

REFERENCE: I-5714

PROJECT: 50127

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
PROJECT DESCRIPTION I-77 & SR 2136 (GILEAD RD)
INTERCHANGE - UPGRADE EXISTING DIAMOND
INTERCHANGE TO DIVERGING DIAMOND
INTERCHANGE
SITE DESCRIPTION BRIDGE OVER I-77 ON SR 2136
(GILEAD ROAD) BETWEEN SR 2138 AND NC 115

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5-9	CROSS SECTIONS
10-16	BORELOG REPORTS
17	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5714	1	18

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 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
- 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

- HPC
- C. LILLY
- M. WALKO, P.E.
- M. BREWER, P.E.
- A. ROTH
- J. FRAZIER

INVESTIGATED BY ECS SOUTHEAST, LLP


DRAWN BY M. BREWER, P.E.

CHECKED BY M. WALKO, P.E.

SUBMITTED BY ECS SOUTHEAST, LLP

DATE DECEMBER 2017

Prepared in the Office of:

 ECS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINEERING
FIRM # F-1078



DocuSigned by:
D. Matthew Brewer

EC2ABBEE99DB48C...
SIGNATURE DATE 12/18/2017

**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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6				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 (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (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)																																																									
<table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="6">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="3">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <td>A-1</td><td>A-3</td><td>A-2</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> <td>A-1, A-2</td><td>A-3</td><td>A-4, A-5</td><td>A-6, A-7</td> <td></td><td></td> </tr> <tr> <th>SYMBOL</th> <td>○○○○○</td><td>○○○○○</td><td>○○○○○</td><td>○○○○○</td><td>○○○○○</td><td>○○○○○</td><td>○○○○○</td> <td>○○○○○</td><td>○○○○○</td><td>○○○○○</td><td>○○○○○</td> <td></td><td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td><td>50 MX 25 MX 10 MX</td> <td>51 MN 35 MX 35 MX</td><td>35 MX 35 MX 35 MX</td><td>35 MX 35 MX 35 MX</td><td>35 MX 35 MX 35 MX</td><td>35 MN 36 MN 36 MN</td> <td></td><td></td><td></td><td></td> <td></td><td></td> </tr> </table>				GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)						SILT-CLAY MATERIALS (> 35% PASSING #200)			ORGANIC MATERIALS		GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7			SYMBOL	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○			% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MN 36 MN 36 MN							THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.		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																																																					
GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7																																																				
SYMBOL	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○	○○○○○																																																				
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MN 36 MN 36 MN																																																								
MINERALOGICAL COMPOSITION				COMPRESSION		CRYSTALLINE ROCK (CR)																																																									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.				SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50		FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																																																									
PERCENTAGE OF MATERIAL				GROUND WATER		NON-CRYSTALLINE ROCK (NCR)																																																									
<table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>				ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	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		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.																																					
ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL																																																												
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%																																																												
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%																																																												
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%																																																												
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE																																																												
MISCELLANEOUS SYMBOLS				WEATHERING		COASTAL PLAIN SEDIMENTARY ROCK (CP)																																																									
<table border="1"> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </table>				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-COESIVE)	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 (COESIVE)	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	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY		ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF 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.																																													
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-COESIVE)	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 (COESIVE)	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				RECOMMENDATION SYMBOLS		COMPLETE																																																									
<table border="1"> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <td>4</td><td>10</td><td>40</td><td>60</td><td>200</td><td>270</td> </tr> <tr> <td></td> <td>4.76</td><td>2.00</td><td>0.42</td><td>0.25</td><td>0.075</td><td>0.053</td> </tr> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GR.)</th> <th>COARSE SAND (CSE. SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GRAIN SIZE</th> <th>MM</th> <th>305</th> <th>75</th> <th>2.0</th> <th>0.25</th> <th>0.05</th> <th>0.005</th> </tr> <tr> <th></th> <th>IN.</th> <th>12</th> <th>3</th> <th></th> <th></th> <th></th> <th></th> </tr> </table>				U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270		4.76	2.00	0.42	0.25	0.075	0.053	BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)								GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005		IN.	12	3					UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK		ROCK HARDNESS													
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																									
	4.76	2.00	0.42	0.25	0.075	0.053																																																									
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)																																																									
GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005																																																								
	IN.	12	3																																																												
SOIL MOISTURE - CORRELATION OF TERMS				ABBREVIATIONS		VERY HARD																																																									
<table border="1"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td rowspan="2"> LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT </td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td></td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td></td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>				SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE		- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE		- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY U - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC D - DRY UNIT WEIGHT CSE. - COARSE ORG. - ORGANIC SAP. - SAPROLITE DPT - DILATOMETER TEST PMT - PRESSUREMETER TEST SD. - SAND, SANDY e - VOID RATIO SAP. - SAND, SANDY SL. - SILT, SILTY F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY		CAN BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																																											
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																													
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																													
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																													
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																													
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																													
PLASTICITY				EQUIPMENT USED ON SUBJECT PROJECT		MODERATELY HARD																																																									
<table border="1"> <tr> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>NON PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>				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	DRILL UNITS: <input checked="" type="checkbox"/> CME-550-X <input checked="" type="checkbox"/> DIEDRICH D-50 <input type="checkbox"/> CME-55 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST		HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST		MODERATELY HARD																																								
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				FRACTURE SPACING		MEDIUM HARD																																																									
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				<table border="1"> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>		TERM	SPACING	TERM	THICKNESS	VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET	WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET	CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED	0.03 - 0.16 FEET	VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET			THINLY LAMINATED	< 0.008 FEET	MEDIUM HARD																													
TERM	SPACING	TERM	THICKNESS																																																												
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	4 FEET																																																												
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET																																																												
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET																																																												
CLOSE	0.16 TO 1 FOOT	VERY THINLY BEDDED	0.03 - 0.16 FEET																																																												
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET																																																												
		THINLY LAMINATED	< 0.008 FEET																																																												
FRACURE SPACING				BEDDING		SOFT																																																									
INDURATION				INDURATION		VERY SOFT																																																									
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.				FRAGILE MODERATELY INDURATED INDURATED EXTREMELY INDURATED		RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																									
NOTES:				BENCH MARK:		CONTROL POINT:																																																									
NORTHINGS AND EASTINGS OBTAINED USING A TRIMBLE GEO7X WITH SUB-FOOT ACCURACY.				BL I-5714-18; N-608845.50, E-1446008.21, ELEV.-766.75 *820CL; N-609229.67, E-1446466.61, EL.-753.882 LEAD: N-609124.14, E-1446787.05, EL.-773.45 ELEVATION: FEET		COORDINATES AND ELEVATION FOR CONTROL POINT #820CL (LOCATED AT STATION 820+00 ALONG I-77 (-L-) CENTERLINE) WAS PROVIDED BY SUGAR CREEK CONSTRUCTION, LLC.																																																									

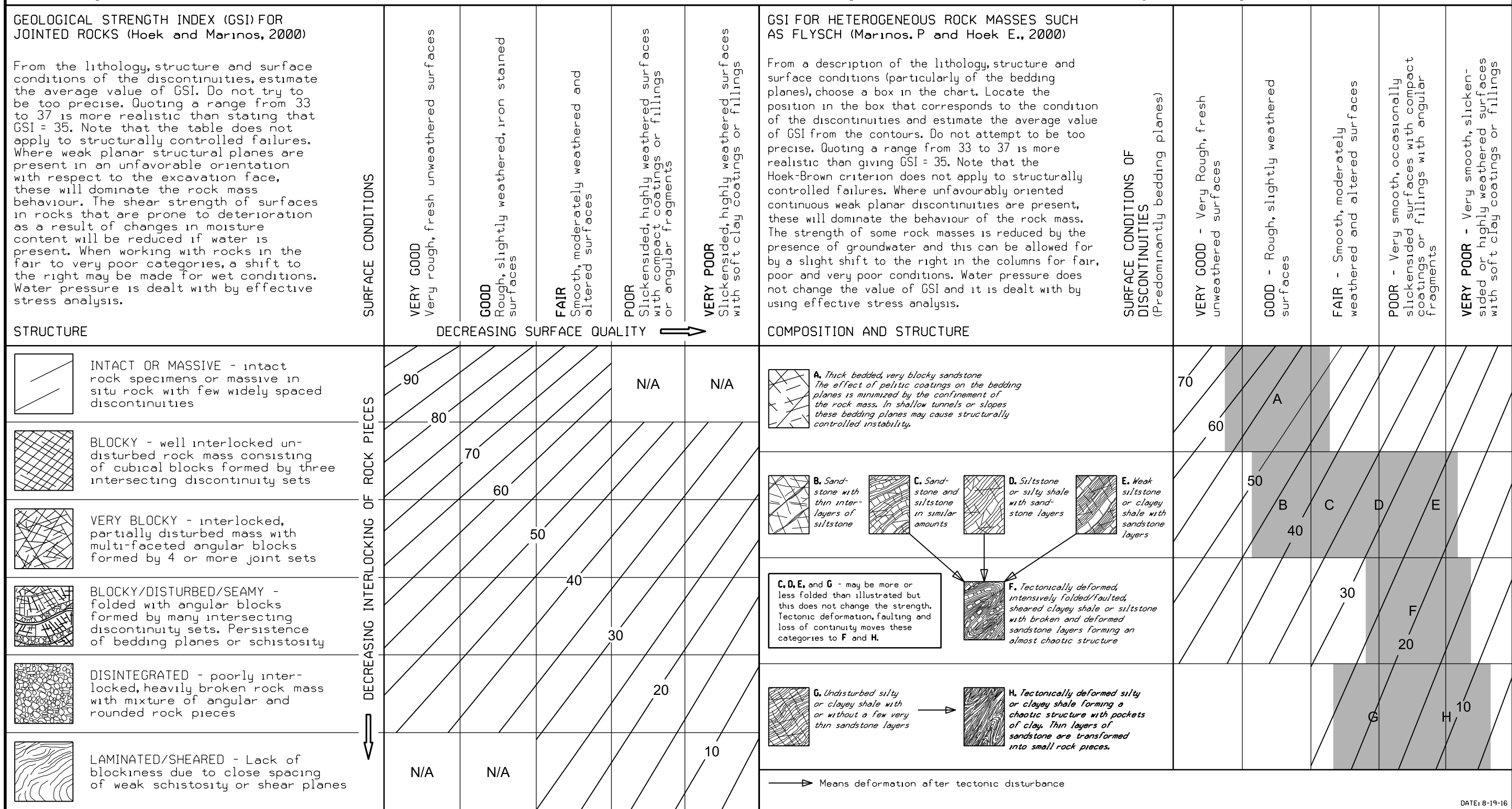
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

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



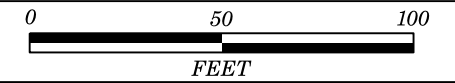
Prepared in the Office of:



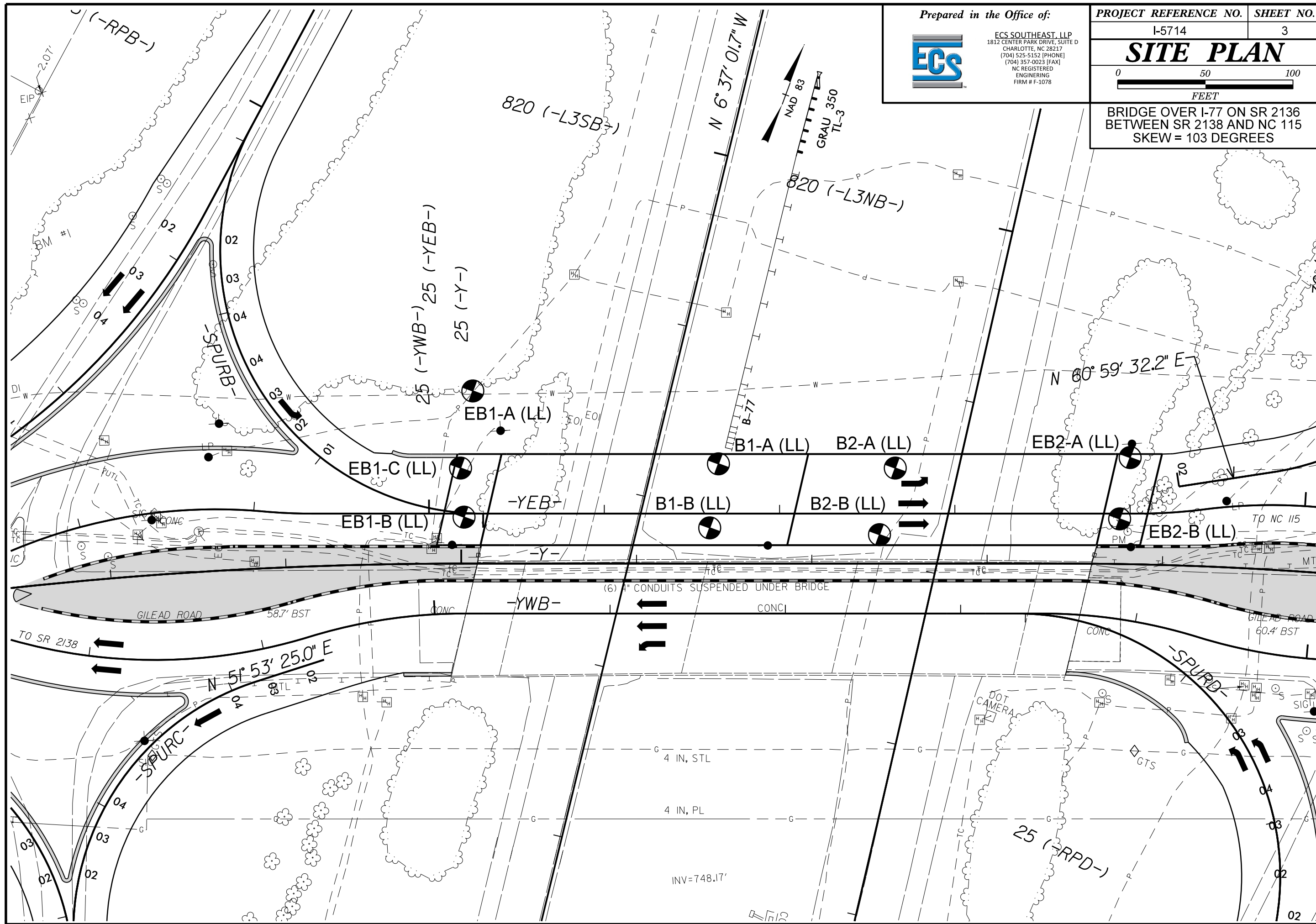
ECS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINEERING
FIRM # F-1078

PROJECT REFERENCE NO. I-5714 SHEET NO. 3

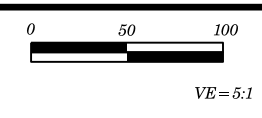
SITE PLAN



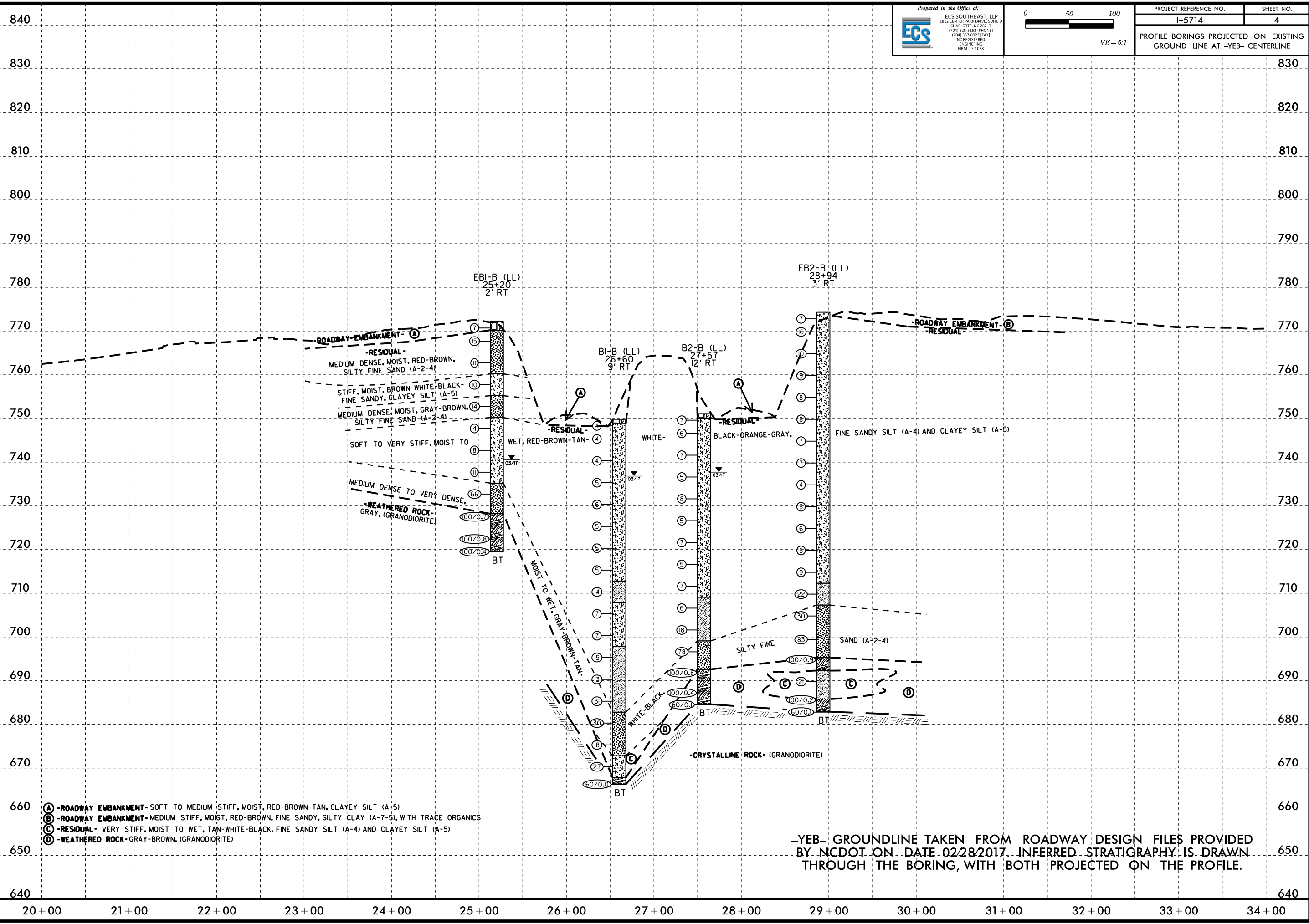
BRIDGE OVER I-77 ON SR 2136
BETWEEN SR 2138 AND NC 115
SKEW = 103 DEGREES



5/14/99
 P:\PROJECTS\2017\2017-09-29\PROJ\2000-12999\12100\12109-A - I-5714 1-77 and SR 1236 Interchange-Structure Inventory\CADD\GEO\TECH\Site\Sub\I-5714_GEO_BRDG_PFI_YEB.dgn
 03/20/2017 2:03:29 PM
 P:\PROJECTS\2017\2017-09-29\PROJ\2000-12999\12100\12109-A - I-5714 1-77 and SR 1236 Interchange-Structure Inventory\CADD\GEO\TECH\Site\Sub\I-5714_GEO_BRDG_PFI_YEB.dgn
 03/20/2017 2:03:29 PM



PROJECT REFERENCE NO.	SHEET NO.
I-5714	4
PROFILE BORINGS PROJECTED ON EXISTING GROUND LINE AT -YEB- CENTERLINE	



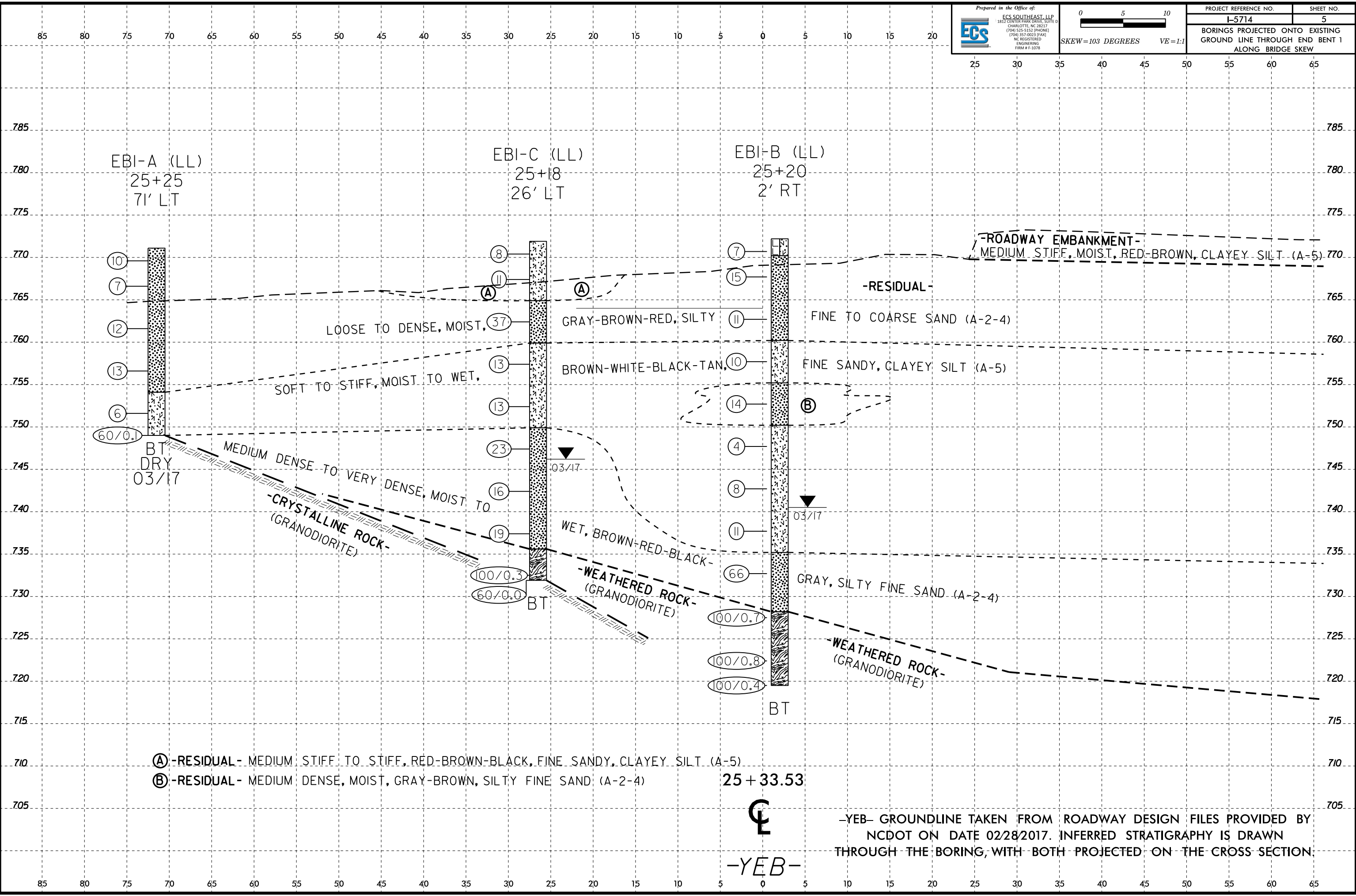
- (A) -ROADWAY EMBANKMENT- SOFT TO MEDIUM STIFF, MOIST, RED-BROWN-TAN, CLAYEY SILT (A-5)
- (B) -ROADWAY EMBANKMENT- MEDIUM STIFF, MOIST, RED-BROWN, FINE SANDY, SILTY CLAY (A-7-5), WITH TRACE ORGANICS
- (C) -RESIDUAL- VERY STIFF, MOIST TO WET, TAN-WHITE-BLACK, FINE SANDY SILT (A-4) AND CLAYEY SILT (A-5)
- (D) -WEATHERED ROCK- GRAY-BROWN, (GRANODIORITE)

-YEB- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 02/28/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE PROFILE.


6/23/16
15-DEC-2017 10:42
I:\2017\CH\02-EGS-10144\BIBLLO
EGS
EGS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 (PHONE)
(704) 557-0023 (FAX)
NC REGISTERED
ENGINEERING
FIRM # E-1078

	Prepared in the Office of: EGS SOUTHEAST, LLP 1812 CENTER PARK DRIVE, SUITE D CHARLOTTE, NC 28217 (704) 525-5152 (PHONE) (704) 557-0023 (FAX) NC REGISTERED ENGINEERING FIRM # E-1078	 SKEW=103 DEGREES VE=1:1	PROJECT REFERENCE NO.	SHEET NO.
			I-5714	5

BORINGS PROJECTED ONTO EXISTING GROUND LINE THROUGH END BENT 1 ALONG BRIDGE SKEW



Prepared in the Office of:



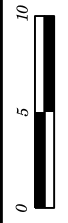
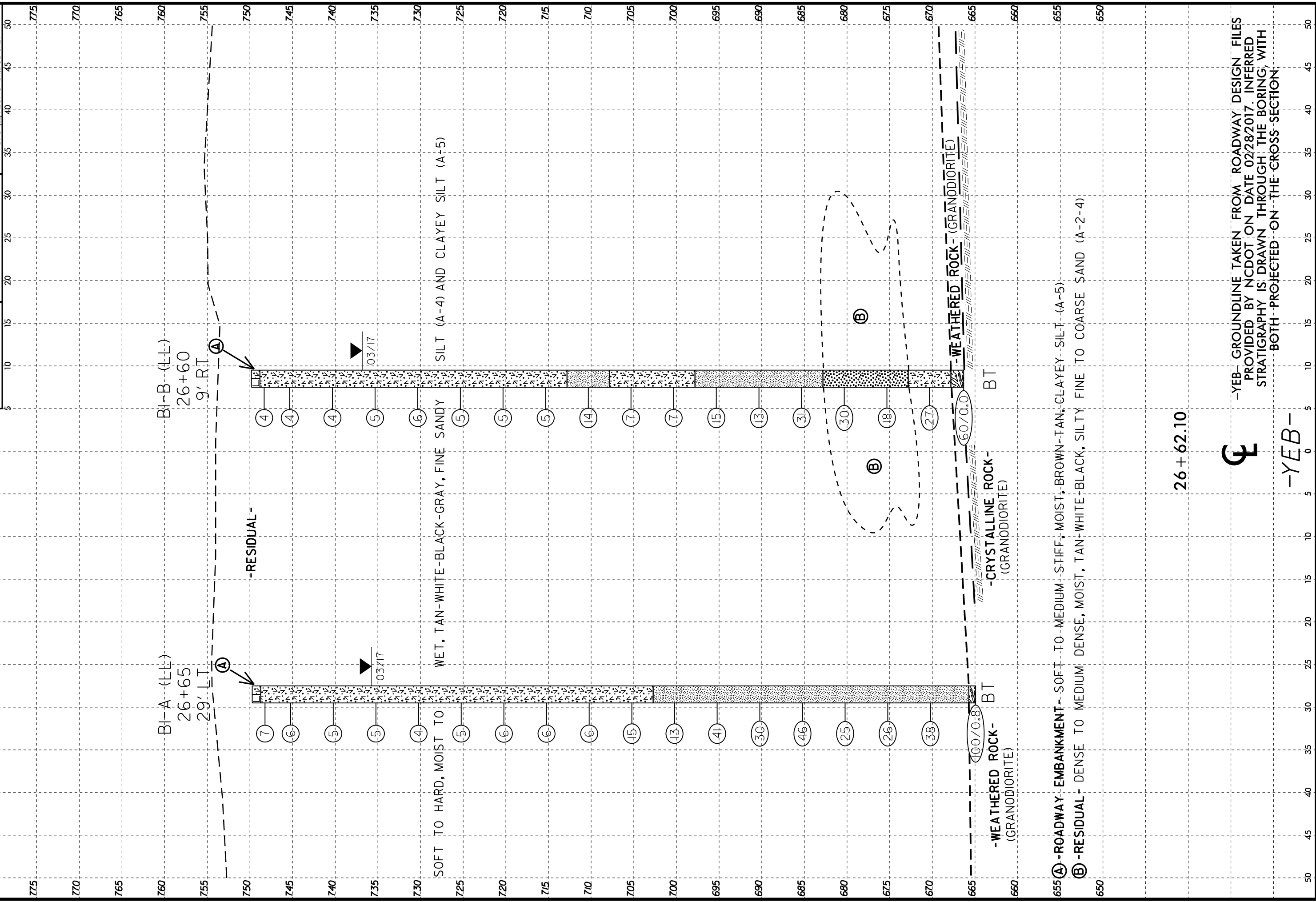
EGS SOUTHEAST L.P.
1817 CHARLOTTE, NC 28217
(704) 332-5222 (FAX)
(704) 332-5222 (PHONE)
INC. REGISTERED
PRM # 12078

PROJECT REFERENCE NO. I-5714

SHEET NO. 6

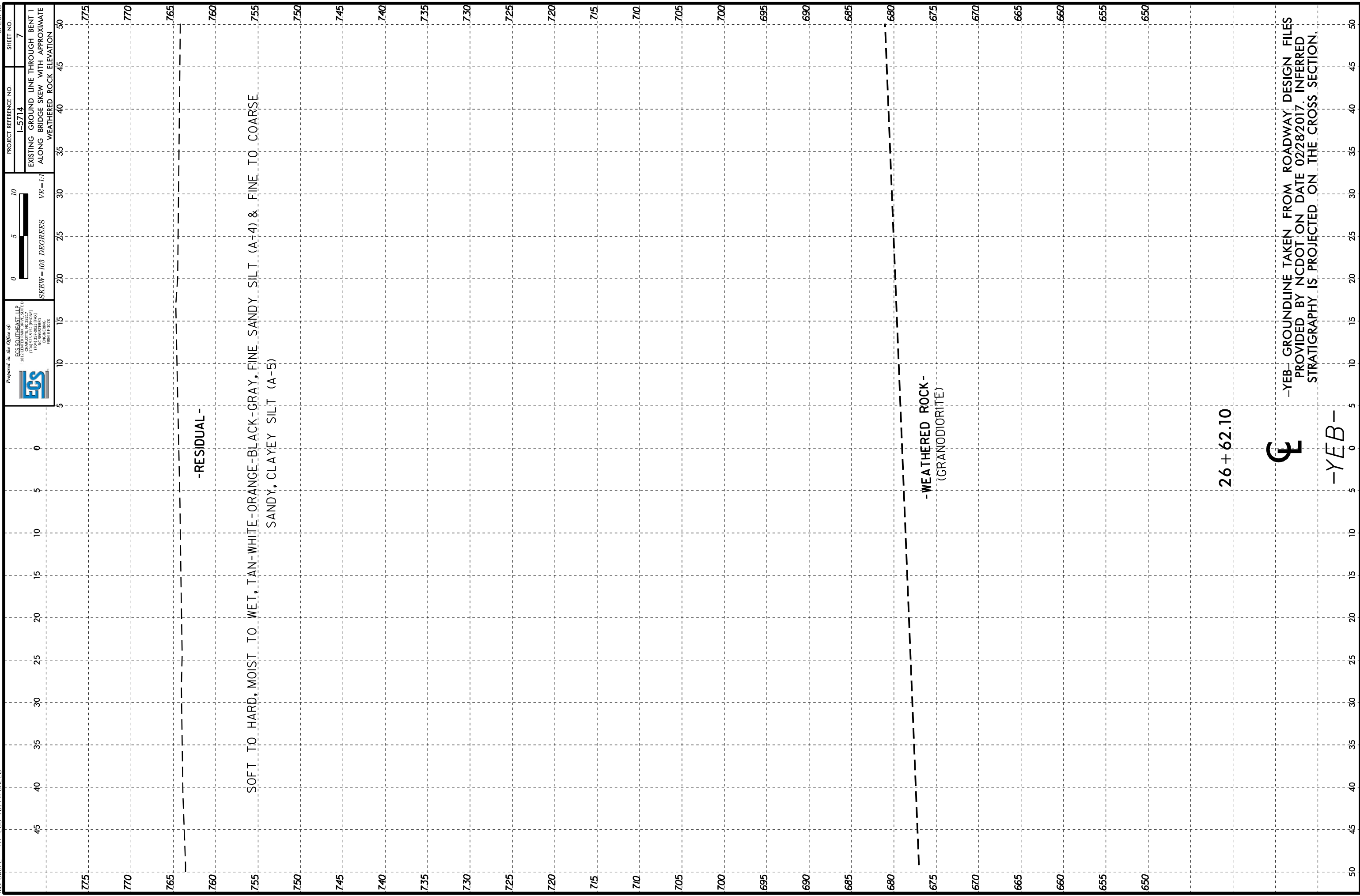
BORINGS PROJECTED ONTO EXISTING GROUND LINE THROUGH BI-A (LL) AND BI-B (LL) ALONG BRIDGE SKEW

SKREW = 103 DEGREES VE = 1:1

-YEB- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 02/28/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

-YEB-



-YEB- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES
PROVIDED BY NCDOT ON DATE 02/28/2017. INFERRED
STRATIGRAPHY IS PROJECTED ON THE CROSS SECTION.

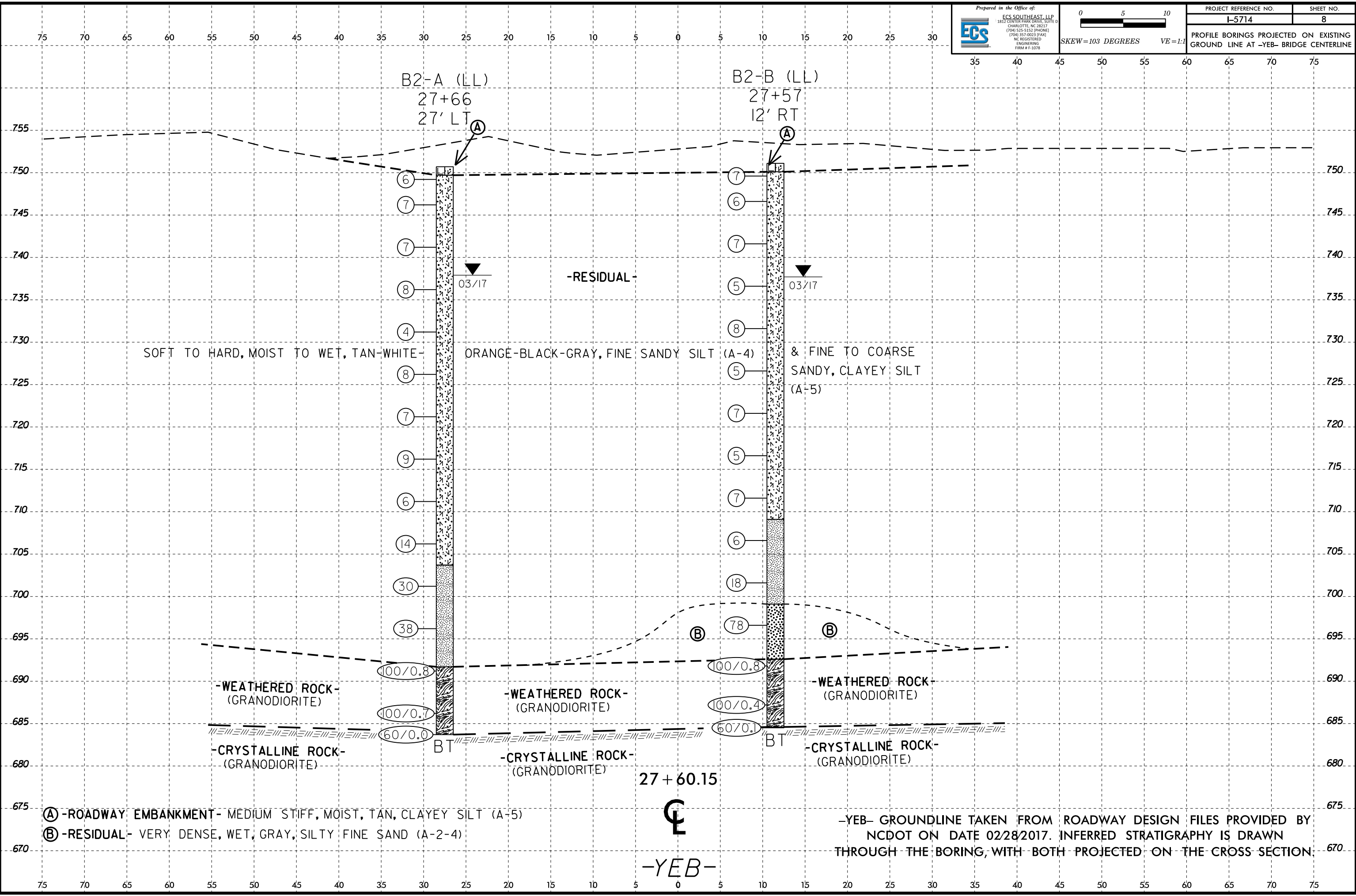
6/23/16
I:\2017\12\15\121009\121009-A - I-5714 I-77 and SR 1236 Interchange Structure Inventor\CAD\GEO\TECH\Site\Sub\I-5714_geo_brdg_xsl.yeb.dgn

Prepared in the Office of:
ECS SOUTH EAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 (PHONE)
(704) 525-5152 (FAX)
NC REGISTERED ENGINEERING
FIRM # E-1078

0 5 10
SKEW=103 DEGREES VE=1:1

PROJECT REFERENCE NO.	SHEET NO.
I-5714	8

PROFILE BORINGS PROJECTED ON EXISTING GROUND LINE AT -YEB- BRIDGE CENTERLINE



(A) -ROADWAY EMBANKMENT- MEDIUM STIFF, MOIST, TAN, CLAYEY SILT (A-5)
(B) -RESIDUAL- VERY DENSE, WET, GRAY, SILTY FINE SAND (A-2-4)

-YEB- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 02/28/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.

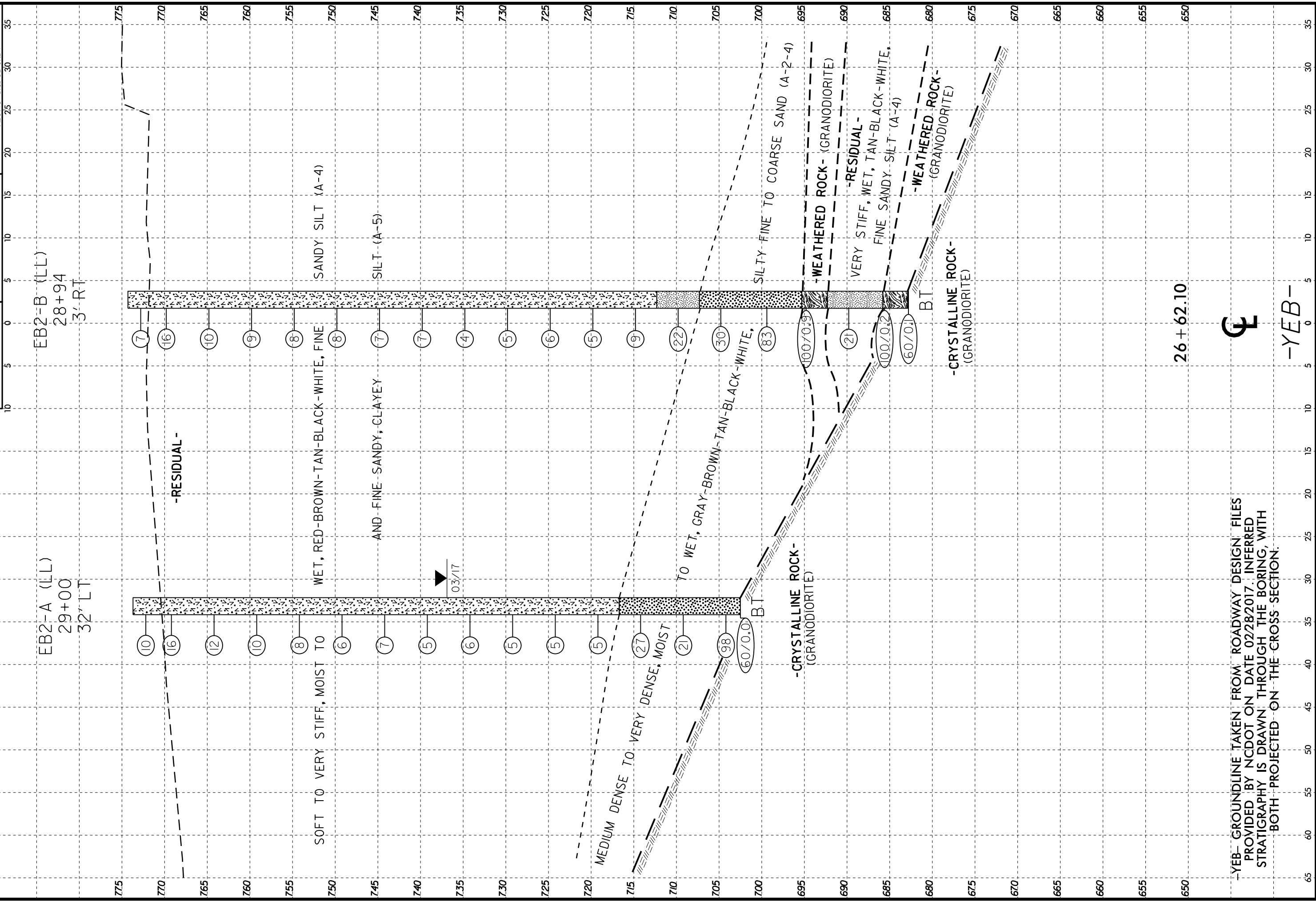
27 + 60.15
CL
-YEB-



Prepared in the Office of:
ECS SOUTHEAST LUP
1817 CHARLOTTE, NC 28217
(704) 333-2021 (FAX)
(704) 333-2021 (PHONE)
PRN # 13078



0 5 10
SKEDW=103 DEGREES VE=1:1



-YEB- GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES PROVIDED BY NCDOT ON DATE 02/28/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING, WITH BOTH PROJECTED ON THE CROSS SECTION.



-YEB-

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly									
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)								
BORING NO. EB1-A (LL)		STATION 25+25		OFFSET 71 ft LT		ALIGNMENT -YEB-									
COLLAR ELEV. 771.1 ft		TOTAL DEPTH 22.1 ft		NORTHING 609,042		EASTING 1,446,292									
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER J. Cain		START DATE 03/16/17		COMP. DATE 03/16/17		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					
775															
770	770.6	0.5	2	3	7									771.1	GROUND SURFACE
	767.6	3.5	2	3	4										RESIDUAL Loose to Medium Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica
765	762.6	8.5	6	6	6										
760	757.6	13.5	3	6	7										
755	752.6	18.5	3	3	3									754.1	Medium Stiff, Brown, Clayey SILT (A-5), with trace mica
750	749.1	22.0												749.1	CRYSTALLINE ROCK (GRANODIORITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 749.0 ft In Crystalline Rock (GRANODIORITE)

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly									
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)								
BORING NO. EB1-B (LL)		STATION 25+20		OFFSET 2 ft RT		ALIGNMENT -YEB-									
COLLAR ELEV. 772.2 ft		TOTAL DEPTH 52.7 ft		NORTHING 608,973		EASTING 1,446,312									
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER J. Cain		START DATE 03/16/17		COMP. DATE 03/16/17		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					
775															
770	771.7	0.5	3	3	4									772.2	GROUND SURFACE
	768.7	3.5	5	7	8									770.2	ROADWAY EMBANKMENT Medium Stiff, Red-Brown, Clayey SILT (A-5)
765	763.7	8.5	4	5	6										RESIDUAL Medium Dense, Red-Brown, Silty Fine SAND (A-2-4), with trace mica
760	758.7	13.5	3	4	6									760.2	Stiff, Brown-White-Black, Fine Sandy, Clayey SILT (A-5), with trace mica
755	753.7	18.5	6	9	5									755.2	Medium Dense, Gray-Brown, Silty Fine SAND (A-2-4), with trace mica
750	748.7	23.5	2	2	2									750.2	Soft to Stiff, Tan-White-Black, Clayey SILT (A-5), with trace mica
745	743.7	28.5	3	3	5										
740	738.7	33.5	3	4	7										
735	733.7	38.5	15	26	40									735.2	Very Dense, Gray-Brown, Silty Fine SAND (A-2-4), with trace mica
730	728.7	43.5	22	64	36/0.2									728.2	WEATHERED ROCK Gray, (GRANODIORITE)
725	723.7	48.5	16	44	56/0.3										
720	719.9	52.3												719.5	Boring Terminated at Elevation 719.5 ft In Weathered Rock (GRANODIORITE)

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT_12/9/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly											
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)										
BORING NO. EB1-C (LL)		STATION 25+18		OFFSET 26 ft LT		ALIGNMENT -YEB-	0 HR. Dry										
COLLAR ELEV. 771.9 ft		TOTAL DEPTH 40.0 ft		NORTHING 608,999		EASTING 1,446,301	24 HR. 25.7										
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 03/16/17		COMP. DATE 03/16/17		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				ELEV. (ft)	DEPTH (ft)		
775																	
	771.4	0.5	7	3	5	8									771.9	GROUND SURFACE	0.0
770																	
	768.4	3.5	3	5	6	11											
765																	
	763.4	8.5	10	21	16	37									764.9	Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica	7.0
760																	
	758.4	13.5	4	6	7	13									759.9	Stiff, Brown-White-Black, Fine Sandy, Clayey SILT (A-5), with trace mica	12.0
755																	
	753.4	18.5	5	6	7	13											
750																	
	748.4	23.5	8	11	12	23									749.9	Medium Dense, Brown-Red-Black, Silty Fine SAND (A-2-4), with trace mica	22.0
745																	
	743.4	28.5	4	7	9	16											
740																	
	738.4	33.5	7	10	9	19											
735																	
	732.8	39.1	100	0.3											735.6	WEATHERED ROCK (GRANODIORITE)	36.3
	731.9	40.0	60	0.0											731.9	Boring Terminated with Standard Penetration Test Refusal at Elevation 731.9 ft On Crystalline Rock (GRANODIORITE)	40.0

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT 12/9/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly										
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)									
BORING NO. B1-A (LL)		STATION 26+65		OFFSET 29 ft LT		ALIGNMENT -YEB-										
COLLAR ELEV. 749.7 ft		TOTAL DEPTH 84.8 ft		NORTHING 609,052		EASTING 1,446,438										
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER J. Cain		START DATE 03/09/17		COMP. DATE 03/09/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
750	749.2	0.5	3	3	4									749.7	0.0	GROUND SURFACE
	746.2	3.5	2	2	4									748.7	1.0	ROADWAY EMBANKMENT Medium Stiff, Tan, Clayey SILT (A-5), with trace gravel
745																RESIDUAL Soft to Stiff, Tan-White-Black, Clayey SILT (A-5), with trace mica and trace gravel-sized quartz fragments at 38.5 Feet
740	741.2	8.5	2	2	3											
735	736.2	13.5	2	2	3											
730	731.2	18.5	1	2	2											
725	726.2	23.5	1	2	3											
720	721.2	28.5	1	3	3											
715	716.2	33.5	1	3	3											
710	711.2	38.5	2	2	4											
705	706.2	43.5	4	6	9											
700	701.2	48.5	3	5	8									702.7	47.0	Stiff to Hard, Tan-White-Black-Gray, Fine Sandy SILT (A-4), with trace mica
695	696.2	53.5	8	17	24											
690	691.2	58.5	6	11	19											
685	686.2	63.5	7	19	27											
680	681.2	68.5	5	10	15											
675	676.2	73.5	4	9	17											
670	671.2	78.5	9	17	21											

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly											
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)										
BORING NO. B1-A (LL)		STATION 26+65		OFFSET 29 ft LT		ALIGNMENT -YEB-											
COLLAR ELEV. 749.7 ft		TOTAL DEPTH 84.8 ft		NORTHING 609,052		EASTING 1,446,438											
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 03/09/17		COMP. DATE 03/09/17		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
670																	Match Line
665	666.2	83.5	14	32	68/0.3									665.7	84.0	Stiff to Hard, Tan-White-Black-Gray, Fine Sandy SILT (A-4), with trace mica (continued)	
														664.9	84.8	WEATHERED ROCK Gray-Brown, (GRANODIORITE) Boring Terminated at Elevation 664.9 ft In Weathered Rock (GRANODIORITE)	

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT_12/9/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly	
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)
BORING NO. B1-B (LL)		STATION 26+60		OFFSET 9 ft RT		ALIGNMENT -YEB-	
COLLAR ELEV. 749.8 ft		TOTAL DEPTH 83.5 ft		NORTHING 609,016		EASTING 1,446,446	
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic	
DRILLER J. Cain		START DATE 03/10/17		COMP. DATE 03/10/17		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				ELEV. (ft)	DEPTH (ft)	
750	749.3	0.5	2	2	2											749.8 GROUND SURFACE 0.0
745	746.3	3.5	1	2	2	ROADWAY EMBANKMENT Soft, Brown, Clayey SILT (A-5)										748.8 1.0
						RESIDUAL Soft to Medium Stiff, Tan-White-Black Clayey SILT (A-5), with trace mica										
740	741.3	8.5	2	2	2											
735	736.3	13.5	2	2	3											
730	731.3	18.5	2	3	3											
725	726.3	23.5	2	2	3											
720	721.3	28.5	2	2	3											
715	716.3	33.5	1	3	2											
710	711.3	38.5	3	4	10											712.8 37.0 Stiff, Tan-White-Black, Fine Sandy SILT (A-4), with trace mica
705	706.3	43.5	2	3	4											707.8 42.0 Medium Stiff, Tan-White-Black, Clayey SILT (A-5), with trace mica
700	701.3	48.5	2	3	4											
695	696.3	53.5	4	7	8											697.8 52.0 Stiff to Hard, Tan-White-Black, Fine Sandy SILT (A-4), with trace mica
690	691.3	58.5	3	5	8											
685	686.3	63.5	7	13	18											
680	681.3	68.5	9	12	18											682.8 67.0 Dense to Medium Dense, Tan-White-Black, Silty Fine to Coarse SAND (A-2-4), with trace mica
675	676.3	73.5	4	5	13											
670	671.3	78.5	3	5	22											672.8 77.0 Very Stiff, Tan-White-Black, Clayey SILT (A-5), with trace mica

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly	
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)
BORING NO. B1-B (LL)		STATION 26+60		OFFSET 9 ft RT		ALIGNMENT -YEB-	
COLLAR ELEV. 749.8 ft		TOTAL DEPTH 83.5 ft		NORTHING 609,016		EASTING 1,446,446	
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic	
DRILLER J. Cain		START DATE 03/10/17		COMP. DATE 03/10/17		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				ELEV. (ft)	DEPTH (ft)	
670																670.0 Match Line
	666.3	83.5														666.3 WEATHERED ROCK (GRANODIORITE) 83.5
																667.8 82.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 666.3 ft On Crystalline Rock (GRANODIORITE)

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT_12/9/17

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly										
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)									
BORING NO. B2-A (LL)		STATION 27+66		OFFSET 27 ft LT		ALIGNMENT -YEB-										
COLLAR ELEV. 750.7 ft		TOTAL DEPTH 67.0 ft		NORTHING 609,085		EASTING 1,446,533										
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 03/09/17		COMP. DATE 03/09/17		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						
755																
750	750.2	0.5	2	3	3										750.7	GROUND SURFACE
															749.7	ROADWAY EMBANKMENT Medium Stiff, Tan, Clayey SILT (A-5), with trace gravel
745	747.2	3.5	3	3	4											RESIDUAL Soft to Stiff, Brown-Tan-White-Black-Gray, Clayey SILT (A-5), with trace mica
740	742.2	8.5	2	3	4											
735	737.2	13.5	3	3	5											
730	732.2	18.5	2	1	3											
725	727.2	23.5	3	3	5											
720	722.2	28.5	2	3	4											
715	717.2	33.5	3	4	5											
710	712.2	38.5	2	2	4											
705	707.2	43.5	3	5	9											
700	702.2	48.5	7	13	17										703.7	Very Stiff to Hard, Gray-White, Fine Sandy SILT (A-4), with trace mica
695	697.2	53.5	13	18	20											
690	692.2	58.5	27	47	53/0.3										691.7	WEATHERED ROCK Gray, (GRANODIORITE)
685	687.2	63.5	50	50/0.2												
	683.7	67.0	60/0.0												683.7	Boring Terminated with Standard Penetration Test Refusal at Elevation 683.7 ft On Crystalline Rock (GRANODIORITE)

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly										
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)									
BORING NO. B2-B (LL)		STATION 27+57		OFFSET 12 ft RT		ALIGNMENT -YEB-										
COLLAR ELEV. 751.1 ft		TOTAL DEPTH 66.6 ft		NORTHING 609,046		EASTING 1,446,538										
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 03/09/17		COMP. DATE 03/09/17		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						
755																
750	750.6	0.5	2	3	4										751.1	GROUND SURFACE
															750.1	ROADWAY EMBANKMENT Medium Stiff, Tan, Clayey SILT (A-5), with trace gravel
745	747.6	3.5	2	2	4											RESIDUAL Medium Stiff, Tan-Orange-Black-Gray-White, Clayey SILT (A-5), with trace gravel-sized rock fragments and mica
740	742.6	8.5	2	3	4											
735	737.6	13.5	2	2	3											
730	732.6	18.5	6	4	4											
725	727.6	23.5	2	2	3											
720	722.6	28.5	2	2	5											
715	717.6	33.5	2	2	3											
710	712.6	38.5	2	3	4											
705	707.6	43.5	2	2	4											
700	702.6	48.5	3	7	11										709.1	Medium Stiff to Very Stiff, Gray, Fine Sandy SILT (A-4), with trace mica
695	697.6	53.5	13	28	50										699.1	Very Dense, Gray, Silty Fine SAND (A-2-4), with trace mica
690	692.6	58.5	40	60/0.3											692.6	WEATHERED ROCK Gray-Brown, (GRANODIORITE)
685	687.6	63.5	100/0.4													
	684.6	66.5	60/0.1												684.6	CRYSTALLINE ROCK (GRANODIORITE)
															684.5	Boring Terminated with Standard Penetration Test Refusal at Elevation 684.5 ft In Crystalline Rock (GRANODIORITE)

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT_12/9/17

GEOTECHNICAL BORING REPORT BORE LOG

WBS 50127.1.FS1		TIP I-5714		COUNTY MECKLENBURG		GEOLOGIST C. Lilly											
SITE DESCRIPTION I-77 and SR 2136 (Gilead Road) Interchange Upgrade to Diverging Diamond Interchange							GROUND WTR (ft)										
BORING NO. EB2-A (LL)		STATION 29+00		OFFSET 32 ft LT		ALIGNMENT -YEB-											
COLLAR ELEV. 773.7 ft		TOTAL DEPTH 71.2 ft		NORTHING 609,137		EASTING 1,446,657											
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 11/02/2016				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER J. Cain		START DATE 03/20/17		COMP. DATE 03/20/17		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				ELEV. (ft)	DEPTH (ft)		
775															773.7	GROUND SURFACE	0.0
	773.2	0.5	3	4	6	10								M	RESIDUAL Medium Stiff to Very Stiff, Red-Brown-Tan-Black-White, Fine Sandy, Clayey SILT (A-5), with trace mica.		
770	770.2	3.5	6	7	9	16								M			
765	765.2	8.5	4	6	6	12								M			
760	760.2	13.5	3	4	6	10								M			
755	755.2	18.5	3	4	4	8								M			
750	750.2	23.5	2	3	3	6								M			
745	745.2	28.5	2	4	3	7								M			
740	740.2	33.5	1	2	3	5								M			
735	735.2	38.5	1	3	3	6								M			
730	730.2	43.5	2	2	3	5								M			
725	725.2	48.5	2	2	3	5								M			
720	720.2	53.5	3	2	3	5								M			
715	715.2	58.5	5	11	16	27								M		716.7	57.0
710	710.2	63.5	6	9	12	21								W		Medium Dense to Very Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica.	
705	705.2	68.5	16	39	59	98								W			
	702.5	71.2	60/0.0			60/0.0								W	702.5		71.2
Boring Terminated with Standard Penetration Test Refusal at Elevation 702.5 ft On Crystalline Rock (GRANODIORITE)																	

NCDOT BORE DOUBLE I5714_GEO_RDY_BORELOGS.GPJ NC_DOT_GDT 12/9/17

SITE PHOTOS



Photo No. 1: View at existing Bent 2 looking west (downstation) on -YEB- (SR 2136)



Photo No. 3: View at End Bent 1 looking east (upstation) on -YEB- (SR 2136)



Photo No. 2: View at existing Bent 1 looking east (upstation) on -YEB- (SR 2136)