5980 Ä REFERENCE **CONTENTS** 

**DESCRIPTION** 

LEGEND (SOIL & ROCK)

BRIDGE BORING AND CORE LOGS

SOIL AND ROCK TEST RESULTS

TITLE SHEET

CROSS SECTIONS

CORE PHOTOS

SITE PHOTOS

SITE PLAN

PROFILE

SHEET NO.

5-7

8-II 12

13-14

4761

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY **NASH** PROJECT DESCRIPTION <u>I-95 INTERCHANGE</u> IMPROVEMENTS AT HALIFAX RD (SR 1522)

SITE DESCRIPTION BRIDGE ON -YI- (SR 1544) OVER -L1-AND -L2-(I-95)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5980	1	15

#### 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 (99) 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 BORNOSS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (INF-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 NDICATED 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 DIES 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** 

R. DOYLE

Z. ARDEBILI

A. LOZADA

A. PITZER

**G.** *LANG* 

SUMMIT D&E

GEOTECHNICS

INVESTIGATED BY R. DOYLE

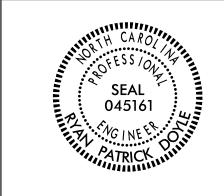
DRAWN BY A. LOZADA

CHECKED BY R. DOYLE

SUBMITTED BY **AECOM** 

DATE **JUNE 2019** 





SIGNATURE

**DOCUMENT NOT CONSIDERED FINAL** 

DATE

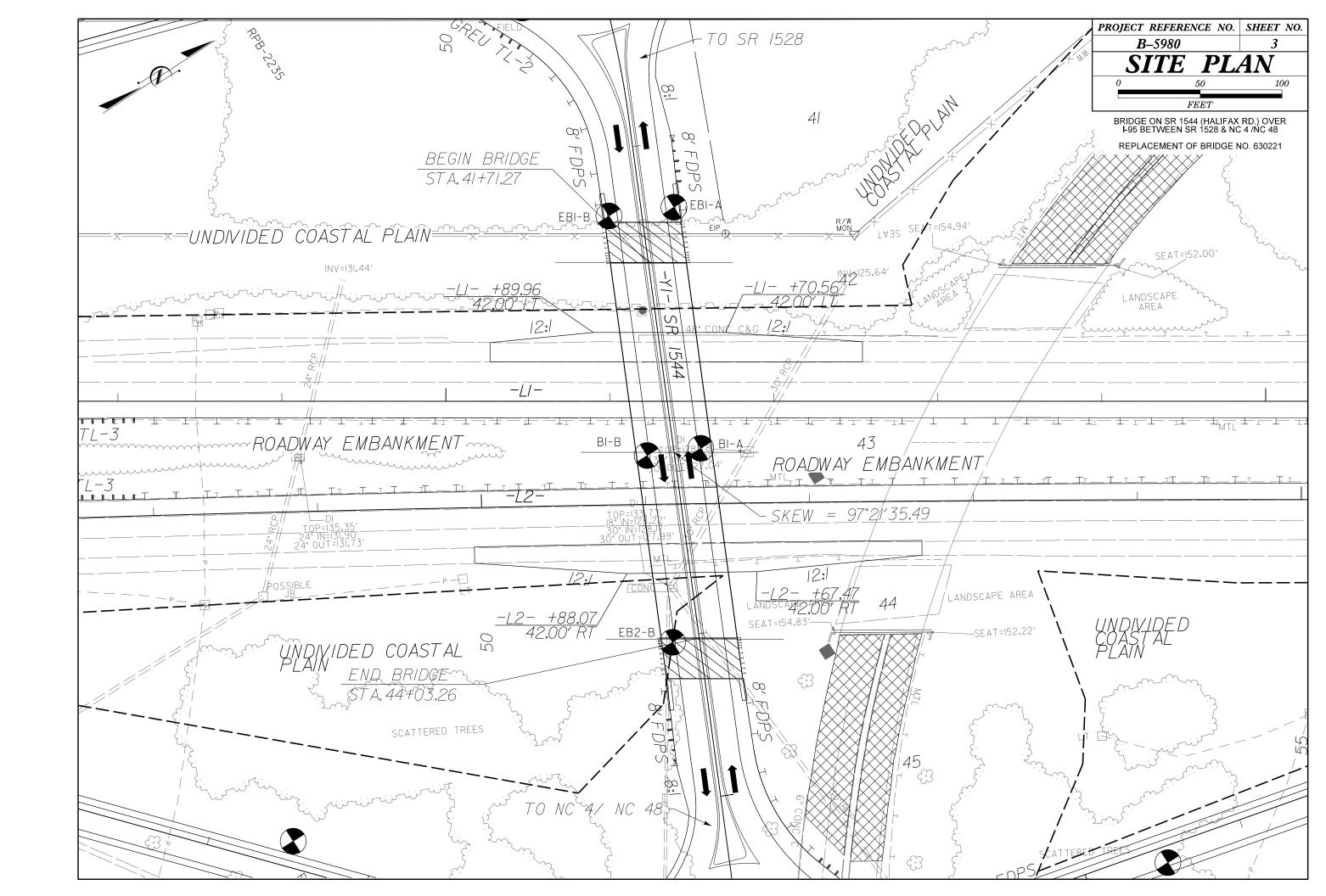
**UNLESS ALL SIGNATURES COMPLETED** 

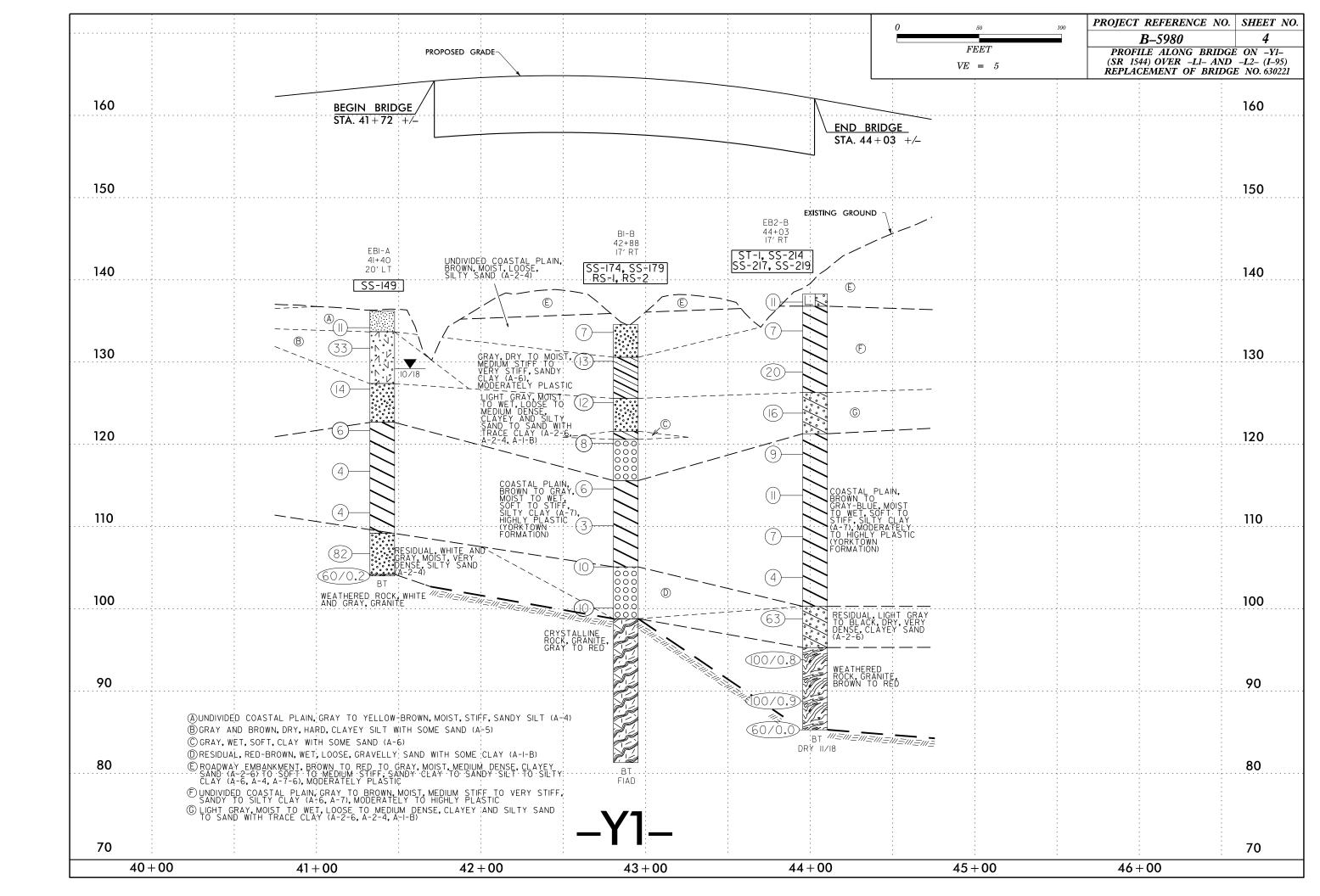
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

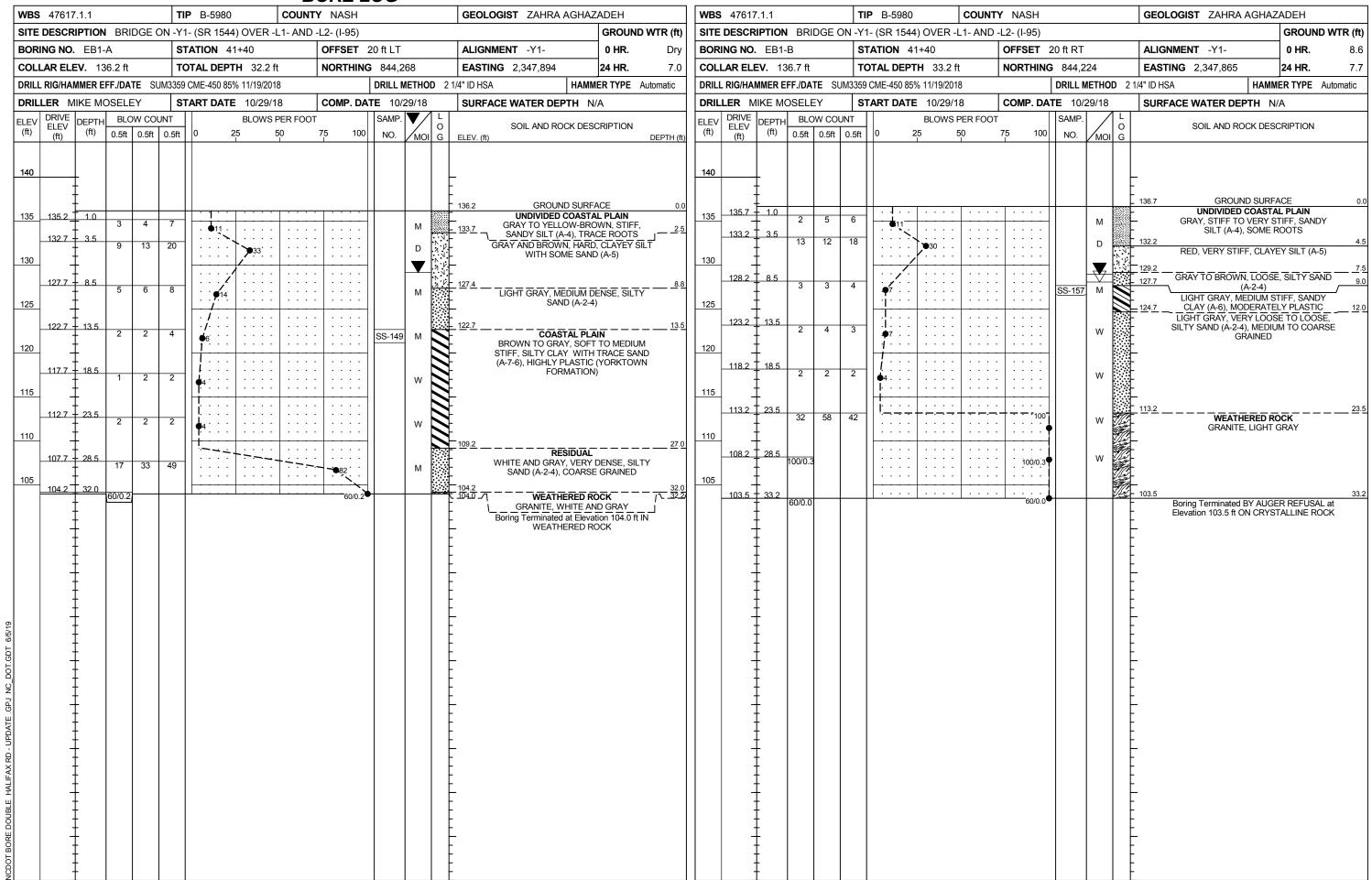
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS
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	<u>WELL GRADED</u> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED V// NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
CENERAL CRANIII AR MATERIALS STIT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	FINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC POCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNELSS, GARBROU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CHISTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE,
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK PT SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
"10 50 MX GRANULAR CLAY MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3%. 3 - 5%. TRACE 1 - 10%.	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL — — 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 140 MX 41 MN LITTLE OR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP TIMES A A A AMY B MY 12 MY 16 MY NO MY AMOUNTS OF ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. FINE CHITICAD CLASES.	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MATOR CRAVEL AND FINE SILIT OR CLAYEY SILIT CLAYEY MATTER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	√PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	PARENT MATERIAL.
AS SUBGRADE PUON	O-MG SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI 0F A-7-5 SUBGROUP IS ≤ LL - 30 : PI 0F A-7-6 SUBGROUP IS > LL - 30  CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
DANCE OF CTANDARD DANCE OF LINCONFINED	MISCELLHNEUUS STMBULS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSIDERACY PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
IN-VALUE) (TUNS/FT-)	₩ITH SOIL DESCRIPTION → OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  LOOSE 4 TO 10	SOIL SYMBOL	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KADLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MATERIAL MEDIUM DENSE 10 TO 30 N/A	저	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50  VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER  THAN ROADWAY EMBANKMENT  AUGER BORING  CONE PENETROMETER TEST	VERY  ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE  SEVERE  BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— INFERRED SOIL BOUNDARY ← CORE BORING • SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	MW - TECT DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0   MATERIAL   STIFF   8 TO 15   1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTREEM TON	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053		HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.  MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED  CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.  HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION SOIDE FOR TIELS HOSTORIC DESCRIPTION	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLID: REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RHINGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS $w$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING	BENCH MARK: BM-4
"" PL L _ PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N: 842477.22; E: 2345412.50
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE -	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: I5I.38 FEET
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	ADDITIONAL ABBREVIATIONS:
ATTAIN OPTIMUM MOISTURE	CME-55  4* CONTINUOUS FLIGHT AUGER  CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	8° HOLLOW AUGERS	INDURATION	FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS X-N Q	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	ROADWAY BORING ELEVATIONS BASED OFF b5980_is_tin.tin File DATED 8/17/2018
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	DATED 0/11/2010
MODERATELY PLASTIC 6-15 SCIONT MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	CDAING CAN DE CEDADATED FROM CAMPLE MITH CTEFL DROPE	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH X HAND AUGER	MODERATELY INDURATED  ORALINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNG-CARB.	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	X CME 450 ATV SOUNDING ROD SOUNDING ROD VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X 2-1/4" ID HOLLOW-STEM AUGER	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14

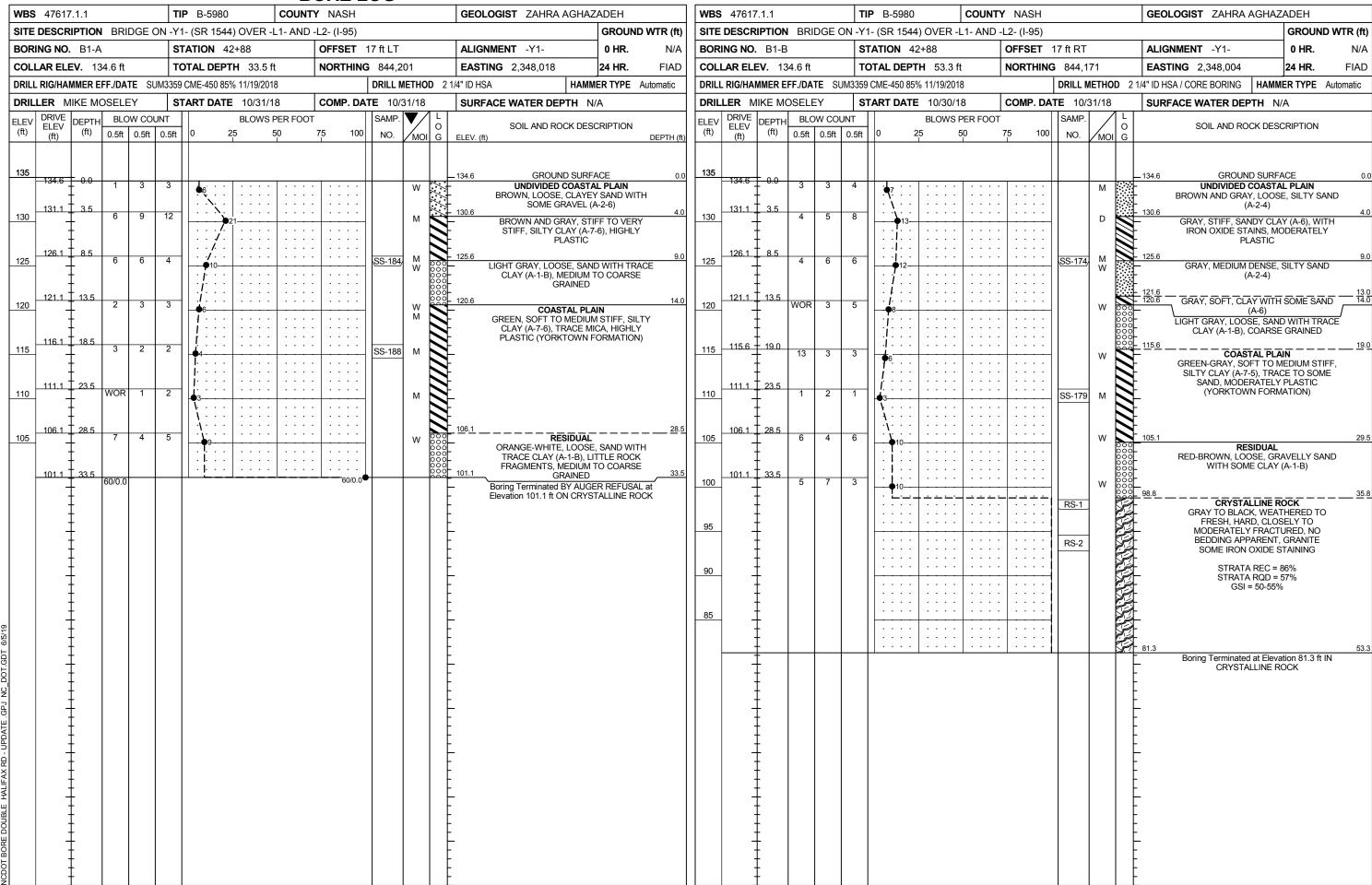




### GEOTECHNICAL BORING REPORT BORE LOG



### GEOTECHNICAL BORING REPORT BORE LOG



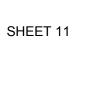
### GEOTECHNICAL BORING REPORT CORE LOG

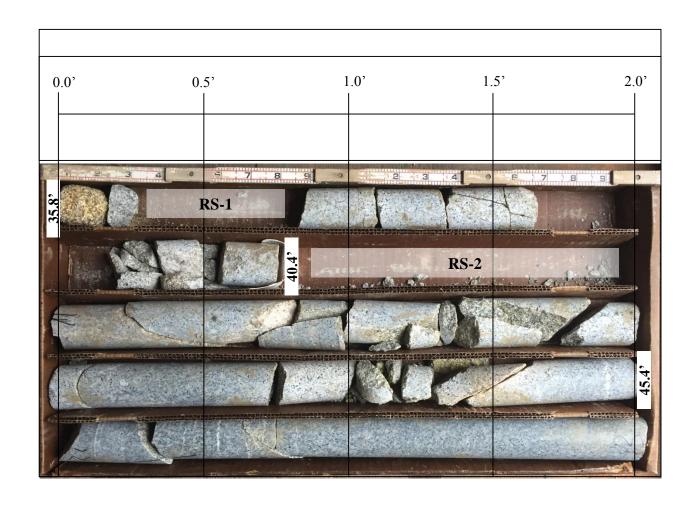
									<u></u>	<u>Ui</u>	RE LUG				
WBS	4761	7.1.1			TIP	B-598	30	C	OUNT	Y١	IASH	GEOLOGIST ZAHRA AC	SHAZADEH		
SITE	DESC	RIPTION	<b>I</b> BRI	DGE ON	I -Y1- (SR 1544) OVER -L1- AND -						(I-95)		GROUND	GROUND WTR (ft)	
BOR	ING NO	). B1-B	3		STATION 42+88						FSET 17 ft RT	ALIGNMENT -Y1-	0 HR.	N/A	
COLI	LAR EL	<b>EV.</b> 13	34.6 ft		TOTAL DEPTH 53.3 ft						<b>RTHING</b> 844,171	<b>EASTING</b> 2,348,004	24 HR.	FIAD	
DRILL	RIG/HA	MMER E	FF./DA	TE SUM	3359 CN	ЛЕ-450	85% 11/19/	2018			DRILL METHOD 21	4" ID HSA / CORE BORING	HAMMER TYPE	Automatic	
DRIL	LER N	ΛΙΚΕ Μ	OSELI	ΞΥ	STA	RT DA	TE 10/3	0/18		СО	<b>MP. DATE</b> 10/31/18	SURFACE WATER DEPT	H N/A		
COR	E SIZE	NQ			тот	AL RU	<b>N</b> 17.5 f	t							
ELEV	RUN ELEV	DEPTH	RUN	DRILL	REC.	UN RQD	SAMP.	STR REC.	ATA RQD	L		ESCRIPTION AND REMARKS			
(ft)	(ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	Ğ	ELEV. (ft)	JESCRIPTION AND REWARKS		DEPTH (ft)	
98.79												Begin Coring @ 35.8 ft			
	98.8	35.8	4.6	2:00/1.0 2:00/1.0	(2.8) 61%	(0.9)	RS-1	(15.0) 86%	(9.9) 57%		- 98.8 - GRAY TO BLACK	CRYSTALLINE ROCK , WEATHERED TO FRESH, HA	RD, CLOSELY TO	35.8	
95	94.2	± 40.4		4:00/1.0 2:50/1.0								RACTURED, NO BEDDING APP. SOME IRON OXIDE STAINING			
	34.2	+0.4	5.0	2:20/0.6 3:38/1.0	(5.0)	(3.2)	RS-2				<u>-</u>				
		‡		3:38/1.0 4:06/1.0 2:55/1.0	100%	64%					<del>-</del> -				
90	89.2	45.4		4:05/1.0 5:00/1.0	1(10)	(0.0)					<del>-</del> -				
		<u> </u>	5.0	2:50/1.0 3:33/1.0		(3.6) 72%					<u>-</u> -				
85		<u> </u>		6:14/1.0 10:22/1.0							- -				
	84.2	† 50.4 	2.9	6:13/1.0 7:48/1.0	(2.9)	(2.2)	1				<u>-</u>				
	81.3	53.3		16:00/1.0 47:30/0.9		76%				2	81.3			53.3	
		+									Boring Terminat	ted at Elevation 81.3 ft IN CRYS	TALLINE ROCK		
		Ŧ									- -				
		‡									- -				
	-	‡									<del>-</del> -				
		‡									<del>-</del> -				
		‡									- <del>-</del>				
		‡									<u>-</u>				
		‡									<del>-</del> -				
	-	<u>†</u>									<u>-</u>				
		ł									<u>-</u> -				
		Ŧ									-				
		Ŧ									-				
		Ŧ									<del>-</del> -				
		Ŧ									- <del>-</del>				
		‡									<del>-</del> -				
		‡									<del>-</del> -				
		‡									<u>-</u> -				
		‡									- -				
		‡									- -				
		İ									<u>-</u> -				
ı		ł									<del>-</del> -				
		+									<del>-</del>				
		Ŧ									- -				
		Ŧ									<del>-</del>				
	.	Ŧ									<del>-</del> -				
		‡									<del>-</del> -				
		+ + + + + + + + + + + + + + + + + + +									- <del>-</del>				
		‡									- -				
		‡									<u>-</u> -				
		$\pm$									<u> </u>				
		Ŧ									<u>-</u> -				
		Ŧ									- -				
	'	†		1			1			1	<del></del>				

SHEET 10

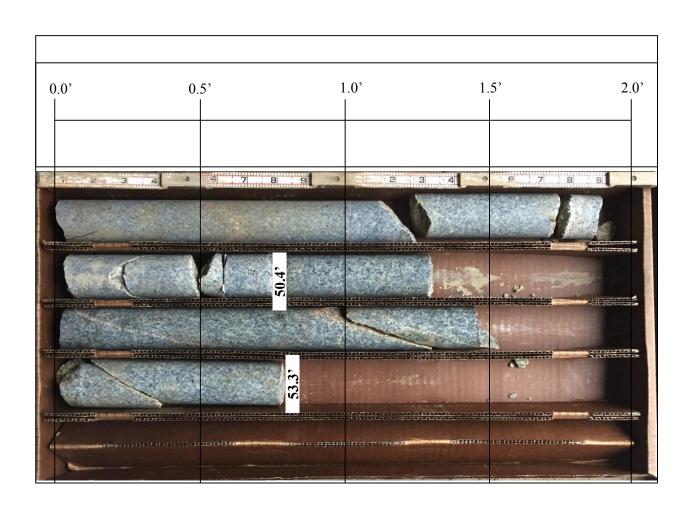
### GEOTECHNICAL BORING REPORT BORE LOG

WBS	47617	1.1.1			TI	<b>P</b> B-5980		COUNT	Y NASH				GEOLOGIST RYAN DOYLE		
SITE	DESCR	IPTION	BRI	DGE (	ON -Y1	I- (SR 1544)	OVER -	L1- AND -	-L2- (I-95)					GROUN	D WTR (ft)
BOR	NG NO.	EB2-	В		Sī	TATION 44-	+03		OFFSET	17 ft RT			ALIGNMENT -Y1-	0 HR.	Dry
COLI	AR ELE	<b>V</b> . 13	8.3 ft		т	OTAL DEPTH	<b>f</b> 53.0 f	t	NORTHIN	<b>G</b> 844,1	22		<b>EASTING</b> 2,348,108	24 HR.	Dry
DRILL	. RIG/HAI	MER E	FF./DA	TE SL	JM3359	CME-450 85%	11/19/201	8		DRILL N	METHO	<b>D</b> 2	1/4" ID HSA HAMM	ER TYPE	Automatic
DRIL	LER M	IKE MO	OSELE	ΞΥ	S	TART DATE	11/02/1	8	COMP. DA	TE 11/	02/18		SURFACE WATER DEPTH NA	A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	W COL	JNT 0.5ft	0 25		PER FOOT	75 100	SAMP.	MOI	L O G	SOIL AND ROCK DESC	CRIPTION	DEDTIL (6)
140	138.3	- 0.0								i iii.	/ IVIO	G	ELEV. (ft)		DEPTH (ft) 0.0
135	- - - - - - - - - -	- - - - 3.5	5	3	6	1. 11 . 1. 1 1	· · · · · · · · · · · · · · · · · · ·			-	D M		ROADWAY EMBANI - 136.8 ORANGE-BROWN, MEDI - CLAYEY SAND (A UNDIVIDED COASTA	UM DENSI -2-6),	E, /— 1.5 J
130	129.8	- - - - 8.5	5	8	12	•7 · · · · · · · · · · · · · · · · · · ·				SS-214	M		GRAY, MEDIUM TO VERY CLAY (A-7-6), TRACE SA PLASTIC	STIFF, SIL	.TY .Y
125	-	- - - 								33-214	I		- - 126.3 LIGHT GRAY TO TAN, MEI	DIUM DEN	<u>12.0</u> SE.
120	124.8 <u> </u>	<u>- 13.5</u> - - -	4	9	7	· · •16					w		CLAYEY SAND (A		17.0
120	119.8 <u> </u>	- - 18.5 - -	2	4	5	. <b>/</b> 9 · ·				-	М		COASTAL PLA GRAY-BLUE, SOFT TO STIF (A-7-6), HIGHLY PLASTIC	F, SILTY ( YORKTO)	CLAY
115	- - 114.8_	- - - 23.5 -	4	5	6	11.				SS-217	66% W		FORMATION	,	
110	- - 109.8	- - - - 28.5				· [ · · · ·							<u>-</u>		
105	- - - 104.8	- - - - 33.5	2	3	4	<b>∳</b> 7 · · ·   J · · · ·   J · · · ·					W		- - - -		
	104.6 <del>-</del> - -	- 33.5 - -	2	2	2	<b>4</b> 4				SS-219	w				
100	99.8 _	- - 38.5 - -	15	24	39			63		-	D		Tight Gray to Black, \ Clayey Sand (A-2-6), Le	AD/GRAPH	u
95	94.8 <u> </u>	- - 43.5 -	26	46	54/0.3				100/0.8		D		APPEARANCE - 95.3 WEATHERED RO GRANITE, BROWN	ock	43.0
90	89.8 <b>-</b>	- - - 48.5 -	15	85/0.4							D		- - -		
	85.3 -	- - - 53.0	60/0.0						100/0.9				- 85.3	D DEFUS	53.0
		- 53.00	60/0.0						60/0.0				Boring Terminated BY AUGE Elevation 85.3 ft ON CRYST  Other Samples: ST-1 (20.0 - 22.0)		AL at





Sta. 42+88 -Y1-, 17-ft RT, Box 1 of 2, 35.8-ft to 47.4-ft



Sta. 42+88 -Y1-, 17-ft RT, Box 2 of 2, 47.4-ft to 53.3-ft

SCALE 1:40 (1"=4")

### **ROCK CORE PHOTOGRAPHS**

BRIDGE ON -Y1- (SR 1544) OVER -L1- AND -L2- (I-95) NASH COUNTY, NORTH CAROLINA WBS NO.: 47617.1.1, TIP NO.: B-5980



AECOM- North Carolina 1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560 Tel: 919-461-1100 Fax: 919-46-1415

PROJECT REFERENCE NO.	SHEET
B-5980	13

	$SOIL\ TEST\ RESULTS$															
BORING	SAMPLE	OFFSET	STATION	ALIGNMENT	DEPTH	AASHTO	L.L.	P.I.		% BY 1			% PAS	SING (S	(EVES)	%
NO.	NO.	011521		IIDI GIVIADIVI	INTERVAL	CLASS.	Б.Б.	1 .1.	GRAVEL	C. SAND	F. SAND	FINES	10	40	200	MOISTURE
EB 1- A	SS- 149	20' LT	41+40	- Y 1-	13. 5- 15. 0	A-7-6(56)	77	54	0.00	0.87	6.75	92. 38	100.0	99. 13	92. 38	47.7
EB1-B	SS- 157	20' RT	41+40	- Y 1-	9.0-10.0	A-6(9)	39	18	0.00	2. 45	34.46	63.09	100.0	97.55	63.09	21.2
B1- A	SS- 184	17' LT	42+88	- Y 1-	8.5-9.0	A-7-6(19)	67	47	0.00	24.99	23. 19	51.83	100.0	75.01	51.83	17.2
B1- A	SS- 188	17' LT	42+88	- Y 1-	18. 5- 20. 0	A-7-6(29)	54	30	0.67	3. 16	8.70	87.46	99. 33	96. 16	87.46	51.9
B1-B	SS- 174	17' RT	42+88	- Y 1-	8.5-9.0	A-6(7)	35	20	1. 48	15.70	28.57	54. 25	98.52	82.82	54. 25	16.6
B1-B	SS- 179	17' RT	42+88	- Y 1-	23. 5- 25. 0	A-7-5(17)	47	16	0.00	1. 37	11. 29	<i>87.34</i>	100.0	98.63	87.34	69.5
EB2- B	SS-214	17' RT	44+03	- Y 1-	8.5-10.0	A-7-6(29)	68	50	0.66	8.07	28.48	62.8	99. 34	91.28	62.80	18. 9
EB2- B	ST- 1	17' RT	44+03	- Y 1-	20. 0- 22. 0	A-7-6(41)	58	39	2. 32	0.24	2.62	94.83	97.68	97.44	94.83	65.8
EB2-B	SS-217	17' RT	44+03	- Y 1-	23. 5- 25. 0	A-7-6(41)	66	45	0.36	6.86	8. 22	84. 56	99.64	92.78	84. 56	49. 1
EB2- B	SS-219	17' RT	44+03	- Y 1-	33. 5- 35. 0	A-7-6(46)	70	50	0.05	3. 32	11.46	85. 17	99. 95	96.64	85. 17	68.4



#### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Boring No.: Client: **AECOM** Y1-4288-R Client Project: Halifax Rd. Interchange Depth (ft): 36-37 Project No.: R-2018-313-001 Sample ID: RS-1

Lab ID No.: R-2018-313-001-044 Moisture Condition: As Received-Unpreserved

Specimen Weight (g): 482.95 SPECIMEN LENGTH (in) **SPECIMEN DIAMETER (in):** Reading 1: 4.06 Reading 1: 1.87 Reading 2: 4.04 Reading 2: 1.87 Reading 3: 4.07 Average: 1.87 Area (in<sup>2</sup>): 2.75 4.06 Average: L/D: 2.17 MOISTURE CONTENT Tare Number: 860.00 Total Load (lb): 44,075 Wt. of Tare & Wet Sample (g): 336.57 Uniaxial Compressive Strength (psi): 16,050 Wt. of Tare & Dry Sample (g): 336.10 Weight of Tare (g): 135.06 Fracture Type: Shear Weight of Wet Sample (g): 201.51 Sample Volume (cm<sup>3</sup>): 182.58 Rate of Loading (lb/sec): Moisture Content (%): 0.23 Time to Break (min:sec): 3:8.96 Unit Wet Weight (g/cm<sup>3</sup>): 2.645 Deviation From Straightness<sup>2</sup>: Pass Unit Wet Weight (pcf): 165.1 Unit Dry Weight (g/cm<sup>3</sup>): 2.639 AXIAL: Pass TOP: Pass BOTTOM: Pass

164.7

#### Physical Description: Rock Core

### Notes:

- 1) Moisture conditions at time of the test are: As Received-Unpreserved
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:

R176 Compression Machine,

R525 Digital Calipers,

Unit Dry Weight (pcf):

R148 Feeler Gauge, R419 Scale

R512 Rock Saw

R148 Straight Edge

R582 V-Block, R585 Dial Gauge



Date: 12/7/18 Tested By: Date: 12/6/18 Checked By: GEM

SHEET 14

#### UNCONFINED COMPRESSIVE STRENGTH of INTACT ROCK CORE SPECIMENS

ASTM D 7012-14 Method C

This method does not report strain rate or deformation

Client: **AECOM** Boring No.: Y1-4288-R Client Project: Halifax Rd. Interchange 40.4-41.8 Depth (ft): Project No.: R-2018-313-001 Sample ID: RS-2

Lab ID No.: R-2018-313-001-045 Moisture Condition: As Received-Unpreserved

504.66 Specimen Weight (g):

SPECIMEN LENGTH (in)		<b>SPECIMEN DIAMETER (in):</b>
Reading 1:	4.23	Reading 1:

Reading 2: 4.22 Reading 2: 1.87 Reading 3: 4.22 Average: 1.87 4.22 Area (in<sup>2</sup>): 2.75 Average:

> L/D: 2.26

1.87

MOISTURE CONTENT

Tare Number:	859.00	Total Load (lb):	39,265
Wt. of Tare & Wet Sample (g):	255.79	Uniaxial Compressive Strength (psi):	14,300

255.46 Wt. of Tare & Dry Sample (g): Weight of Tare (g): 134.20

Fracture Type: Shear Weight of Wet Sample (g): 121.59 Sample Volume (cm<sup>3</sup>): 190.08 Rate of Loading (lb/sec): 202 Moisture Content (%): 0.27 Time to Break (min:sec): 3:14.06

Unit Wet Weight (g/cm<sup>3</sup>): 2.655 Unit Wet Weight (pcf): 165.7

Unit Dry Weight (g/cm<sup>3</sup>): 2.648 AXIAL: Pass TOP: Pass BOTTOM: Fail Unit Dry Weight (pcf): 165.2

Physical Description: Rock Core

### Notes:

- 1) Moisture conditions at time of the test are: As Received-Unpreserved
- 2) Sample prep conforms to ASTM D4543-08 "best effort" if applicable
- 3) Deviation from straightness, Procedure A of ASTM D 4543-08 Pass/Fail criteria: gap < 0.02 = Pass, gap > 0.02 = Fail
- 4) Temperature is laboratory room temperature.
- 5) D4543 Prep and D7012 Testing Equipment Used:

R176 Compression Machine,

R525 Digital Calipers,

R148 Feeler Gauge, R419 Scale

R512 Rock Saw

R148 Straight Edge

R582 V-Block, R585 Dial Gauge



Deviation From Straightness<sup>2</sup>: Pass

GEM Date: 12/7/18 Tested By: SFS Date: 12/6/18 Checked By:



PHOTO TAKEN FROM Y1-4403 LOOKING UP STATION



PHOTO TAKEN NEAR RPC-2000 LOOKING ALONG BRIDGE SPAN

### SITE PHOTOGRAPHS

BRIDGE ON -Y1- (SR 1544) OVER -L1- AND -L2- (I-95) WBS NO.: 47617.1.1, TIP NO.: B-5980



AECOM – North Carolina 1600 Perimeter Park Drive, Suite 400 Morrisville, NC 27560 Tel: 919-461-1100 Fax: 919-46-1415