REFERENCE: B-4654

PROJECT: 38454

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4654	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *WAKE*

PROJECT DESCRIPTION *BRIDGE NUMBER 69 ON NC-50 (BENSON ROAD) OVER US HWY 70*

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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DRAWN BY *N.O. MOORE*

CHECKED BY *N.T. ROBERSON*

SUBMITTED BY *N.T. ROBERSON*

DATE *NOVEMBER 2018*

NORTH CAROLINA LICENSED SEAL 1912 GEOLOGIST NEIL T. ROBERSON

DocuSigned by:
Neil T. Roberson 1/25/2019
4061D9A8C6C3494... SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
B-4654	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 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
- [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
- [ ] 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 LOCATIONS AND ELEVATION TAKEN FROM ROADWAY TIN (6/30/17) AND GPK FILE

ELEVATION: FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
B-4654	3

SITE PLAN

0 50 100

FEET

TO TIMBER DRIVE →

← TO TIMBER DRIVE EAST

TO WEST GARNER ROAD →

← TO I-40

NC 50 / US HWY 70 EB OFF RAMP

US HWY 70 WB OFF RAMP

NC 50 / SR 2561 BENSON RD 43' BST

NC 50 WB / SR 2561 BENSON RD 40' BST

US HWY 70

-RPC-

-Y1-

-Y2-

-L-

-DW1-

-DW2-

EBI-A

EBI-B

BI-A

BI-B

EB2-A

EB2-B

CONC BRIDGE #69

TOP=368.93'

NAD 83/NA 2011

GAS TANK/ PROPANE FILLING STATION

TEST STATION

2SBK BUS

ISBK BUS

ISFD

WOODS

GRASS

CANOPY

GAZEBO

CONC

BST

EXISTING R/W

R/W MON

FO MARKER

TRAFFIC

MTL

CONC ISL

CONC S/W

8" PVC

8" DIP

8" STEEL

12" RCP

15" CMP

18" RCP

24" C&G

18" C&G

6" C&G

12" C&G

2" PLASTIC

4" PVC

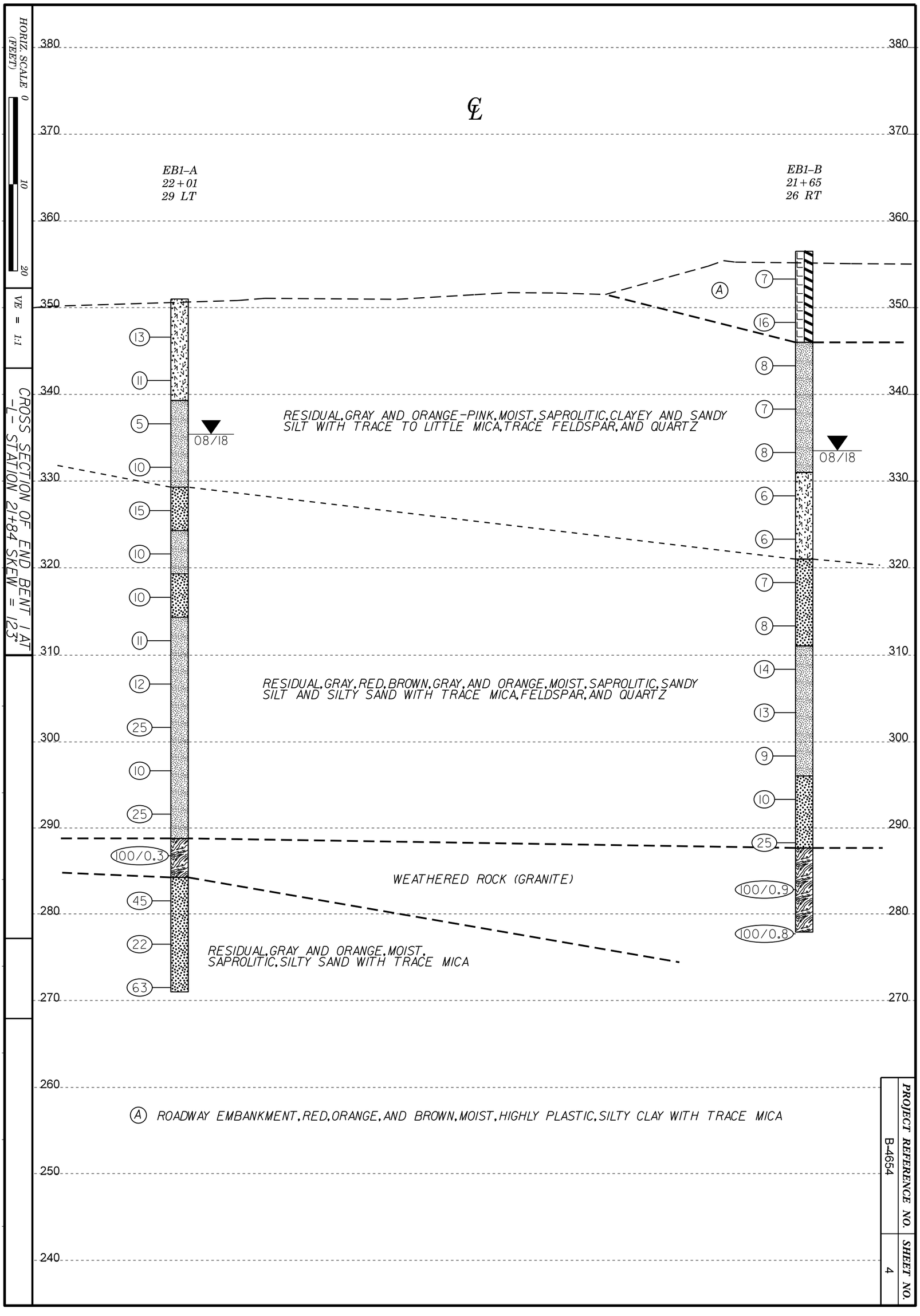
72" WD

96" WD

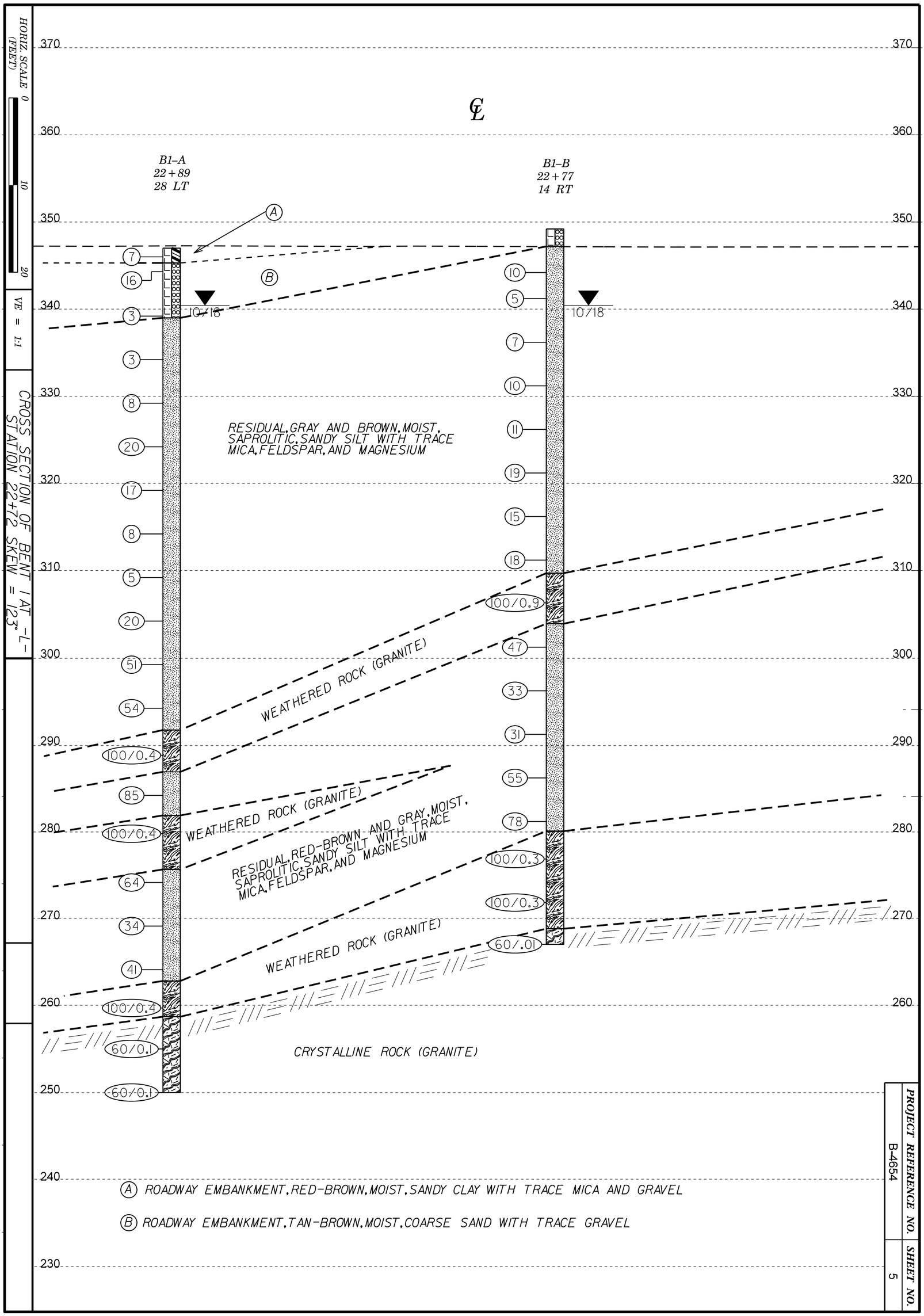
60" CHL

48" CHL

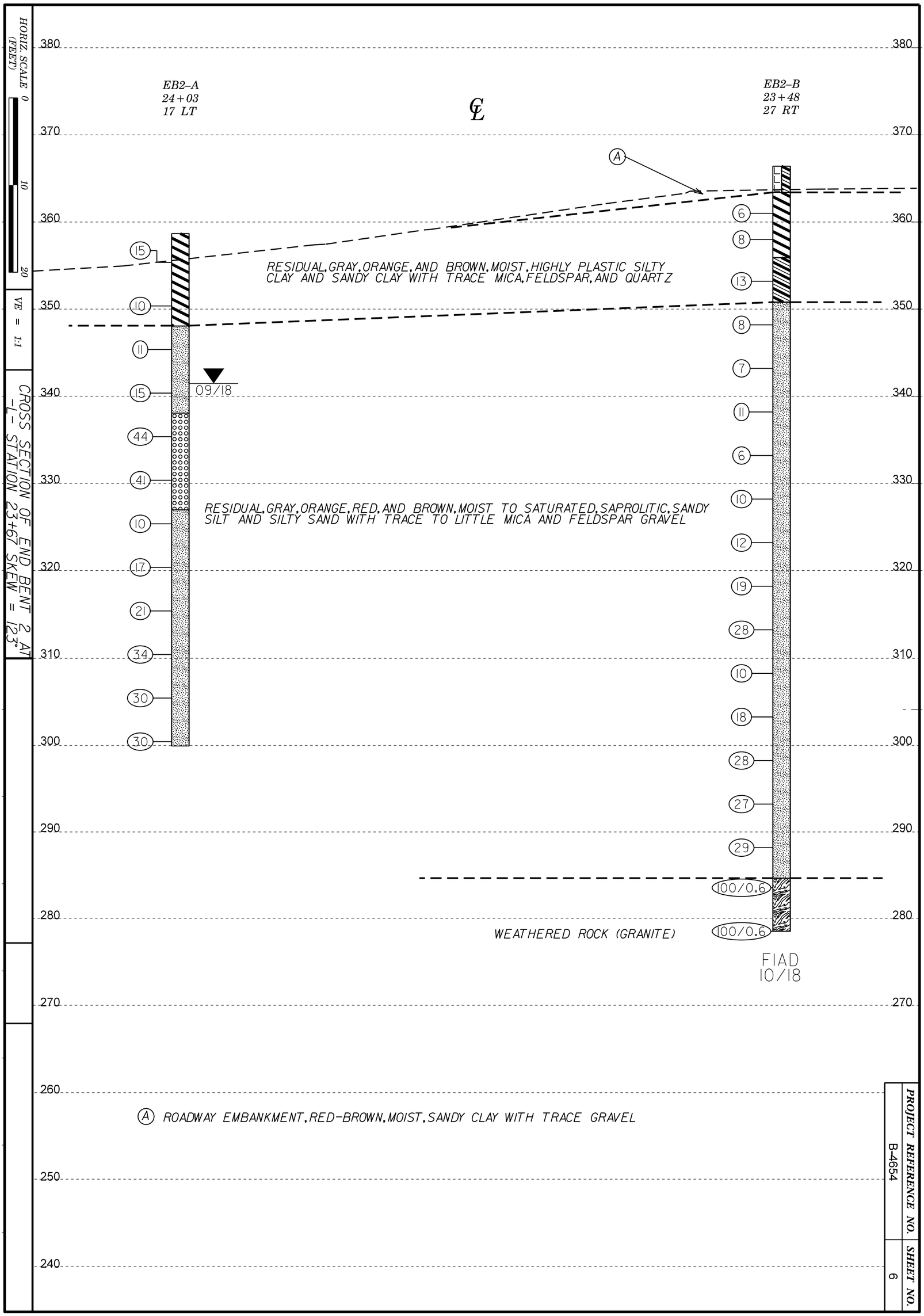
150' X 12'



PROJECT REFERENCE NO.	SHEET NO.
B-4654	4



PROJECT REFERENCE NO.	SHEET NO.
B-4654	5



PROJECT REFERENCE NO.	SHEET NO.
B-4654	6

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 22+01	**OFFSET** 29 ft LT	**ALIGNMENT** -L-	**0 HR.** 17.7
COLLAR ELEV. 351.0 ft	**TOTAL DEPTH** 79.9 ft	**NORTHING** 712,210	**EASTING** 2,114,723	**24 HR.** 15.6
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** 08/29/18	**COMP. DATE** 08/29/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
355											
350										351.0 GROUND SURFACE	0.0
	347.6	3.4	4	6	7	13	SS-18	M		**RESIDUAL** RED AND GRAY, SAPROLITIC, CLAYEY SILT WITH TRACE MICA	
345											
	342.6	8.4	5	5	6	11		M		339.3	11.7
340										GRAY AND ORANGE, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA	
	337.6	13.4	2	2	3	5	SS-19	M			
335											
	332.6	18.4	3	4	6	10		M		329.3	21.7
330										GRAY AND ORANGE, SAPROLITIC, SILTY SAND WITH TRACE MICA, FELDSPAR, AND QUARTZ	
	327.6	23.4	4	8	7	15	SS-20	M			
325										324.3	26.7
	322.6	28.4	2	4	6	10	SS-21	M		GRAY, RED, AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE MICA AND CLAY LENSES	
320										319.3	31.7
	317.6	33.4	4	5	5	10		M		GRAY AND ORANGE, SAPROLITIC, SILTY SAND WITH TRACE MICA, FELDSPAR, AND QUARTZ	
315										314.3	36.7
	312.6	38.4	3	5	6	11		M		GRAY AND ORANGE, SAPROLITIC, SANDY SILTY WITH TRACE TO LITTLE MICA	
310											
	307.6	43.4	2	4	8	12		M			
305											
	302.6	48.4	9	14	11	25		Sat.			
300											
	297.6	53.4	3	5	5	10		Sat.			
295											
	292.6	58.4	5	11	14	25		Sat.			
290											
	287.6	63.4	50	50/0.3		100/0.3		Sat.		288.8	62.2
285										**WEATHERED ROCK** GRANITE	
	282.6	68.4	17	20	25	45		Sat.		284.3	66.7
280										**RESIDUAL** GRAY AND ORANGE, SAPROLITIC, SILTY SAND WITH TRACE MICA	
	277.6	73.4	2	8	14	22	SS-22	Sat.			
275											

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 22+01	**OFFSET** 29 ft LT	**ALIGNMENT** -L-	**0 HR.** 17.7
COLLAR ELEV. 351.0 ft	**TOTAL DEPTH** 79.9 ft	**NORTHING** 712,210	**EASTING** 2,114,723	**24 HR.** 15.6
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** 08/29/18	**COMP. DATE** 08/29/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
275						Match Line				
	272.6	78.4	18	20	43	63		Sat.		**RESIDUAL** GRAY AND ORANGE, SAPROLITIC, SILTY SAND WITH TRACE MICA *(continued)*
										271.1 79.9
										Boring Terminated at Elevation 271.1 ft IN RESIDUAL (SILTY SAND)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 21+65	**OFFSET** 26 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 356.5 ft	**TOTAL DEPTH** 78.5 ft	**NORTHING** 712,183	**EASTING** 2,114,783	**24 HR.** 23.0
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Clarke, R. E.	**START DATE** 08/30/18	**COMP. DATE** 08/30/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
360										ELEV. (ft) DEPTH (ft)
										356.5 GROUND SURFACE 0.0
355	354.3	2.2	2	3	4	7		M		**ROADWAY EMBANKMENT** RED, ORANGE, AND BROWN, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA
350	349.3	7.2	4	7	9	16	SS-23	M		346.0 10.5
345	344.3	12.2	3	3	5	8	SS-24	M		**RESIDUAL** ORANGE-PINK, SANDY SILT WITH TRACE MICA AND FELDSPAR
340	339.3	17.2	2	3	4	7		M		
335	334.3	22.2	2	3	5	8		M		
330	329.3	27.2	2	2	4	6	SS-25	M		331.0 25.5 ORANGE-PINK, AND GRAY, SAPROLITIC, CLAYEY SILT WITH TRACE MICA
325	324.3	32.2	1	2	4	6		M		
320	319.3	37.2	3	2	5	7		M		321.0 35.5 BROWN AND GRAY , SAPROLITIC, SILTY SAND WITH TRACE MICA AND FELDSPAR
315	314.3	42.2	3	2	6	8		M		
310	309.3	47.2	4	6	8	14		M		311.0 45.5 RED, BROWN, ORANGE, AND GRAY, SAPROLITIC, SANDY SILTY WITH TRACE MICA
305	304.3	52.2	3	5	8	13		M		
300	299.3	57.2	2	4	5	9	SS-26	M		
295	294.3	62.2	3	4	6	10		M		296.0 60.5 GRAY AND BROWN, SAPROLITIC, SILTY SAND WITH TRACE MICA
290	289.3	67.2	6	11	14	25		M		287.7 68.8 **WEATHERED ROCK** GRANITE
285	284.3	72.2	18	40	60/0.4	100/0.9				
280										

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 21+65	**OFFSET** 26 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 356.5 ft	**TOTAL DEPTH** 78.5 ft	**NORTHING** 712,183	**EASTING** 2,114,783	**24 HR.** 23.0
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Clarke, R. E.	**START DATE** 08/30/18	**COMP. DATE** 08/30/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
280						Match Line				
	278.8	77.7	39	61/0.3		100/0.8				278.0 78.5 Boring Terminated at Elevation 278.0 ft IN WEATHERED ROCK (GRANITE)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+89	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 347.0 ft	**TOTAL DEPTH** 96.9 ft	**NORTHING** 712,297	**EASTING** 2,114,709	**24 HR.** 6.6
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/19/18	**COMP. DATE** 10/19/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
350										
	347.0	0.0								347.0 GROUND SURFACE 0.0
345	345.3	1.7	2	3	4	7		M		345.3 **ROADWAY EMBANKMENT** RED-BROWN, SANDY CLAY WITH TRACE MICA AND GRAVEL 1.7
			4	7	9	16		M		TAN-BROWN, COARSE SAND WITH TRACE GRAVEL
340	340.2	6.8								339.0 8.0
			1	2	1	3		M		**RESIDUAL** GRAY AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE MICA, FELDSPAR, AND MAGNESIUM
335	335.2	11.8								
			2	1	2	3		M		
330	330.2	16.8								
			1	3	5	8		M		
325	325.2	21.8								
			6	8	12	20		M		
320	320.2	26.8								
			5	7	10	17		M		
315	315.2	31.8								
			3	3	5	8		M		
310	310.2	36.8								
			2	2	3	5		M		
305	305.2	41.8								
			3	8	12	20		M		
300	300.2	46.8								
			13	22	29	51		M		
295	295.2	51.8								
			21	25	29	54	SS-52	M		
290	290.2	56.8								291.7 55.3
			25	37	63/0.4	100/0.4				**WEATHERED ROCK** GRANITE
285	285.2	61.8								286.9 60.1
			22	46	39	85		M		**RESIDUAL** RED-BROWN AND GRAY, SAPROLITIC, SANDY SILT WITH TRACE MICA, FELDSPAR, AND MAGNESIUM
280	280.2	66.8	100/0.4			100/0.4				281.9 65.1
										WEATHERED ROCK GRANITE
275	275.2	71.8								275.7 71.3
			16	31	33	64		M		**RESIDUAL** GRAY AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA, TRACE FELDSPAR AND MAGNESIUM
270	270.2	76.8								

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+89	**OFFSET** 28 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 347.0 ft	**TOTAL DEPTH** 96.9 ft	**NORTHING** 712,297	**EASTING** 2,114,709	**24 HR.** 6.6
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/19/18	**COMP. DATE** 10/19/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
270						Match Line				
			26	19	15	34		M		**RESIDUAL** GRAY AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA, TRACE FELDSPAR AND MAGNESIUM *(continued)*
265	265.2	81.8	13	19	22	41		M		262.9 84.1
										WEATHERED ROCK GRANITE
260	260.2	86.8	100/0.4			100/0.4				258.8 88.2
										CRYSTALLINE ROCK GRANITE
255	255.2	91.8	60/0.1			60/0.1				
										250.1 96.9
	250.2	96.8	60/0.1			60/0.1				Boring Terminated at Elevation 250.1 ft IN CRYSTALLINE ROCK (GRANITE)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+77	**OFFSET** 14 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 349.2 ft	**TOTAL DEPTH** 82.1 ft	**NORTHING** 712,270	**EASTING** 2,114,769	**24 HR.** 8.8
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/18/18	**COMP. DATE** 10/18/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
350										349.2 GROUND SURFACE	0.0
										ROADWAY EMBANKMENT	
										347.2 TAN-BROWN, MEDIUM DENSE, COARSE SAND WITH TRACE GRAVEL	2.0
345	345.2	4.0	4	5	5	10	SS-51	M		**RESIDUAL**	
	342.2	7.0	2	2	3	5		M		GRAY AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA AND TRACE FELDSPAR AND MAGNESIUM	
340											
	337.2	12.0	3	3	4	7		M			
335											
	332.2	17.0	2	4	6	10		M			
330											
	327.2	22.0	3	5	6	11		M			
325											
	322.2	27.0	4	7	12	19		M			
320											
	317.2	32.0	4	5	10	15		M			
315											
	312.2	37.0	4	7	11	18		M			
310											
	307.2	42.0	28	72/0.4		100/0.9				309.7	39.5
305										**WEATHERED ROCK** GRANITE	
	302.2	47.0	13	20	27	47		M		303.9	45.3
300										**RESIDUAL** GRAY AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA AND TRACE MAGNESIUM AND QUARTZ VEINS	
	297.2	52.0	9	16	17	33		M			
295											
	292.2	57.0	8	12	19	31		M			
290											
	287.2	62.0	12	24	31	55		M			
285											
	282.2	67.0	21	26	52	78		M		280.1	69.1
280										**WEATHERED ROCK** GRANITE	
	277.2	72.0	100/0.3			100/0.3					
275											
	272.2	77.0	100/0.3			100/0.3					
270											

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+77	**OFFSET** 14 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 349.2 ft	**TOTAL DEPTH** 82.1 ft	**NORTHING** 712,270	**EASTING** 2,114,769	**24 HR.** 8.8
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/18/18	**COMP. DATE** 10/18/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
270						Match Line				268.9 80.3
	267.2	82.0	60/0.1			60/0.1				**CRYSTALLINE ROCK** GRANITE 267.1 82.1
										Boring Terminated at Elevation 267.1 ft IN CRYSTALLINE ROCK (GRANITE)

NCDOT BORE DOUBLE B4654_GEO_BRDG0069_BH.GPJ NC_DOT.GDT 11/14/18

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 24+03	**OFFSET** 17 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 358.7 ft	**TOTAL DEPTH** 58.8 ft	**NORTHING** 712,411	**EASTING** 2,114,702	**24 HR.** 17.2
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 09/04/18	**COMP. DATE** 09/04/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft) / DEPTH (ft)
360										358.7 / 0.0 GROUND SURFACE
	356.4	2.3	4	7	8	15		M		**RESIDUAL** GRAY AND ORANGE, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA, FELDSPAR, AND QUARTZ
355										
	351.4	7.3	3	4	6	10		M		
350										
	346.4	12.3	3	6	5	11		M		348.1 / 10.6 GRAY AND BROWN, SANDY SILT WITH TRACE MICA AND CLAY LENSES
345										
	341.4	17.3	4	6	9	15		M		
340										
	336.4	22.3	21	20	24	44	SS-27	M		338.1 / 20.6 GRAY AND ORANGE, COARSE SAND WITH TRACE MICA AND FELDSPAR GRAVEL
335										
	331.4	27.3	11	23	18	41		M		
330										
	326.4	32.3	2	4	6	10	SS-28	M		327.0 / 31.7 RED, ORANGE, BROWN, AND GRAY, SAPROLITIC, SANDY SILT WITH TRACE TO LITTLE MICA
325										
	321.4	37.3	4	7	10	17		M		
320										
	316.4	42.3	5	9	12	21		M		
315										
	311.4	47.3	12	17	17	34		M		
310										
	306.4	52.3	6	12	18	30		M		
305										
	301.4	57.3	8	14	16	30		M		299.9 / 58.8 Boring Terminated at Elevation 299.9 ft IN RESIDUAL (SANDY SILT)
300										

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+48	**OFFSET** 27 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 366.4 ft	**TOTAL DEPTH** 87.8 ft	**NORTHING** 712,364	**EASTING** 2,114,754	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/17/18	**COMP. DATE** 10/17/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
370										366.4 / 0.0 GROUND SURFACE
										ROADWAY EMBANKMENT RED-BROWN, SANDY CLAY WITH TRACE GRAVEL
365										363.4 / 3.0 **RESIDUAL** ORANGE AND GRAY, HIGHLY PLASTIC, SILTY CLAY WITH TRACE MICA
	362.0	4.4	2	3	3	6	SS-44	M		
360	359.0	7.4	1	3	5	8		M		355.9 / 10.5 ORANGE, GRAY, AND RED, SANDY CLAY WITH TRACE MICA, QUARTZ, AND FELDSPAR
355	354.2	12.2	4	5	8	13	SS-45	M		
350	349.2	17.2	2	4	4	8	SS-46	M		350.8 / 15.6 ORANGE, GRAY, AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE MICA, FELDSPAR, QUARTZ, AND MAGNESIUM
345	344.2	22.2	3	3	4	7		M		
340	339.2	27.2	3	5	6	11	SS-47	M		
335	334.2	32.2	2	2	4	6		M		
330	329.2	37.2	3	4	6	10	SS-48	M		
325	324.2	42.2	4	5	7	12		M		
320	319.2	47.2	5	8	11	19		M		
315	314.2	52.2	7	12	16	28		M		
310	309.2	57.2	4	5	5	10		M		
305	304.2	62.2	4	6	12	18	SS-49	M		
300	299.2	67.2	5	11	17	28		M		
295	294.2	72.2	9	11	16	27	SS-50	M		
290										

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 38454.1.2	**TIP** B-4654	**COUNTY** WAKE	**GEOLOGIST** Moore, N. O.	
SITE DESCRIPTION BRIDGE NO. 69 ON NC-50 (BENSON ROAD) OVER US-70				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+48	**OFFSET** 27 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 366.4 ft	**TOTAL DEPTH** 87.8 ft	**NORTHING** 712,364	**EASTING** 2,114,754	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 86% 11/17/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Pinter, D. G.	**START DATE** 10/17/18	**COMP. DATE** 10/17/18	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
290						Match Line				
	289.2	77.2	9	12	17	29		M		ORANGE, GRAY, AND BROWN, SAPROLITIC, SANDY SILT WITH TRACE MICA, FELDSPAR, QUARTZ, AND MAGNESIUM *(continued)*
285	284.2	82.2	39	60/0.1		100/0.6				284.7 / 81.7 **WEATHERED ROCK** GRANITE
280	279.2	87.2	78	22/0.1		100/0.6				278.6 / 87.8 Boring Terminated at Elevation 278.6 ft IN WEATHERED ROCK (GRANITE)

PROJ. NO. - 38454.1.2
ID NO. - B-4654
COUNTY - WAKE

EB1-A

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-18	29' LT	22+01	3.4-4.9	A-5(5)	49	10	7.3	38.0	32.5	22.2	100	99	57	-	-
SS-19	29' LT	22+01	13.4-14.9	A-4(0)		NP	10.5	46.9	30.5	12.1	100	97	45	-	-
SS-20	29' LT	22+01	23.4-24.9	A-2-4(0)		NP	36.8	32.3	20.8	10.1	95	70	31	-	-
SS-21	29' LT	22+01	28.4-29.9	A-4(0)		NP	21.4	38.2	28.3	12.1	100	91	42	-	-
SS-22	29' LT	22+01	68.4-69.9	A-2-4(0)		NP	46.1	24.6	19.2	10.1	95	65	29	-	-

EB1-B

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-23	26' RT	21+65	7.2-8.7	A-7-5(30)	73	41	19.8	11.3	16.4	52.5	100	87	70	-	-
SS-24	26' RT	21+65	12.2-13.7	A-4(1)	36	8	34.5	23.8	23.4	18.2	98	75	41	-	-
SS-25	26' RT	21+65	27.2-28.7	A-5(2)	41	10	30.7	24.8	24.2	20.2	97	77	44	-	-
SS-26	26' RT	21+65	57.2-58.7	A-4(0)		NP	19.6	37.8	26.5	16.2	100	93	44	-	-

EB2-A

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-27	17' LT	24+03	22.3-23.8	A-1-b(0)		NP	54.5	23.8	13.5	8.1	70	43	16	-	-
SS-28	17' LT	24+03	32.3-33.8	A-4(0)		NP	21.8	33.9	30.1	14.1	100	89	46	-	-

EB2-B

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-44	27 RT	23+48	4.4-5.9	A-7-6(14)	54	26	17.8	24.6	11.2	46.4	96	85	59	-	-
SS-45	27 RT	23+48	12.2-13.7	A-7-6(13)	60	33	30.1	17.0	14.6	38.3	89	68	50	-	-
SS-46	27 RT	23+48	17.2-18.7	A-2-4(0)	40	4	37.7	35.3	10.8	16.1	99	78	32	-	-
SS-47	27 RT	23+48	27.2-28.7	A-2-4(0)	39	4	50.1	28.5	11.4	10.1	91	60	24	-	-
SS-48	27 RT	23+48	37.2-38.7	A-2-4(0)	38	4	42.2	33.5	14.2	10.1	97	68	30	-	-
SS-49	27 RT	23+48	62.2-63.7	A-2-4(0)	40	6	35.9	38.3	15.6	10.1	100	81	33	-	-
SS-50	27 RT	23+48	72.2-73.7	A-4(0)	37	6	12.1	57.9	17.9	12.1	100	97	39	-	-

B1-B

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-51	14 RT	22+77	4.0-5.5	A-2-5(0)	44	5	26.0	46.8	13.0	14.1	100	92	33	-	-

B1-A

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-52	28 LT	22+89	51.8-53.3	A-2-4(0)		NP	43.0	37.5	11.4	8.1	96	69	24	-	-

REFERENCE: B-4654

PROJECT: 38454

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4654	1	6

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *WAKE*

PROJECT DESCRIPTION *BRIDGE NO. 69 ON NC-50 (-L-) (BENSON ROAD) OVER US HWY 70 (-Y1-)*

CONTENTS

CAUTION NOTICE

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

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PERSONNEL

N.O. MOORE

D.G. PINTER

R.E. CLARKE

INVESTIGATED BY *N.O. MOORE*

DRAWN BY *N.O. MOORE*

CHECKED BY *N.T. ROBERSON*

SUBMITTED BY *N.T. ROBERSON*

DATE *NOVEMBER 2018*

NORTH CAROLINA LICENSED SEAL 1912 GEOLOGIST NEIL T. ROBERSON

DocuSigned by:
Neil T. Roberson 3/1/2019
4061D9A8C6C840C... SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
B-4654	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 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [X] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] 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 LOCATIONS AND ELEVATION TAKEN FROM ROADWAY TIN (6/30/17) AND GPK FILE

ELEVATION: FEET

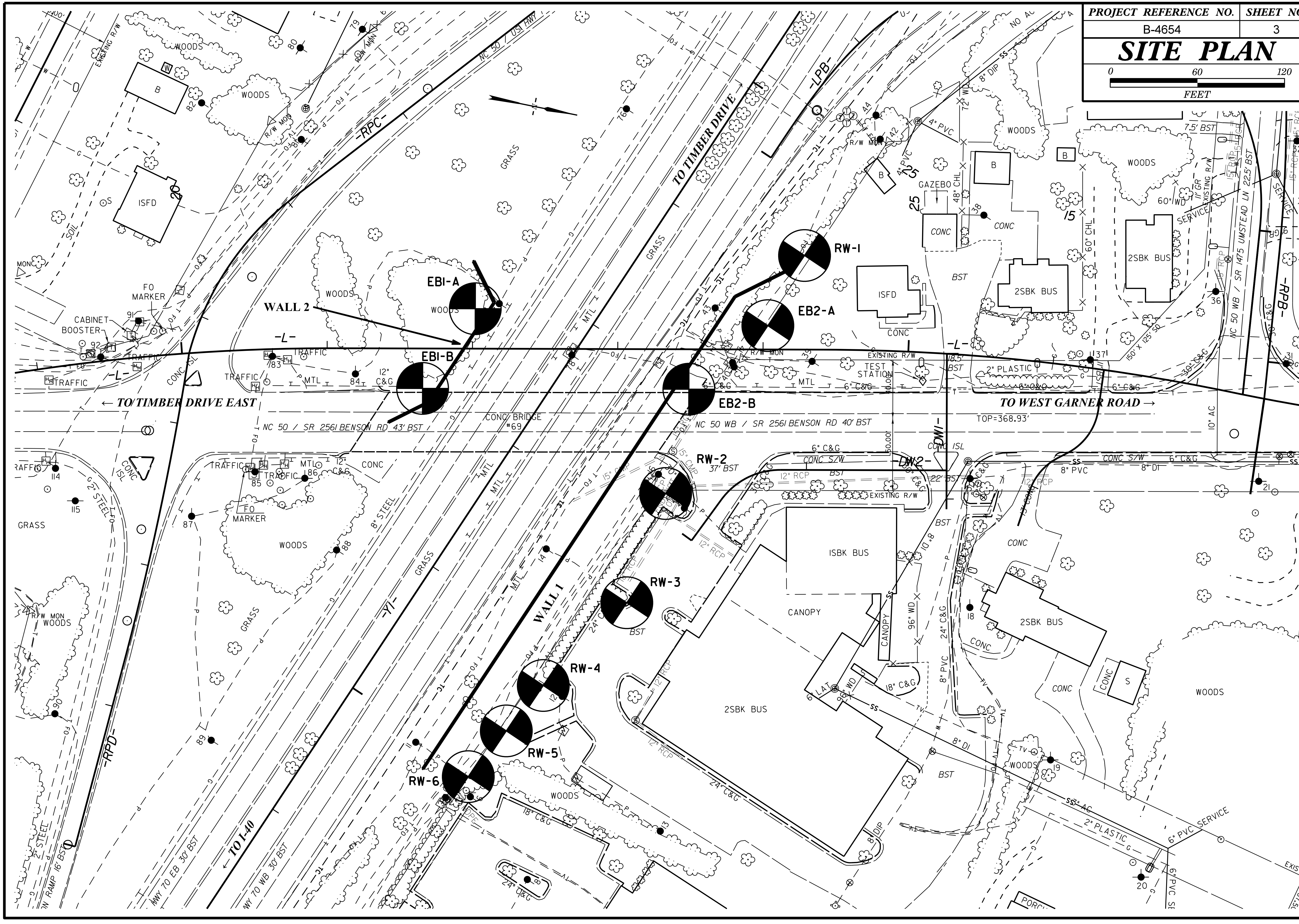
NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
B-4654	3

SITE PLAN

0 60 120
FEET



PROJECT REFERENCE NO.	SHEET NO.
B-4654	4

PROFILE THROUGH BORINGS PROJECTED ALONG –WALLI–

0 50 100
FEET
VE = 5:1

RW–1 9+84 26 LT
EB2–A 10+39 27 LT
EB2–B 11+11 8 LT
RW–2 11+80 34 LT
RW–3 12+57 54 LT
RW–4 13+36 37 LT
RW–5 13+76 34 LT
RW–6 14+17 29 LT

EXISTING GROUNDLINE

09/18

WEATHERED ROCK (GRANITE)

100/0.6

FIAD 10/18

(A) ROADWAY EMBANKMENT, RED-BROWN, MEDIUM STIFF, MOIST, SANDY CLAY WITH TRACE MICA AND GRAVEL

(B) RESIDUAL, RED, ORANGE, AND GRAY, MEDIUM TO VERY STIFF, MOIST, SAPROLITC, HIGHLY PLASTIC, SILTY CLAY AND SANDY SILT WITH TRACE MICA

(C) RESIDUAL, BROWN, GRAY, AND ORANGE, MOIST, SAPROLITIC, MEDIUM TO VERY STIFF AND LOOSE TO MEIDUM DENSE, SANDY SILT AND SILTY SAND WITH TRACE MICA, QUARTZ, POTASSIUM FELDSPAR, AND CLAY LENSES

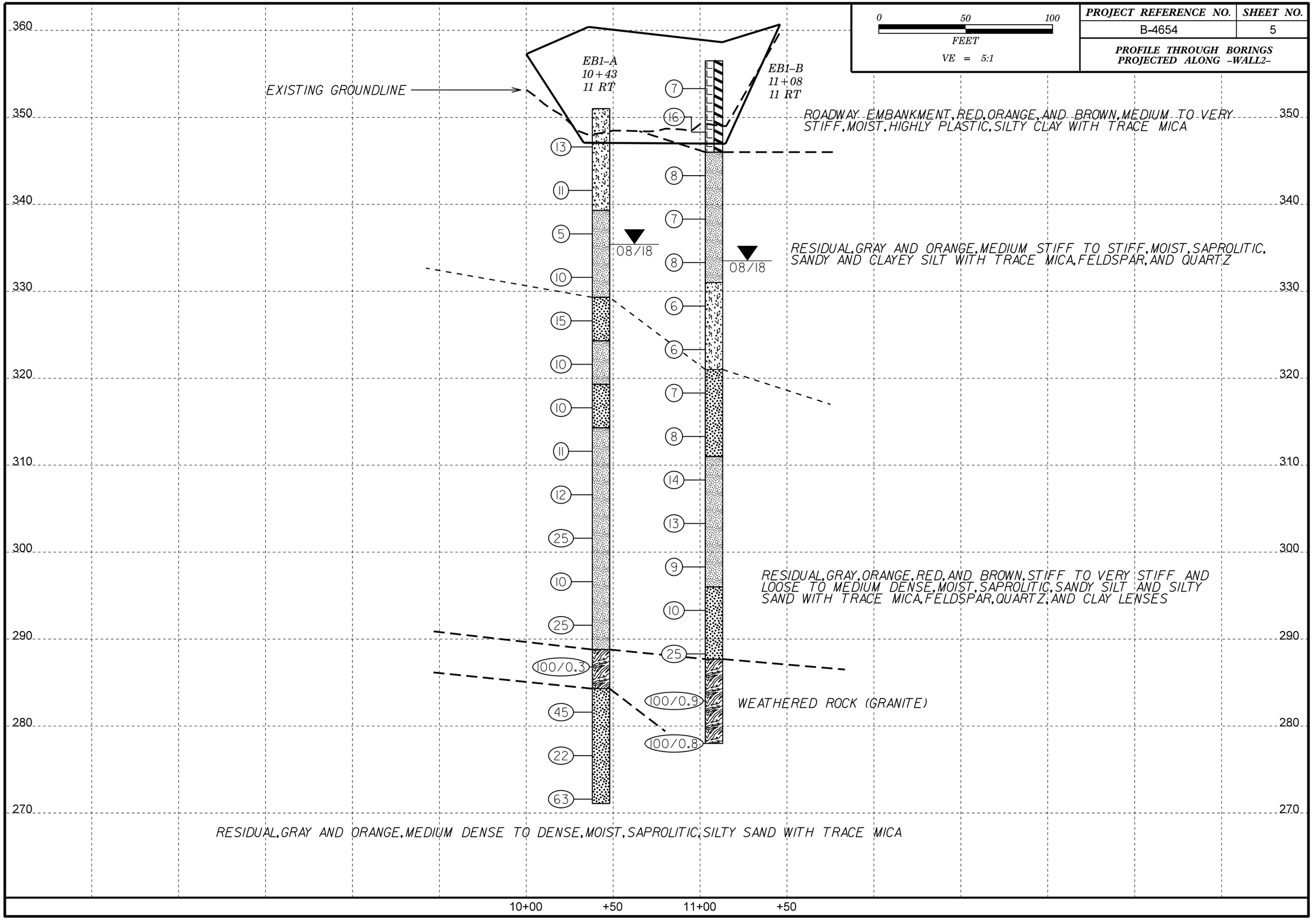
(D) RESIDUAL, GRAY AND ORANGE, DENSE, MOIST, COARSE SAND WITH TRACE MICA AND FELDSPAR GRAVEL

(E) RESIDUAL, ORANGE, BROWN, GRAY, AND PALE GREEN, MEDIUM STIFF TO STIFF, MOIST, SAPROLITIC, SILTY CLAY WITH TRACE MICA

PROJECT REFERENCE NO.	SHEET NO.
B-4654	5

PROFILE THROUGH BORINGS PROJECTED ALONG –WALL2–

0 50 100
FEET
VE = 5:1



PROJ. NO. - 38454.1.2
ID NO. - B-4654
COUNTY - WAKE

EB1-A

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-18	29' LT	22+01	3.4-4.9	A-5(5)	49	10	7.3	38.0	32.5	22.2	100	99	57	-	-
SS-19	29' LT	22+01	13.4-14.9	A-4(0)	-	NP	10.5	46.9	30.5	12.1	100	97	45	-	-
SS-20	29' LT	22+01	23.4-24.9	A-2-4(0)	-	NP	36.8	32.3	20.8	10.1	95	70	31	-	-
SS-21	29' LT	22+01	28.4-29.9	A-4(0)	-	NP	21.4	38.2	28.3	12.1	100	91	42	-	-
SS-22	29' LT	22+01	68.4-69.9	A-2-4(0)	-	NP	46.1	24.6	19.2	10.1	95	65	29	-	-

EB1-B

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-23	26' RT	21+65	7.2-8.7	A-7-5(30)	73	41	19.8	11.3	16.4	52.5	100	87	70	-	-
SS-24	26' RT	21+65	12.2-13.7	A-4(1)	36	8	34.5	23.8	23.4	18.2	98	75	41	-	-
SS-25	26' RT	21+65	27.2-28.7	A-5(2)	41	10	30.7	24.8	24.2	20.2	97	77	44	-	-
SS-26	26' RT	21+65	57.2-58.7	A-4(0)	-	NP	19.6	37.8	26.5	16.2	100	93	44	-	-

EB2-A

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-27	17' LT	24+03	22.3-23.8	A-1-b(0)	-	NP	54.5	23.8	13.5	8.1	70	43	16	-	-
SS-28	17' LT	24+03	32.3-33.8	A-4(0)	-	NP	21.8	33.9	30.1	14.1	100	89	46	-	-

EB2-B

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-44	36' RT	23+48	4.4-5.9	A-7-6(14)	54	26	17.8	24.6	11.2	46.4	96	85	59	-	-
SS-45	36' RT	23+48	12.2-13.7	A-7-6(13)	60	33	30.1	17.0	14.6	38.3	89	68	50	-	-
SS-46	36' RT	23+48	17.2-18.7	A-2-4(0)	40	4	37.7	35.3	10.8	16.1	99	78	32	-	-
SS-47	36' RT	23+48	27.2-28.7	A-2-4(0)	39	4	50.1	28.5	11.4	10.1	91	60	24	-	-
SS-48	36' RT	23+48	37.2-38.7	A-2-4(0)	38	4	42.2	33.5	14.2	10.1	97	68	30	-	-
SS-49	36' RT	23+48	62.2-63.7	A-2-4(0)	40	6	35.9	38.3	15.6	10.1	100	81	33	-	-
SS-50	36' RT	23+48	72.2-73.7	A-4(0)	37	6	12.1	57.9	17.9	12.1	100	97	39	-	-

RW-1

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-29	95' LT	25+79	3.2-4.7	A-7-5(21)	65	34	9.3	28.7	31.7	30.3	100	97	63	-	-
SS-30	95' LT	25+79	8.2-9.7	A-7-6(7)	42	17	25.9	18.0	21.8	34.3	98	82	56	-	-

RW-2

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-43	105' LT	27+70	33.4-34.9	A-2-4(0)	-	NP	49.9	21.0	14.9	14.1	87	54	26	-	-

RW-3

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-40	124' LT	28+47	8.1-9.6	A-4(1)	29	7	26.3	25.9	9.5	38.4	97	81	47	-	-
SS-41	124' LT	28+47	18.1-19.6	A-7-5(5)	41	11	3.0	39.8	28.9	28.3	100	99	59	-	-
SS-42	124' LT	28+47	33.1-34.6	A-7-5(5)	43	12	10.3	38.4	33.1	18.2	100	97	53	-	-

RW-4

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-37	108' LT	29+26	28.3-29.8	A-4(4)	39	7	12.9	26.1	32.7	28.3	98	90	61	46	-
SS-38	108' LT	29+26	38.3-39.7	A-7-6(6)	41	13	6.3	34.9	32.5	26.3	100	99	60	49	-
SS-39	108' LT	29+26	43.3-44.8	A-7-5(6)	49	11	10.5	32.3	34.9	22.2	100	95	59	-	-

RW-5

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-34	104' LT	29+66	13.0-14.5	A-7-5(9)	50	15	3.8	34.7	25.1	36.4	100	98	63	-	-
SS-35	104' LT	29+66	33.0-34.5	A-7-6(6)	42	14	2.6	46.3	30.9	20.2	100	100	54	-	-
SS-36	104' LT	29+66	48.0-49.5	A-2-4(0)	-	NP	48.5	20.0	19.4	12.1	88	55	28	-	-

RW-6

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-31	99' LT	30+07	3.2-4.7	A-7-5(11)	53	21	26.3	13.7	25.7	34.3	97	79	59	-	-
SS-32	99' LT	30+07	8.2-9.7	A-7-5(25)	68	28	7.1	17.4	25.1	50.5	100	96	76	41	-
SS-33	99' LT	30+07	13.2-14.7	A-4(1)	36	2	6.5	38.2	29.1	26.3	100	97	57	-	-