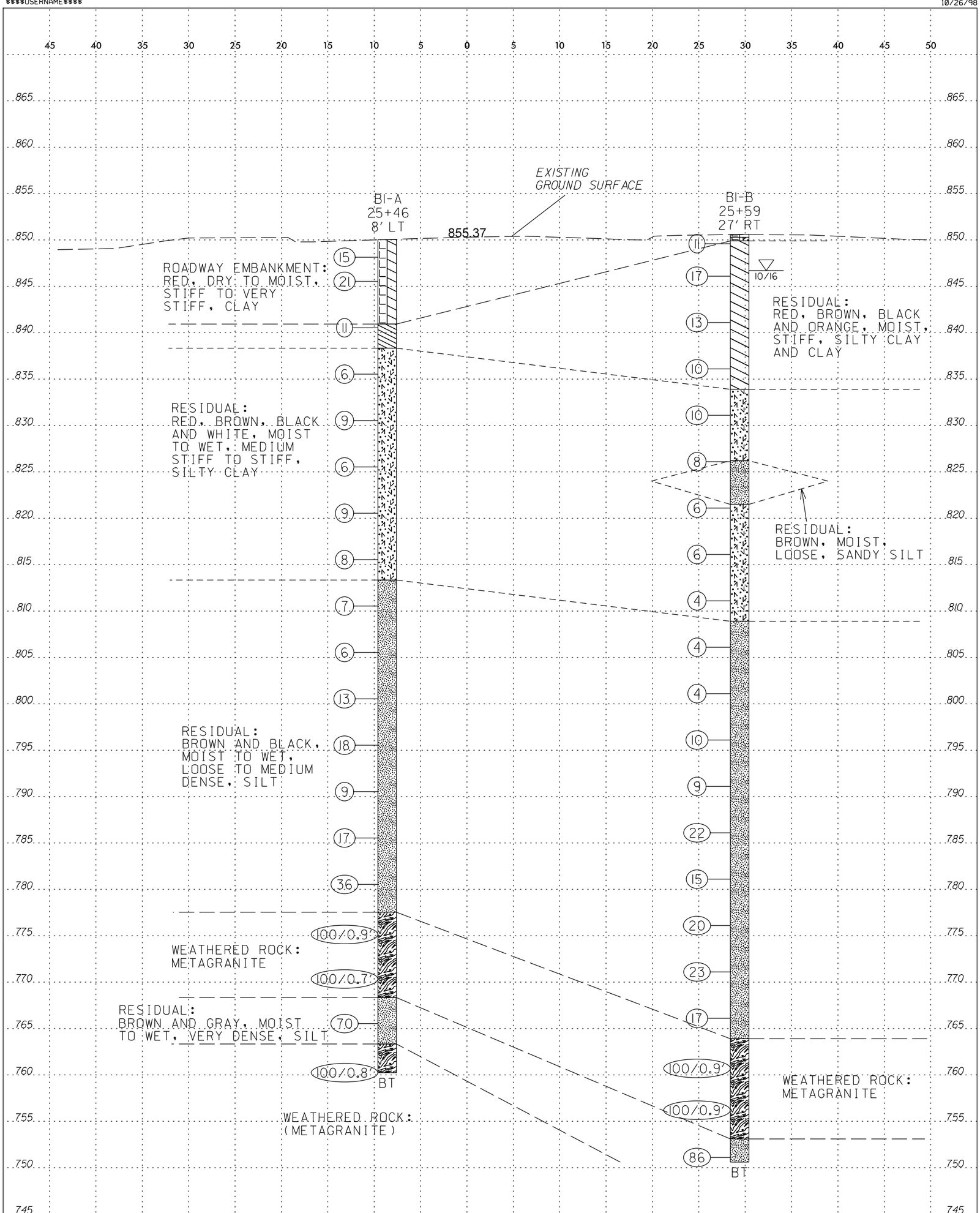
(C) RESIDUAL: RED AND WHITE, MOIST, MEDIUM STIFF TO VERY STIFF, SILTY CLAY AND CLAYEY SILT

PROJ. REFERENCE NO. U-2525C

SHEET NO. 5

$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$$

10/26/98



NOTES: GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE u2525c_ls.tin.tin DATED 10/20/16.

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

SKEW = 70 DEGREES

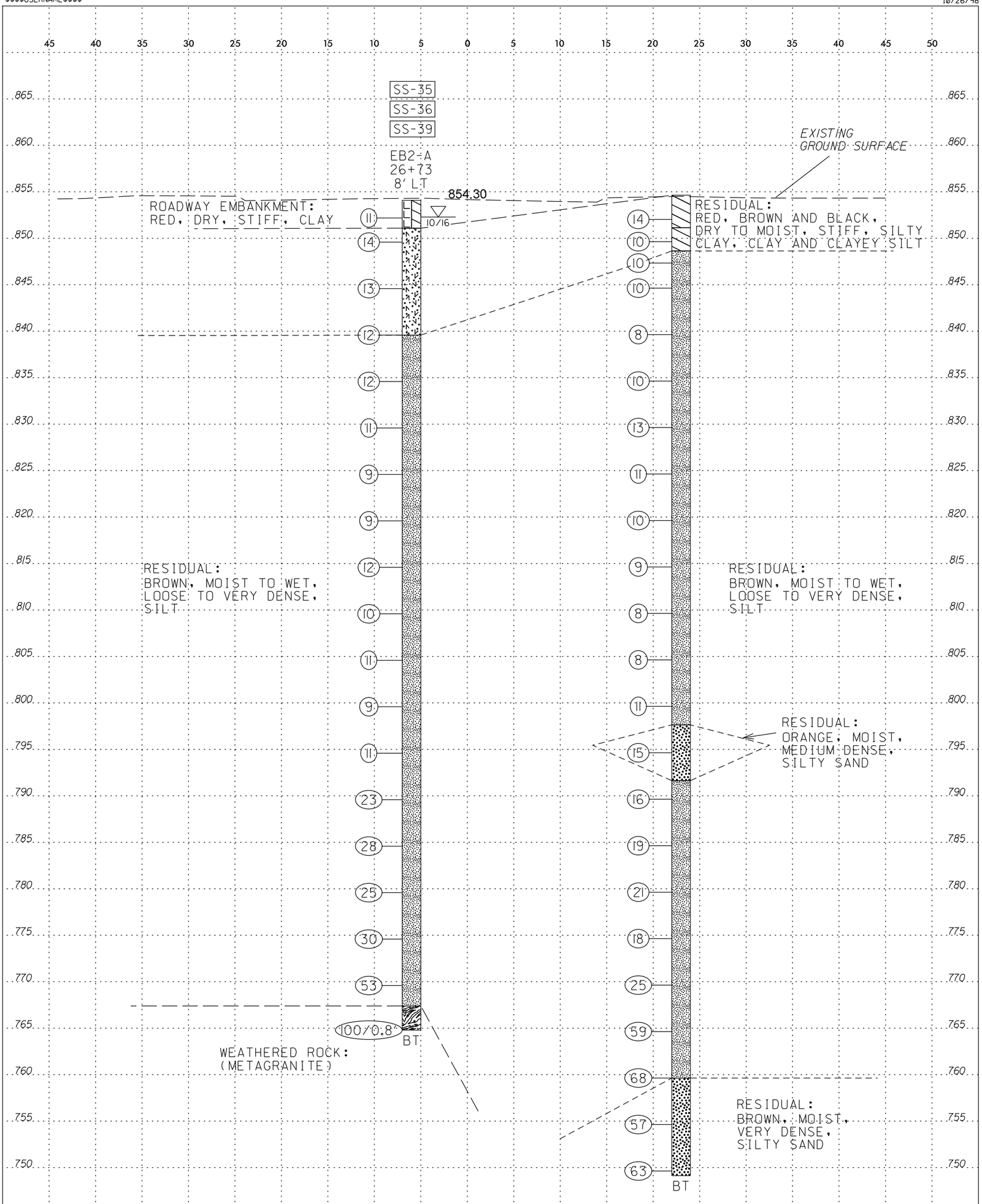
25+52.71

PROJ. REFERENCE NO. U-2525C

SHEET NO. 6

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$$

10/26/98



NOTES: GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE u2525c_ls.tin.tin DATED 10/20/16.

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

SKEW = 70 DEGREES

26+66.71

-Y7-

PROJ. REFERENCE NO. U-2525C

SHEET NO. 7

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB13-L	**STATION** 24+35	**OFFSET** 25 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 854.8 ft	**TOTAL DEPTH** 94.6 ft	**NORTHING** 871,419	**EASTING** 1,759,348	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 11/05/15	**COMP. DATE** 11/05/15	**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)
855										854.8 PAVEMENT	0.0
	853.8	1.0	3	2	2	4		M		853.7 ASPHALT (0.7') CABC STONE (0.4')	1.1
	851.0	3.8								**ROADWAY EMBANKMENT**	
850			6	10	13	23		M		851.3 Tan Fine Sandy SILT with Fine Gravel	3.5
	848.8	6.0								**RESIDUAL**	
			4	4	7	11		D		849.3 Red Silty CLAY with Little Fine Sand	5.5
	846.0	8.8								Red-Tan Fine Sandy SILT with Little to Some Clay and Manganese Seams	
845			4	4	6	10		D			
	841.0	13.8									
840			4	4	6	10		D			
	836.0	18.8									
835			3	5	6	11		D			
	831.0	23.8									
830			2	4	6	10		D			
	826.0	28.8									
825			2	2	4	6		D			
	821.0	33.8								822.8 Tan-Brown Fine Sandy SILT with Manganese Seams and Mica	32.0
820			2	3	4	7		M			
	816.0	38.8									
815			2	3	3	6		M			
	811.0	43.8									
810			2	4	5	9		M			
	806.0	48.8									
805			2	3	4	7		M			
	801.0	53.8								802.8 Gray-Tan Silty Fine SAND with Manganese Seams	52.0
800			2	4	4	8		M			
	796.0	58.8									
795			2	4	6	10		M			
	791.0	63.8									
790			3	6	12	18		M			
	786.0	68.8								787.8 Gray-Tan Silty Fine SAND with Quartz Rock Fragments	67.0
785			8	12	23	35		M			
	781.0	73.8									
780			12	23	34	57		M			
	776.0	78.8								775.5	79.3
775			35	65/0.4		100/0.9					

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB13-L	**STATION** 24+35	**OFFSET** 25 ft LT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 854.8 ft	**TOTAL DEPTH** 94.6 ft	**NORTHING** 871,419	**EASTING** 1,759,348	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 11/05/15	**COMP. DATE** 11/05/15	**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
775						Match Line				**WEATHERED ROCK** (Metamorphosed Granite) *(continued)*
	771.0	83.8	27	59	41/0.3	100/0.8				
770										
	766.0	88.8	30	70/0.4		100/0.9				
765										
	761.0	93.8	52	48/0.3		100/0.8				760.2 Boring Terminated at Elevation 760.2 ft in Weathered Rock (Metamorphosed Granite) 94.6

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 24+20	**OFFSET** 29 ft RT	**ALIGNMENT** -Y7-	**0 HR.** 2.3
COLLAR ELEV. 856.0 ft	**TOTAL DEPTH** 79.3 ft	**NORTHING** 871,378	**EASTING** 1,759,385	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/04/16	**COMP. DATE** 10/04/16	**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											
	856.0	0.0	5	8	9	17		D		856.0 GROUND SURFACE	0.0
855										855.1 **ROADWAY EMBANKMENT**	0.9
	852.5	3.5	8	11	14	25	SS-21	M		853.5 REDDISH BROWN AND GRAY, CLAYEY SILT WITH LITTLE SAND AND GRAVEL	2.5
850										LIGHT ORANGISH BROWN AND GRAYISH BROWN, SILT	
	847.5	8.5	6	7	8	15	SS-22	M		849.3 RED, GRAVELLY SANDY CLAY	6.7
845										**RESIDUAL** RED AND WHITE, SILTY CLAY WITH TRACE SAND	
	842.5	13.5	3	3	5	8	SS-23	W		844.3	11.7
840										RED AND WHITE, CLAYEY SILT WITH LITTLE SAND	
	837.5	18.5	3	4	5	9	SS-24	W		839.3	16.7
835										LIGHT ORANGISH BROWN AND ORANGISH BROWN WITH BLACK STREAKS, SILT WITH LITTLE SAND AT 28.5': SANDY SILT	
	832.5	23.5	3	3	5	8		W			
830											
	827.5	28.5	3	3	5	8		W			
825											
	822.5	33.5	2	2	8	10	SS-27	W			
820											
	817.5	38.5	2	2	4	6		W		816.8	39.2
815										ORANGISH BROWN AND RED, CLAYEY SILT	
	812.5	43.5	1	2	3	5		W		814.3 WHITE AND GRAY, SILTY FINE TO COARSE SAND	41.7
810										811.4	44.6
	807.5	48.5	3	4	7	11		W		ORANGISH BROWN AND RED WITH BLACK STREAKS, CLAYEY SILT	
805										809.3 LIGHT BROWN WITH BLACK AND WHITE STREAKS, SANDY SILT AT 58.5': ORANGISH BROWN AND WHITE	46.7
	802.5	53.5	5	7	12	19		W			
800											
	797.2	58.8	9	13	19	32		W			
795											
	792.5	63.5	10	16	21	37		W			
790											
	787.5	68.5	15	18	23	41		W			
785											
	782.5	73.5	41	54	46/0.4'					783.5	72.5
780						100/0.9'				**WEATHERED ROCK** (METAGRANITE)	

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
780						Match Line				**WEATHERED ROCK** (METAGRANITE) *(continued)*
	777.5	78.5	53	47/0.3'		100/0.8'				776.7 79.3
										Boring Terminated at Elevation 776.7 ft In Weathered Rock (Metagranite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 25+46	**OFFSET** 8 ft LT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 855.2 ft	**TOTAL DEPTH** 89.8 ft	**NORTHING** 871,504	**EASTING** 1,759,422	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**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											
855										855.2	0.0
	854.3	0.9								GROUND SURFACE **ROADWAY EMBANKMENT** ASPHALT: 0.9' RED, CLAY	
	851.7	3.5	8	6	9	15 21		D			
850			8	9	12			M			
	846.7	8.5								846.1	9.1
845			4	5	6	11		M		**RESIDUAL** RED WITH BROWN AND BLACK MOTTLING, SILTY CLAY	
	841.7	13.5								843.5	11.7
840			3	2	4	6		W		RED AND ORANGISH BROWN WITH BLACK STREAKS, CLAYEY SILT AT 18.5': CLAYEY SILT WITH TRACE SAND AND ROCK FRAGMENTS AT 23.5': CLAYEY SILT WITH TRACE ROCK FRAGMENTS AT 28.5': CLAYEY SILT	
	836.7	18.5									
835			3	4	5	9		W			
	831.7	23.5									
830			1	3	3	6		W			
	826.7	28.5									
825			2	4	5	9		W			
	821.7	33.5									
820			2	3	5	8		W			
	816.7	38.5								818.5	36.7
815			2	3	4	7		W		GRAYISH BROWN AND REDDISH BROWN WITH BLACK STREAKS, SILT WITH TRACE CLAY AND SAND AT 43.5': GRAY AND LIGHT BROWN WITH BLACK STREAKS AT 48.5': LIGHT BROWN WITH BLACK STREAKS AT 63.5': LIGHT BROWN, SILT WITH LITTLE SAND, MICACEOUS AT 68.5': SANDY SILT	
	811.7	43.5									
810			2	2	4	6		W			
	806.7	48.5									
805			3	5	8	13		W			
	801.7	53.5									
800			5	7	11	18		W			
	796.7	58.5									
795			3	3	6	9		W			
	791.7	63.5									
790			3	5	12	17		W			
	786.7	68.5									
785			10	14	22	36		W			
	781.7	73.5								782.7	72.5
780			32	48	52/0.4'	100/0.9'				**WEATHERED ROCK** (METAGRANITE)	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 25+46	**OFFSET** 8 ft LT	**ALIGNMENT** -Y7-	**0 HR.** Dry
COLLAR ELEV. 855.2 ft	**TOTAL DEPTH** 89.8 ft	**NORTHING** 871,504	**EASTING** 1,759,422	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**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
780						Match Line				
	776.7	78.5	35	51	49/0.2'	100/0.7'				**WEATHERED ROCK** (METAGRANITE) *(continued)*
775										773.5 81.7
	771.7	83.5	21	28	42	70		W		**RESIDUAL** LIGHT BROWN AND GRAY, SANDY SILT WITH TRACE ROCK FRAGMENTS
770										768.5 86.7
	766.7	88.5	27	60	40/0.3'	100/0.8'				**WEATHERED ROCK** (METAGRANITE)
										765.4 89.8
										Boring Terminated at Elevation 765.4 ft In Weathered Rock (Metagranite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 25+59	**OFFSET** 27 ft RT	**ALIGNMENT** -Y7-	**0 HR.** 3.9
COLLAR ELEV. 855.7 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 871,496	**EASTING** 1,759,458	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/03/16	**COMP. DATE** 10/04/16	**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										
855	855.7	0.0	3	3	8	11		D		855.7 0.0 GROUND SURFACE 855.4 0.3 **ROADWAY EMBANKMENT** 855.0 0.7 ORANGE, CLAY WITH LITTLE SAND
	852.2	3.5	6	8	9	17		D		**RESIDUAL** BROWN AND GRAY, CLAYEY SILT WITH TRACE SAND AND GRAVEL
850										ORANGE, CLAY AT 9.5': ORANGISH RED WITH BLACK AND BROWN AND WHITE MOTTLING
	847.2	8.5	4	5	8	13		M		
845										
	842.2	13.5	3	4	6	10		W		
840										839.0 16.7 ORANGISH RED WITH BLACK AND GRAY AND WHITE STREAKS, CLAYEY SILT
	837.2	18.5	2	5	5	10		W		
835										
	832.2	23.5	2	3	5	8		W		831.3 24.4 LIGHT GRAYISH AND ORANGISH BROWN, SANDY SILT
830										
	827.2	28.5	2	2	4	6		W		826.6 29.1 REDDISH BROWN WITH BLACK AND GRAY STREAKS, CLAYEY SILT AT 34.2': LIGHT ORANGISH BROWN AND GRAY WITH BLACK STREAKS AT 38.5': WITH TRACE SAND
825										
	822.2	33.5	2	2	4	6		W		
820										
	817.2	38.5	2	1	3	4		W		
815										
	812.2	43.5	2	2	2	4		W		
810										
	807.2	48.5	1	2	2	4		W		814.0 41.7 LIGHT YELLOWISH BROWN AND ORANGISH BROWN, SILT WITH LITTLE SAND AT 53.5': SILT WITH TRACE SAND AT 64.6': LIGHT YELLOWISH BROWN AND ORANGISH BROWN AND BLACK, GRAVELLY (ROCK FRAGMENTS) SILT WITH TRACE SAND AT 68.5': SILT WITH LITTLE SAND AND TRACE GRAVEL (ROCK FRAGMENTS) AT 73.5': SILT WITH TRACE SAND AT 78.5': SILT WITH TRACE SAND AND GRAVEL (ROCK FRAGMENTS)
805										
	802.2	53.5	4	4	6	10		W		
800										
	797.2	58.5	2	4	5	9		W		
795										
	792.2	63.5	5	10	12	22		W		
790										
	787.2	68.5	3	5	10	15		W		
785										
	782.2	73.5	4	10	10	20		W		
780										

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 25+59	**OFFSET** 27 ft RT	**ALIGNMENT** -Y7-	**0 HR.** 3.9
COLLAR ELEV. 855.7 ft	**TOTAL DEPTH** 100.0 ft	**NORTHING** 871,496	**EASTING** 1,759,458	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/03/16	**COMP. DATE** 10/04/16	**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
780						Match Line				
	777.2	78.5	4	12	11	23		W		
775										
	772.2	83.5	5	6	11	17		W		
770										769.0 86.7 **WEATHERED ROCK** (METAGRANITE)
	767.2	88.5	41	42	58/0.4'	100/0.9'				
765										
	762.2	93.5	21	79/0.4'		100/0.9'				
760										758.2 97.5 **RESIDUAL**
	757.2	98.5	17	31	55	86		W		755.7 100.0 LIGHT ORANGISH BROWN AND DARK GRAY, SILT WITH LITTLE GRAVEL (ROCK FRAGMENTS) AND TRACE SAND Boring Terminated at Elevation 755.7 ft In Silt with Little Gravel (Rock Fragments) and Trace Sand

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 26+73	**OFFSET** 8 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 1.8
COLLAR ELEV. 854.1 ft	**TOTAL DEPTH** 89.3 ft	**NORTHING** 871,611	**EASTING** 1,759,489	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**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)
855											
	853.2	0.9	4	5	6	11				854.1 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT ASPHALT: 0.9'	
850	850.6	3.5	6	7	7	14	SS-35	D		851.1 RED, CLAY	3.0
							SS-36	D		**RESIDUAL** RED AND LIGHT BROWN, CLAYEY SILT AT 9.7': CLAYEY SILT WITH LITTLE GRAVEL AT 11.7': WITH BLACK STREAKS	
845	845.6	8.5	4	6	7	13		D			
840	840.6	13.5	3	5	7	12		M		839.6	14.5
										REDDISH BROWN AND LIGHT BROWN, SILT WITH LITTLE CLAY AND SAND AT 18.5': SILT WITH LITTLE CLAY AT 23.5': RED AND LIGHT BROWN WITH BLACK STREAKS AT 43.5': SILT WITH LITTLE CLAY AND SAND AT 44.7': GRAYISH BROWN AND ORANGISH BROWN, SILT WITH TRACE SAND AT 48.5': WITH BLACK STREAKS AT 53.5': GRAYISH BROWN AND ORANGISH BROWN AND GRAY WITH BLACK STREAKS, SILT WITH LITTLE SAND AT 68.5': SILT AT 78.5': BROWN AT 79.7': LIGHT BROWN AND DARK GRAY, GRAVELLY (ROCK FRAGMENTS) SILT WITH TRACE SAND	
835	835.6	18.5	3	5	7	12	SS-39	M			
830	830.6	23.5	3	5	6	11		M			
825	825.6	28.5	3	3	6	9		W			
820	820.6	33.5	3	3	6	9		W			
815	815.6	38.5	3	5	7	12		W			
810	810.6	43.5	3	4	6	10		W			
805	805.6	48.5	3	4	7	11		W			
800	800.6	53.5	3	4	5	9		W			
795	795.6	58.5	2	5	6	11		W			
790	790.6	63.5	7	9	14	23		W			
785	785.6	68.5	8	12	16	28		W			
780	780.6	73.5	7	10	15	25		W			
775	775.6	78.5									

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
775						Match Line				
			9	16	14	30		W		
770	770.6	83.5	11	20	33	53		W		
765	765.6	88.5	51	49/0.3'		100/0.8'				767.4 86.7 **WEATHERED ROCK** (METAGRANITE) 764.8 89.3 Boring Terminated at Elevation 764.8 ft In Weathered Rock (Metagranite)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Whitt, J.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 26+73	**OFFSET** 8 ft LT	**ALIGNMENT** -Y7-	**0 HR.** 1.8
COLLAR ELEV. 854.1 ft	**TOTAL DEPTH** 89.3 ft	**NORTHING** 871,611	**EASTING** 1,759,489	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 86% 02/16/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Davis, S.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB14-R	**STATION** 26+65	**OFFSET** 25 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 854.6 ft	**TOTAL DEPTH** 105.5 ft	**NORTHING** 871,587	**EASTING** 1,759,513	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 11/05/15	**COMP. DATE** 11/06/15	**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)
855										854.6 GROUND SURFACE 0.0
	853.0	1.6								**RESIDUAL**
			4	6	8	14		M		Red Silty CLAY with Trace of Fine Sand
850	850.6	4.0	4	4	6	10		M		851.1 3.5
	848.3	6.3								Red-Tan Silty CLAY with Little Fine Sand
			3	4	6	10		D		848.6 6.0
845	845.6	9.0								Red-Tan Fine Sandy SILT with Some Clay
			3	4	6	10		D		Manganese seams starting at 17 feet
840	840.6	14.0								Quartz Rock at 24.3 feet
			3	3	5	8		D		
835	835.6	19.0								
			3	4	6	10		D		
830	830.6	24.0								
			3	5	8	13		D		
825	825.6	29.0								
			3	5	6	11		D		
820	820.6	34.0								
			3	4	6	10		D		
815	815.6	39.0								
			3	4	5	9		M		
810	810.6	44.0								
			3	3	5	8		M		
805	805.6	49.0								
			3	3	5	8		M		
800	800.6	54.0								
			3	4	7	11		M		
795	795.6	59.0								
			3	6	9	15		M		
790	790.6	64.0								
			4	7	9	16		M		
785	785.6	69.0								
			6	8	11	19		M		
780	780.6	74.0								
			6	8	13	21		M		
775	775.6	79.0								

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
775						Match Line				
			2	7	11	18		M		Tan-Brown Fine Sandy SILT with Manganese
770	770.6	84.0								Seams and Rock Fragments *(continued)*
			5	9	16	25		M		
765	765.6	89.0								
			16	17	42	59		M		
760	760.6	94.0								
			14	24	44	68		M		759.6 95.0
755	755.6	99.0								Brown-Tan Silty Fine SAND with Manganese
			10	20	37	57		M		Seams and Rock Fragments
750	750.6	104.0								
			14	23	40	63		M		749.1 105.5
										Boring Terminated at Elevation 749.1 ft in
										Silty Fine SAND

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Site #7 (Structure #10), Bridge No. 1249 on Lake Jeanette Road (-Y7-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB14-R	**STATION** 26+65	**OFFSET** 25 ft RT	**ALIGNMENT** -Y7-	**0 HR.** N/A
COLLAR ELEV. 854.6 ft	**TOTAL DEPTH** 105.5 ft	**NORTHING** 871,587	**EASTING** 1,759,513	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 11/05/15	**COMP. DATE** 11/06/15	**SURFACE WATER DEPTH** N/A	

797.6 — 57.0
Orange-Tan Silty Fine SAND with Manganese Seams

791.6 — 63.0
Tan-Brown Fine Sandy SILT with Manganese Seams and Rock Fragments

NCDOT BORE DOUBLE U2525C_GEO_RDWY_5-16-2016.GPJ NC_DOT.GDT 9/29/17

SITE #7 (STRUCTURE #10), BRIDGE NO. 1249 ON LAKE JEANETTE ROAD (-Y7-) OVER I-85 BYPASS (-L-)

SOIL TEST RESULTS

BORING	SAMPLE			DEPTH INTERVAL	AASHTO	LIQUID	PLASTICITY	% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	NO.	STATION	OFFSET	(FEET)	CLASS.	LIMIT	INDEX	GRAVEL	C.SAND	F.SAND	SILT & CLAY	10	40	200	MOISTURE	ORGANIC
EB1-B	SS-21	24+20	29' RT	3.5 - 5.0	A-7-5	73.0	37.0	8.0	10.1	9.9	72.0	92.0	81.9	72.0	24.4	-
EB1-B	SS-22	24+20	29' RT	8.5 - 10.0	A-7-5	46.0	16.0	0.3	9.4	24.2	66.2	99.7	90.4	66.2	25.3	-
EB1-B	SS-23	24+20	29' RT	13.5 - 15.0	A-4	40.0	7.0	0.8	12.4	27.1	59.7	99.3	86.8	59.7	34.6	-
EB1-B	SS-24	24+20	29' RT	18.5 - 20.0	A-4	35.0	6.0	0.1	10.3	30.0	59.7	99.9	89.7	59.7	36.7	-
EB1-B	SS-27	24+20	29' RT	33.5 - 35.0	A-4	34.0	7.0	7.4	9.2	29.0	54.4	92.6	83.5	54.4	36.1	-
EB2-A	SS-35	26+73	8' LT	0.9 - 2.4	A-7-5	55.0	22.0	0.5	1.6	16.9	81.0	99.5	97.9	81.0	29.2	
EB2-A	SS-36	26+73	8' LT	3.5 - 5.0	A-5	45.0	8.0	1.2	2.4	23.5	73.0	98.8	96.4	73.0	21.7	
EB2-A	SS-39	26+73	8' LT	18.5 - 20.0	A-5	50.0	9.0	0.2	3.1	27.8	68.9	99.8	96.7	68.9	39.1	-

SITE PHOTOGRAPHS - SITE #7 (STRUCTURE #10), BRIDGE NO. 1249 ON LAKE JEANETTE ROAD (-Y7-) OVER I-85 BYPASS (-L-)

View looking upstation along proposed bridge alignment

View looking nearly perpendicular to proposed bridge alignment (approximate northwest)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *CULVERT AT -L- 364+68 AT UNNAMED TRIBUTARY TO REEDY FORK/TOWNSEND LAKE*

CONTENTS

CAUTION NOTICE

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

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

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

L. BUTLER

T. WILLIAMS

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *T.T. WALKER, F&R, Inc.*

CHECKED BY *C.A. YOUNGBLOOD*

SUBMITTED BY *C.A. YOUNGBLOOD*

DATE *DECEMBER 2017*

NORTH CAROLINA LICENSED SEAL 1959 GEOLOGIST CHERYL A. YOUNGBLOOD

DocuSigned by:
Cheryl A. Youngblood
B304AB5FC8F3424...

12/18/2017

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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		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		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

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: BM#5: -L- STATION 365+24.36, 174' RT, RR SPIKE IN POPLAR
N: 874857, E: 1773975
ELEVATION: 761.79 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200

FEET

SKEW=68 DEGREES

NAD 83'95

BEGIN CONSTRUCTION
-Y3- STA. 10+79.45

CV3-L

CV2-C

CV4-R

NCDOT
(FORMERLY SYDNEY J. MITCHELL)

1 @ 8' X 8' RCBC W/BEVELED HEADWALL BURIED ONE FOOT WITH BAFFLES AT 20 FT. SPACING ON CENTER FROM OUTLET END

RW 768.0' 30' FROM CULVERT INLET

HOUSTON H. & VIRGINIA H. COLEMAN
LEONARD G. & FRANCES N. COLEMAN
NOAH MARVIN & HAZEL S. COLEMAN

ROGER DALE ARNOLD

JAMES E. SOHL

MARK BRIAN BAILEY

DAVID L. ADAMS

ARCHIE ADAMS

MERLOND C. COX
JUNE H. COX

HALEY B. BURCH
DONNA L. BURCH

CHARLES G. APPLE

ARCHIE J. ADAMS &
LOUISE A. ADAMS

END CONSTRUCTION
-DR3- POT STA 14+20.00

-L- POC Sta. 370+50.00
-DR3- POT Sta. 10+00.00
N 12° 38' 08.1" W

360

365

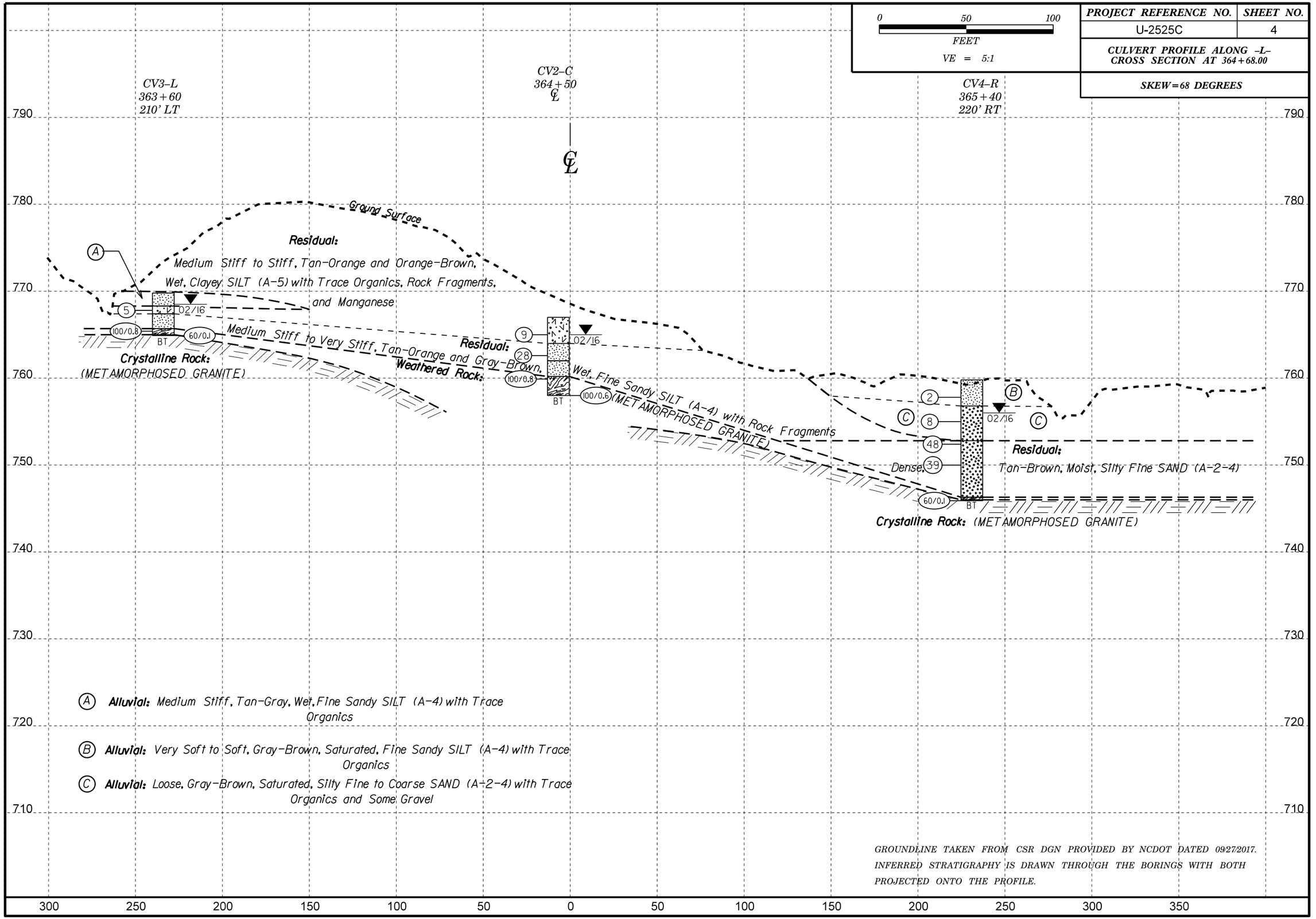
370

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

CULVERT PROFILE ALONG –L–
CROSS SECTION AT 364+68.00

SKEW=68 DEGREES

0 50 100
FEET
VE = 5:1



(A) **Alluvial:** Medium Stiff, Tan-Gray, Wet, Fine Sandy SILT (A-4) with Trace Organics

(B) **Alluvial:** Very Soft to Soft, Gray-Brown, Saturated, Fine Sandy SILT (A-4) with Trace Organics

(C) **Alluvial:** Loose, Gray-Brown, Saturated, Silty Fine to Coarse SAND (A-2-4) with Trace Organics and Some Gravel

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09/27/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV3-L	**STATION** 363+60	**OFFSET** 210 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 769.8 ft	**TOTAL DEPTH** 4.9 ft	**NORTHING** 874,477	**EASTING** 1,774,148	**24 HR.** 1.3
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring		**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 02/09/16	**COMP. DATE** 02/09/16	**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)
770												
	768.8	1.0	2	2	3	5		W		GROUND SURFACE	769.8	0.0
	766.2	3.6								**ALLUVIAL** Tan-Gray Fine Sandy SILT with Trace of Organics	768.3	1.5
765	765.0	4.8	22	78/0.3		100/0.8		Sat.			767.4	2.4
			60/0.1			60/0.1				**RESIDUAL** Tan-Orange Clayey SILT with Trace of Organics	765.7	4.1
										Brown-Orange Fine Sandy SILT with Little Rock Fragments	765.0	4.8
										WEATHERED ROCK (Metamorphosed Granite)	764.9	4.9
										CRYSTALLINE ROCK (Metamorphosed Granite)		
										Boring Terminated with Standard Penetration Test Refusal at Elevation 764.9 ft in Crystalline Rock (Metamorphosed Granite)		

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV2-C	**STATION** 364+50	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 767.0 ft	**TOTAL DEPTH** 9.0 ft	**NORTHING** 874,686	**EASTING** 1,774,056	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring		**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 02/09/16	**COMP. DATE** 02/09/16	**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)
770												
	766.0	1.0	3	4	5	9				GROUND SURFACE	767.0	0.0
765	763.6	3.4	4	12	16	28		W		**RESIDUAL** Orange-Brown Clayey SILT, with Rock Fragments and Manganese	764.0	3.0
	760.7	6.3	44	56/0.3		100/0.8				Gray-Green SILT	762.0	5.0
760	758.6	8.4	67	33/0.1		100/0.6				Gray-Brown Fine Sandy SILT	760.2	6.8
										WEATHERED ROCK (Metamorphosed Granite)	758.0	9.0
										Boring Terminated at Elevation 758.0 ft in Weathered Rock (Metamorphosed Granite)		

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV4-R	**STATION** 365+40	**OFFSET** 220 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 759.8 ft	**TOTAL DEPTH** 13.9 ft	**NORTHING** 874,902	**EASTING** 1,773,956	**24 HR.** 3.8
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring		**HAMMER TYPE** Automatic
DRILLER T. Williams	**START DATE** 02/09/16	**COMP. DATE** 02/09/16	**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)
760										759.8 GROUND SURFACE	0.0
	758.8	1.0	1	1	1	2		Sat.		**ALLUVIAL** Gray- Brown Fine Sandy SILT with Trace of Organics	
	756.0	3.8	3	3	5	8		Sat.		756.8 Gray-BrownSilty Fine to Coarse SAND with Trace of Organic Matter and Some Gravel	3.0
755	753.4	6.4	10	18	30	48		M		752.8 **RESIDUAL** Tan-Brown Silty Fine SAND	7.0
	751.0	8.8	19	12	27	39		M			
750	746.0	13.8	60/0.1			60/0.1				746.3	13.5
										746.0 **WEATHERED ROCK** (Metamorphosed Granite)	13.8
										745.9 **CRYSTALLINE ROCK** (Metamorphosed Granite)	13.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 745.9 ft in Crystalline Rock (Metamorphosed Granite)	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)

SITE DESCRIPTION CULVERT AT -L- 382+49 AT UNNAMED TRIBUTARY TO REEDY FORK/TOWNSEND LAKE

CONTENTS

CAUTION NOTICE

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

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

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

L. BUTLER

T. WILLIAMS

INVESTIGATED BY S&ME, Inc.

DRAWN BY T.T. WALKER, F&R, Inc.

CHECKED BY C.A. YOUNGBLOOD

SUBMITTED BY C.A. YOUNGBLOOD

DATE DECEMBER 2017

NORTH CAROLINA LICENSED SEAL 1959 GEOLOGIST CHERYL A. YOUNGBLOOD

DocuSigned by:
Cheryl A. Youngblood
B304AB5FC8F3424...
12/7/2017
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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

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: U2525C_LS_TIN_170816.tin 11/09/2017

ELEVATION: N/A FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200

FEET

SKEW=149 DEGREES

NAD 83/95

ROBERT A. LANCASTER & MARTHA M. LANCASTER

UZELLIA W. FINLEY

MES E. SOHL

GARY W. & LISA B. ARNOLD

1½SFD

LARRY L. HOWELL

NCDOT (FORMERLY RONALD D. SMITH)

JAMES B. BARLEY

END CONSTRUCTION
-DR4- POT STA 13+00.00

-L- POS Sta. 381+00
-DR4- POT Sta. 10+00.00
S 30° 41' 53" E

CV6-R

CV5-C

CV7-R

-Y4RPC-

380

385

375

MARK EDWARD MILLAWAY
KAREN M. SMITH

JOSEPH C. SMITH

-Y4RPC- POT Sta 10+00.00
-L- POT Sta. 382+56.07 OFF Rt. 59'

BM #6

DORIS B. STONEMAN

ADAMS &
ADAMS

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

CULVERT PROFILE ALONG –L–
CROSS SECTION AT 382+49.00

SKEW=149 DEGREES

0 50 100
FEET
VE = 5:1

CV6–R2
384+00
90' LT

CV5–C
382+30
℄

CV7–R
379+35
100' RT

790
780
770
760
750
740
730
720

Alluvial: Soft to Medium Stiff, Gray–Brown, Wet, Fine
Sandy CLAY (A–7)
Medium Stiff to Hard,
Brown–Tan, Gray, and White, Moist, Fine
Trace
Dense to Very Dense,
Gray–Tan and Brown–Gray/Green, Dry to
Weathered Rock:
BT
FIAD
Residual:
Residual:
Ground Surface
Sandy SILT (A–4) with Trace Rock Fragments, Mica, and Organics
Moist, Silty Fine to Coarse SAND (A–2–4) with Trace Rock Fragments and Trace
(METAMORPHOSED GRANITE)
Crystalline Rock: (METAMORPHOSED GRANITE)
Manganese

Ⓐ **Alluvial:** Very Loose, Dark Gray, Wet, Silty Coarse SAND (A–2–4)

Ⓑ **Alluvial:** Medium Stiff, Red–Gray, Moist, Clayey SILT (A–5) with Trace Mica

Ⓒ **Alluvial:** Very Soft to Soft, Dark Gray, Wet, Coarse to Fine Sandy CLAY (A–6)

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09/27/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

300 250 200 150 100 50 0 50 100 150 200 250 300 350

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Tiernan, S.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV6-R2	**STATION** 384+00	**OFFSET** 90 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.0
COLLAR ELEV. 770.4 ft	**TOTAL DEPTH** 21.0 ft	**NORTHING** 873,980	**EASTING** 1,772,286	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/22/16	**COMP. DATE** 02/22/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
775											
770	769.4	1.0	2	2	2	4		W		770.4 GROUND SURFACE	0.0
	766.9	3.5				3		W		**ALLUVIAL** Gray-Brown Fine Sandy CLAY	
765			2	2	1					767.4 Dark Gray Silty Coarse SAND	3.0
	764.4	6.0								765.4	5.0
	761.9	8.5	5	12	23	35 77		M		**RESIDUAL** Brown Fine Sandy SILT with Trace of Rock Fragments and Mica	
760			37	46	31			D		762.4 Gray-Tan Silty Coarse SAND with Trace of Rock Fragments Rock	8.0
	756.9	13.5								755.9	14.5
755			15	30	70/0.3					**WEATHERED ROCK** (Metamorphosed Granite)	
	751.9	18.5	43	57/0.3							
750	749.5	20.9	60/0.1			60/0.1				749.5	20.9
										749.4 **CRYSTALLINE ROCK** (Metamorphosed Granite)	21.0
										Boring Terminated with Standard Penetration Test Refusal at Elevation 749.4 ft in Crystalline Rock (Metamorphosed Granite)	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Culpepper, A.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV5-C	**STATION** 382+30	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 767.3 ft	**TOTAL DEPTH** 17.0 ft	**NORTHING** 874,144	**EASTING** 1,772,386	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 01/29/16	**COMP. DATE** 01/29/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										
										767.3 GROUND SURFACE 0.0
765	766.3	1.0	2	2	3	5		M		**RESIDUAL** Brown-Tan Fine Sandy SILT with Trace of Organics
	763.8	3.5	4	4	6	10		M		762.3 Brown-Gray and White Fine Sandy SILT 5.0
760	761.3	6.0	9	9	12	21		M		759.3 Gray Silty Fine to Coarse SAND 8.0
	758.8	8.5	27	26	41	67		M		
755	753.8	13.5	36	64/0.2		100/0.7				753.3 **WEATHERED ROCK** (Metamorphosed Granite) 14.0
	750.3	17.0	60/0.0			60/0.0				750.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 750.3 ft on Crystalline Rock (Metamorphosed Granite) 17.0

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Tiernan, S.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV7-R	**STATION** 379+35	**OFFSET** 100 ft RT	**ALIGNMENT** -L-	**0 HR.** 9.5
COLLAR ELEV. 767.1 ft	**TOTAL DEPTH** 10.9 ft	**NORTHING** 874,381	**EASTING** 1,772,591	**24 HR.** 7.5
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/19/16	**COMP. DATE** 02/19/16	**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)
770											
										767.1 GROUND SURFACE	0.0
	766.1	1.0	2	2	3	5		M		**ALLUVIAL** Mottled Red-Gray Clayey SILT with Trace of Mica	
765	763.6	3.5	2	1	1	2		W		762.6 Dark Gray Coarse to Fine Sandy CLAY	4.5
	761.1	6.0	10	35	57	92				760.6	6.5
760	758.6	8.5	14	23	18	41		M		**RESIDUAL** Brown-Gray/Green Silty Fine to Coarse SAND withTrace of Manganese	
	756.3	10.8	60/0.1			60/0.1				756.3	10.8
										756.2 **CRYSTALLINE ROCK** (Metamorphosed Granite)	10.9
										Boring Terminated with Standard Penetration Test Refusal at Elevation 756.2 ft in Crystalline Rock (Metamorphosed Granite)	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *CULVERT AT -L- 430+93 AT UNNAMED TRIBUTARY TO REEDY FORK/TOWNSEND LAKE*

CONTENTS

CAUTION NOTICE

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

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

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

L. BUTLER

T. WILLIAMS

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *T.T. WALKER, F&R, Inc.*

CHECKED BY *C.A. YOUNGBLOOD*

SUBMITTED BY *C.A. YOUNGBLOOD*

DATE *DECEMBER 2017*

NORTH CAROLINA LICENSED SEAL 1959 GEOLOGIST CHERYL A. YOUNGBLOOD

DocuSigned by:
Cheryl A. Youngblood
B304AB5FC8F3424...

12/18/2017

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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		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		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

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

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: BM #9: RR SPIKE SET IN 20" POPLAR, -L- STA. 431+66.13, 221.02' RT, N: 871805.51, E: 1768033.527
ELEVATION: 816.23 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200

FEET

SKEW = 114 DEGREES

NAD 83'95

GARY S. & VIRGINIA W. CHURCH

PATTI CHURCH PHILLIPS
GARY S. CHURCH

SHARON MCADOO CHAPPELL FAMILY TRUST
(FORMERLY ELMER A. McADOO JR
SHARON M. CHAPPEL)

END UNKNOWN

8" TYP. UNKNOWN

16" PVC, City of Greensboro

10" DIP (ABANDONED)

CONC

CV11-L

CV12-C

CV13-R

NCDOT

BM #9

REBAR&CAP

KEN CONSTANT
JANET OPOKU

INEZ R. TURNER

HOWARD L. HUTCHENS &
LYUDMILA P. HUTCHENS

HARVEST HILL PROPERTY OWNERS ASSOC.
(FORMERLY PROJECT HOMESTEAD)

8" PLASTIC

8" TYPE UNKNOWN

ISBKD

GR

425 430 435

8:1

45BW 48BW 50BW 55BW 58BW 35BW

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

CULVERT PROFILE ALONG –L–
CROSS SECTION AT 430+93.00

SKEW=114 DEGREES

0 50 100
FEET
VE = 5:1

CV11–L
431+60
160' LT

CV12–C
431+27
℄

CV13–R
430+60
145' RT

℄

800
790
780
770
760
750
740
730

B
12
100/0.8
A
78
17
Medium Stiff to
100/0.4
Residual:
Very Dense, Brown-Tan,
87
Silty Fine SAND (A-2-4)
Fragments
100/0.3
60/0.1
BT
02/16
A
Moist to Saturated, Fine
Residual:
Hard, Tan-Green-Gray, Moist to
with Trace Mica, Rock Fragments,
B
Dry,
with Rock
Weathered Rock:

Alluvial:
C
5
4
5
9
9
31
100/0.6
60/0.1
BT
02/16
Ground Surface
Soft to Stiff, Orange-Gray-Brown,
Sandy Silty CLAY (A-7) with Trace
Saturated, Fine Sandy SILT (A-4) and
and Manganese

5
6
20
13
16
100/0.8
100/0.7
BT
02/16
Organics
Clayey SILT (A-5)

(METAMORPHOSED GRANITE)

Crystalline Rock: (METAMORPHOSED GRANITE)

300 250 200 150 100 50 0 50 100 150 200 250 300 350

(A) **Residual:** Medium Dense to Very Dense, Gray-Tan-Green, Moist, Silty Fine SAND (A-2-4)

(B) **Weathered Rock:** (METAMORPHOSED GRANITE)

(C) **Alluvial:** Loose, Dark Gray, Wet, Silty Coarse SAND (A-2-4)

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09/27/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV11-L	**STATION** 431+60	**OFFSET** 160 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 785.6 ft	**TOTAL DEPTH** 27.5 ft	**NORTHING** 871,481	**EASTING** 1,768,234	**24 HR.** 0.8
DRILL RIG/HAMMER EFF./DATE TRI0472 CME-850 88% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R.Toothman	**START DATE** 02/02/16	**COMP. DATE** 02/02/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										785.6	0.0
										GROUND SURFACE	
	784.4	1.2	3	5	7	12				784.6	1.0
										ALLUVIAL	
	782.4	3.2						M		Orange- Brown Silty CLAY	2.0
			21	64	36/0.3	100/0.8				783.6	
										Gray -Brown Fine Sandy SILT	3.7
	780.4	5.2	32	36	42	78				781.9	
										RESIDUAL	
										Gray Silty Fine SAND	5.0
	777.3	8.3						D		780.6	
			4	6	11	17				**WEATHERED ROCK**	
										(Metamorphosed Granite)	7.5
								M		778.1	
										RESIDUAL	
										Tan-Green Silty Fine SAND	9.3
										Orange-Tan SILT	
	772.4	13.2	100/0.4			100/0.4				776.3	
										Yellow-Green Fine Sandy SILT	12.7
										772.9	
										WEATHERED ROCK	
										(Metamorphosed Granite)	14.2
	767.3	18.3	13	31	56	87				771.4	
										RESIDUAL	
										Brown-Tan Silty Fine SAND with Rock Fragment Lense at 19 ft	
								D			
	760.3	25.3	100/0.3			100/0.3				760.3	25.3
										WEATHERED ROCK	
	758.2	27.4	60/0.1			60/0.1				(Metamorphosed Granite)	27.4
										758.2	
										758.1	27.5
										CRYSTALLINE ROCK	
										(Metamorphosed Granite)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 758.1 ft in Crystalline Rock (Metamorphosed Granite)	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV12-C	**STATION** 431+27	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 5.5
COLLAR ELEV. 784.0 ft	**TOTAL DEPTH** 27.5 ft	**NORTHING** 871,636	**EASTING** 1,768,180	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE TRI0472 CME-850 88% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R.Toothman	**START DATE** 02/05/16	**COMP. DATE** 02/05/16	**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	
										784.0	0.0
										GROUND SURFACE	
	782.5	1.5	1	2	3	5				**ALLUVIAL**	
								Sat.		782.0	
	780.5	3.5								Orange- Brown Silty CLAY	2.0
			2	2	2	4		W		Orange-Gray Silty Fine to Coarse SAND	
										780.0	4.0
	777.6	6.4								Gray- Brown Silty CLAY with Trace of Organics	
			1	2	3	5		Sat.		777.0	7.0
	775.3	8.7								**RESIDUAL**	
			3	4	5	9		Sat.		775.5	8.5
										Orange SILT with Manganese	
										Gray-Tan Fine Sandy SILT	
	770.2	13.8	3	4	5	9				769.8	14.2
								W		Gray- Orange Fine Sandy SILT with Manganese and Trace of Mica and Rock Fragments	
	765.3	18.7	5	10	21	31		M			
										762.0	22.0
	760.7	23.3	65	35/0.1		100/0.6				**WEATHERED ROCK**	
										(Metamorphosed Granite)	
	756.6	27.4	60/0.1			60/0.1				756.6	27.4
										756.5	27.5
										CRYSTALLINE ROCK	
										(Metamorphosed Granite)	
										Boring Terminated with Standard Penetration Test Refusal at Elevation 756.5 ft in Crystalline Rock (Metamorphosed Granite)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV13-R	**STATION** 430+60	**OFFSET** 145 ft RT	**ALIGNMENT** -L-	**0 HR.** 6.0
COLLAR ELEV. 782.6 ft	**TOTAL DEPTH** 24.0 ft	**NORTHING** 871,795	**EASTING** 1,768,164	**24 HR.** 1.0
DRILL RIG/HAMMER EFF./DATE TRI0472 CME-850 88% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R.Toothman	**START DATE** 02/05/16	**COMP. DATE** 02/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
785										
	782.6									782.6 GROUND SURFACE 0.0
	781.5	1.1								**ALLUVIAL**
780			1	2	3	5		M		Gray Fine Sandy CLAY with Trace of Organics
	779.1	3.5								779.6 3.0
			3	3	3	6		M		**RESIDUAL**
	776.6	6.0								Tan Orange and Gray Clayey SILT with Trace of Mica
775			8	10	10	20		M		
	774.1	8.5								774.6 8.0
			5	5	8	13		M		Brown- Orange Fine Sandy SILT with Trace of Mica and Manganese
770	769.1	13.5								
			2	7	9	16		M		
765	764.1	18.5								764.1 18.5
			70/0.5	30/0.3		100/0.8				**WEATHERED ROCK** (Metamorphosed Granite)
760	759.3	23.3								
			64	36/0.2		100/0.7				758.6 24.0
										Boring Terminated at Elevation 758.6 ft in Weathered Rock (Metamorphosed Granite)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)

SITE DESCRIPTION CULVERT AT -L- 472+13 AT UNNAMED TRIBUTARY TO RICHLAND CREEK/LAKE

CONTENTS

CAUTION NOTICE

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

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

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

L. BUTLER

T. WILLIAMS

INVESTIGATED BY S&ME, Inc.

DRAWN BY T.T. WALKER, F&R, Inc.

CHECKED BY C.A. YOUNGBLOOD

SUBMITTED BY C.A. YOUNGBLOOD

DATE DECEMBER 2017

NORTH CAROLINA LICENSED SEAL 1959 GEOLOGIST CHERYL A. YOUNGBLOOD

DocuSigned by:
Cheryl A. Youngblood
B304AB5FC8F3424...
SIGNATURE

12/19/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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		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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

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: U2525C_LS_TIN_170816.tin 11/09/2017

ELEVATION: N/A FEET

NOTES:

FIAD-FILLED IMMEDIATELY AFTER DRILLING

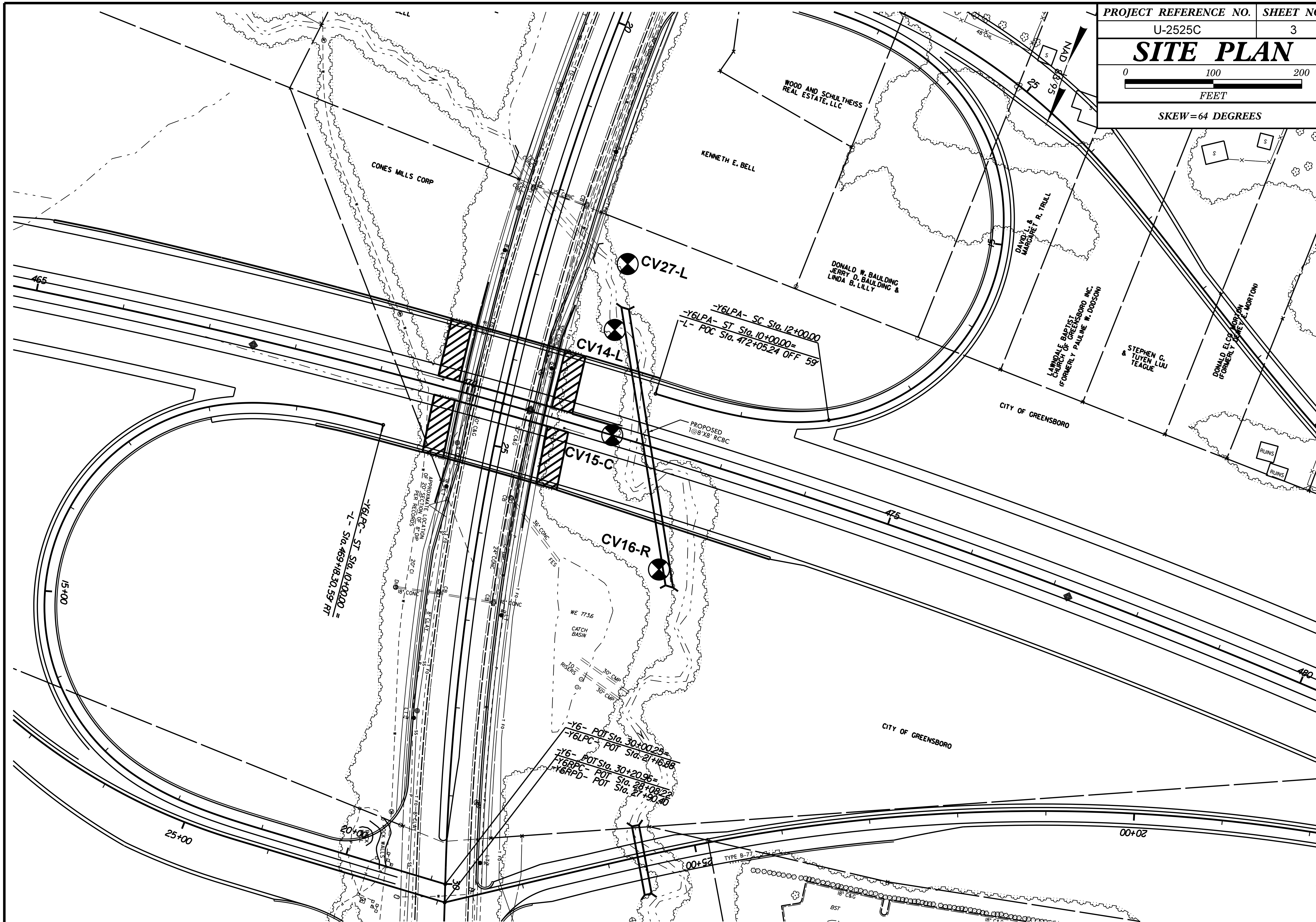
DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200
FEET

SKEW=64 DEGREES



PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

CULVERT PROFILE ALONG –L–
CROSS SECTION AT 472+13.00

SKEW=64 DEGREES

0 50 100
FEET
VE = 5:1

CV27–L
471+02
158' LT

CV14–L
471+41
115' LT

CV15–C
471+72
℄

CV16–R
472+68
130' RT

℄

800
790
780
770
760
750
740
730

Ground Surface

Alluvial:
Brown and Blue-Gray, Wet, Silty CLAY (A-7) with Rock Fragments, Trace Organics, Wood, and Gravel

Residual:
Stiff to Hard, Gray-Tan, Moist to Dry, Fine Sandy SILT (A-4)

Weathered Rock: (METAMORPHOSED DIORITE)

Crystalline Rock: (METAMORPHOSED DIORITE)

(A) Artificial Fill: Very Stiff, Brown, Wet, Silty CLAY (A-7) with Rip-Rap

(B) Residual: Stiff, Brown-Gray, Moist, Silty CLAY (A-7)

(C) Residual: Very Dense, Gray-Tan, Wet, Silty Fine SAND (A-2-4)

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09/27/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

300 250 200 150 100 50 0 50 100 150 200 250 300 350

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV27-L	**STATION** 22+93	**OFFSET** 65 ft LT	**ALIGNMENT** -Y6-	**0 HR.** 20.5
COLLAR ELEV. 780.0 ft	**TOTAL DEPTH** 23.0 ft	**NORTHING** 870,250	**EASTING** 1,764,455	**24 HR.** 5.6
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/02/16	**COMP. DATE** 02/02/16	**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										
780										780.0 GROUND SURFACE 0.0
	777.0	3.0	4	9	8	17		W		**ARTIFICIAL FILL** Brown Silty CLAY with Rip-Rap
775	773.8	6.2								774.5 5.5
	772.0	8.0	5	5	6	11		W		**ALLUVIAL** Brown Silty CLAY with Rock Fragments and Trace of Organics
770			4	6	7	13		M		771.0 9.0
	767.0	13.0								770.0 **RESIDUAL** 10.0
765			8	14	18	32		D		Brown-Gray Silty CLAY Tan-Gray Fine Sandy SILT with Manganese Seams
	762.0	18.0								
760			5	19	30	49		D		
	757.0	23.0								757.0 23.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 757.0 ft on Crystalline Rock (Metamorphosed Diorite)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV14-L	**STATION** 471+41	**OFFSET** 115 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.0
COLLAR ELEV. 776.0 ft	**TOTAL DEPTH** 6.2 ft	**NORTHING** 870,291	**EASTING** 1,764,413	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/03/16	**COMP. DATE** 02/03/16	**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
780										
775	775.0	1.0	1	1	2	3				776.0 GROUND SURFACE 0.0
	772.6	3.4	8	38	62/0.2					**ALLUVIAL** Brown Silty CLAY with Rock Fragments and Organics
770	769.8	6.2				100/0.7				772.1 3.9
			60/0.0			60/0.0				**WEATHERED ROCK** (Metamorphosed Diorite) 769.8 6.2
										Boring Terminated with Standard Penetration Test Refusal at Elevation 769.8 ft on Crystalline Rock (Metamorphosed Diorite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV15-C	**STATION** 471+72	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 5.3 Caved
COLLAR ELEV. 773.8 ft	**TOTAL DEPTH** 6.1 ft	**NORTHING** 870,404	**EASTING** 1,764,377	**24 HR.** 1.8
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/03/16	**COMP. DATE** 02/03/16	**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
775										ELEV. (ft) DEPTH (ft)
										773.8 GROUND SURFACE 0.0
	772.8	1.0	5	8	12	20				**ALLUVIAL** Brown-Gray Silty CLAY with Rock Fragments and Wood
770	770.2	3.6	8	34	66/0.2	100/0.7				769.7 4.1
	767.7	6.1	60/0.0			60/0.0				769.2 4.6 **RESIDUAL** Gray-Tan Silty Fine SAND 767.7 6.1
										WEATHERED ROCK (Metamorphosed Diorite)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 767.7 ft on Crystalline Rock (Metamorphosed Diorite)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV16-R	**STATION** 472+68	**OFFSET** 130 ft RT	**ALIGNMENT** -L-	**0 HR.** 3.5
COLLAR ELEV. 772.3 ft	**TOTAL DEPTH** 34.0 ft	**NORTHING** 870,530	**EASTING** 1,764,276	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 89% 1/15/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 02/04/16	**COMP. DATE** 02/04/16	**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
775										
										772.3 GROUND SURFACE 0.0
	771.2	1.1	3	3	4	7				**ALLUVIAL** Red-Brown Silty CLAY with Rock Fragments
770	768.6	3.7	2	2	2	4		W		767.6 4.7
	766.0	6.3	3	3	4	7		W		766.8 Blue-Gray Silty CLAY 5.5
765	763.6	8.7	3	5	6	11		M		Tan Silty CLAY with Gravel
	758.6	13.7	5	11	15	26		M		763.3 9.0 **RESIDUAL** Gray-Tan Fine Sandy SILT
760	753.6	18.7	3	5	9	14		M		
755	748.6	23.7	7	19	35	54		D		750.3 22.0 Tan-Gray Fine Sandy SILT
750	743.6	28.7	7	24	76/0.3	100/0.8				742.6 29.7 **WEATHERED ROCK** (Metamorphosed Diorite)
745	738.6	33.7	100/0.3			100/0.3				738.3 34.0 Boring Terminated at Elevation 738.3 ft in Weathered Rock (Metamorphosed Diorite)
740										

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	BORE LOGS

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *CULVERT AT -L- 493+43 OVER UT TO RICHLAND CREEK/LAKE*

CAUTION NOTICE

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

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

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

PERSONNEL

L. BUTLER

T. WILLIAMS

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *T.T. WALKER, F&R, Inc.*

CHECKED BY *C.M. BRUINSMA*

SUBMITTED BY *C.M. BRUINSMA*

DATE *DECEMBER 2017*

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA MICHELLE BRUINSMA

DocuSigned by:

12/15/2017

C6DB1C8A6D0F44A... SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-50
- [ ] _____

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: Boring elevations taken from u2525c_ls_tin file dated 4/2/2014

ELEVATION: N/A FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

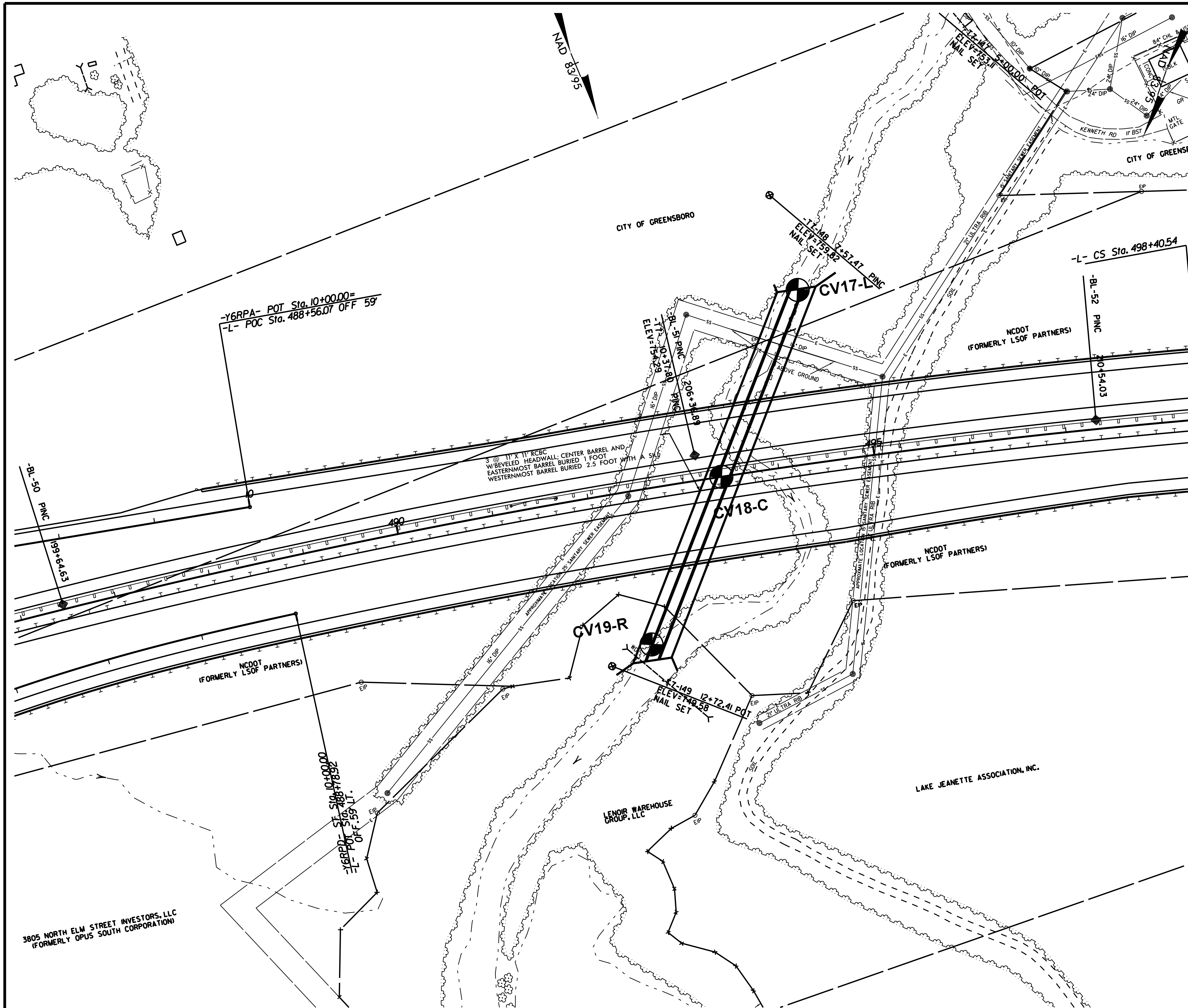
DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200
FEET

SKEW=120 DEGREES

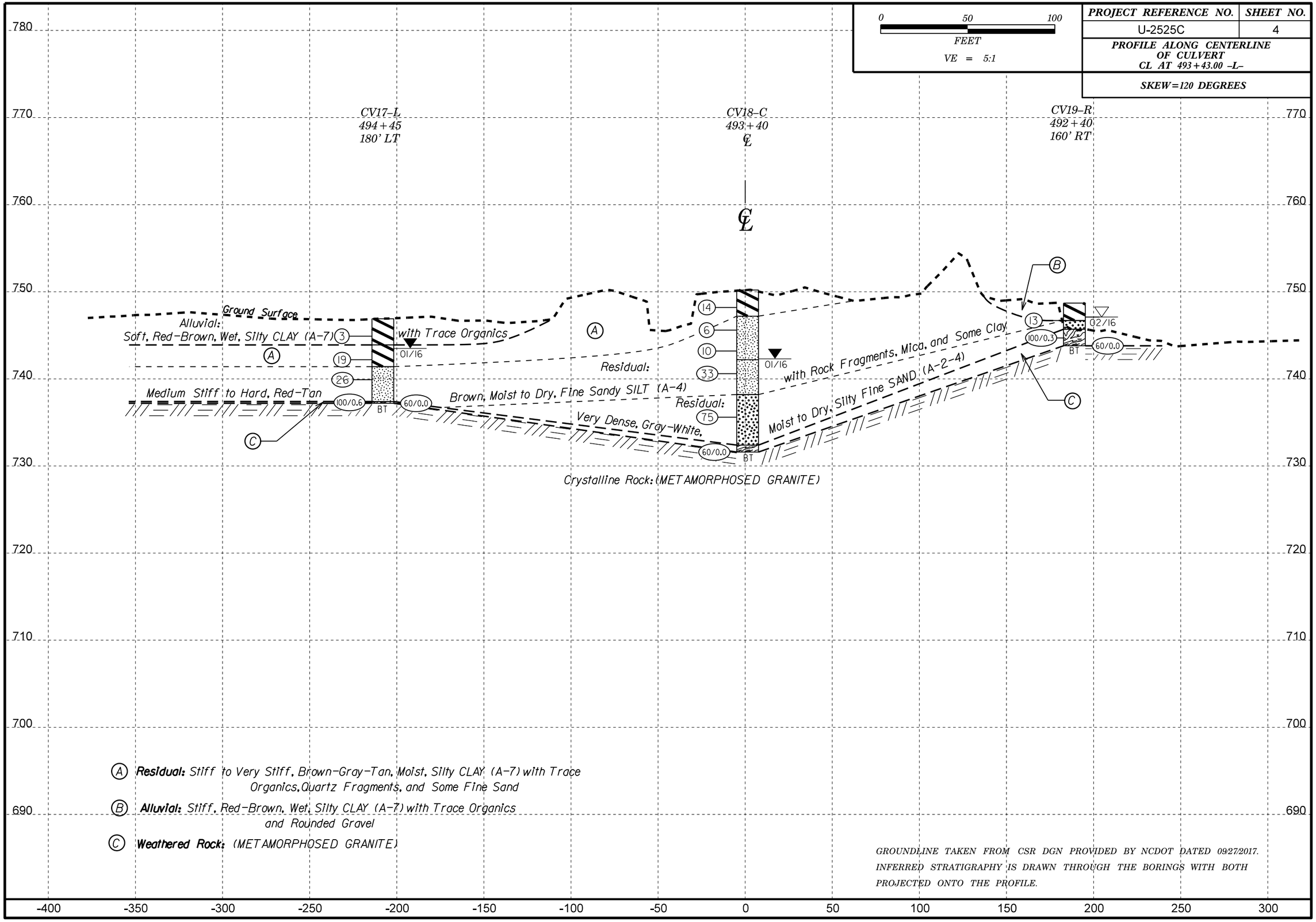


PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

PROFILE ALONG CENTERLINE OF CULVERT CL AT 493+43.00 –L–

SKEW=120 DEGREES

0 50 100
FEET
VE = 5:1



Ⓐ **Residual:** Stiff to Very Stiff, Brown–Gray–Tan, Moist, Silty CLAY (A–7) with Trace Organics, Quartz Fragments, and Some Fine Sand

Ⓑ **Alluvial:** Stiff, Red–Brown, Wet, Silty CLAY (A–7) with Trace Organics and Rounded Gravel

Ⓒ **Weathered Rock:** (METAMORPHOSED GRANITE)

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09/27/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS	TIP	COUNTY	GEOLOGIST	
34821.1.5	U-2525C	GUILFORD	Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV17-L	**STATION** 494+45	**OFFSET** 180 ft LT	**ALIGNMENT** -L-	**0 HR.** 4.1
COLLAR ELEV. 746.9 ft	**TOTAL DEPTH** 9.7 ft	**NORTHING** 870,470	**EASTING** 1,762,079	**24 HR.** 3.4
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 01/21/16	**COMP. DATE** 01/21/16	**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)
750										
	745.9	1.0								746.9 GROUND SURFACE 0.0
745			1	1	2	3		W		**ALLUVIAL** Red-Brown Silty CLAY with Trace of Organics (A-7) 743.9 3.0
	743.2	3.7	6	9	10	19		M		**RESIDUAL** Brown-Gray Silty CLAY with Trace of Organic, Quartz Fragments and Trace Fine Sand (A-7) 741.4 5.5
740	740.9	6.0	6	10	16	26		D		Gray-Brown Fine Sandy SILT with Trace Rock Fragments and Mica (A-4) 737.4 9.5
	738.4	8.5	29	35	65/0.1	100/0.6				**WEATHERED ROCK** (Metamorphosed Granite) 737.2 9.7
	737.2	9.7	60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 737.2 ft on Crystalline Rock (Metamorphosed Granite)

WBS	TIP	COUNTY	GEOLOGIST	
34821.1.5	U-2525C	GUILFORD	Wright, F.	
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)				**GROUND WTR (ft)**
BORING NO. CV18-C	**STATION** 493+40	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 750.2 ft	**TOTAL DEPTH** 18.6 ft	**NORTHING** 870,618	**EASTING** 1,762,227	**24 HR.** 7.9
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Bare	**START DATE** 01/21/16	**COMP. DATE** 01/21/16	**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
755										
750	749.2	1.0	4	6	8	14		M		750.2 GROUND SURFACE 0.0
	746.6	3.6	2	3	3	6		M		**RESIDUAL** Red-Tan Silty CLAY with Little Fine Sand (A-7) 747.2 3.0
745	744.2	6.0	4	5	5	10		D		Red-Tan and Brown Fine Sandy SILT with trace clay and rock fragments (A-4)
	741.6	8.6	5	12	21	33				738.2 12.0
740	736.6	13.6	42	31	44	75		D		Gray Silty Fine SAND (A-2-4)
735	731.6	18.6	60/0.0			60/0.0				732.4 17.8
										WEATHERED ROCK (Metamorphosed Granite) 731.6 18.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 731.6 ft on Crystalline Rock (Metamorphosed Granite)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.
SITE DESCRIPTION Greensboro Eastern Loop From US 29 North of Greensboro to East of SR 2303 (Lawndale Drive)			**GROUND WTR (ft)**
BORING NO. CV19-R	**STATION** 492+40	**OFFSET** 160 ft RT	**ALIGNMENT** -L-	**0 HR.** 1.6
COLLAR ELEV. 748.7 ft	**TOTAL DEPTH** 4.9 ft	**NORTHING** 870,750	**EASTING** 1,762,360	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SUM0093 DIEDRICH D-50 88% 11/05/2015		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic
DRILLER J. Bare	**START DATE** 01/19/16	**COMP. DATE** 01/19/16	**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
750										
	747.7	1.0								748.7 GROUND SURFACE 0.0
			2	3	10	13		W		**ALLUVIAL**
										746.7 Red-Brown Silty CLAY with Trace of Organics and Rounded Gravel (A-7) 2.0
745	745.0	3.7								745.7 3.0
	743.8	4.9	100/0.3			100/0.3				**RESIDUAL**
			60/0.0			60/0.0				743.8 Gray-White Silty Fine SAND (A-2-4) 4.9
										WEATHERED ROCK (Metamorphosed Grantite)
										Boring Terminated with Standard Penetration Test Refusal at Elevation 743.8 ft on Crystalline Rock (Metamorphosed Granite)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *CULVERT AT -Y6RPD- 25+62 AT UNNAMED TRIBUTARY AT RICHLAND CREEK/LAKE*

CONTENTS

CAUTION NOTICE

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

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

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

L. BUTLER

T. WILLIAMS

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *T.T. WALKER, F&R, Inc.*

CHECKED BY *C.M. BRUINSMA*

SUBMITTED BY *C.M. BRUINSMA*

DATE *DECEMBER 2017*

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA MICHELLE BRUINSMA

DocuSigned by:

12/22/2017

C6DB1CBA0D0F44A...

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [ ] AUTOMATIC [ ] MANUAL

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

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] HAND AUGER
- [X] 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: BORING ELEVATIONS TAKEN FROM U2525C_LS_TIN FILE DATED 4/2/2014

ELEVATION: N/A FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 100 200

FEET

SKEW = 92 DEGREES

CONES MILLS CORP

CITY OF GREENSBORO

3805 NORTH ELM STREET INVESTORS, LLC (FORMERLY OPUS SOUTH CORPORATION)

3803 NORTH ELM STREET INVESTORS, LLC

NAD 83/95

-L- Sta. 469+18.30.59' RT

-Y6LPC- ST Sta.10+00.00 =

-Y6- POT Sta. 30+00.29=

-Y6LPC- POT Sta. 2+16.88

-Y6- POT Sta. 30+20.96=

-Y6RPC- POT Sta. 28+08.22

-Y6RPD- POT Sta. 27+90.40

C3 Y6RPD

C2 Y6RPD

C1 Y6RPD

PROPOSED 6'8"X8' RCBC

TYPE R-7

NOTE: SHOWN PER RECORD I FD NO EVIDENCE OF CORNER COULD NOT BE LOCATED FOUND IN THE FIELD

APPROXIMATE LOCATION OF 20' PER RECORDS

HANDHOLE WITH FIBER/LINE NO INFORMATION NO RECORDS

8" DIP EXISTING 20' SANITARY SEWER EASEMENT

35' INGRESS EGRESS EASEMENT

RIP RAP

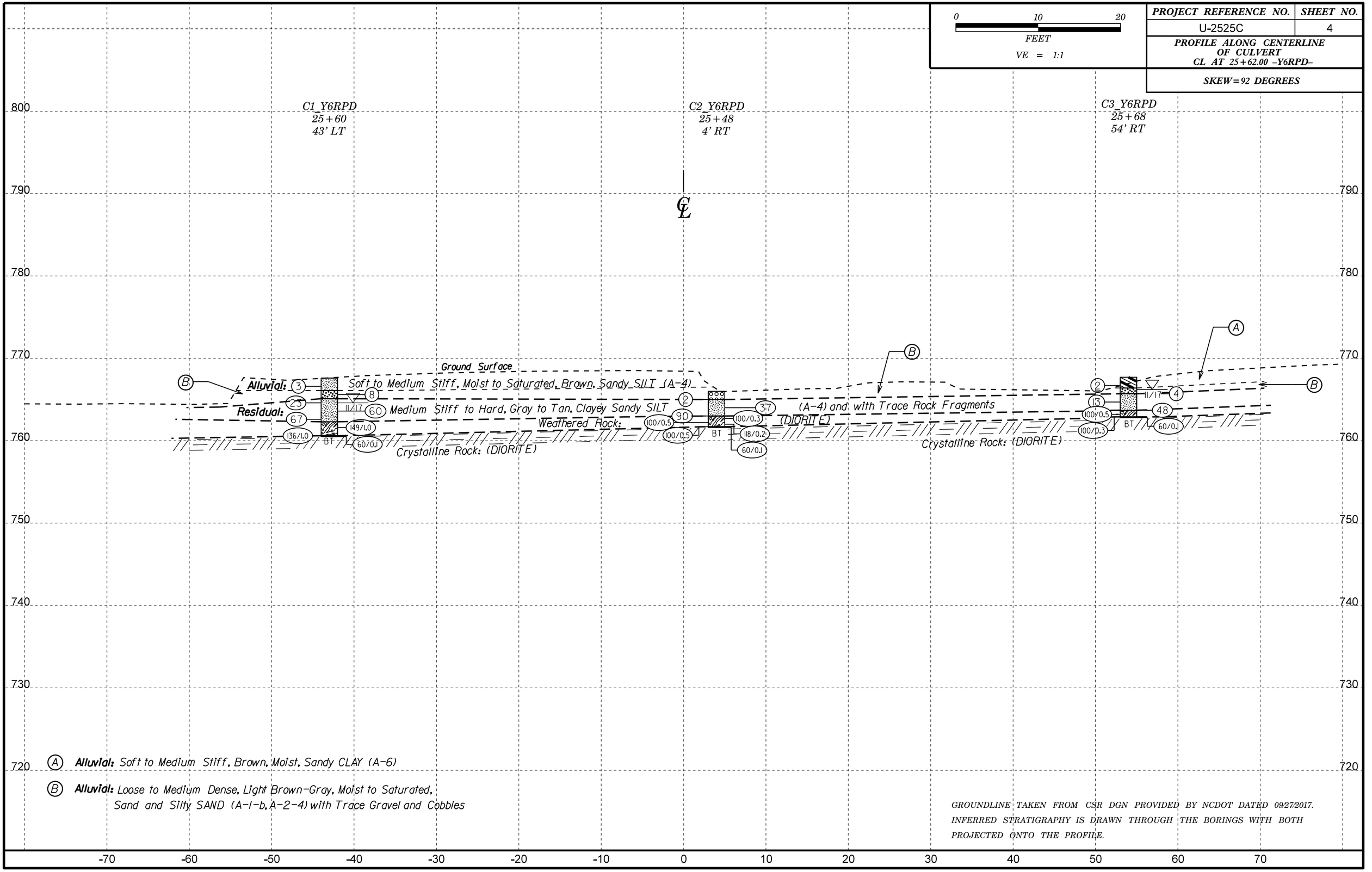
100L A. ALBRIGHT)

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

PROFILE ALONG CENTERLINE OF CULVERT CL AT 25+62.00 –Y6RPD–

SKEW=92 DEGREES

0 10 20
FEET
VE = 1:1



(A) **Alluvial:** Soft to Medium Stiff, Brown, Moist, Sandy CLAY (A-6)

(B) **Alluvial:** Loose to Medium Dense, Light Brown-Gray, Moist to Saturated, Sand and Silty SAND (A-1-b, A-2-4) with Trace Gravel and Cobbles

GROUNDLINE TAKEN FROM CSR DGN PROVIDED BY NCDOT DATED 09272017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT
BORE LOG

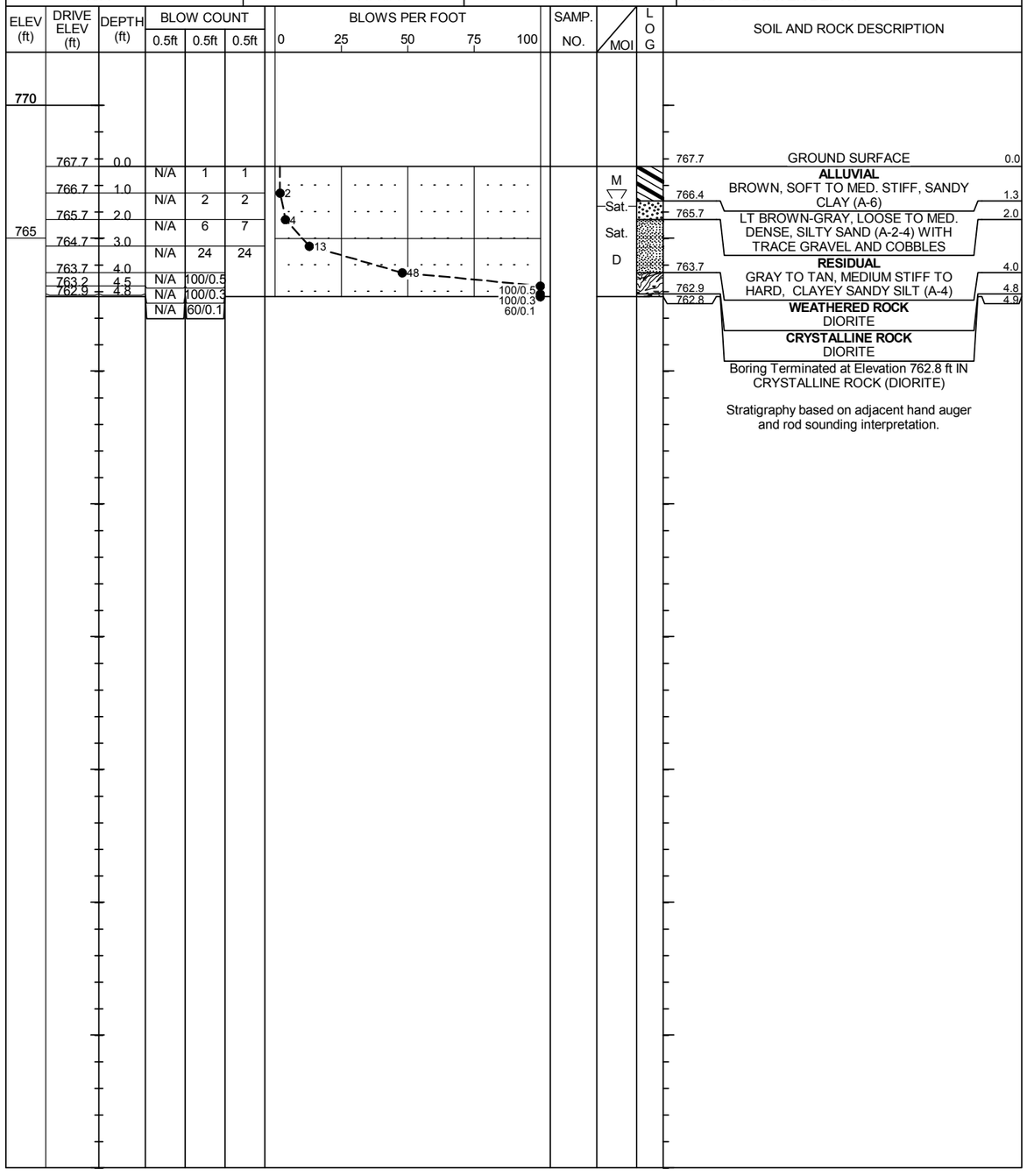
WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Dungan, F. M.	
SITE DESCRIPTION CULVERT AT 25+62 -Y6RPD- OVER UNNAMED TRIBUTARY TO RICHLAND CREEK/LAKE				**GROUND WTR (ft)**
BORING NO. C1_Y6RPD	**STATION** 25+60	**OFFSET** 43 ft LT	**ALIGNMENT** -Y6RPD-	**0 HR.** 3.0
COLLAR ELEV. 767.6 ft	**TOTAL DEPTH** 7.1 ft	**NORTHING** 870,879	**EASTING** 1,764,164	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Rod Sounding/Hand Auger	**HAMMER TYPE** Automatic	
DRILLER N/A	**START DATE** 11/13/17	**COMP. DATE** 11/13/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
770											
	767.6	0.0								767.6 GROUND SURFACE	0.0
	766.6	1.0	N/A	1	2	3 8		M		**ALLUVIAL** BROWN, SOFT TO MED. STIFF SANDY SILT (A-4)	
	765.6	2.0	N/A	4	4			Sat.		766.1	1.5
765	764.6	3.0	N/A	10	13	23				LT BROWN-GRAY, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL	
	763.6	4.0	N/A	30	30	60		M		765.1	2.5
	762.6	5.0	N/A	32	33	65		W		**RESIDUAL** GRAY TO TAN, MED. STIFF TO HARD, CLAYEY SANDY SILT (A-4) WITH TRACE ROCK FRAGMENTS	
	761.6	6.0	149/1.0			149/1.0				762.3	5.3
	760.6	7.0	136/1.0			136/1.0				**WEATHERED ROCK** DIORITE	
			60/0.1			60/0.1				760.6	7.0
										760.5 **CRYSTALLINE ROCK** DIORITE	7.1
										Boring Terminated at Elevation 760.5 ft IN CRYSTALLINE ROCK (DIORITE)	
										Stratigraphy based on adjacent hand auger and rod sounding interpretation.	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Dungan, F. M.	
SITE DESCRIPTION CULVERT AT 25+62 -Y6RPD- OVER UNNAMED TRIBUTARY TO RICHLAND CREEK/LAKE				**GROUND WTR (ft)**
BORING NO. C2_Y6RPD	**STATION** 25+48	**OFFSET** 4 ft RT	**ALIGNMENT** -Y6RPD-	**0 HR.** N/A
COLLAR ELEV. 766.0 ft	**TOTAL DEPTH** 4.4 ft	**NORTHING** 870,833	**EASTING** 1,764,178	**24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Rod Sounding	**HAMMER TYPE** Automatic	
DRILLER N/A	**START DATE** 11/13/17	**COMP. DATE** 11/13/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
770										
	766.0	0.0								766.0 GROUND SURFACE 0.0
			N/A	4	4	8		Sat.		**ALLUVIAL**
765	765.0	1.0								765.0 LT BROWN-GRAY, LOOSE, SILTY, GRAVELLY, SAND (A-1) WITH COBBLES 1.0
	764.0	2.0	N/A	18	19	37		M		**RESIDUAL**
			N/A	45	45					GRAY TO TAN, STIFF TO HARD, SANDY SILT (A-4)
	763.0	3.0				90				763.0 3.0
	762.7	3.3	100/0.3			100/0.3				**WEATHERED ROCK**
	762.2	3.8	100/0.5			100/0.5				DIORITE
	762.0	4.0	118/0.2			118/0.2				761.7 4.3
	761.7	4.3	100/0.3			100/0.3				761.6 **CRYSTALLINE ROCK** DIORITE 4.4
			60/0.1			60/0.1				Boring Terminated at Elevation 761.6 ft IN CRYSTALLINE ROCK (DIORITE)
										Stratigraphy based on rod sounding interpretation and conditions at C1 and C3.

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Dungan, F. M.
SITE DESCRIPTION CULVERT AT 25+62 -Y6RPD- OVER UNNAMED TRIBUTARY TO RICHLAND CREEK/LAKE			**GROUND WTR (ft)**
BORING NO. C3_Y6RPD	**STATION** 25+68	**OFFSET** 54 ft RT	**ALIGNMENT** -Y6RPD- **0 HR.** 1.5
COLLAR ELEV. 767.7 ft	**TOTAL DEPTH** 4.9 ft	**NORTHING** 870,801	**EASTING** 1,764,222 **24 HR.** N/A
DRILL RIG/HAMMER EFF./DATE N/A		**DRILL METHOD** Rod Sounding/Hand Auger	**HAMMER TYPE** Automatic
DRILLER N/A	**START DATE** 11/13/17	**COMP. DATE** 11/13/17	**SURFACE WATER DEPTH** N/A



REFERENCE: U-2525C

PROJECT: 34821

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	6

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *RETAINING WALL NO. 1 -Y6RPD- STATION 22+74.50 TO 24+45.00*

CONTENTS

CAUTION NOTICE

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

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NOTES:
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

M. L. HARTMAN

A. KINTNER, GIT

R. CLARKE

D. PINTER

INVESTIGATED BY *M. L. HARTMAN*

DRAWN BY *C. BRUINSMA, LG*

CHECKED BY *C. YOUNGBLOOD, LG*

SUBMITTED BY *C. YOUNGBLOOD, LG*

DATE *JANUARY 2018*

NORTH CAROLINA LICENSED SEAL 2031 GEOLOGIST CHRISTINA MICHELLE BRUINSMA

DocuSigned by:

C6DB1CBA0D0F44A...

1/9/2018

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	
	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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

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

MISCELLANEOUS SYMBOLS

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

RECOMMENDATION SYMBOLS

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

ABBREVIATIONS

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

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] 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: BORING ELEVATIONS TAKEN FROM U2525C_LS_TIN FILE
DATED 11/22/2017
ELEVATION: N/A FEET

NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

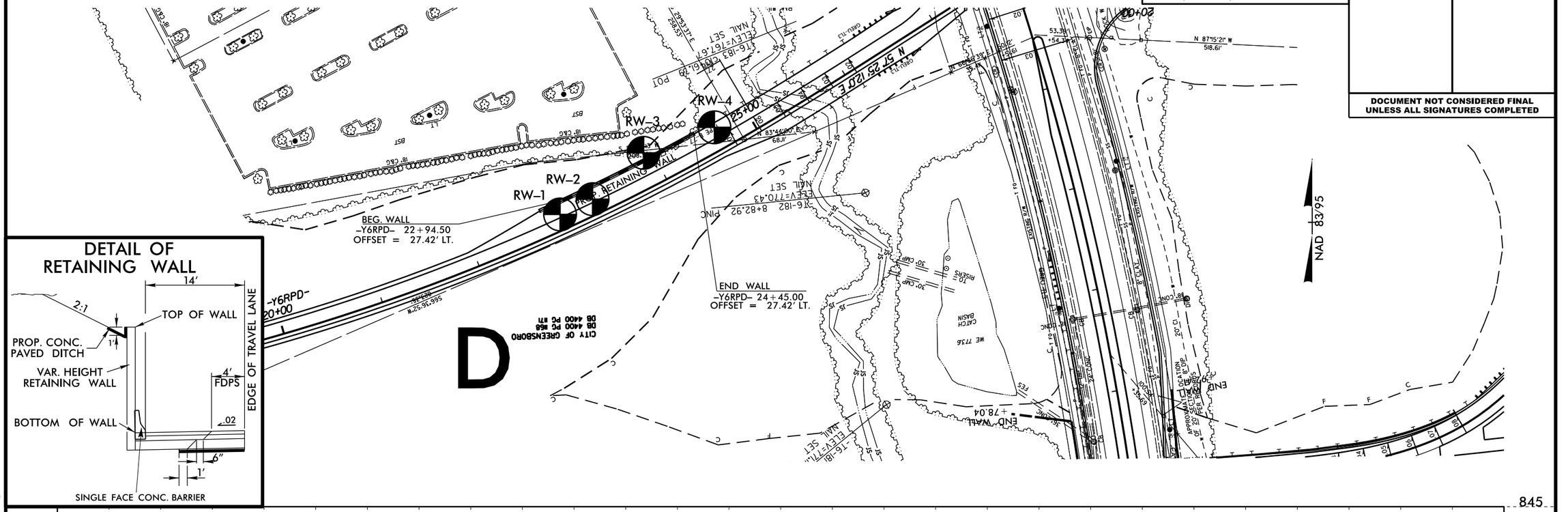
DATE: 8-15-14

PRELIMINARY PLAN OF RETAINING WALL NO. 1 –Y6RPD–

WETHERILL ENGINEERING
1223 Jones Franklin Rd.
Raleigh, N.C. 27606
License No. F-0377
Bus: 919 851 8077
Fax: 919 851 8107
TRANSPORTATION PLANNING/DESIGN - BRIDGE/STRUCTURE DESIGN
CIVIL/SITE DESIGN - GIS/GPS - CONSTRUCTION OBSERVATION

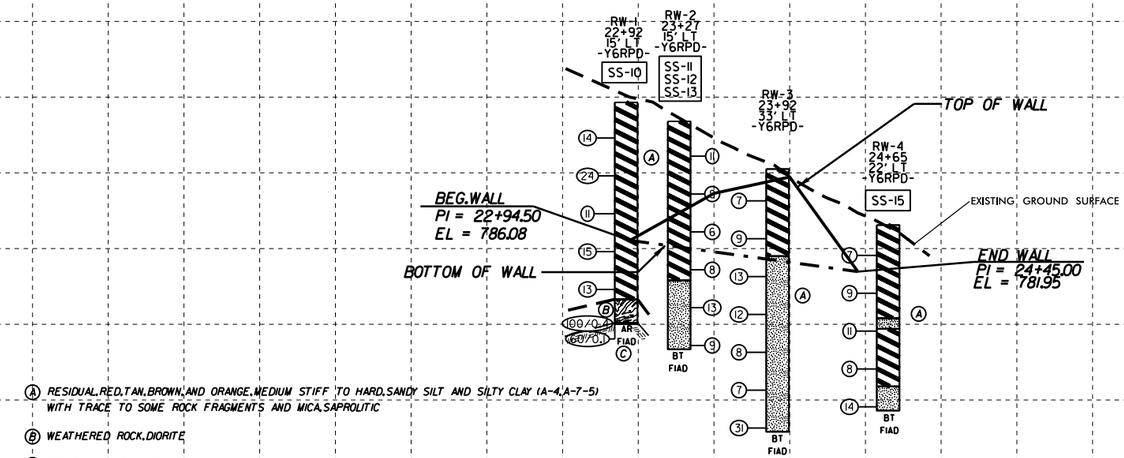
PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



DETAIL OF RETAINING WALL

RETAINING WALL NO. 1 –Y6RPD–



(A) RESIDUAL, RED, TAN, BROWN, AND ORANGE, MEDIUM STIFF TO HARD, SANDY SILT AND SILTY CLAY (A-4, A-7-5) WITH TRACE TO SOME ROCK FRAGMENTS AND MICA, SAPROLITIC

(B) WEATHERED ROCK, DIORITE

(C) CRYSTALLINE ROCK, DIORITE

REVISIONS

8/17/99

08-JAN-2018 17:06
\\Contracts\Investigations\TIP\U2525C_GEO_RETWALL_Y6RPD\CADD_GEOTECH\Site&Sub\u2525c_GEO_pf1_y6rpdwall.dgn
$$$$USERNAME$$$$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Hartman, M. L.	
SITE DESCRIPTION Retaining Wall No. 1, -Y6RPD-, Station 22+74.50 To 24+45.00				**GROUND WTR (ft)**
BORING NO. RW-1	**STATION** 22+92	**OFFSET** 15 ft LT	**ALIGNMENT** -Y6RPD-	**0 HR.** Dry
COLLAR ELEV. 804.3 ft	**TOTAL DEPTH** 29.3 ft	**NORTHING** 870,750	**EASTING** 1,763,935	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Clarke, R.	**START DATE** 12/14/17	**COMP. DATE** 12/14/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
805										804.3 GROUND SURFACE 0.0
										RESIDUAL Red-brown silty clay (A-7-5) (trace to some rock fragments)
800	800.6	3.7	3	6	8	14		M		
795	795.6	8.7	5	9	15	24	SS-10	D		
790	790.6	13.7	7	5	6	11		D		
785	785.6	18.7	6	6	9	15		D		
780	780.6	23.7	7	6	7	13		D		778.3 26.0 **WEATHERED ROCK** Diorite
775	775.6	28.7	100/0.4			100/0.4				775.2 29.1
	775.1	29.2	60/0.1			60/0.1				775.0 **CRYSTALLINE ROCK** Diorite 29.3
										Boring Terminated with Standard Penetration Test Refusal at Elevation 775.0 ft in crystalline rock (diorite)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Hartman, M. L.	
SITE DESCRIPTION Retaining Wall No. 1, -Y6RPD-, Station 22+74.50 To 24+45.00				**GROUND WTR (ft)**
BORING NO. RW-2	**STATION** 23+27	**OFFSET** 15 ft LT	**ALIGNMENT** -Y6RPD-	**0 HR.** Dry
COLLAR ELEV. 801.8 ft	**TOTAL DEPTH** 30.1 ft	**NORTHING** 870,743	**EASTING** 1,763,976	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 12/15/17	**COMP. DATE** 12/15/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
805										
										801.8 GROUND SURFACE 0.0
										RESIDUAL Dark red and brown, to tan, orange, and grey silty clay (A-7-5)
800	798.2	3.6	5	5	6	11	SS-11	M		
795	793.2	8.6	4	4	4	8		M		
790	788.2	13.6	3	3	3	6	SS-12	M		
785	783.2	18.6	2	4	4	8		M		
780	778.2	23.6	4	5	8	13	SS-13	M		780.8 21.0
775	773.2	28.6	3	4	5	9		M		**RESIDUAL** Grey, orange, black, and tan sandy silt (A-4)
										771.7 30.1
										Boring Terminated at Elevation 771.7 ft in sandy silt (residual)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Hartman, M. L.	
SITE DESCRIPTION Retaining Wall No. 1, -Y6RPD-, Station 22+74.50 To 24+45.00				**GROUND WTR (ft)**
BORING NO. RW-3	**STATION** 23+92	**OFFSET** 33 ft LT	**ALIGNMENT** -Y6RPD-	**0 HR.** Dry
COLLAR ELEV. 795.5 ft	**TOTAL DEPTH** 34.7 ft	**NORTHING** 870,789	**EASTING** 1,764,026	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 12/15/17	**COMP. DATE** 12/15/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
800										
795										795.5 GROUND SURFACE 0.0 **RESIDUAL** Light brown to orange silty clay (A-7-5) with trace roots
	792.3	3.2	3	3	4	7		M		
790	787.3	8.2	3	4	5	9		M		
785	782.3	13.2	3	6	7	13		M		784.0 11.5 **RESIDUAL** Brown, grey, tan, and white sandy silt (A-4), saprolitic, with trace to some mica
780	777.3	18.2	3	5	7	12		M		
775	772.3	23.2	3	4	4	8		M		
770	767.3	28.2	2	3	4	7		W		
765	762.3	33.2	6	13	18	31		M		760.8 34.7 Boring Terminated at Elevation 760.8 ft in sandy silt (residual)

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Hartman, M. L.	
SITE DESCRIPTION Retaining Wall No. 1, -Y6RPD-, Station 22+74.50 To 24+45.00				**GROUND WTR (ft)**
BORING NO. RW-4	**STATION** 24+65	**OFFSET** 22 ft LT	**ALIGNMENT** -Y6RPD-	**0 HR.** Dry
COLLAR ELEV. 788.1 ft	**TOTAL DEPTH** 24.5 ft	**NORTHING** 870,813	**EASTING** 1,764,094	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 12/15/17	**COMP. DATE** 12/15/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
790										788.1 GROUND SURFACE 0.0 **RESIDUAL** Light brown-orange silty clay (A-7-5), trace to some mica
785	785.1	3.0	2	3	4	7		D		
780	780.1	8.0	2	4	5	9		M		775.8 12.3 **RESIDUAL** Grey, black, and white sandy silt (A-4), saprolitic 774.4 13.7
775	775.1	13.0	6	6	5	11		M		**RESIDUAL** Brown, grey, orange, and black silty clay (A-7-5) with trace mica and trace rock fragments
770	770.1	18.0	3	3	5	8		M		766.8 21.3 **RESIDUAL** Dark grey, orange, and tan sandy silt (A-4), trace mica
765	765.1	23.0	2	5	9	14	SS-15	M		763.6 24.5 Boring Terminated at Elevation 763.6 ft in sandy silt (residual) Top 0.5' topsoil

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	**28' LT**	**22+75**	**9.2-10.2**	**A-7-5(17)**	**55**	**15**	**6.3**	**15.8**	**33.3**	**44.6**	**100**	**97**	**84**	**-**	**-**
SS-11	**28' LT**	**23+25**	**4.1-5.1**	**A-7-5(24)**	**58**	**20**	**2.8**	**12.2**	**36.4**	**48.6**	**100**	**98**	**92**	**-**	**-**
SS-12	**28' LT**	**23+25**	**14.1-15.1**	**A-7-5(14)**	**51**	**12**	**2.4**	**21.5**	**39.6**	**36.5**	**100**	**99**	**86**	**-**	**-**
SS-13	**28' LT**	**23+25**	**24.1-25.1**	**A-4(0)**	**-**	**-**	**2.0**	**33.4**	**46.3**	**18.2**	**100**	**99**	**81**	**-**	**-**
SS-15	**27' LT**	**24+50**	**23.5-24.5**	**A-4(0)**	**-**	**-**	**17.0**	**42.6**	**30.3**	**10.1**	**99**	**89**	**56**	**-**	**-**