

PROJECT: 50128

REFERENCE: I-5715

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STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE

SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG

PROJECT DESCRIPTION I-77 AND NC 73 INTERCHANGE,
UPGRADE EXISTING INTERCHANGE TO
SPLIT DIAMOND CONFIGURATION

SITE DESCRIPTION BRIDGE NO.1417 OVER I-77
SOUTHBOUND (-L3SB-) ON I-77 NORTH
CROSSING (-Y3-)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5715	1	10

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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:
- 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.
 - 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

GRAINGER, P.

BEATY, A.

TURNAGE, J.

INVESTIGATED BY GRAINGER, P.

DRAWN BY WELLS, T. R.

CHECKED BY RIGGS, A.F., JR.

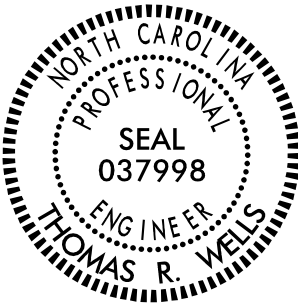
SUBMITTED BY WELLS, T. R.

DATE APRIL 2025

Prepared in the Office of:



7327-G W. FRIENDLY AVE.
GREENSBORO, NORTH CAROLINA 27410
NC REGISTERED ENGINEERING FIRM: E-0869
NC REGISTERED GEOLOGIC FIRM: C-367



Signed by: Thomas R. Wells 04/15/2025

F38C777458854EA SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

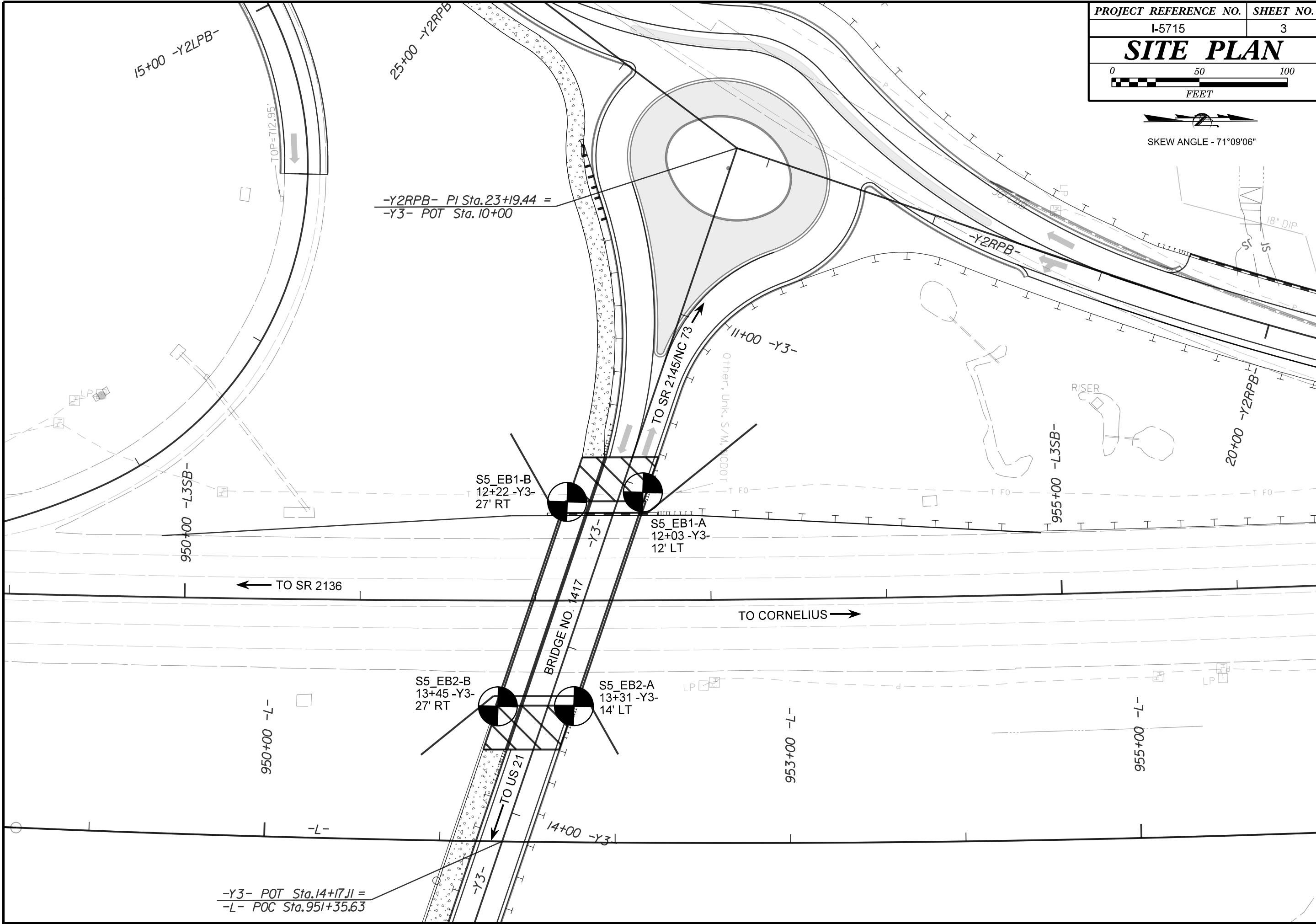
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

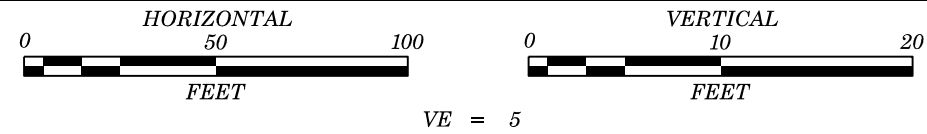
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										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 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										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:										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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.									
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					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.																				
GROUP CLASS.	A-1-a	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	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.																							
SYMBOL														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.																							
% PASSING #10 #40 #200														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														FAIR TO POOR		POOR		UNSUITABLE																					
USUAL TYPES OF MAJOR MATERIALS														FAIR TO POOR		POOR		UNSUITABLE																					
GEN. RATING AS SUBGRADE														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										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																			
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (IN-VALUE)				RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES		SLOPE INDICATOR INSTALLATION		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>																			
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				SOIL SYMBOL		TEST BORING		CONE PENETROMETER TEST		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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>																			
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				INFERRED SOIL BOUNDARY		CORE BORING		SOUNDING ROD		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.																			
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ROCK HARDNESS																			
U.S. STD. SIEVE SIZE OPENING (MM)		4 4.75		10 2.00		40 0.42		60 0.25		200 0.075		270 0.053		UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE		UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL		HARD		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																	
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE, SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)		SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK				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.																	
GRAIN SIZE		305 12		75 3		2.0		0.25		0.05		0.005								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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																	
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION						AR - AUGER REFUSAL		MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC		VST - VANE SHEAR TEST		WEA. - WEATHERED		VERY HARD		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																			
LL - LIQUID LIMIT		SATURATED - (SAT.)		USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE						CSE - COARSE		ORG. - ORGANIC		S - BULK		7 - UNIT WEIGHT		HARD		CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																			
PL - PLASTIC LIMIT		WET - (W)		SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE						PMT - PRESSUREMETER TEST		SAP. - SAPROLITIC		SS - SPLIT SPOON		7 _u - DRY UNIT WEIGHT		MODERATELY HARD		CAN BE GROOVED 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.																			
OM - OPTIMUM MOISTURE		MOIST - (M)		SOLID; AT OR NEAR OPTIMUM MOISTURE						SD - SAND, SANDY		SL - SILT, SILTY		ST - SHELBY TUBE				SOFT		CAN BE GROOVED 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.																			
SL - SHRINKAGE LIMIT		DRY - (D)		REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE						SLI - SLIGHTLY		TCR - TRICONE REFUSAL		RS - ROCK				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.																			
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING										BEDDING									
NON PLASTIC		0-5		VERY LOW						DRILL UNITS:		ADVANCING TOOLS:		HAMMER TYPE:		TERM		THICKNESS		BENCH MARK: SEE BELOW																			
SLIGHTLY PLASTIC		6-15		SLIGHT						CME-45C		CLAY BITS		X AUTOMATIC		VERY WIDE		4 FEET		ELEVATION: SEE BELOW FEET																			
MODERATELY PLASTIC		16-25		MEDIUM						CME-55		6" CONTINUOUS FLIGHT AUGER		CORE SIZE:		WIDE		1.5 - 4 FEET																					
HIGHLY PLASTIC		26 OR MORE		HIGH						CME-550		8" HOLLOW AUGERS		-B		MODERATELY CLOSE		0.16 - 1.5 FEET																					
COLOR																				-N		CLOSE		0.03 - 0.16 FEET															
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.																				HAND TOOLS:		VERY CLOSE		< 0.008 FEET															
																				POST HOLE DIGGER																			
																				SOUNDING ROD																			
																				VANE SHEAR TEST																			
																				X MOBILE B-57 (TER4013)																			
																				X TRICONE 2-15%																			
																				CORE BIT																			
																				X 3-1/4 HOLLOW STEM AUGERS																			



NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -Y3- TAKEN FROM THE PROVIDED PROJECT TIN FILE (i5715_Is_tin.tin).

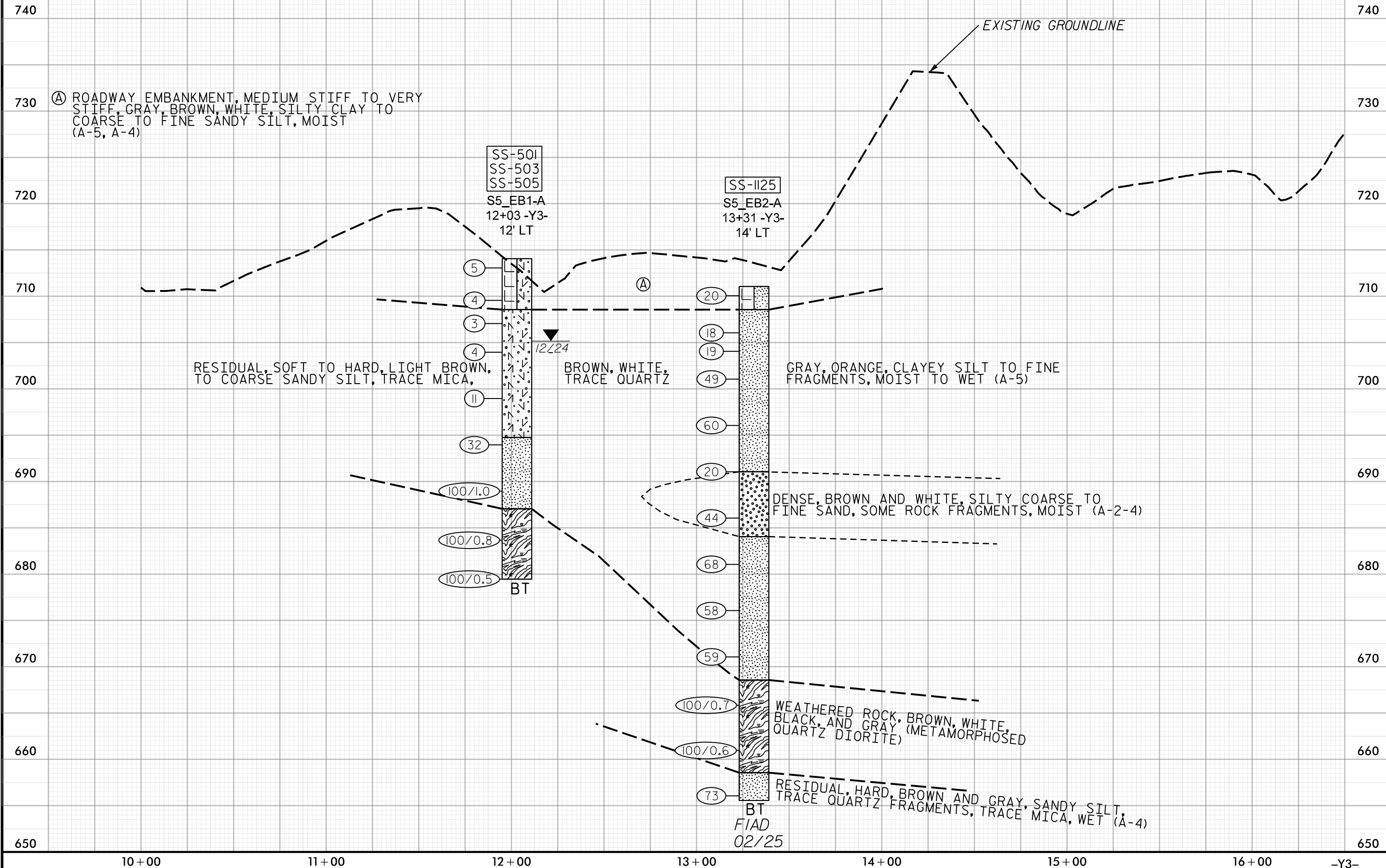


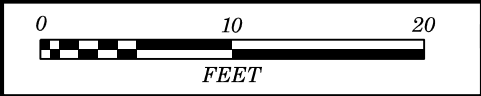
PROJECT REFERENCE NO. SHEET NO.

I-5715

4

CENTERLINE PROFILE ALONG
-Y3- AT BRIDGE NO. 1417





NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: i5715_ls_tin_.tin
SKEW ANGLE - 71° 05' 28"

CROSS SECTION THROUGH END BENT NO. 1 AT STA. 12+12.01 -Y3-

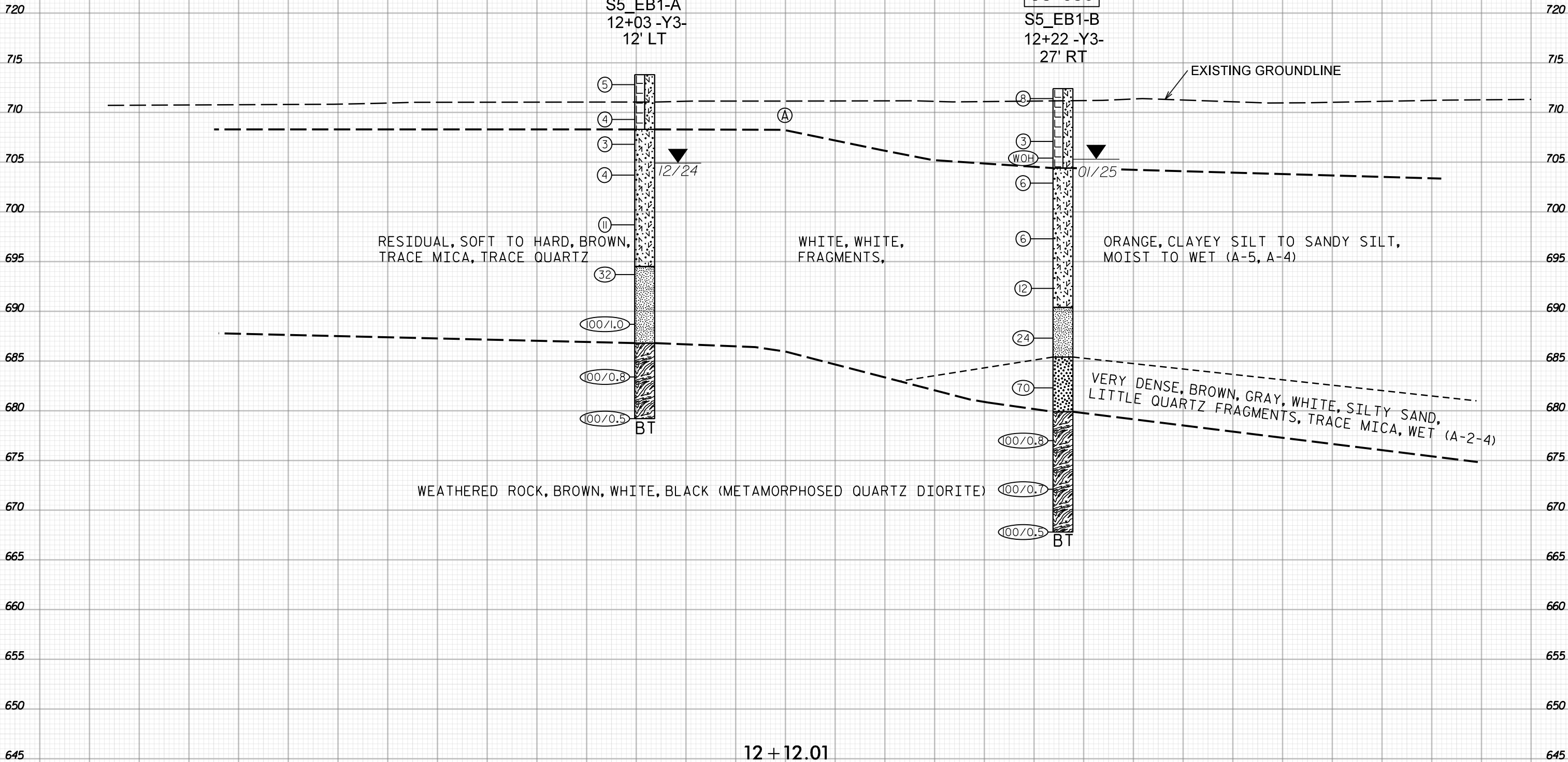
Ⓐ ROADWAY EMBANKMENT, MEDIUM STIFF TO VERY SOFT, BROWN, WHITE, RED, CLAYEY SILT, MOIST (A-5)

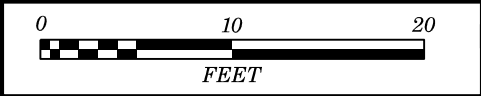
SS-501
SS-503
SS-505

S5_EB1-A
12+03 -Y3-
12' LT

SS-839

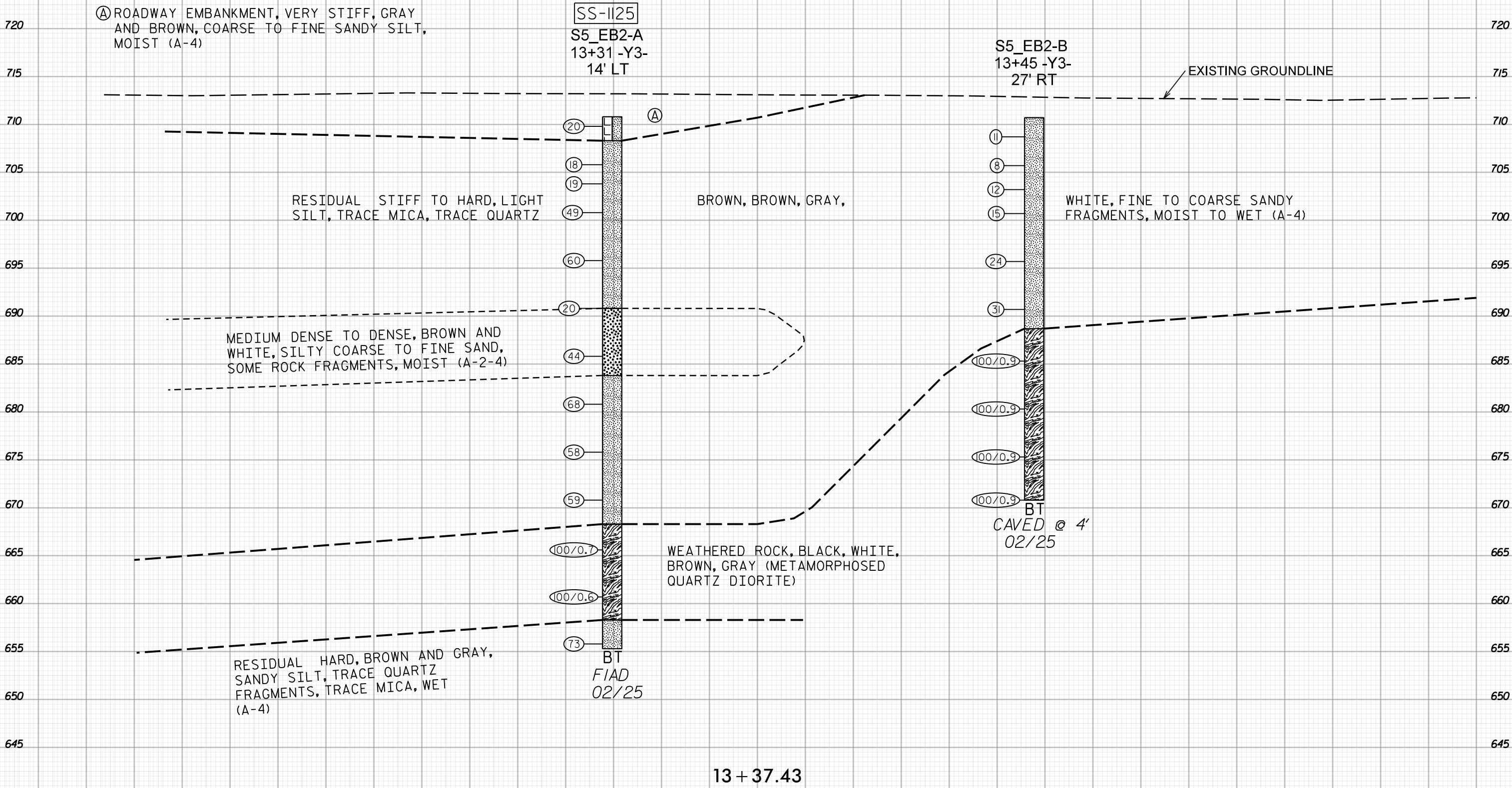
S5_EB1-B
12+22 -Y3-
27' RT





NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: i5715_ls_tin_.tin
SKEW ANGLE - 71° 05' 28"

CROSS SECTION THROUGH END BENT NO. 2 AT STA. 13+37.43 -Y3-



NC DOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/3/25

[illegible]

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 50128.1.FS1

TIP: I-5715

COUNTY: Mecklenburg

DESCRIPTION: I-77 and the NC 73 Interchange: Bridge No. 1417 over I-77 Southbound (-L3SB-) on I-77 North Crossing (-Y3-)

[illegible]

Mitra Grabski
Certified Lab Technician Signature

114-01-1203
Certification Number

SITE PHOTOGRAPHS

BRIDGE NO. 1417 OVER I-77 SOUTHBOUND
(-L3SB-) ON I-77 NORTH CROSSING (-Y3-)

PROJECT REFERENCE NO.	SHEET NO.
I-5715	10



END BENT NO. 1 LOOKING WEST ALONG I-77 NORTH CROSSING



END BENT NO. 1 LOOKING SOUTH ALONG I-77 SOUTHBOUND

REFERENCE: I-5715

PROJECT: 50128

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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
PROJECT DESCRIPTION I-77 AND NC 73 INTERCHANGE,
UPGRADE EXISTING INTERCHANGE TO
SPLIT DIAMOND CONFIGURATION

SITE DESCRIPTION BRIDGE NO.1418 OVER I-77
NORTHBOUND (-L3NB-) ON I-77 NORTH
CROSSING (-Y3-)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5715	1	10

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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:
- 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.
 - 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.

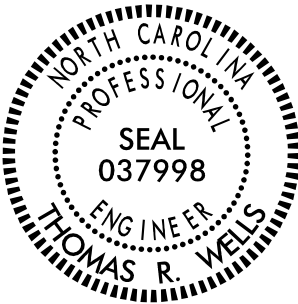
PERSONNEL
MARPLES, Z.
GRAINGER, P.
TURNAGE, J.

INVESTIGATED BY GRAINGER, P.
DRAWN BY WELLS, T. R.
CHECKED BY RIGGS, A.F., JR.
SUBMITTED BY WELLS, T. R.
DATE APRIL 2025

Prepared in the Office of:



7327-G W. FRIENDLY AVE.
GREENSBORO, NORTH CAROLINA 27410
NC REGISTERED ENGINEERING FIRM: E-0869
NC REGISTERED GEOLOGIC FIRM: C-367



Signed by: Thomas R. Wells 04/15/2025
F38C777458854E1 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

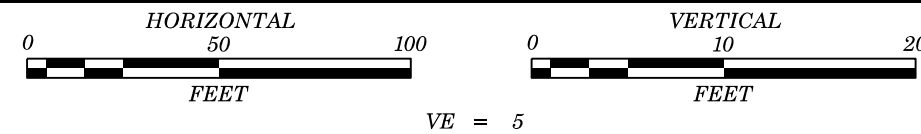
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION												GRADATION												ROCK DESCRIPTION												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 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>												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.												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:												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.											
SOIL LEGEND AND AASHTO CLASSIFICATION												ANGULARITY OF GRAINS												WEATHERED ROCK (WR)												NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.											
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)						ORGANIC MATERIALS						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.																									
GROUP CLASS.	A-1-a	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			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.																													
SYMBOL																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.																													
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			GRANULAR SOILS		SILT-CLAY SOILS				MUCK, PEAT																											
MATERIAL PASSING #40 LL PI	— 6 MX		— NP		40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN			SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER						HIGHLY ORGANIC SOILS																										
GROUP INDEX	0		0		0		4 MX		8 MX		12 MX		16 MX		NO MX																																
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS				CLAYEY SOILS																																		
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR						FAIR TO POOR		POOR		UNSUITABLE																														
PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30																																															
CONSISTENCY OR DENSENESS												MISCELLANEOUS SYMBOLS												ROCK HARDNESS												BEDDING											
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)				RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		25/025 DIP & DIP DIRECTION OF ROCK STRUCTURES		SLOPE INDICATOR INSTALLATION		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>																											
GENERAL		VERY LOOSE		< 4				N/A				SOIL SYMBOL		TEST BORING		CONE PENETROMETER TEST		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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>																											
GENERAL		LOOSE		4 TO 10								ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		AUGER BORING		TEST BORING 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 ALSO AN EXAMPLE.																											
GENERAL		MEDIUM DENSE		10 TO 30								INFERRED SOIL BOUNDARY		CORE BORING		SOUNDING ROD																															
GENERAL		DENSE		30 TO 50								INFERRED ROCK LINE		MONITORING WELL		TEST BORING WITH CORE																															
GENERAL		VERY DENSE		> 50								ALLUVIAL SOIL BOUNDARY		PIEZOMETER INSTALLATION		SPT N-VALUE																															
GENERAL		SOFT		2 TO 4				< 0.25																																							
GENERAL		MEDIUM STIFF		4 TO 8				0.25 TO 0.5																																							
GENERAL		STIFF		8 TO 15				0.5 TO 1.0																																							
GENERAL		VERY STIFF		15 TO 30				1 TO 2																																							
GENERAL		HARD		> 30				2 TO 4																																							
GENERAL								> 4																																							
TEXTURE OR GRAIN SIZE												RECOMMENDATION SYMBOLS												ROCK HARDNESS												BEDDING											
U.S. STD. SIEVE SIZE		4		10		40		60		200		270		UNDERCUT		UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE		UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL		VERY HARD		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																									
OPENING (MM)		4.76		2.00		0.42		0.25		0.075		0.053		SHALLOW UNDERCUT		UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK				HARD		CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																									
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE, SD.)		FINE SAND (F SD.)		SILT (SL.)		CLAY (CL.)								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.																									
GRAIN SIZE		305 IN.		75 IN.		2.0 IN.		0.25 IN.		0.05 IN.		0.005 IN.								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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																									
SOIL MOISTURE - CORRELATION OF TERMS												ABBREVIATIONS												ROCK HARDNESS												BEDDING											
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION								AR - AUGER REFUSAL		MED. - MEDIUM		VST - VANE SHEAR TEST		VERY HARD		CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																											
												BT - BORING TERMINATED		MICA - MICACEOUS		WEA. - WEATHERED		HARD		CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																											
												CL - CLAY		MOD. - MODERATELY		7 - UNIT WEIGHT		MODERATELY 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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																											
												CPT - CONE PENETRATION TEST		NP - NON PLASTIC		7 _u - DRY UNIT WEIGHT		MODERATELY HARD		CAN BE GROOVED 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.																											
												CSE - COARSE		ORG. - ORGANIC		SAMPLE ABBREVIATIONS		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.																											
												DPT - DILATOMETER TEST		PMT - PRESSUREMETER TEST				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.																											
												DPT - DYNAMIC PENETRATION TEST		SAP. - SAPROLITIC				SOFT		FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.																											
												e - VOID RATIO		SD. - SAND, SANDY				VERY 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.																											
												F - FINE		SL. - SILT, SILTY				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.																											
												FOSS. - FOSSILIFEROUS		SLI. - SLIGHTLY																																	
												FRAC. - FRACTURED, FRACTURES		TCR - TRICONE REFUSAL																																	
												FRAGS. - FRAGMENTS		w - MOISTURE CONTENT																																	
												HL - HIGHLY		v - VERY																																	
PLASTICITY												EQUIPMENT USED ON SUBJECT PROJECT												ROCK HARDNESS												BEDDING											
PLASTICITY INDEX (PI)		DRY STRENGTH										DRILL UNITS:		ADVANCING TOOLS:				HAMMER TYPE:		TERM		SPACING										TERM		THICKNESS													
												☐ CME-45C		☐ CLAY BITS				☒ AUTOMATIC ☐ MANUAL		VERY WIDE		MORE THAN 10 FEET										VERY THICKLY BEDDED		4 FEET													
												☐ CME-55		☐ 6" CONTINUOUS FLIGHT AUGER						WIDE		3 TO 10 FEET										THICKLY BEDDED		1.5 - 4 FEET													
												☐ CME-550		☐ 8" HOLLOW AUGERS						MODERATELY CLOSE		1 TO 3 FEET										THINLY BEDDED		0.16 - 1.5 FEET													
												☐ VANE SHEAR TEST		☐ HARD FACED FINGER BITS						CLOSE		0.16 TO 1 FOOT										VERY THINLY BEDDED		0.03 - 0.16 FEET													
												☐ PORTABLE HOIST		☐ TUNG.-CARBIDE INSERTS						VERY CLOSE		LESS THAN 0.16 FEET										THINLY LAMINATED		0.008 - 0.03 FEET													
												☒ MOBILE B-57 (TER4013)		☒ TRICONE 2-15% TUNG.-CARB.																		THINLY LAMINATED		< 0.008 FEET													
												☐		☒ 3-1/4 HOLLOW STEM AUGERS																																	
COLOR												EQUIPMENT USED ON SUBJECT PROJECT												ROCK HARDNESS												BEDDING											
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.																								FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.												FRIABLE											
																																				MODERATELY INDURATED											
																																				INDURATED											
																																				EXTREMELY INDURATED											

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ON TO THE EXISTING GROUND PROFILE ALONG THE CENTERLINE OF -Y3- TAKEN FROM THE PROVIDED PROJECT TIN FILE (j5715_Is_tin.tin).



END BENT NO.1
STA. 15+01.51 -Y3-

BRDG. NO. 1418

END BENT NO. 2
STA. 16+24.09 -Y3-

EXISTING GROUNDLINE



SS-1032

S6_EB1-A
15+02 -Y3-
9' LT

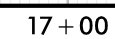
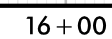
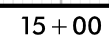
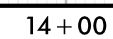
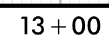
S6_EB2-A
16+27 -Y3
13' LT

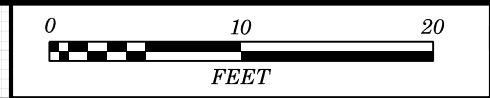


RESIDUAL, MEDIUM STIFF
BROWN, WHITE, GRAY,
TO FINE SANDY SILT,
MOIST TO WET

TO HARD,
CLAYEY SILT
TRACE MICA,
(A-5, A-4)

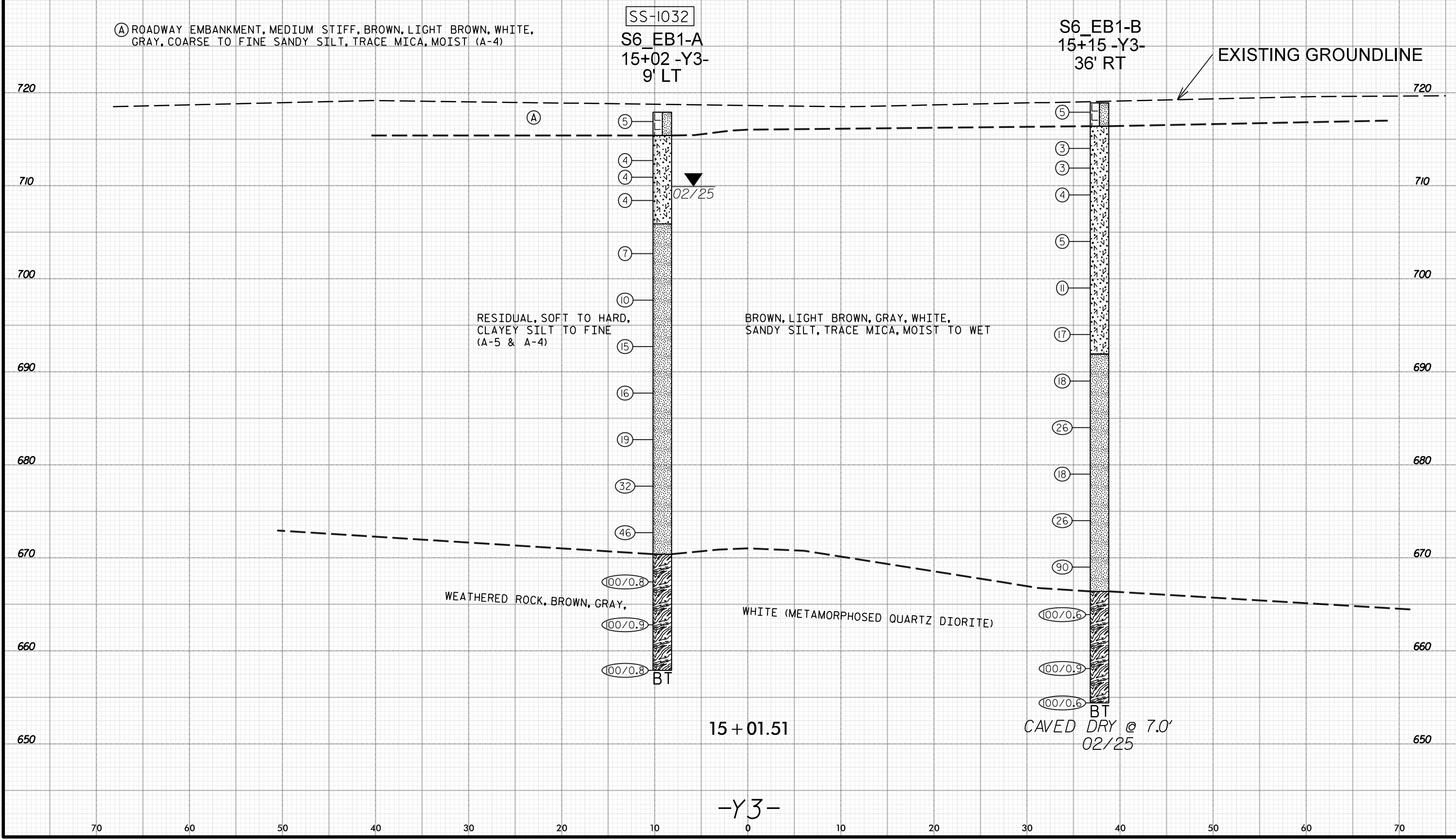
12/24
RESIDUAL, MEDIUM DENSE TO VERY DENSE,
BROWN, GRAY, SILTY FINE TO COARSE
SAND, MOIST (A-2-4)





NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: i5715_ls_tin_tin
SKEW ANGLE - 72° 56' 58"

CROSS SECTION THROUGH END BENT NO. 1 AT STA. 15 + 01.51 -Y3-



NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS AND PROJECTED ON TO THE CROSS SECTION. GROUND LINE TAKEN FROM PROVIDED TIN FILE: i5715_ls_tin_.tin
SKEW ANGLE - 72° 56' 58"

CROSS SECTION THROUGH END BENT NO. 2 AT STA. 16 + 24.09 -Y3-

- Ⓐ ROADWAY, EMBANKMENT LOOSE TO MEDIUM DENSE, BROWN, GRAY, SILTY FINE TO COARSE SAND, MOIST (A-2-4)
- Ⓑ ROADWAY, EMBANKMENT STIFF, BLACK, WHITE, BROWN, SILTY SAND, TRACE OF ORGANIC MATTER, TRACE MICA, MOIST (A-5)
- Ⓒ RESIDUAL, STIFF, BROWN, GRAY, WHITE, SILTY SAND, TRACE MICA, MOIST (A-5)
- Ⓓ RESIDUAL, MEDIUM DENSE TO VERY DENSE, BROWN, GRAY, SILTY FINE TO COARSE SAND, MOIST (A-2-4)
- Ⓔ WEATHERED ROCK, GRAY (METAMORPHOSED QUARTZ DIORITE)

S6_EB2-A
16+27 -Y3-
13' LT

S6_EB2-B
16+33 -Y3-
36' RT

EXISTING GROUNDLINE

CRYSTALLINE ROCK, GRAY
(METAMORPHOSED QUARTZ DIORITE)

16 + 24.09



NC DOT BORE DOUBLE I5715 GEO_STRUC.GPJ NC_DOT.GDT 4/4/25

[illegible]

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 50128.1.FS1			TIP I-5715			COUNTY MECKLENBURG			GEOLOGIST MARPLES, Z.					
SITE DESCRIPTION Bridge No. 1418 over I-77 Northbound (-L3NB-) on I-77 North Crossing (-Y3-)									GROUND WTR (ft)					
BORING NO. S6_EB2-A			STATION 16+27			OFFSET 13 ft LT			ALIGNMENT -Y3-			0 HR. N/A		
COLLAR ELEV. 721.3 ft			TOTAL DEPTH 24.1 ft			NORTHING 621,766			EASTING 1,443,594			24 HR. 8.6		
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.			START DATE 12/17/24			COMP. DATE 12/17/24			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
725														
720	720.3	1.0												721.3 GROUND SURFACE 0.0
715	717.8	3.5	3	4	6						M			ROADWAY EMBANKMENT LOOSE TO MEDIUM DENSE, BROWN, GRAY, SILTY FINE TO COARSE SAND, MOIST (A-2-4)
	715.3	6.0	6	7	7						M			
710	712.2	9.1	4	6	7									RESIDUAL MEDIUM DENSE TO VERY DENSE, BROWN, GRAY, SILTY FINE TO COARSE SAND, MOIST (A-2-4)
	710.0		8	13	20						M			
705	707.2	14.1												
700	703.2	18.1	18	28	28						M			WEATHERED ROCK GRAY (METAMORPHOSED QUARTZ DIORITE)
	700.0		17	30	70/0.4									
	697.2	24.1												697.2 24.1
			60/0.0											Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 697.2 ft ON CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)

WBS 50128.1.FS1			TIP I-5715			COUNTY MECKLENBURG			GEOLOGIST MARPLES, Z.					
SITE DESCRIPTION Bridge No. 1418 over I-77 Northbound (-L3NB-) on I-77 North Crossing (-Y3-)									GROUND WTR (ft)					
BORING NO. S6_EB2-B			STATION 16+33			OFFSET 36 ft RT			ALIGNMENT -Y3-			0 HR. N/A		
COLLAR ELEV. 720.7 ft			TOTAL DEPTH 24.1 ft			NORTHING 621,718			EASTING 1,443,586			24 HRCAVED @4.6		
DRILL RIG/HAMMER EFF./DATE TER4013 Mobile B-57 88% 11/12/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER TURNAGE, J. R.			START DATE 12/17/24			COMP. DATE 12/17/24			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
725														
720	720.7	0.0												720.7 GROUND SURFACE 0.0
715	717.2	3.5	3	4	5									ROADWAY EMBANKMENT STIFF, BLACK, WHITE, BROWN, SILTY SAND, TRACE OF ORGANIC MATTER, TRACE MICA, MOIST (A-5)
	714.7	6.0	3	7	6									717.7 3.0
710	711.6	9.1	6	14	20									RESIDUAL STIFF, BROWN, GRAY, WHITE, SILTY SAND, TRACE MICA, MOIST (A-5)
	706.6	14.1	10	17	25									714.7 6.0
705	701.6	19.1	17	26	31									DENSE TO VERY DENSE, BROWN, GRAY, SILTY FINE TO COARSE SAND, MOIST (A-2-4)
700	696.6	24.1	60/0.0											701.6 19.1
			60/0.0											CRYSTALLINE ROCK GRAY (METAMORPHOSED QUARTZ DIORITE)
														696.6 24.1
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 696.6 ft IN CRYSTALLINE ROCK (METAMORPHOSED QUARTZ DIORITE)
														CAVED DRY @ 4.6'

NCDOT BORE DOUBLE I5715_GEO_STRUC.GPJ NC_DOT.GDT 4/4/25

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 50128.1.FS1

TIP: I-5715

COUNTY: Mecklenburg

DESCRIPTION: I-77 and the NC 73 Interchange: Bridge No. 1418 over I-77 Northbound (-L3NB-) on I-77 North Crossing (-Y3-)

[illegible]

NP - NON-PLASTIC

Mitra Grabski
Certified Lab Technician Signature

114-01-1203
Certification Number

SITE PHOTOGRAPHS

BRIDGE NO. 1418 OVER I-77 NORTHBOUND
(-L3NB-) ON I-77 NORTH CROSSING (-Y3-)

PROJECT REFERENCE NO.	SHEET NO.
I-5715	10



END BENT NO. 2 LOOKING WEST ALONG THE I-77 NORTHBOUND CROSSING



NORTH OF THE I-77 NORTHBOUND CROSSING LOOKING SOUTH