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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

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

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**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT  
SUBSURFACE INVESTIGATION  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

**SOIL DESCRIPTION**

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, *VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6*

**SOIL LEGEND AND AASHTO CLASSIFICATION**

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			
	A-1	A-1-b	A-2	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			
GROUP CLASS.	A-1-a, A-1-b							A-2-4, A-2-5, A-2-6, A-2-7							A-1, A-2, A-3, A-4, A-5, A-6, A-7			
SYMBOL	[Pattern]							[Pattern]							[Pattern]			
% 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							
MATERIAL PASSING #40 LL PI	[Table]							[Table]							[Table]			
GROUP INDEX	0							4 MX, 8 MX, 12 MX, 16 MX, NO MX							[Table]			
USUAL TYPES OF MAJOR MATERIALS	FINE SAND			SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS				CLAYEY SOILS				[Table]		
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR, POOR, UNSUITABLE			

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

**CONSISTENCY OR DENSENESS**

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )
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**

U.S. STD. SIEVE SIZE OPENING (MM)	4		10		40		60		200		270	
	4.75	2.00	0.42	0.25	0.075	0.053						
BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE, SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)						
GRAIN SIZE	MM 305 IN. 12	75 3	2.0	0.25	0.05	0.005						

**SOIL MOISTURE - CORRELATION OF TERMS**

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
OM - OPTIMUM MOISTURE SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

**PLASTICITY**

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

**COLOR**

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

**GRADATION**

**WELL GRADED** - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  
**UNIFORMLY GRADED** - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  
**GAP-GRADED** - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

**ANGULARITY OF GRAINS**

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: **ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.**

**MINERALOGICAL COMPOSITION**

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

**COMPRESSIBILITY**

SLIGHTLY COMPRESSIBLE LL < 31  
MODERATELY COMPRESSIBLE LL = 31 - 50  
HIGHLY COMPRESSIBLE LL > 50

**PERCENTAGE OF MATERIAL**

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE

**GROUND WATER**

WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING  
 STATIC WATER LEVEL AFTER 24 HOURS  
 PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA  
 SPRING OR SEEP

**MISCELLANEOUS SYMBOLS**

**RECOMMENDATION SYMBOLS**

**ABBREVIATIONS**

- AR - AUGER REFUSAL
- BT - BORING TERMINATED
- CL - CLAY
- CPT - CONE PENETRATION TEST
- CSE - COARSE
- DMT - DILATOMETER TEST
- DPT - DYNAMIC PENETRATION TEST
- ø - VOID RATIO
- F - FINE
- FOSS. - FOSSILIFEROUS
- FRAC. - FRACTURED, FRACTURES
- FRAGS. - FRAGMENTS
- HI. - HIGHLY
- MED. - MEDIUM
- MICA - MICACEOUS
- MOD. - MODERATELY
- NP - NON PLASTIC
- ORG. - ORGANIC
- PMT - PRESSUREMETER TEST
- SAP. - SAPROLITIC
- SD. - SAND, SANDY
- SL. - SILT, SILTY
- SLI. - SLIGHTLY
- TCR - TRICONE REFUSAL
- w - MOISTURE CONTENT
- V - VERY
- VST - VANE SHEAR TEST
- WEA. - WEATHERED
- UW - UNIT WEIGHT
- DW - DRY UNIT WEIGHT
- S - BULK
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- RS - ROCK
- RT - RECOMPACTED TRIAXIAL
- CBR - CALIFORNIA BEARING RATIO

**EQUIPMENT USED ON SUBJECT PROJECT**

- DRILL UNITS:
  - CME-550-X
  - DIEDRICH D-50
  - CME-55
  - VANE SHEAR TEST
  - PORTABLE HOIST
- ADVANCING TOOLS:
  - CLAY BITS
  - 6" CONTINUOUS FLIGHT AUGER
  - 8" HOLLOW AUGERS
  - HARD FACED FINGER BITS
  - TUNG-CARBIDE INSERTS
  - CASING  W/ ADVANCER
  - TRICONE  \*STEEL TEETH
  - TRICONE  \*TUNG-CARB.
  - CORE BIT
- HAMMER TYPE:
  - AUTOMATIC
  - MANUAL
- CORE SIZE:
  - B
  - H
  - N
- HAND TOOLS:
  - POST HOLE DIGGER
  - HAND AUGER
  - SOUNDING ROD
  - VANE SHEAR TEST

**ROCK DESCRIPTION**

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

**WEATHERING**

**FRESH** ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.  
**VERY SLIGHT (V SLI.)** ROCK GENERALLY FRESH, JOINTS STAINED. SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.  
**SLIGHT (SLI.)** ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.  
**MODERATE (MOD.)** SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.  
**MODERATELY SEVERE (MOD. SEV.)** ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*  
**SEVERE (SEV.)** ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*  
**VERY SEVERE (V SEV.)** ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*  
**COMPLETE** ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

**ROCK HARDNESS**

**VERY HARD** CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  
**HARD** CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.  
**MODERATELY HARD** CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.  
**MEDIUM HARD** CAN BE GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.  
**SOFT** CAN BE GROUDED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.  
**VERY SOFT** CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.

**FRACTURE SPACING**

TERM	SPACING	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

**INDURATION**

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.  
**FRIABLE** RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.  
**MODERATELY INDURATED** GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.  
**INDURATED** GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.  
**EXTREMELY INDURATED** SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

**TERMS AND DEFINITIONS**

**ALLUVIUM (ALLUV.)** - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  
**AQUIFER** - A WATER BEARING FORMATION OR STRATA.  
**ARENACEOUS** - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  
**ARGILLACEOUS** - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.  
**ARTESIAN** - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.  
**CALCAREOUS (CALC.)** - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  
**COLLUVIUM** - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  
**CORE RECOVERY (REC.)** - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  
**DIKE** - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  
**DIP** - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  
**DIP DIRECTION (DIP AZIMUTH)** - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  
**FAULT** - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  
**FISSILE** - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  
**FLOAT** - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED 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.  
**BENCH MARK:** BL I-5714-18; N-608845.50, E-1446008.21, ELEV.-766.75  
**CONTROL POINT** #82OCL: N-609229.67, E-1446466.61, EL.-753.882  
**LEAD:** N-609124.14, E-1446787.05, EL.-773.45 **ELEVATION:** FEET

**NOTES:**

NORTHINGS AND EASTINGS OBTAINED USING A TRIMBLE GEO7X WITH SUB-FOOT ACCURACY.  
COORDINATES AND ELEVATION FOR CONTROL POINT #82OCL (LOCATED AT STATION 820+00 ALONG I-77 (-L-) CENTERLINE) WAS PROVIDED BY SUGAR CREEK CONSTRUCTION, LLC.

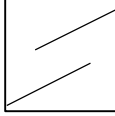
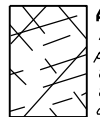
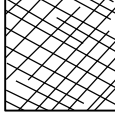
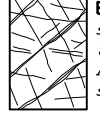



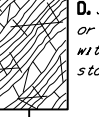
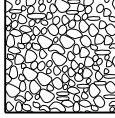
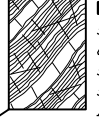
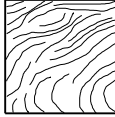

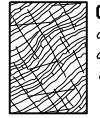

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

**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)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)							
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings					
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE									
 INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities		90			N/A	N/A	 <b>A.</b> Thick bedded, very blocky sandstone. The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70								
 BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		80					 <b>B.</b> Sandstone with thin inter-layers of siltstone	60								
 VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets							 <b>C.</b> Sandstone and siltstone in similar amounts	50								
 BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity							 <b>D.</b> Siltstone or silty shale with sandstone layers	40								
 DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces							 <b>E.</b> Weak siltstone or clayey shale with sandstone layers	30								
 LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes		N/A	N/A				 <b>F.</b> Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure	20								
							 <b>G.</b> Undisturbed silty or clayey shale with or without a few very thin sandstone layers	10								
							 <b>H.</b> Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.									
							→ Means deformation after tectonic disturbance									

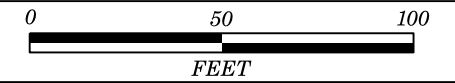
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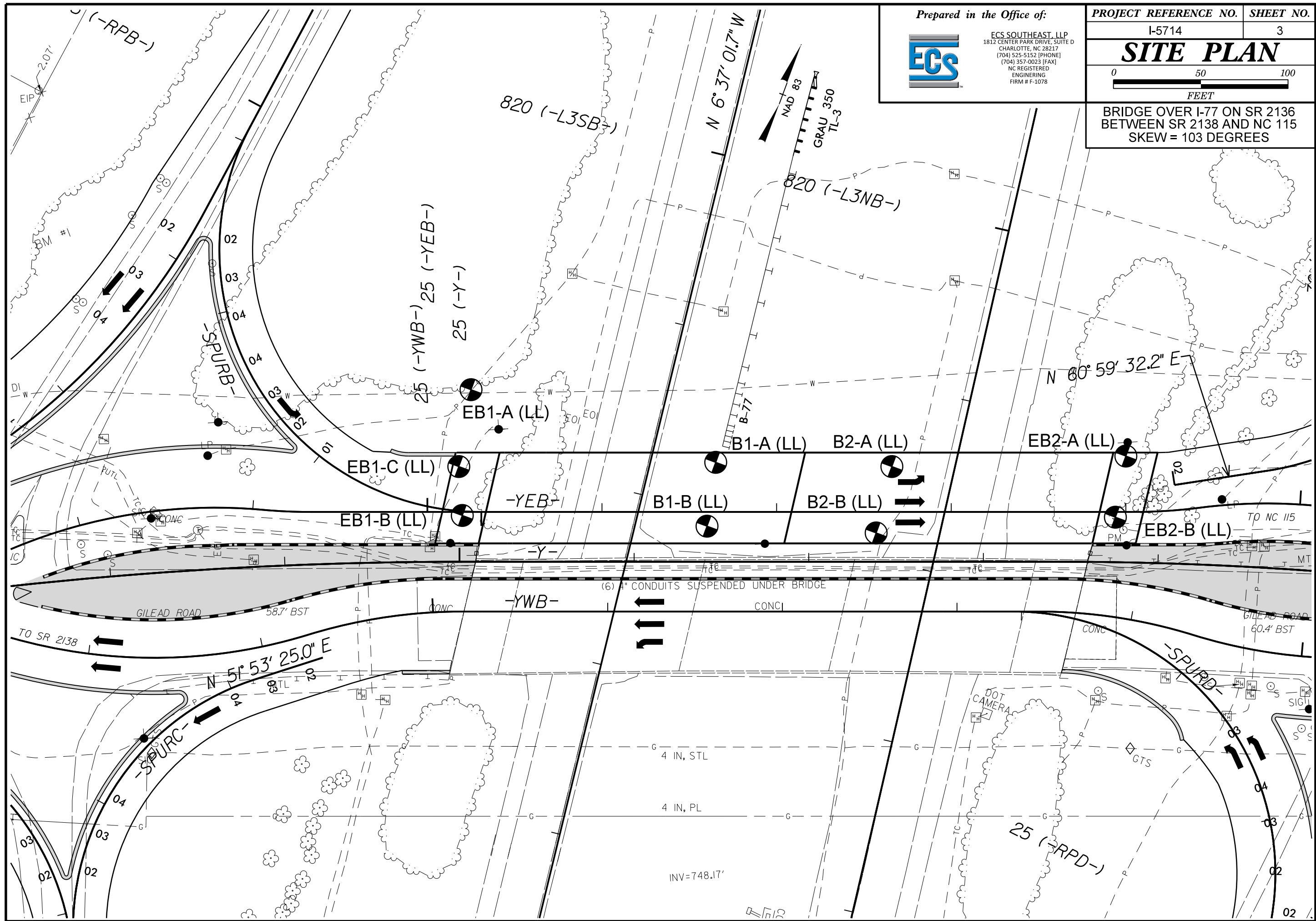
ECS SOUTHEAST, LLP  
1812 CENTER PARK DRIVE, SUITE D  
CHARLOTTE, NC 28217  
(704) 525-5152 [PHONE]  
(704) 357-0023 [FAX]  
NC REGISTERED  
ENGINEERING  
FIRM # F-1078

PROJECT REFERENCE NO. I-5714 SHEET NO. 3

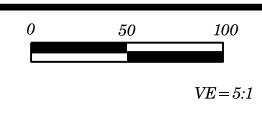
# SITE PLAN



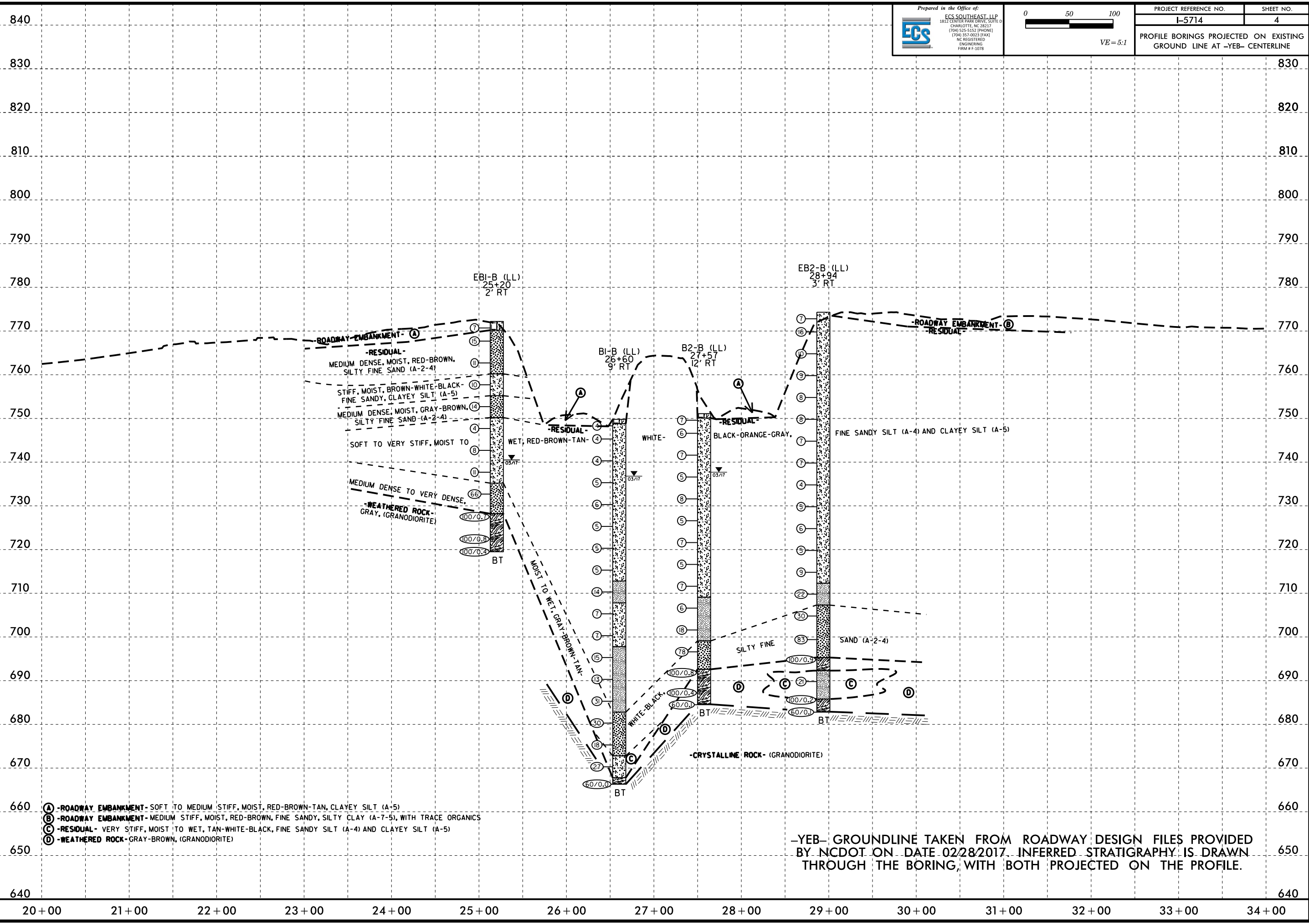
BRIDGE OVER I-77 ON SR 2136  
BETWEEN SR 2138 AND NC 115  
SKEW = 103 DEGREES



5/14/99  
 P:\PROJECTS\2017\2017-03-29\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  
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PROJECT REFERENCE NO.	SHEET NO.
I-5714	4
PROFILE BORINGS PROJECTED ON EXISTING GROUND LINE AT -YEB- CENTERLINE	



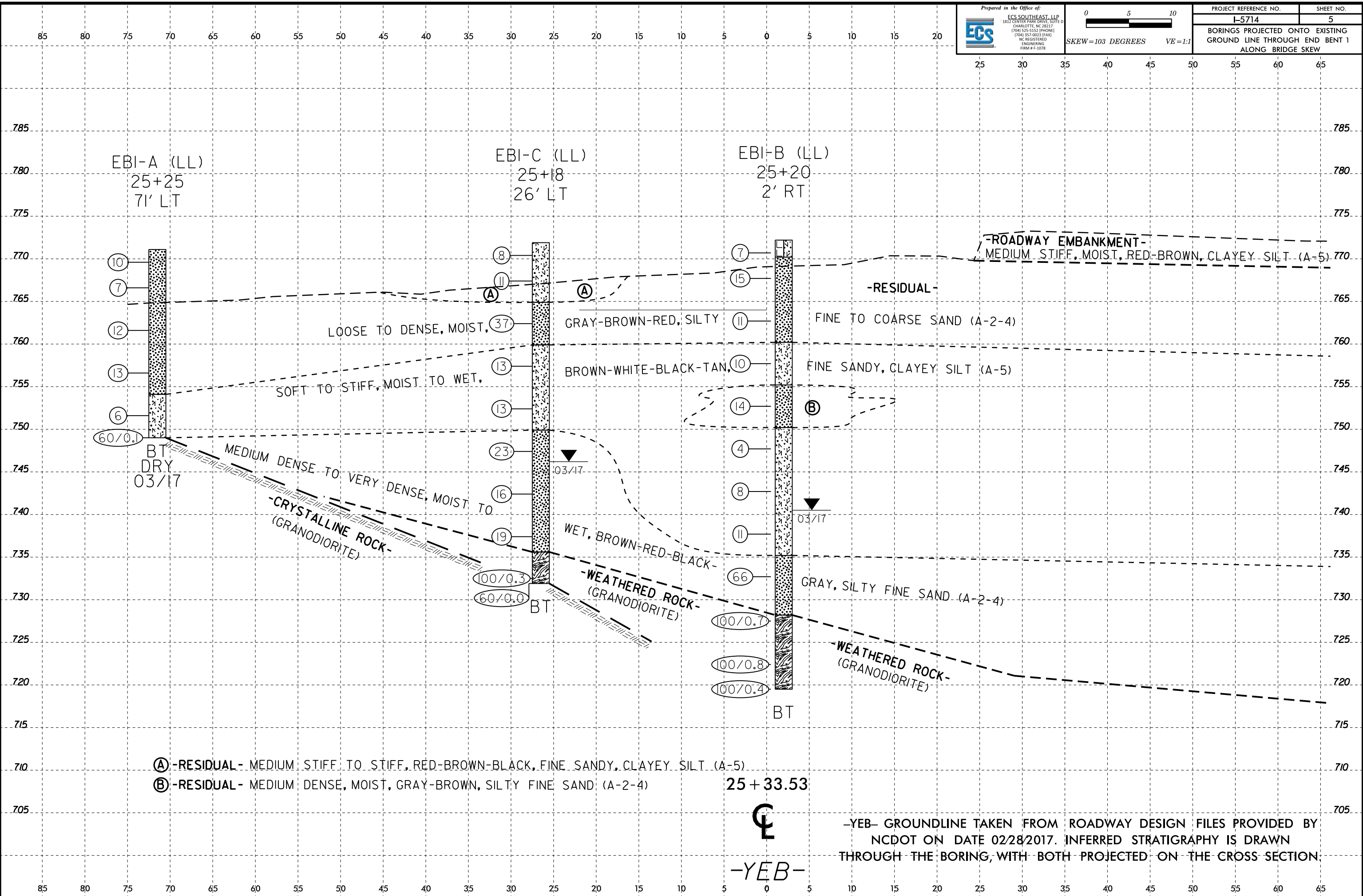
- (A) -ROADWAY EMBANKMENT- SOFT TO MEDIUM STIFF, MOIST, RED-BROWN-TAN, CLAYEY SILT (A-5)
- (B) -ROADWAY EMBANKMENT- MEDIUM STIFF, MOIST, RED-BROWN, FINE SANDY, SILTY CLAY (A-7-5), WITH TRACE ORGANICS
- (C) -RESIDUAL- VERY STIFF, MOIST TO WET, TAN-WHITE-BLACK, FINE SANDY SILT (A-4) AND CLAYEY SILT (A-5)
- (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  
I:\2017\12109\12109-A - I-5714 1-77 and SR 1236 Interchange Structure Inventory\CADD\GEO\TECH\State\Sub\I-5714\_geo\_brdg\_xsl\_YEB.dgn

 ECS 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

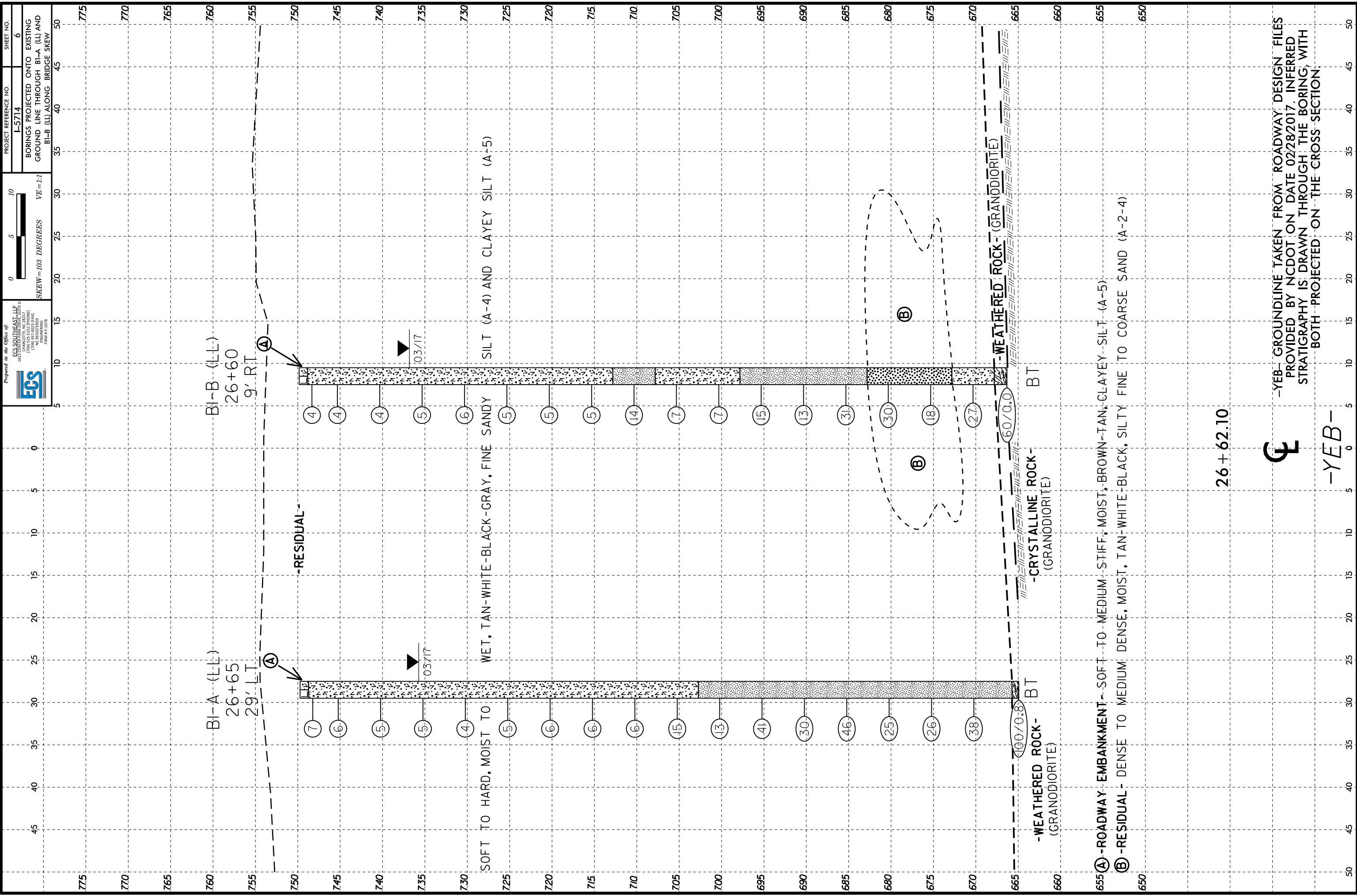


(A) -RESIDUAL - MEDIUM STIFF TO STIFF, RED-BROWN-BLACK, FINE SANDY, CLAYEY SILT (A-5)  
(B) -RESIDUAL - MEDIUM DENSE, MOIST, GRAY-BROWN, SILTY FINE SAND (A-2-4)

25 + 33.53

-YEB-

-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.



BI-A (LL)  
26+65  
29' LT

BI-B (LL)  
26+60  
9' RT

-RESIDUAL-

BT

-WEATHERED ROCK-  
(GRANODIORITE)

-CRYSTALLINE ROCK-  
(GRANODIORITE)

BT

-WEATHERED ROCK- (GRANODIORITE)

SOFT TO HARD, MOIST TO

WET, TAN-WHITE-BLACK-GRAY, FINE SANDY

SILT (A-4) AND CLAYEY SILT (A-5)

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

(B) -RESIDUAL - DENSE TO MEDIUM DENSE, MOIST, TAN-WHITE-BLACK, SILTY FINE TO COARSE SAND (A-2-4)

26 + 62.10



-YEB-

-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

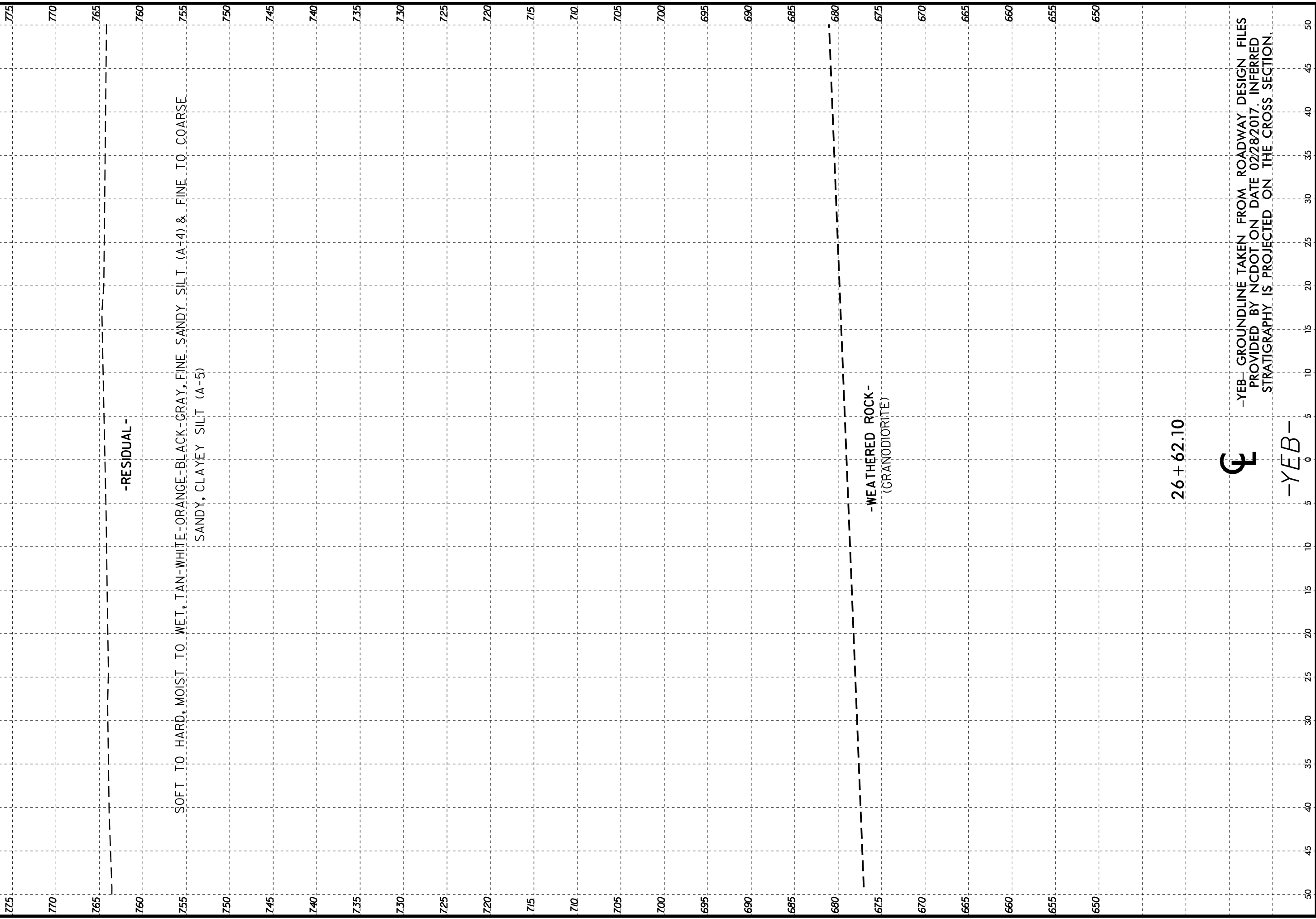


EXISTING GROUND LINE THROUGH BENT 1 ALONG BRIDGE SKEW WITH APPROXIMATE WEATHERED ROCK ELEVATION

Prepared in the Office of:



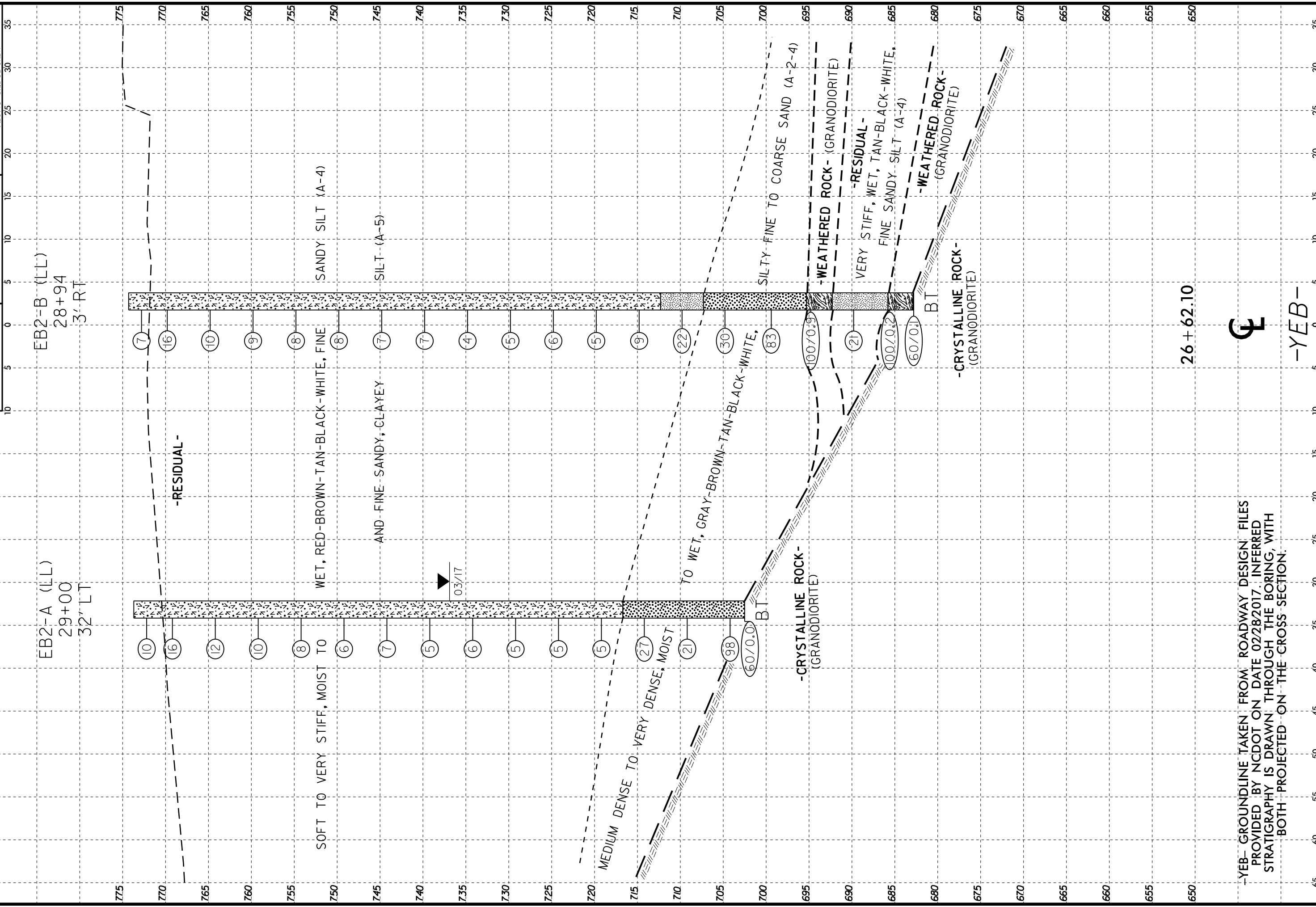
**ECS**  
 ENGINEERING CONSULTANTS  
 1817 CHARLOTTE AVENUE  
 CHARLOTTE, NC 28217  
 (704) 333-8900  
 (704) 333-5223 (FAX)  
 LIC. REGISTERED PROFESSIONAL ENGINEER  
 P.E. # 12078



Φ

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





-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.



26 + 62.10

-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 MOI	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 MOI	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-											
COLLAR ELEV. 771.9 ft		TOTAL DEPTH 40.0 ft		NORTHING 608,999		EASTING 1,446,301											
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																	
															771.9	GROUND SURFACE	0.0
770	771.4	0.5	7	3	5	8								M	RESIDUAL Medium Stiff to Stiff, Red-Brown-Black, Fine Sandy, Clayey SILT (A-5), with trace mica		
	768.4	3.5	3	5	6	11								M			
765															764.9	Dense, Gray-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica	7.0
	763.4	8.5	10	21	16	37								M			
760															759.9	Stiff, Brown-White-Black, Fine Sandy, Clayey SILT (A-5), with trace mica	12.0
	758.4	13.5	4	6	7	13								M			
755																	
	753.4	18.5	5	6	7	13								M			
750																	
	748.4	23.5	8	11	12	23								M	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								M			
740																	
	738.4	33.5	7	10	9	19								M			
735																	
	732.8	39.1															
	731.9	40.0	100/0.3												735.6	WEATHERED ROCK (GRANODIORITE)	36.3
			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	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	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
670																	Match Line
	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)	
665														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. 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 MOI	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	0.0
														749.7	1.0
	747.2	3.5	3	3	4										
745															
	742.2	8.5	2	3	4										
740															
	737.2	13.5	3	3	5										
735															
	732.2	18.5	2	1	3										
730															
	727.2	23.5	3	3	5										
725															
	722.2	28.5	2	3	4										
720															
	717.2	33.5	3	4	5										
715															
	712.2	38.5	2	2	4										
710															
	707.2	43.5	3	5	9										
705															
	702.2	48.5	7	13	17										
700															
	697.2	53.5	13	18	20										
695															
	692.2	58.5	27	47	53/0.3										
690															
	687.2	63.5	50	50/0.2											
685															
	683.7	67.0	60/0.0												

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 MOI	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	0.0
														750.1	1.0
	747.6	3.5	2	2	4										
745															
	742.6	8.5	2	3	4										
740															
	737.6	13.5	2	2	3										
735															
	732.6	18.5	6	4	4										
730															
	727.6	23.5	2	2	3										
725															
	722.6	28.5	2	2	5										
720															
	717.6	33.5	2	2	3										
715															
	712.6	38.5	2	3	4										
710															
	707.6	43.5	2	2	4										
705															
	702.6	48.5	3	7	11										
700															
	697.6	53.5	13	28	50										
695															
	692.6	58.5	40	60/0.3											
690															
	687.6	63.5	100/0.4												
685															
	684.6	66.5	60/0.1												

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			
705	705.2	68.5	16	39	59									W			
	702.5	71.2	60/0.0			60/0.0					98				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)