

REFERENCE: U-2579AB

PROJECT: 34839

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2579AB	1	12

CONTENTS

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2	LEGEND (SOIL & ROCK)
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STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY FORSYTH
PROJECT DESCRIPTION WINSTON-SALEM BELTWAY
FROM US 421/I-40 BUS TO I-40

SITE DESCRIPTION BRIDGE NO. 722 ON SR 2632
(SEdge GARDEN ROAD) OVER WINSTON-SALEM
NORTHERN BELTWAY

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 1919 T07-6850. 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

P.M. WEAVER

C.R. PASTRANA

RED DOG DRILLING

INVESTIGATED BY ESP Associates, Inc.

DRAWN BY C.R. PASTRANA

CHECKED BY P.M. WEAVER

SUBMITTED BY ESP Associates, Inc.

DATE MAY 2019

 **ESP ASSOCIATES, INC.**
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SUITE E
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Signature: Paul M. Weaver

Date: 8/27/2019

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
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**

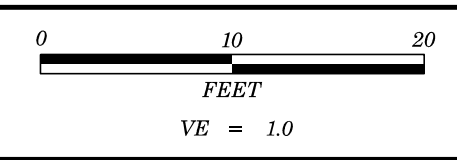
SOIL DESCRIPTION																
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>																
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-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	
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	35 MX 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT		
MATERIAL PASSING #40 LL PI													SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS		
GROUP INDEX																
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	UNSATURABLE					
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 RESISTANCE (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 OPENING (MM)	4	10	40	60	200	270										
	4.75	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 IN. 12	75 3	2.0	0.25	0.05	0.005										
SOIL MOISTURE - CORRELATION OF TERMS																
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION														
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE														
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE														
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- 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-BROWN). 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 TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10%	GRANULAR SOILS SILT - CLAY SOILS	OTHER MATERIAL TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE
GROUND WATER		
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS 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	DIP & DIP DIRECTION OF ROCK STRUCTURES SPT TEST BORING AUGER BORING CORE BORING 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 - COARSE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - 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 % - UNIT WEIGHT %g - 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: <input checked="" type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT	HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST

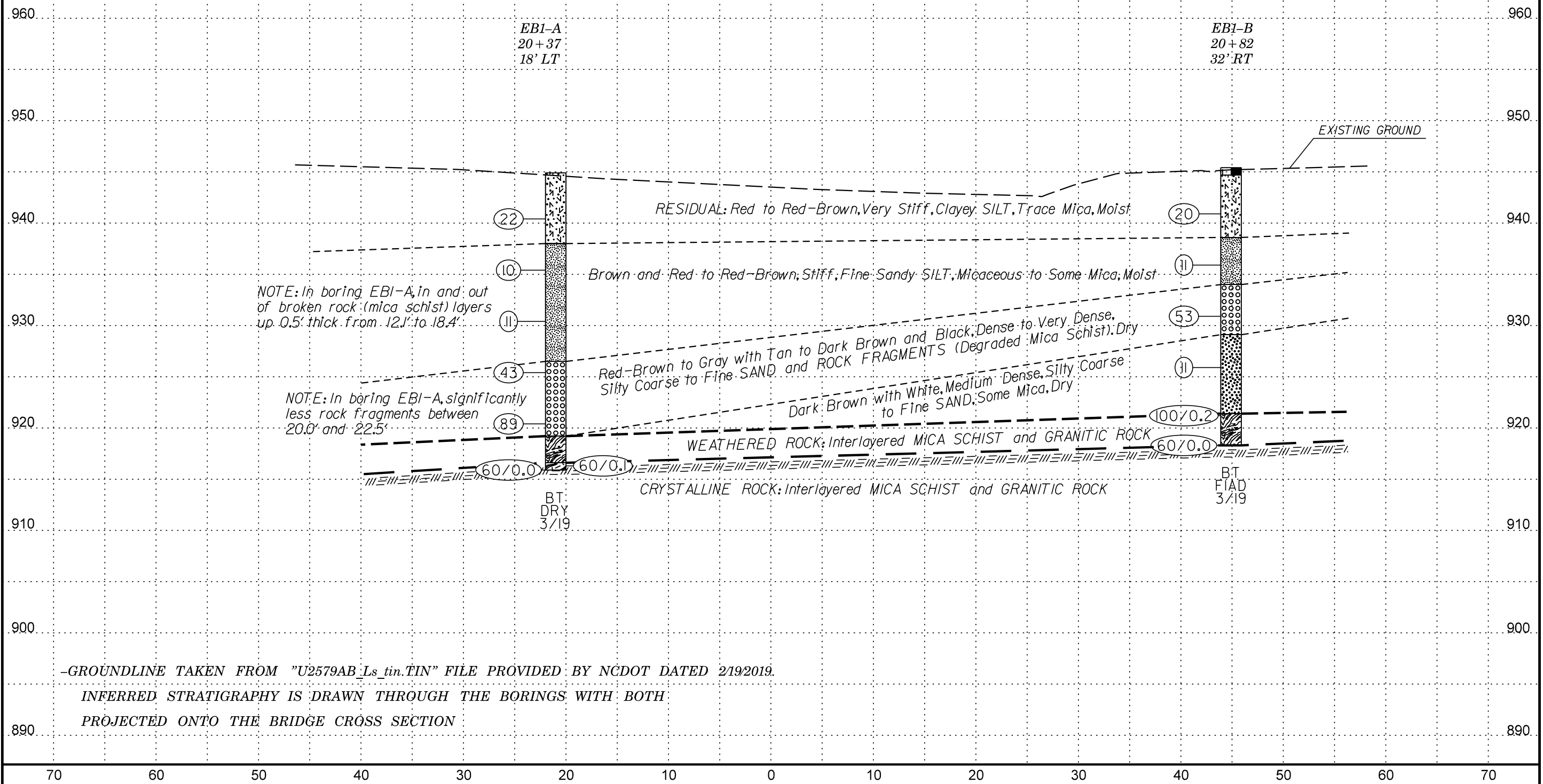
ROCK DESCRIPTION	
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL 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 YIELD 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 (IV 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>
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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i>
VERY SEVERE (IV 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>
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 GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROUDED 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 FINGER NAIL.
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 DISLOGGED 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 (ROD) - 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 (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
BENCH MARK: BL-28; N 856,456.0410 E 1,663,688.1040
ELEVATION: 944.90 FEET
NOTES: FIAD= FILLED IN AFTER DRILLING

-Y1B- STA. 20+50.39

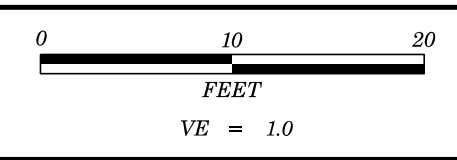


PROJECT REFERENCE NO.	SHEET NO.
U-2579AB	4
SECTION THROUGH END BENT 1 SKEW = 41°-15'-42" (TAN. TO CURVE)	

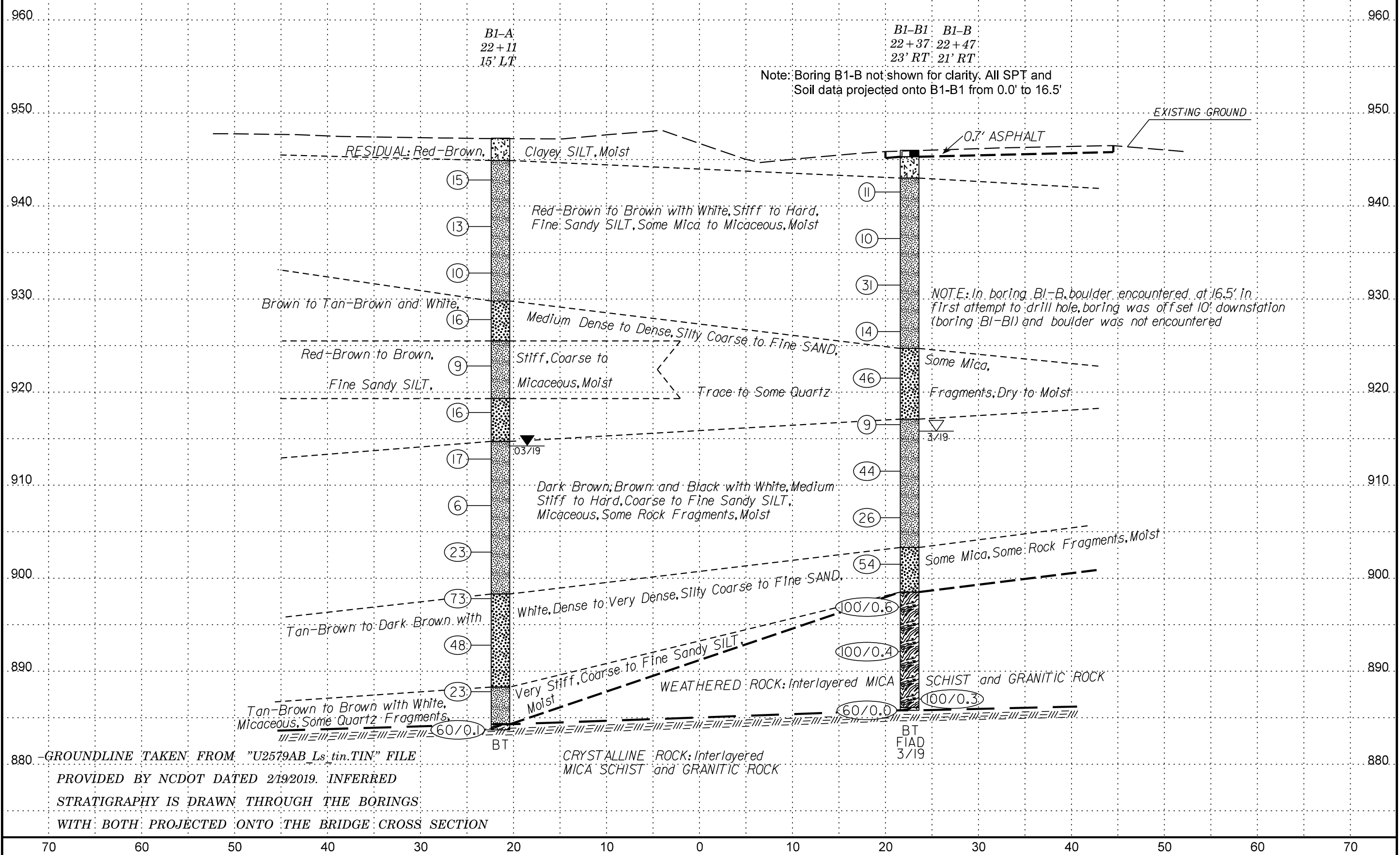


-GROUNDLINE TAKEN FROM "U2579AB_Ls tin.TIN" FILE PROVIDED BY NCDOT DATED 2/19/2019.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE BRIDGE CROSS SECTION

-Y1B- STA. 22+26.35



PROJECT REFERENCE NO.	SHEET NO.
U-2579AB	5
SECTION THROUGH BENT 1 SKEW = 43°-55'-42" (TAN. TO CURVE)	



GROUNDLINE TAKEN FROM "U2579AB Ls tin.TIN" FILE
 PROVIDED BY NCDOT DATED 2/19/2019. INFERRED
 STRATIGRAPHY IS DRAWN THROUGH THE BORINGS
 WITH BOTH PROJECTED ONTO THE BRIDGE CROSS SECTION

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34839.1.8		TIP U-2579AB		COUNTY FORSYTH		GEOLOGIST Weaver, P.M.										
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 20+37		OFFSET 18 ft LT		ALIGNMENT -Y1B-										
COLLAR ELEV. 944.9 ft		TOTAL DEPTH 29.0 ft		NORTHING 856,526		EASTING 1,663,703										
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Seiler, M.		START DATE 03/26/19		COMP. DATE 03/26/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
945														944.9	GROUND SURFACE	0.0
940	941.4	3.5	8	10	12							M	RESIDUAL Red, Clayey SILT, Trace Mica			
935	936.4	8.5	4	5	5							M	Brown and Red, Fine Sandy SILT, Micaceous Note: In and out of broken rock (mica schist) layers up to 0.5' thick from 12.1' to 18.4'	6.9		
930	931.4	13.5	15	8	3							M				
925	926.4	18.5	16	25	18							D	Red-Brown to Gray with Tan, Silty Coarse to Fine SAND and Rock Fragments, Some Mica Note: Significantly less rock fragments between 20' and 22.5'	18.4		
920	921.4	23.5	18	61	28							D		25.7		
	916.4	28.5											WEATHERED ROCK Interlayered MICA SCHIST and GRANITIC ROCK	28.3		
	915.9	29.0	60/0.1										CRYSTALLINE ROCK Interlayered MICA SCHIST and GRANITIC ROCK	29.0		
			60/0.0										Boring Terminated with Standard Penetration Test Refusal at Elevation 915.9 ft on Crystalline Rock: Interlayered MICA SCHIST and GRANITIC ROCK			

WBS 34839.1.8		TIP U-2579AB		COUNTY FORSYTH		GEOLOGIST Pastrana, C.R.										
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 20+82		OFFSET 32 ft RT		ALIGNMENT -Y1B-										
COLLAR ELEV. 945.4 ft		TOTAL DEPTH 27.1 ft		NORTHING 856,465		EASTING 1,663,676										
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Seiler, M.		START DATE 03/27/19		COMP. DATE 03/27/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
950														945.4	GROUND SURFACE	0.0
945	944.7	0.7										M	ROADWAY EMBANKMENT 0.7' ASPHALT RESIDUAL Red-Brown, Clayey SILT, Trace Mica	0.7		
940	941.9	3.5	5	8	12							M		6.8		
935	936.9	8.5	2	4	7							M	Red-Brown, Fine Sandy SILT, Some Mica	6.8		
930	931.9	13.5	5	23	30							D	Dark Brown and Black, Silty Fine to Coarse SAND and Rock Fragments (Degraded Mica Schist)	11.4		
925	926.9	18.5	4	5	6							D	Dark Brown with White, Silty Coarse to Fine SAND, Some Mica	16.3		
920	921.9	23.5	15	100/0.2										24.0		
	918.3	27.1	60/0.0										WEATHERED ROCK Interlayered MICA SCHIST and GRANITIC ROCK	27.1		
			60/0.0										Boring Terminated with Standard Penetration Test Refusal at Elevation 918.3 ft on Crystalline Rock: Interlayered MICA SCHIST and GRANITIC ROCK			

NCDOT BORE DOUBLE U2579AB_GEO_BRDG330722GINT LOGS.GPJ NC_DOT_GDT 5/13/19

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34839.1.8	TIP U-2579AB	COUNTY FORSYTH	GEOLOGIST Pastrana, C.R.
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway			GROUND WTR (ft)
BORING NO. B1-A	STATION 22+11	OFFSET 15 ft LT	ALIGNMENT -Y1B-
COLLAR ELEV. 947.3 ft	TOTAL DEPTH 63.6 ft	NORTHING 856,368	EASTING 1,663,773
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Seiler, M.	START DATE 03/26/19	COMP. DATE 03/26/19	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
950																	
															947.3		GROUND SURFACE
															944.9	2.4	RESIDUAL Red-Brown, Clayey SILT, Moist
945	943.8	3.5	4	6	9								M				Red-Brown to Brown, Fine Sandy SILT, Some Mica to Micaceous
940	938.8	8.5	4	6	7								M				
935	933.8	13.5	4	5	5								M				
930	928.8	18.5	7	10	6								D		929.8	17.5	Brown, Silty Coarse to Fine SAND, Some Mica
925	923.8	23.5	3	4	5								D		925.5	21.8	Red-Brown to Brown, Coarse to Fine Sandy SILT, Micaceous
920	918.8	28.5	7	7	9								M		919.3	28.0	Tan-Brown and White, Silty Coarse to Fine SAND, Some Mica, Trace Quartz Fragments
915	913.8	33.5	4	7	10								M		914.7	32.8	Dark Brown to Brown and Black with White, Coarse to Fine Sandy SILT, Miceous
910	908.8	38.5	2	2	4								M				
905	903.8	43.5	8	9	14								M				
900	898.8	48.5	20	26	47								M		898.3	49.0	Tan-Brown and White, Silty Coarse to Fine SAND, Some Mica
895	893.8	53.5	17	21	27								M				
890	888.8	58.5	25	10	13								M		888.3	59.0	Tan-Brown to Brown with White, Coarse to Fine Sandy SILT, Micaceous, Some Quartz Fragments
885	883.8	63.5													884.3	63.0	CRYSTALLINE ROCK Interlayered MICA SCHIST and GRANITIC ROCK
															883.7	63.6	Boring Terminated with Standard Penetration Test Refusal at Elevation 883.7 ft in Crystalline Rock: Interlayered MICA SCHIST and GRANITIC ROCK

NCDOT BORE DOUBLE U2579AB_GEO_BRD330722GINT LOGS.GPJ NC_DOT_GDT 5/13/19

WBS 34839.1.8	TIP U-2579AB	COUNTY FORSYTH	GEOLOGIST Pastrana, C.R.
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway			GROUND WTR (ft)
BORING NO. B1-B	STATION 22+47	OFFSET 21 ft RT	ALIGNMENT -Y1B-
COLLAR ELEV. 946.0 ft	TOTAL DEPTH 16.5 ft	NORTHING 856,320	EASTING 1,663,757
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Seiler, M.	START DATE 03/27/19	COMP. DATE 03/27/19	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
950																	
															946.0		GROUND SURFACE
															945.3	0.7	ROADWAY EMBANKMENT 0.7' ASPHALT
945	942.5	3.5	4	5	6								M				RESIDUAL Red-Brown, Clayey SILT, Moist
940	937.5	8.5	3	5	5								M				Red-Brown to Brown with White, Fine Sandy SILT, Some Mica to Micaceous Note: Boulder encountered at 16.5'
935	932.5	13.5	4	12	19								M				
930															929.5	16.5	Boring Terminated by Auger Refusal at Elevation 929.5 ft On Boulder Note: Offset boring 10' and Drilled B1-B1

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34839.1.8		TIP U-2579AB		COUNTY FORSYTH		GEOLOGIST Pastrana, C.R.										
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 24+16		OFFSET 11 ft RT		ALIGNMENT -Y1B-										
COLLAR ELEV. 945.9 ft		TOTAL DEPTH 84.1 ft		NORTHING 856,175		EASTING 1,663,845										
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Seiler, M.		START DATE 03/27/19		COMP. DATE 03/27/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
950																
945																
942.4	942.4	3.5	4	8	8											
940																
937.4		8.5	5	8	11											
935																
932.4		13.5	4	6	7											
930																
927.4		18.5	4	5	7											
925																
922.4		23.5	3	5	7											
920																
917.4		28.5	4	7	10											
915																
912.4		33.5	5	9	13											
910																
907.4		38.5	4	6	10											
905																
902.4		43.5	5	7	10											
900																
897.4		48.5	6	6	10											
895																
892.4		53.5	8	13	15											
890																
887.4		58.5	8	12	17											
885																
882.4		63.5	12	13	14											
880																
877.4		68.5	18	25	32											
875																
872.4		73.5	10	13	22											
870																

WBS 34839.1.8		TIP U-2579AB		COUNTY FORSYTH		GEOLOGIST Pastrana, C.R.										
SITE DESCRIPTION Bridge No. 722 on SR 2632 (Sedge Garden Road) over Winston-Salem Northern Beltway							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 24+16		OFFSET 11 ft RT		ALIGNMENT -Y1B-										
COLLAR ELEV. 945.9 ft		TOTAL DEPTH 84.1 ft		NORTHING 856,175		EASTING 1,663,845										
DRILL RIG/HAMMER EFF./DATE RD285584 CME-45C 84% 03/18/2019			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Seiler, M.		START DATE 03/27/19		COMP. DATE 03/27/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
870																
865																
867.4	867.4	78.5	100	0.4												
865																
862.4	862.4	83.5	53	47	0.1											
861.8																
861.8																

NCDOT BORE DOUBLE U2579AB_GEO_BRDG330722GINT LOGS.GPJ NC_DOT_GDT 5/13/19

945.9 GROUND SURFACE 0.0
 944.8 ROADWAY EMBANKMENT 1.1
 0.7' ASPHALT over 0.4' ABC STONE
 942.9 RESIDUAL 3.0
 Red-Brown, Clayey SILT, Moist
 Red-Brown to Dark Brown with White and
 Black, Coarse to Fine Sandy SILT,
 Micaceous, Trace Quartz Fragments

Match Line
 869.7 WEATHERED ROCK 76.2
 Intelayered MICA SCHIST and GRANITIC
 ROCK
 861.8 Boring Terminated at Elevation 861.8 ft in
 Weathered Rock: Interlayered MICA
 SCHIST and GRANITIC ROCK 84.1

SITE PHOTOGRAPHS
Bridge No. 722 on SR 2632 (-Y1B- Sedge Garden Road) over -L- (Winston-Salem Northern Beltway)

View Along End Bent 1 Looking Left to Right



View Along Bent 1 Looking Left to Right



View Along End Bent 2 Looking Left to Right



View Along -Y1B- Downstation to Upstation

