REFERENCE: U-5760

PROJECT: 46381

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5760	1	11

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY FORSYTH

PROJECT DESCRIPTION BRIDGE ON BIG MILL FARM ROAD OVER US 421 /I-40 BUS /NC 150 BETWEEN SR 4315 AND SR 2649

SITE DESCRIPTION BRIDGE NO. 751 AT STA. 27+37.26 -L- ON BIG MILL FARM ROAD OVER US 421 /I-40 BUS /NC 150

CONTENTS

CAUTION NOTICE

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DATE APRIL 2021

NORTH CAROLINA LICENSED SEAL 1506 GEOLOGIST CHARLES R. LAVENDER, III

DocuSigned by:
4/13/2021
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PROJECT REFERENCE NO.	SHEET NO.
U-5760	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
- [X] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N NWL-2

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: W. P. #2 ESTABLISHED BY NCDOT LOCATION AND SURVEY UNIT

ELEVATION: 913.86 FEET

NOTES:

COLLAR ELEVATIONS FOR BORINGS EBI-A, EBI-B, EB2-A, EB2-B OBTAINED FROM TIN FILE U5760_LS_TIN.TIN DATED 07/31/2018

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-5760	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

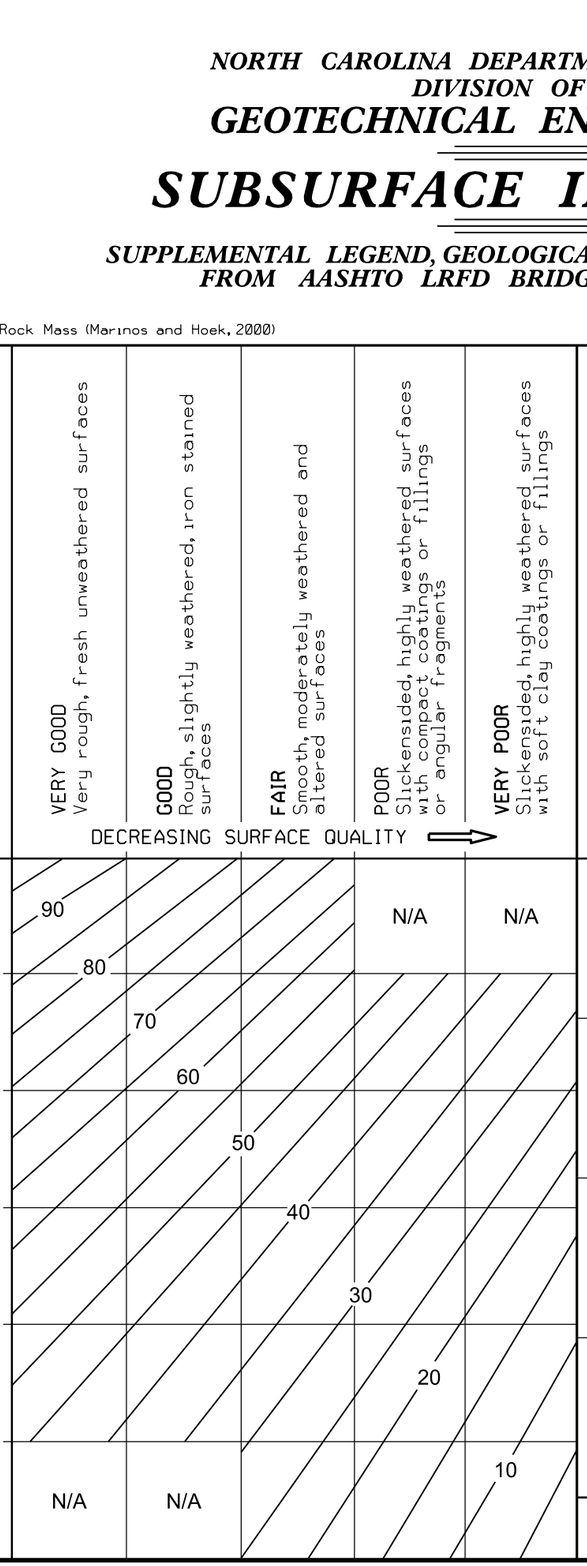
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

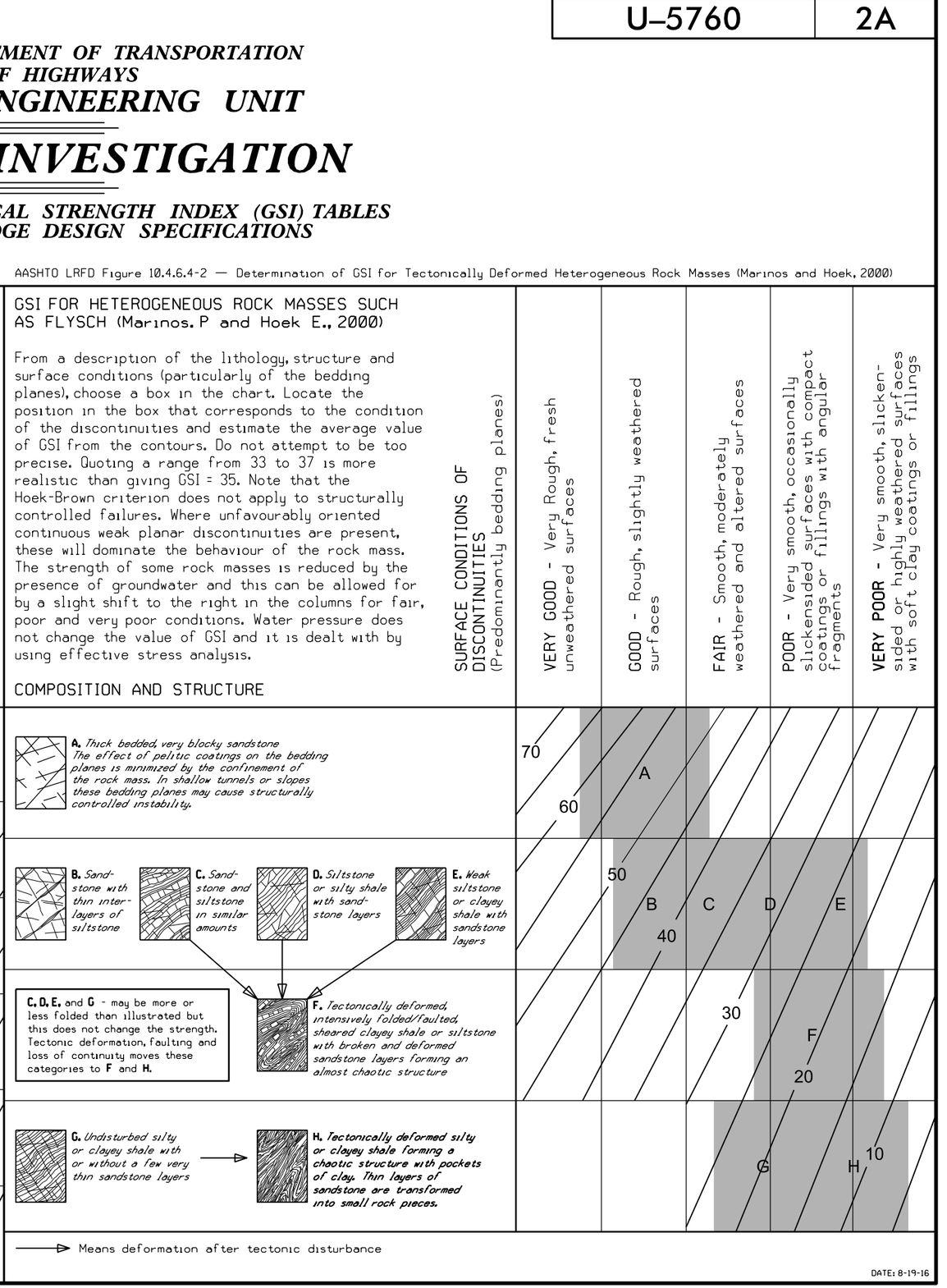


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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
U-5760	3

SITE PLAN

0 50 100

FEET

SKEW = 90°

-YILPB- SC Sta. 12+00.00

-YILPB- TS Sta. 10+00.00 =
-YI- POT 54+69.81 (51' LT)

55+00

-L-
BIG MILL FARM RD
N 4° 26' 14.2" E

EXIST R/W

CONCRETE

WOODS

EB2-A

EB2-B

-YILPB-

-BL- 106

-YI-
US 421/I-40 BUS/NC 150

TO WINSTON-SALEM

R/W VARIES

48" WW & ISBW

JS MIT

8" DIP

B1-A B1-C B1-B

EB1-B

EB1-A

U/C

VAR. SOIL

-YILPD- SC Sta. 12+00.00

TO GREENSBORO

-YILPD- TS Sta. 10+00.00 =
-YI- POT Sta. 56+51.05 (51' RT)

-YILPD-

-BL- 105

-L- POT Sta. 27+37.26 =
-YI- POT Sta. 55+70.00
△ = 90°

-L- PT Sta. 26+05.74

25+00

0 10 20 FEET	PROJECT REFERENCE NO.	SHEET
	U–5760	4
	SECTION THROUGH END BENT 1 STA. 26+54.51 –L– SKEW = 90° V. E. = 1:1	

–L–

930 920 910 900 890 880 870 860

EB1–A
26+50 –L–
59.0 LT

7
6
4
8
23

ARTIFICIAL FILL
Brown, silty clayey fine SAND, trace mica

RESIDUAL
Orange-tan-white to brown-white-tan, fine sandy SILT, little mica

EXISTING GROUND

100/0.4

60/0.0

WEATHERED ROCK (GRANITE)

AR
DRY
0619

CRYSTALLINE ROCK
(GRANITE)

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

NOTES:

GROUNDLINE TAKEN FROM .TIN FILE DATED 07/31/2018

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

PROJECT REFERENCE NO.	SHEET
U-5760	5

SECTION THROUGH BENT 1
STA. 27+37.26 -L-
SKEW = 90° V.E. = 1:1

0 10 20
FEET

-L-

930 920 910 900 890 880 870 860 850

B1-A
27+26 -L-
30.0 LT

B1-C
27+26 -L-
C/L

B1-B
27+25 -L-
30.0 RT

EXISTING GROUND

ROADWAY EMBANKMENT
Tan to Brown, Silty Clayey SAND, Trace Mica

ALLUVIAL
Red to Brown, Silty CLAY, Trace Mica, with alternating layers of Tan to Brown, Clayey, Silty SAND, Trace Mica

RESIDUAL
Red to Orange, Fine Sandy Silty CLAY

WEATHERED ROCK
Black, White and Gray (BIOTITE GNEISS and SCHIST)

CRYSTALLINE ROCK
(BIOTITE GNEISS and GRANITE)

ROADWAY EMBANKMENT
Tan, Brown, Silty Clayey SAND, Trace to Little Mica

Red, Brown Silty CLAY, Trace to Little Mica Interlayered with Tan, Brown, Clayey Silty SAND, Trace to Little Mica

Brown, Gray, CLAY, Interlayered with Red, Orange, Fine Sandy Silty CLAY

ALLUVIAL

RESIDUAL
Brown, Gray CLAY, (Note 23.2 ft. to 32 ft., alternating layers of soft and hard material)

WEATHERED ROCK
Gray, Black (BIOTITE GNEISS/GRANITE)

CRYSTALLINE ROCK
Gray, Black and White BIOTITE GNEISS
REC = 91%
RQD = 70%
GSI 80 - 85%

Gray and White GRANITE
REC = 87%
RQD = 87%
GSI 85 - 90%

ROADWAY EMBANKMENT
Tan to Brown, Silty Clayey SAND, Trace Mica

RESIDUAL
Red to Orange, Fine Sandy Silty CLAY

WEATHERED ROCK
Gray to White, (BIOTITE GNEISS and SCHIST)

CRYSTALLINE ROCK
(BIOTITE GNEISS and SCHIST)

BT FIAD 08/20

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

NOTES:

GROUNDLINE TAKEN FROM .TIN FILE DATED 07/31/2018.

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

PROJECT REFERENCE NO.	SHEET
U-5760	6

SECTION THROUGH END BENT 2
STA. 28+20.01 -L-
SKEW = 90° V.E. = 1:1

0 10 20
FEET

-L-

940 930 920 910 900 890 880 870 860

EB2-A
28+50 -L-
59.0 LT

(8) RESIDUAL Brown-red, silty CLAY, trace mica

(11) Red-brown, fine sandy SILT, little mica

(15) Brown, silty SAND, saprolitic

100/0.6 WEATHERED ROCK

60/0.0 GRANITE

AR
DRY
06/19

CRYSTALLINE ROCK
GRANITE

EXISTING GROUND

EB2-B
28+50 -L-
59.0 RT

(3) RESIDUAL Brown, fine to coarse sandy silty CLAY

(11) Red-brown, fine sandy SILT, trace mica, trace organics, saprolitic

(8) Brown, silty fine SAND, trace mica, saprolitic

(12) 60/0.0 CRYSTALLINE ROCK
GRANITE

AR
DRY
06/19

70 60 50 40 30 20 10 0 10 20 30 40 50 60 70

NOTES:

GROUNDLINE TAKEN FROM .TIN FILE DATED 07/31/2018

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** M. Metry	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 26+50	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 906.0 ft	**TOTAL DEPTH** 24.7 ft	**NORTHING** 861,277	**EASTING** 1,672,787	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. White	**START DATE** 06/17/19	**COMP. DATE** 06/17/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
910										
905	906.0	0.0	2	3	4	7		M		906.0 GROUND SURFACE 0.0 **ARTIFICIAL FILL** Brown, silty clayey fine SAND, trace mica
900	901.9	4.1	3	3	3	6		M		
895	896.9	9.1	4	2	2	4		M		898.0 8.0 **RESIDUAL** Orange-tan-white to brown-white-tan, fine sandy SILT, little mica
890	891.9	14.1	2	3	5	8		M		
885	886.9	19.1	11	15	8	23		M		
	881.9	24.1	100/0.4			100/0.4				881.9 24.1 881.3 24.7 **WEATHERED ROCK** GRANITE Boring Terminated by Auger Refusal at Elevation 881.3 ft on Crystalline Rock: GRANITE
	881.3	24.7	60/0.0			60/0.0				

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 (ELEV. (ft) / DEPTH (ft))
920										
	918.0	0.0	1	1	1	2		M		918.0 GROUND SURFACE 0.0 **ARTIFICIAL FILL** Tan-brown, silty clayey fine SAND 2.0
915	913.8	4.2	5	9	13	22		M		916.0 White-black-red, silty fine to coarse SAND
	910.3	7.7	60/0.0			60/0.0				910.3 7.7 Boring Terminated by Auger Refusal at Elevation 910.3 ft on Crystalline Rock: GRANITE

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** M. Metry	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 26+90	**OFFSET** 59 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 918.0 ft	**TOTAL DEPTH** 7.7 ft	**NORTHING** 861,308	**EASTING** 1,672,908	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 88% 08/10/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. White	**START DATE** 06/17/19	**COMP. DATE** 06/17/19	**SURFACE WATER DEPTH** N/A	

NCDOT BORE DOUBLE U5760_GEO_BRDG0751_FORSYTH.GPJ NC_DOT.GDT 4/7/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 27+26	**OFFSET** 30 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 916.2 ft	**TOTAL DEPTH** 45.4 ft	**NORTHING** 861,351	**EASTING** 1,672,822	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 08/26/20	**COMP. DATE** 08/26/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
920										
	916.2	0.0								GROUND SURFACE 0.0
915										**ROADWAY EMBANKMENT** Tan to Brown, Silty Clayey SAND, Trace Mica
	911.2	5.0	3	4	5	9		M		
910	908.2	8.0	4	4	6	10		M		
905	903.2	13.0	3	2	5	7		M		903.2 13.0 **ALLUVIAL** Red to Brown, Silty CLAY, Trace Mica, with alternating layers of Tan to Brown, Clayey, Silty SAND, Trace Mica
900	898.2	18.0	3	3	2	5		M		898.2 18.0 **RESIDUAL** Red to Orange, Fine Sandy Silty CLAY
895	893.2	23.0	11	57	43/0.4	100/0.9				892.7 23.5 **WEATHERED ROCK** Black, White and Gray (BIOTITE GNEISS and SCHIST)
890	888.2	28.0	17	83/0.3		100/0.8				
885										883.2 33.0 **CRYSTALLINE ROCK** (BIOTITE GNEISS and SCHIST)
880	880.9	35.3	60/0.1			60/0.1				
875	875.9	40.3	60/0.1			60/0.1				
	870.9	45.3	60/0.1			60/0.1				870.8 45.4 Boring Terminated at Elevation 870.8 ft in CRYSTALLINE ROCK (BIOTITE GNEISS/GRANITE)

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 27+25	**OFFSET** 30 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 917.5 ft	**TOTAL DEPTH** 50.4 ft	**NORTHING** 861,345	**EASTING** 1,672,882	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 08/26/20	**COMP. DATE** 08/26/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
920										
										917.5 GROUND SURFACE 0.0
915										**ROADWAY EMBANKMENT** Tan to Brown, Silty Clayey SAND, Trace Mica
	914.5	3.0	4	4	5	9		M		
910	909.5	8.0	3	4	9	13		M		
905	904.5	13.0	2	2	3	5		M		904.5 13.0 **RESIDUAL** Red to Orange, Fine Sandy Silty CLAY
900	899.5	18.0	5	5	8	13		M		
895	894.5	23.0	5	6	8	14		D		
890	889.5	28.0	5	37	63/0.3	100/0.8				889.0 28.5 **WEATHERED ROCK** Gray to White, (BIOTITE GNEISS and SCHIST)
885	884.5	33.0	69	31/.1		100/0.6				
880	877.2	40.3	60/0.1			60/0.1				880.5 37.0 **CRYSTALLINE ROCK** (BIOTITE GNEISS and SCHIST)
875	872.2	45.3	60/0.1			60/0.1				
870	867.2	50.3	60/0.1			60/0.1				867.1 50.4 Boring Terminated at Elevation 867.1 ft in CRYSTALLINE ROCK (BIOTITE GNEISS/GRANITE)

NCDOT BORE DOUBLE U5760_GEO_BRDG0751_FORSYTH.GPJ NC_DOT.GDT 4/7/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 27+26	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 917.0 ft	**TOTAL DEPTH** 57.6 ft	**NORTHING** 861,348	**EASTING** 1,672,852	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 08/25/20	**COMP. DATE** 08/25/20	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
920										917.0 GROUND SURFACE	0.0
915										**ROADWAY EMBANKMENT** Tan, Brown, Silty Clayey SAND, Trace to Little Mica	
910	912.0	5.0	4	5	6	11		M			
905	907.0	10.0	3	4	5	9		M		908.5 Red, Brown Silty CLAY, Trace to Little Mica interlayered with Tan, Brown, Clayey Silty SAND, Trace to Little Mica	8.5
900	902.0	15.0	2	3	3	6		W		904.8 **ALLUVIAL** Brown, Gray, CLAY, interlayered with Red, Orange, Fine Sandy Silty CLAY	12.2
895	897.0	20.0	35	16	12	28		W		902.0 **RESIDUAL** Brown, Gray CLAY, (Note 23.2 ft. to 32 ft., alternating layers of soft and hard material)	15.0
890	892.0	25.0	4	5	6	11		W			
885	887.0	30.0	7	7	11	18		W		885.0 **WEATHERED ROCK** Gray, Black (BIOTITE GNEISS/GRANITE)	32.0
880	882.0	35.0	100/0.3			100/0.3				879.2 **CRYSTALLINE ROCK** Gray, Black and White BIOTITE GNEISS REC = 91% RQD = 70% GSI 80 - 85%	37.8
875											
870										869.4 Gray and White GRANITE REC = 87% RQD = 87% GSI 85 - 90%	47.6
865											
860										859.4 Boring Terminated at Elevation 859.4 ft in CRYSTALLINE ROCK (BIOTITE GNEISS/GRANITE)	57.6

NCDOT BORE SINGLE U5760_GEO_BRDG0751_FORSYTH.GPJ NC_DOT.GDT 4/7/21

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 27+26	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 917.0 ft	**TOTAL DEPTH** 57.6 ft	**NORTHING** 861,348	**EASTING** 1,672,852	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 89% 12/16/2019		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 08/25/20	**COMP. DATE** 08/25/20	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 19.8 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)
879.2											Begin Coring @ 37.8 ft	
875	879.2	37.8	4.8		(4.1) 85%	(2.6) 54%		(8.9) 91%	(6.9) 70%		879.2 **CRYSTALLINE ROCK** Gray, Black and White, Very Slight to Fresh, Medium Hard to Moderateratly Hard, BIOTITE GNEISS, vertical contact with Sillimanite-Mica Schist, with close to moderately close fracture spacing.	37.8
870	874.4	42.6	5.0		(4.8) 96%	(4.3) 86%						
865	869.4	47.6	5.0		(4.4) 88%	(4.4) 88%		(8.7) 87%	(8.7) 87%		869.4 Gray and White, very slight to fresh, hard to very hard, GRANITE, with very close fracture spacing.	47.6
860	864.4	52.6	5.0		(4.3) 86%	(4.3) 86%						
	859.4	57.6									859.4 Boring Terminated at Elevation 859.4 ft in CRYSTALLINE ROCK (BIOTITE GNEISS/GRANITE)	57.6

NCDOT CORE SINGLE U5760_GEO_BRDG0751_FORSYTH.GPJ NC_DOT.GDT 4/7/21

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** J. Mize	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 28+50	**OFFSET** 59 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 918.0 ft	**TOTAL DEPTH** 14.9 ft	**NORTHING** 861,477	**EASTING** 1,672,803	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 87% 10/21/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 06/17/19	**COMP. DATE** 06/17/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
920										
	918.0	0.0	2	4	4	8		M		918.0 GROUND SURFACE 0.0
915	914.5	3.5	3	4	7	11		M		**RESIDUAL** 916.0 Brown-red, silty CLAY, trace mica 2.0
										Red-brown, fine sandy SILT, little mica
910	909.5	8.5	4	5	10	15		M		911.0 Brown, silty SAND, saprolitic 7.0
905	905.0	13.0	57	43/0.1		100/0.6				906.0 12.0
	903.1	14.9	60/0.0			60/0.0				**WEATHERED ROCK** GRANITE 903.1 14.9
										Boring Terminated by Auger Refusal at Elevation 903.1 ft on Crystalline Rock: GRANITE

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** J. Mize	
SITE DESCRIPTION Bridge No. 751 on Big Mill Farm Rd. over US 421/ I-40 Bus/NC 150				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 28+50	**OFFSET** 59 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 907.0 ft	**TOTAL DEPTH** 17.0 ft	**NORTHING** 861,468	**EASTING** 1,672,920	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 87% 10/21/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER T. Williams	**START DATE** 06/18/19	**COMP. DATE** 06/18/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
910										
	907.0	0.0	1	1	2	3		W		907.0 GROUND SURFACE 0.0
905	903.5	3.5	3	5	6	11		M		**RESIDUAL** Brown, fine to coarse sandy silty CLAY 904.0 3.0
900	898.5	8.5	4	4	4	8		M		Red-brown, fine sandy SILT, trace mica, trace organics, saprolitic
895	893.5	13.5	7	5	7	12		W		895.0 Brown, silty fine SAND, trace mica, saprolitic 12.0
890	890.0	17.0	60/0.0			60/0.0				890.0 17.0
										Boring Terminated by Auger Refusal at Elevation 890.0 ft on Crystalline Rock: GRANITE

NCDOT BORE DOUBLE U5760_GEO_BRDG0751_FORSYTH.GPJ NC_DOT.GDT 4/7/21

46381.1.1 (U-5760)
FORSYTH COUNTY
BRIDGE ON BIG MILL FARM ROAD OVER US 421 / I-40 BUSINESS / NC 150
BETWEEN SR 4315 AND SR 2649

CORE PHOTOS

B1-C
37.8’ TO 47.6’

B1-C
47.6’ TO 57.6’

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5760	1	6

REFERENCE: U-5760

PROJECT: 46381

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *FORSYTH*

PROJECT DESCRIPTION *KERNERSVILLE SOUTHERN LOOP, AT US 421 /BUSINESS I-40 TO NC 66 (WEST MOUNTAIN STREET) IN KERNERSVILLE. WIDEN BIG MILL FARM ROAD AND SR 2649 (HOPKINS ROAD) AND CONSTRUCT INTERCHANGE AT US 421 /NC 150 /BUSINESS I-40*

SITE DESCRIPTION *CULVERT AT STA. 90+93.82 -L-*

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

STICKNEY, J. K.

SMITH, C. L.

FOSTER, B. E.

BADEY, A.

WHITE, J.

INVESTIGATED BY *STICKNEY, J. K.*

DRAWN BY *FIELDS, W. D.*

CHECKED BY *BEVERLY, J. E.*

SUBMITTED BY *MILLER, K. B.*

DATE *DECEMBER 2019*

NORTH CAROLINA LICENSED SEAL 2029 GEOLOGIST KEVIN BENNETT MILLER

DocuSigned by:

957A789AED704CB...

12/16/2019

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5760	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] CME-550X (HFQ00070)
- [X] CME-550X (SME9563)

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

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: BORIGS PROJECTED USING NCDOT PROVIDED TIN FILE (U5760_ls_tin.tin)

ELEVATION: FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 12-06-2019

PROJECT REFERENCE NO.	SHEET NO.
U-5760	3

SITE PLAN

0 40 80

FEET

SKEW ANGLE - 94°13'49"

JS MIT

WLB

FAMILY M VENTURES, LLC

WOODS

WOODS

WOODS

WOODS

WLB

KERNERS MILL CREEK

JS MIT

MIT

MIT

TB

F

C

-L- 90+06

-L- 92+00

-L- 94+00

11+00 -CULVERT-

10+00 -CULVERT-

L_9120
91+20 -L-
CL

B2
91+08 -L-
22' RT

B1
90+75 -L-
38' RT

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG CENTERLINE OF -CULVERT- TAKEN FROM THE PROVIDED PROJECT TIN FILE (U5760_Ls_tin.tin).

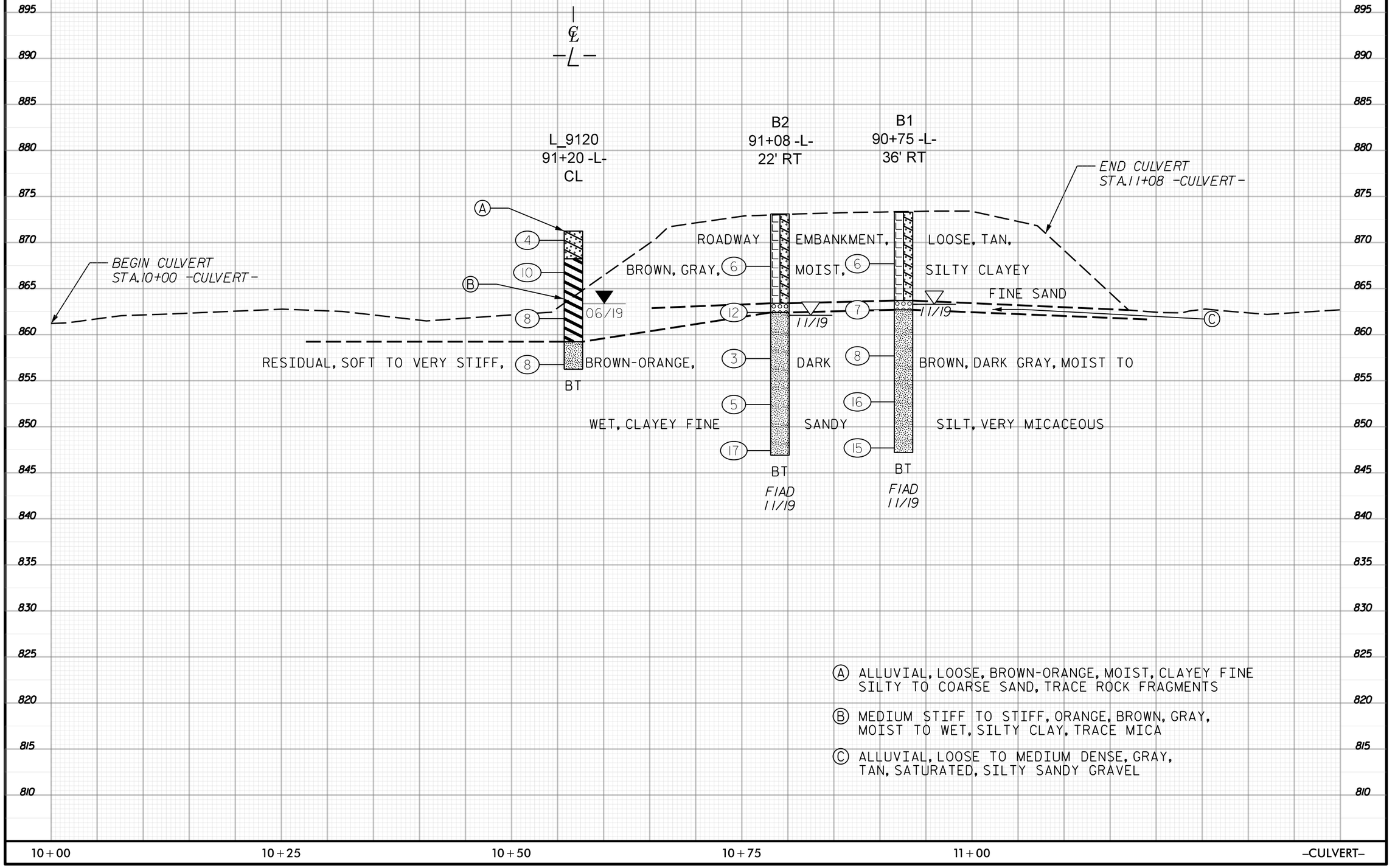
HORIZONTAL 0 10 20 FEET

VERTICAL 0 10 20 FEET

VE = 1

PROJECT REFERENCE NO.	SHEET NO.
U-5760	4

CENTERLINE PROFILE ALONG CULVERT AT STA. 90+93.82 –L–



Ⓐ ALLUVIAL, LOOSE, BROWN-ORANGE, MOIST, CLAYEY FINE SILTY TO COARSE SAND, TRACE ROCK FRAGMENTS

Ⓑ MEDIUM STIFF TO STIFF, ORANGE, BROWN, GRAY, MOIST TO WET, SILTY CLAY, TRACE MICA

Ⓒ ALLUVIAL, LOOSE TO MEDIUM DENSE, GRAY, TAN, SATURATED, SILTY SANDY GRAVEL

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION CULVERT ON SR 2649 (HOPKINS ROAD) OVER KERNERS MILL CREEK				**GROUND WTR (ft)**
BORING NO. B1	**STATION** 90+75	**OFFSET** 38 ft RT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 873.3 ft	**TOTAL DEPTH** 26.1 ft	**NORTHING** 866,978	**EASTING** 1,671,209	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0070 CME-550X 81% 06/04/2018		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
DRILLER Smith, C. L.	**START DATE** 11/07/19	**COMP. DATE** 11/07/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
875										873.3 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT TAN, BROWN, GRAY, SILTY CLAYEY FINE SAND	
870	868.7	4.6	1	2	4	6		M			
	863.7	9.6	5	4	3	7				863.7	9.6
865										862.7 **ALLUVIAL** GRAY, TAN, SILTY SANDY GRAVEL	10.6
	858.7	14.6	1	2	6	8		M		**RESIDUAL** DARK BROWN, CLAYEY FINE SANDY SILT, VERY MICACEOUS	
860											
	853.7	19.6	16	8	8	16		M			
855											
	848.7	24.6	3	6	9	15		M		847.2	26.1
850										Boring Terminated at Elevation 847.2 ft IN RESIDUAL SANDY SILT	

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION CULVERT ON SR 2649 (HOPKINS ROAD) OVER KERNERS MILL CREEK				**GROUND WTR (ft)**
BORING NO. B2	**STATION** 91+08	**OFFSET** 22 ft RT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 873.1 ft	**TOTAL DEPTH** 26.2 ft	**NORTHING** 866,995	**EASTING** 1,671,177	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0070 CME-550X 81% 06/04/2018		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
DRILLER Smith, C. L.	**START DATE** 11/07/19	**COMP. DATE** 11/07/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										873.1 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT TAN, BROWN, ORANGE, GRAY, SILTY CLAYEY FINE SAND
870	868.4	4.7	1	2	4	6		M		
	863.4	9.7	1	4	8	12				863.4 9.7
865										862.4 **ALLUVIAL** GRAY, TAN, SILTY SANDY GRAVEL 10.7
	858.4	14.7	1	2	1	3		M		**RESIDUAL** DARK GRAY, CLAYEY FINE SANDY SILT, VERY MICACEOUS
860										
	853.4	19.7	1	2	3	5		M		
855										
	848.4	24.7	5	8	9	17		M		846.9 26.2
850										Boring Terminated at Elevation 846.9 ft IN RESIDUAL SANDY SILT

NCDOT BORE DOUBLE U5760_GEO_CULV.GPJ NC_DOT.GDT 12/11/19

WBS 46381.1.1	**TIP** U-5760	**COUNTY** FORSYTH	**GEOLOGIST** Badey, A.	
SITE DESCRIPTION CULVERT ON SR 2649 (HOPKINS ROAD) OVER KERNERS MILL CREEK				**GROUND WTR (ft)**
BORING NO. L_9120	**STATION** 91+20	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 871.0 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 866,989	**EASTING** 1,671,152	**24 HR.** 7.9
DRILL RIG/HAMMER EFF./DATE SME9563 CME-550X 93% 11/08/2018		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic
DRILLER BADEY, A.	**START DATE** 06/21/19	**COMP. DATE** 06/21/19	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
870	871.0	0.0	1	2	2	4		M		871.0 GROUND SURFACE 0.0
	867.5	3.5	3	4	6	10		M		**ALLUVIAL** BROWN-ORANGE, CLAYEY FINE SILTY TO COARSE SAND, TRACE ROCK FRAGMENTS 868.0 3.0
865										ORANGE, BROWN, GRAY, SILTY CLAY, TRACE MICA
	862.5	8.5	2	3	5	8		M		
860										859.0 12.0
	857.5	13.5	2	2	6	8		W		**RESIDUAL** BROWN-ORANGE, FINE SANDY SILT 856.0 15.0
										Boring Terminated at Elevation 856.0 ft IN RESIDUAL SANDY SILT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5760	1	11

REFERENCE: U-5760

PROJECT: 46381

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY FORSYTH

PROJECT DESCRIPTION KERNERSVILLE SOUTHERN LOOP, AT US 421/BUS. 40 TO NC 66 (WEST MOUNTAIN ST.) IN KERNERSVILLE

SITE DESCRIPTION WALL 1, WALL 2, WALL 3 AND WALL 4

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

C. L. SMITH

B. E. FOSTER

J. K. STICKNEY

INVESTIGATED BY C. R. LAVENDER, III

DRAWN BY K. B. MILLER DS

CHECKED BY J. E. BEVERLY JEB

SUBMITTED BY K. B. MILLER DS

DATE MAY 2021

NORTH CAROLINA LICENSED SEAL 1506 GEOLOGIST CHARLES R. LAVENDER III

DocuSigned by:
8EEA8D1BBA2E438...
SIGNATURE

5/12/2021
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5760	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	- 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
- [X] 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:

ELEVATION: FEET

NOTES:

DATE: 8-15-14

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RIGHT-OF-WAY REV.

CONST. REV.

PROJECT REFERENCE NO.	SHEET NO.
U-5760	3
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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REVISIONS

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NAD 83/NA 2011

LOWE'S

100-YR FLOODPLAIN

WLB

TM

15+00

NOTE: STREAM EXTENDS BEYOND SURVEY LIMITS

FLOODWAY

FLOODWAY

100-YR FLOODPLAIN

500-YR FLOODPLAIN

SHOP-CURVED GUARDRAIL (R=35') CONNECT TO EXIST GUARDRAIL

-L- POT Sta. 10+00.00

SEE NOTE 1

L 19+00 LT

47" WWF

-L-
HARMON CREEK RD
N 53° 57' 38.6" W

CR
Ø40 CB-F

L 15+50
L 16+00
L 16+50
L 17+10 LT
L 17+50
L 18+00
L 18+50

15" RCP-IV

Ø40
CB-G

CB-G

15" RCP-IV

CR

CB-F Ø40

15" RCP-IV

CB-F Ø40

RETAIN

TRANSITION TO EXIST VALLEY GUTTER

RETAIN EXIST SYSTEM

47" WWF

15" RCP-IV

15" RCP-IV

BEGIN TIP PROJECT U-5760
BEGIN CONSTRUCTION
-L- POT Sta. 13+30.00

-L- PC Sta. 16+61.93

MATCHLINE -L- STA 19+00 (SEE SHEET 5)

KOHL'S

MATCHLINE (SEE SHEET 5)

-L-
PI Sta 21+79.43
Δ = 58° 23' 52.8" (RT)
D = 6° 11' 14.8"
L = 943.81'
T = 517.50'
R = 926.00'
SE = 0.04
RO = 216'

NOTE:
1. BEGIN MSE WALL -WALL 1- (STRUCTURES ITEM)
-L- STA 15+00.00 (68.75' LT)
INSTALL 48" CL FENCE 1' INSIDE WALL (TYP)

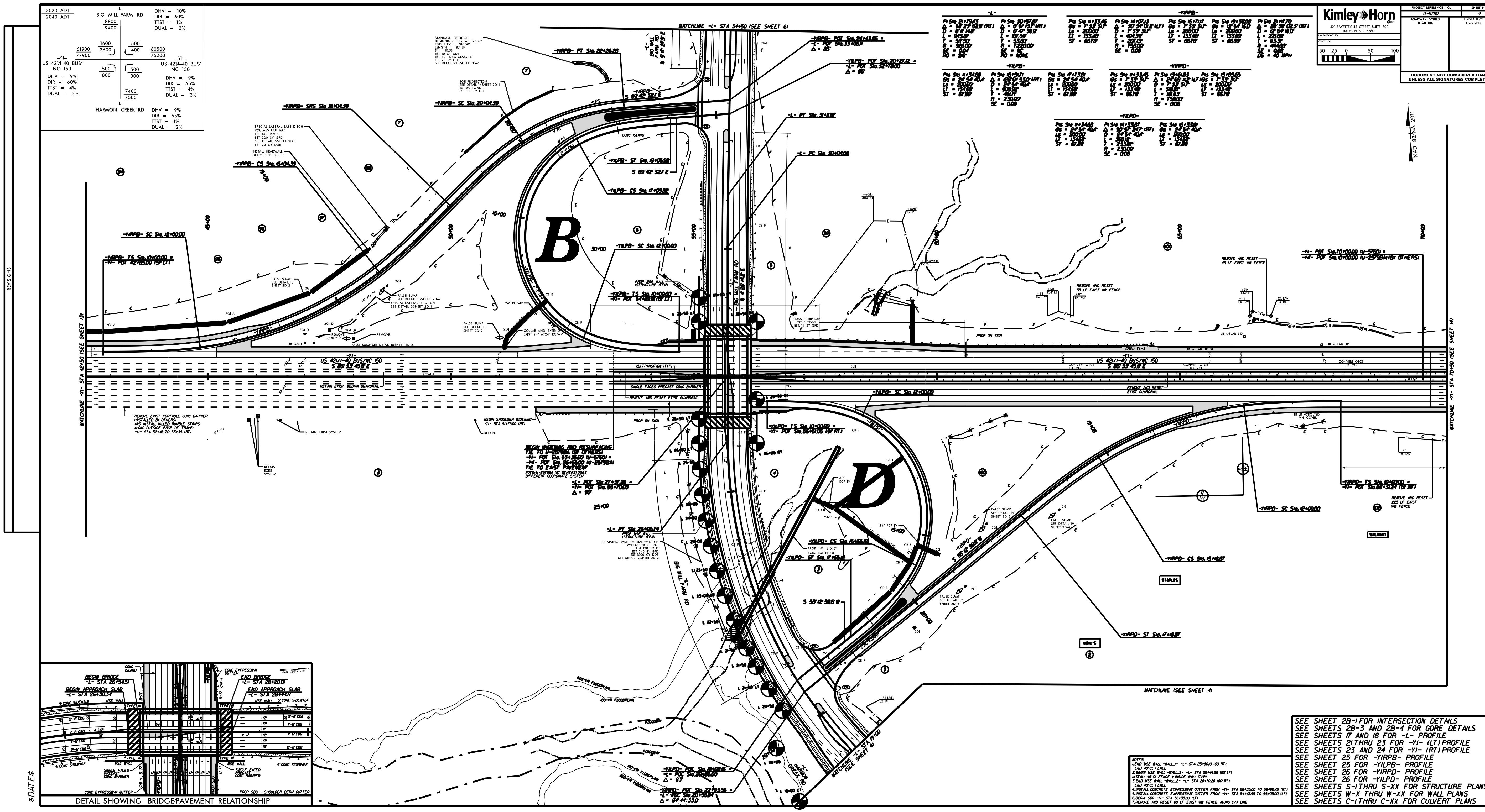
(3) ARNOLD G. KING
HELEN H. PRINCE
DB 2250 PG 829
DB 3267 PG 197

(100) TOWN OF KERNERSVILLE
DB 2207 PG 106
PB 42 PG 86-89
PB 44 PG 32-35

RADII DIMENSIONS ARE TO THE EDGE OF PAVEMENT UNLESS OTHERWISE NOTED (APPLIES TO ALL SHEETS)

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED (APPLIES TO ALL SHEETS)

SEE SHEET 17 FOR -L- PROFILE
SEE SHEETS W-1THRU W-XX FOR WALL PLANS



2023 ADT
2040 ADT
-L-
BIG MILL FARM RD
8800
9400
DHV = 10%
DIR = 60%
TTST = 1%
DUAL = 2%
1600
2600
500
400
61900
77900
60500
75200
-Y1-
US 421/I-40 BUS/
NC 150
DHV = 9%
DIR = 60%
TTST = 4%
DUAL = 3%
-Y1-
US 421/I-40 BUS/
NC 150
DHV = 9%
DIR = 65%
TTST = 4%
DUAL = 3%
500
800
500
300
7400
7500
-L-
HARMON CREEK RD
DHV = 9%
DIR = 65%
TTST = 1%
DUAL = 2%
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50 25 0 50 100
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U-5760
SHEET NO.
4
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
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REVISIONS
MATCHLINE -L- STA 34+50 (SEE SHEET 6)
MATCHLINE (SEE SHEET 4)
US 421/I-40 BUS/NC 150
B
D
DETAIL SHOWING BRIDGE/PAVEMENT RELATIONSHIP
SEE SHEET 2B-1 FOR INTERSECTION DETAILS
SEE SHEETS 2B-3 AND 2B-4 FOR GORE DETAILS
SEE SHEETS 17 AND 18 FOR -L- PROFILE
SEE SHEETS 21 THRU 23 FOR -Y1- (LT) PROFILE
SEE SHEETS 23 AND 24 FOR -Y1- (RT) PROFILE
SEE SHEET 25 FOR -Y1RPB- PROFILE
SEE SHEET 25 FOR -Y1LPB- PROFILE
SEE SHEET 26 FOR -Y1RPD- PROFILE
SEE SHEET 26 FOR -Y1LPD- PROFILE
SEE SHEETS S-1 THRU S-XX FOR STRUCTURE PLANS
SEE SHEETS W-X THRU W-XX FOR WALL PLANS
SEE SHEETS C-1 THRU C-XX FOR CULVERT PLANS
$DATE$

-L-	
PI Sta 49+29.80	PI Sta 61+48.44
Δ = 4° 02' 19.7" (RT)	Δ = 57° 38' 59.7" (LT)
D = 0° 47' 36.9"	D = 8° 03' 30.5"
L = 508.94'	L = 715.39'
T = 254.58'	T = 391.28'
R = 7,220.00'	R = 711.00 (DS = 45 MPH)
SE = NC	SE = 0.04
RO = NONE	RO = 156'

-Y3-	
PI Sta 11+47.11	PI Sta 15+95.90
Δ = 33° 25' 35.3" (LT)	Δ = 15° 33' 33.9" (RT)
D = 17° 37' 46.1"	D = 14° 19' 26.2"
L = 189.61'	L = 108.63'
T = 97.59'	T = 54.65'
R = 325.00'	R = 400.00'
SE = 0.04	SE = 0.035
RO = 84'	RO = 84'

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PROJECT REFERENCE NO.	SHEET NO.
U-5760	5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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$DATE$

BEGIN CONSTRUCTION -Y3- POC Sta.10+50.00

-Y3- POT Sta. 10+00.00
S 49° 45' 59.3" E

-Y3- PC Sta. 10+49.52

-Y3- PT Sta. 12+39.13

-DRWI- POT Sta. 10+00.00 = -L- POC Sta.48+62.00
Δ = 89° 26' 05"

-L- POT Sta. 53+93.64 = -Y3- POT Sta.15+06.12
Δ = 91° 41' 04.0"

-Y3- SELWYCK LN S 83° 11' 34.6" E

-L- PC Sta. 57+57.16

-L- BIG MILL FARM RD N 5° 07' 21.6" E

-L- PT Sta. 51+84.16

-Y3- PC Sta. 15+41.25

-Y3- PT Sta. 16+49.88

END CONSTRUCTION -DRWI- POT Sta.11+30.00

-DRWI- POT Sta. 11+50.00

END CONSTRUCTION -Y3- POT Sta.17+50.00

-Y3- POT Sta. 18+87.00

-Y3- LAWSHIRE RD S 67° 38' 00.7" E

MATCHLINE -L- STA 47+00 (SEE SHEET 6)

MATCHLINE -L- STA 59+50 (SEE SHEET 8)

(22) DOUGLAS A. BROWN
DB 3283 PG 2123
PB 32 PG 35

(24) JOHN W. ABERNATHY
TERRY W. ABERNATHY
DB 1943 PG 2568
PB 32 PG 35

(25) RANDALL EPPERSON
SUSAN EPPERSON
DB 2083 PG 2845
PB 32 PG 35

NOTES:
1. PLUG, FILL AND ABANDON EXIST PIPE
2. SPECIAL LATERAL 'V' DITCH W/ CLASS 'B' RIP RAP
SEE DETAIL 6/SHEET 2D-1
EST 60 TONS
EST 120 SY GFD
3. INSTALL 18" RCP-IV AND CONVERT EXIST CB TO JB
4. CONSTRUCT RETAINING WALL -WALL_3- FROM -L- STA 52+00.00 TO 53+23.18 (48' LT) AND INSTALL 48" CHAIN LINK FENCE 1' INSIDE WALL

SEE SHEET 2B-1 FOR INTERSECTION DETAILS
SEE SHEET 18 FOR -L- PROFILE
SEE SHEET 27 FOR -Y3- PROFILE
SEE SHEET 29 FOR -DRWI- PROFILE
SEE SHEETS W-X THRU W-XX FOR WALL PLANS

-L-	
PI Sta 116+89.16	PI Sta 120+07.00
Δ = 21° 40' 28.2" (RT)	Δ = 29° 10' 03.1" (LT)
D = 8° 03' 30.5"	D = 8° 03' 30.5"
L = 268.97'	L = 361.97'
T = 136.11'	T = 184.99'
R = 711.00'	R = 711.00'
SE = 0.04	SE = RC
RO = 144°	RO = 72°
DS = 45 MPH	DS = 45 MPH

-Y9-		
PI Sta 12+92.95	PI Sta 14+39.71	PI Sta 16+45.44
Δ = 1° 03' 11.1" (LT)	Δ = 1° 48' 54.1" (RT)	Δ = 4° 51' 55.9" (RT)
D = 1° 08' 45.3"	D = 1° 47' 25.8"	D = 5° 27' 24.3"
L = 91.90'	L = 101.37'	L = 89.17'
T = 45.95'	T = 50.69'	T = 44.61'
R = 5,000.00'	R = 3,200.00'	R = 1,050.00'

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PROJECT REFERENCE NO.	SHEET NO.
U-5760	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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$DATE$

-L- PC Sta. 115+53.05

-Y9- POT Sta. 10+00.00

-Y9- PC Sta. 12+47.00

END TIP PROJECT U-5760
END CONSTRUCTION
-L- POC Sta.120+71.00

-Y9- PT Sta. 13+38.89

-L- PT Sta. 121+83.97 15+00

-L- POT Sta. 120+96.45 =
-Y9- POT Sta. 13+43.82
Δ = 89° 27' 43.0"
N 59° 40' 10.9" E

-Y9- PC Sta. 13+89.02

-Y9- PT Sta. 14+90.39

-Y9- PC Sta. 16+00.83

-Y9- PT Sta. 16+90.00

-L- PRC Sta. 118+22.00

-L- POT Sta. 125+00.00

-L- HOPKINS RD (SR 2649) N 29° 21' 07.5" W

-L- OLD HOLLOW RD (NC 66) N 36° 50' 42.4" W

-Y9- WEST MOUNTAIN ST (SR 2377) N 60° 43' 22.0" E

-Y9- WEST MOUNTAIN ST (NC 66) N 61° 29' 05.0" E

MATCHLINE -L- STA 113+00 (SEE SHEET 11)

115+00

120+00

200' STORAGE

140' MEDIAN TAPER

110' STORAGE

RETAIN

RETAIN SYSTEM

SPECIAL LATERAL 'V' DITCH SEE DETAIL 5/SHEET 2D-1

SPECIAL CUT DITCH SEE DETAIL 12/SHEET 2D-1

DRIVEWAY TO BE REMOVED BY PROPERTY OWNER

DRIVEWAY TO BE CONSTRUCTED BY PROPERTY OWNER

REMOVE EXISTING DRIVEWAY

SKATE WORLD

HOPKINS ROAD ANIMAL HOSPITAL

SEE NOTE 1

DO NOT DISTURB BUILDING FOUNDATION DURING WALL EXCAVATION

DO NOT DISTURB UST'S

DO NOT DISTURB POTENTIAL UST

8"x12" CURB

INSTALL 5' MONOLITHIC CONCRETE MEDIAN FOR EMERGENCY ACCESS FROM -L- STA 118+22.00 TO 119+30.00

KERWIN CR

McCRACKEN RD

NOTES:
1. CONSTRUCT RETAINING WALL -WALL 4- FROM -L- STA. 117+25.00 TO 118+22.00 (RT)

(93) DEBORAH ANN STERNBERG REVOCABLE TRUST
DB 3686 PG 4258
DB 1857 PG 336
DB 1729 PG 4170

★ TRAFFIC SIGNAL

SEE SHEET 2B-2 FOR INTERSECTION DETAIL
SEE SHEET 21 FOR -L- PROFILE
SEE SHEETS W-XX THRU W-XX FOR WALL PLANS

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5760	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

(A) ARTIFICIAL FILL - RED,BROWN,MOIST,SOFT TO MED.STIFF TO V.STIFF,SILTY AND SANDY CLAY,AND SANDY CLAYEY SILT

(B) ARTIFICIAL FILL - BROWN TO RED,MOIST,V.LOOSE TO MED.DENSE,CLAYEY AND SILTY SAND

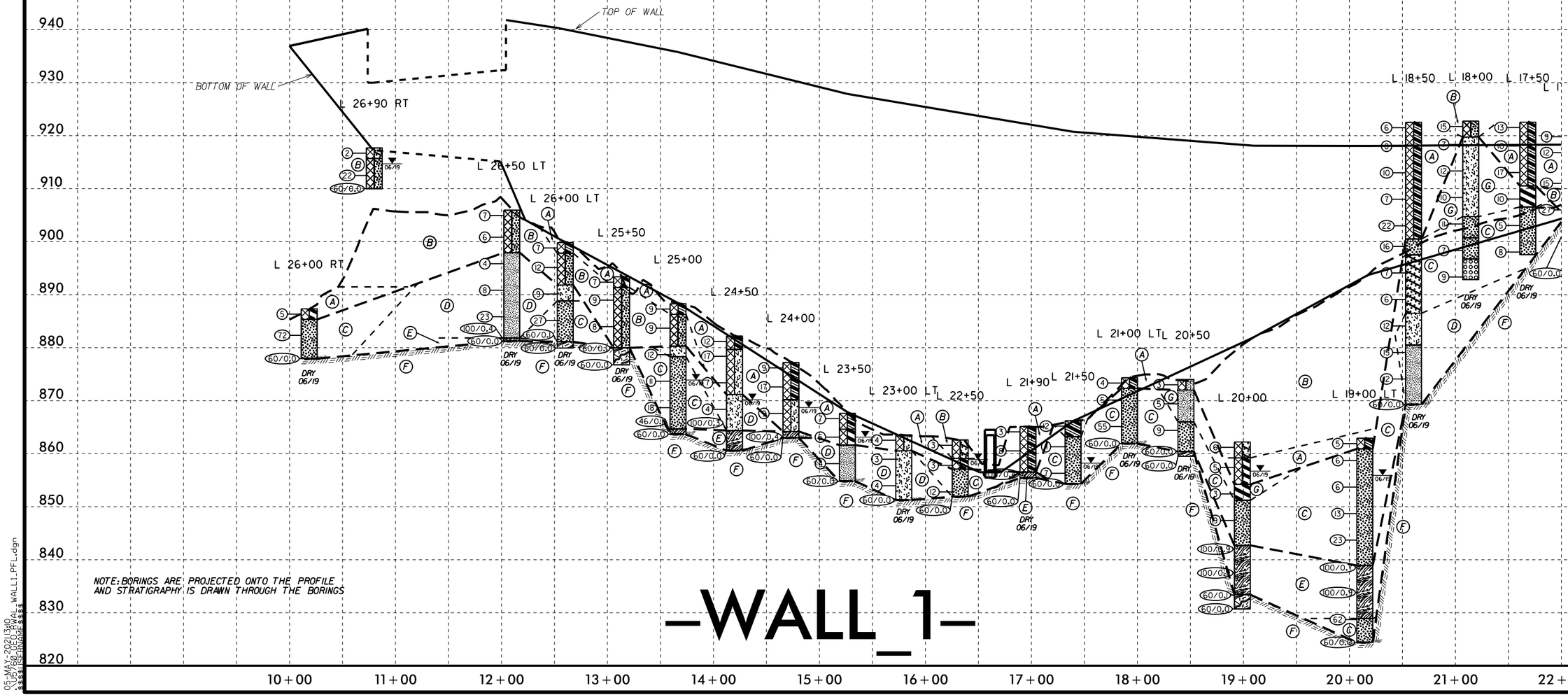
(C) RESIDUAL - BLACK,WHITE AND ORANGE,MOIST,MED.DENSE TO V.DENSE,CLAYEY AND SILTY SAND AND SAND,WITH TRACE ROCK FRAGS.

(D) RESIDUAL - RED TO BROWN,MOIST TO WET,SOFT TO V.STIFF,CLAYEY SILT AND SANDY SILT

(E) WEATHERED ROCK (GRANITE)

(F) CRYSTALLINE ROCK (GRANITE)

(G) RESIDUAL - ORANGE,TAN,WHITE,BROWN,MOIST TO WET,SOFT TO V.STIFF,SILTY CLAY,AND CLAYEY TO SANDY SILT,WITH LITTLE MICA



NOTE: BORINGS ARE PROJECTED ONTO THE PROFILE AND STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

-WALL_1-

05-MAY-2021 13:10
U5760_GEO_RWAL_WALL1_PFL.dgn
$$$$USERNAME$$$$

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5760	8

ROADWAY DESIGN ENGINEER

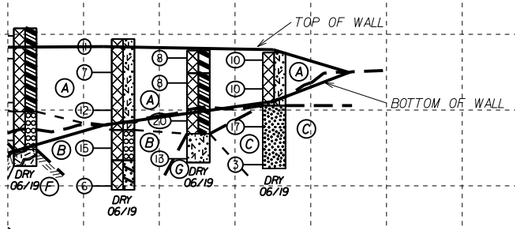
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

1020
1010
1000
990
980
970
960
950
940
930
920
910
900
890
880
870
860
850
840
830
820

7+10 LT
L 16+50
L 16+00
L 15+50



NOTE: BORINGS ARE PROJECTED ONTO THE PROFILE AND STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

-WALL_1-

22+00
23+00
24+00

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\U5760\GEO\RWAL_WALL1_PFL.dgn
$$$$USERNAME$$$$

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5760	9
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

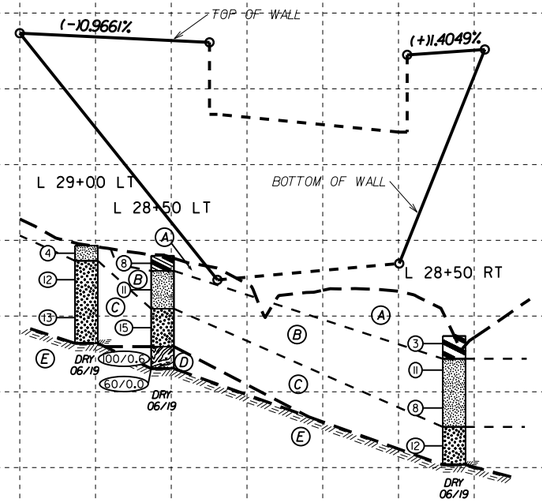
Ⓐ RESIDUAL - RED TO BROWN,MOIST,SOFT TO MED.STIFF,SANDY AND SILTY CLAY WITH TRACE ORGANICS

Ⓑ RESIDUAL - BROWN,MED.STIFF TO STIFF,SANDY CLAYEY SILT WITH TRACE ORGANICS

Ⓒ RESIDUAL - BROWN,MOIST TO WET,MED.DENSE,SILTY SAND

Ⓓ WEATHERED ROCK (GRANITE)

Ⓔ CRYSTALLINE ROCK (GRANITE)



NOTE: BORINGS ARE PROJECTED ONTO THE PROFILE AND STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

-WALL_2-

1040 1030 1020 1010 1000 990 980 970 960 950 940 930 920 910 900 890 880 870 860 850 840

10+00 11+00 12+00 13+00

10-MAY-2021 11:30
\U5760_GEO_RWAL_WALL2_PFL.dgn
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
U-5760	10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

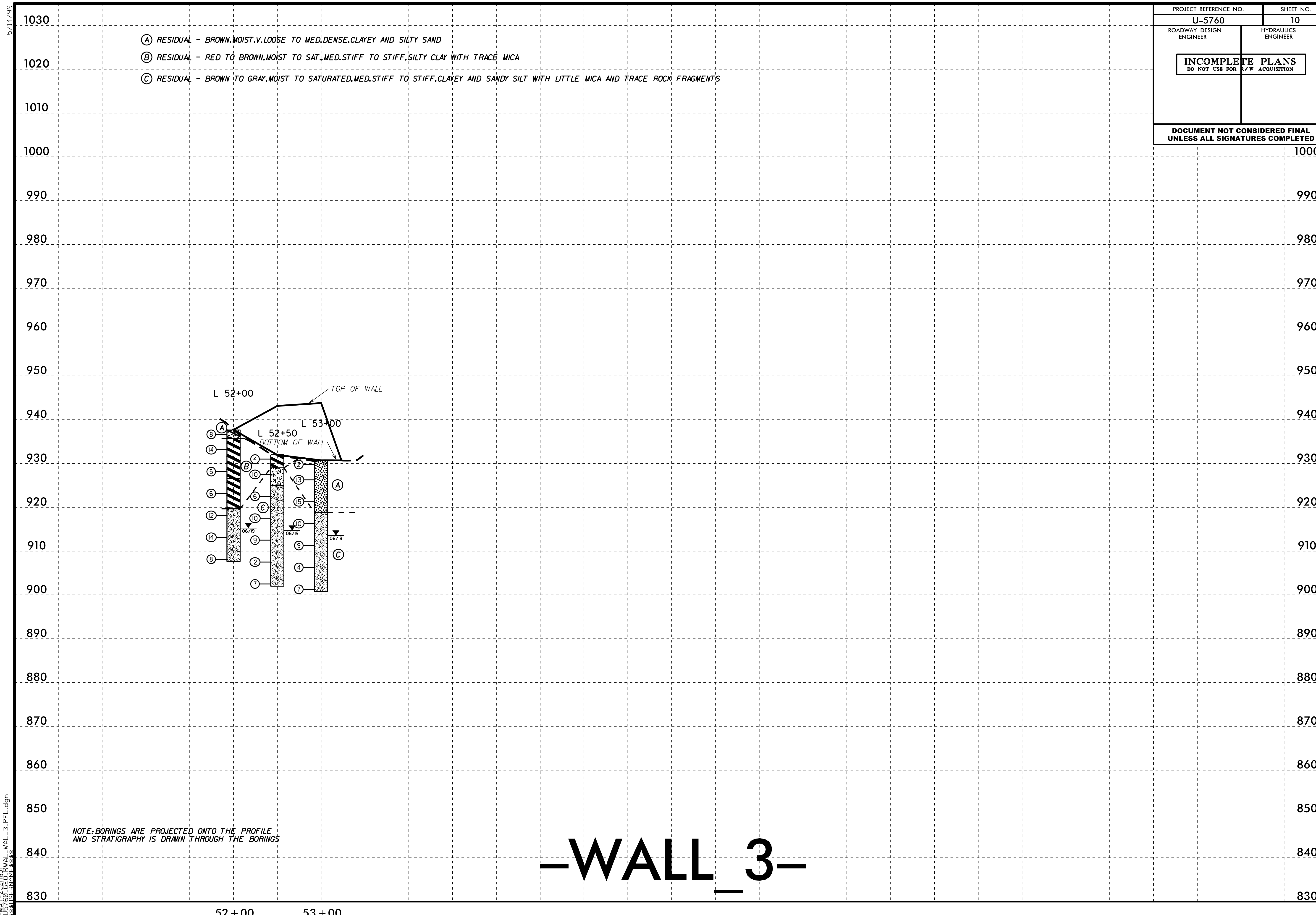
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/14/99

(A) RESIDUAL - BROWN,MOIST,V.LOOSE TO MED.DENSE,CLAYEY AND SILTY SAND

(B) RESIDUAL - RED TO BROWN,MOIST TO SAT.,MED.STIFF TO STIFF,SILTY CLAY WITH TRACE MICA

(C) RESIDUAL - BROWN TO GRAY,MOIST TO SATURATED,MED.STIFF TO STIFF,CLAYEY AND SANDY SILT WITH LITTLE MICA AND TRACE ROCK FRAGMENTS



NOTE: BORINGS ARE PROJECTED ONTO THE PROFILE AND STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

-WALL_3-

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
U-5760	11
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

1050
1040
1030
1020
1010
1000
990
980
970
960
950
940
930
920
910
900
890
880
870
860
850

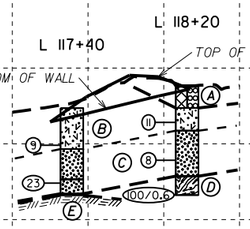
Ⓐ ARTIFICIAL FILL - GRAVEL AND ASPHALT

Ⓑ RESIDUAL - RED AND ORANGE,STIFF,MOIST,FINE SANDY CLAYEY SILT,TRACE MICA

Ⓒ RESIDUAL - RED,ORANGE,TAN AND WHITE,LOOSE TO MEDIUM DENSE,MOIST,CLAYEY SILTY FINE SAND,TRACE MICA

Ⓓ WEATHERED ROCK (GRANITE)

Ⓔ CRYSTALLINE ROCK (GRANITE)



NOTE: BORINGS ARE PROJECTED ONTO THE PROFILE AND STRATIGRAPHY IS DRAWN THROUGH THE BORINGS

-WALL_4-

117+00 118+00 119+00

05-MAY-2021 10:42
\U5760_GEO_RWL_WALL_4_PFL.dgn
$$$$USTRNAME$$$$