

REFERENCE: B-5783

PROJECT: 45738

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY DAVIDSON
PROJECT DESCRIPTION REPLACE BRIDGES 164 AND 168
ON US 29/70 OVER NORFOLK SOUTHERN RAILWAY

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-5	PROFILES
6-13	CROSS SECTIONS
14-27	BORE LOGS, CORE LOGS, AND ROCK CORE PHOTOS
28	LAB RESULTS
29	SITE PHOTOGRAPHS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5783	1	29

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

CG2 EXPLORATION

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SUBMITTED BY CG2, PLLC

DATE NOVEMBER 2022

Prepared in the Office of:
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DocuSigned by:

D. Matthew Brewer 11/09/2022

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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																																																																									
<p>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</p>										<p>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.</p>										<p>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:</p>										<p>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 (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.</p>																																																																									
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.																																																																									
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</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	- 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	<p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p>										<p>VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET</p>										<p>VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET</p>																																																										
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PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION										BENCH MARK: B5783-2; N-788319.2227, E-1689384.5867																																																																									
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td></td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td></td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td></td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td></td> <td>HIGH</td> </tr> </table>										NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH	SLIGHTLY PLASTIC	0-5		VERY LOW	MODERATELY PLASTIC	6-15		SLIGHT	HIGHLY PLASTIC	16-25		MEDIUM		26 OR MORE		HIGH	<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input checked="" type="checkbox"/> DIEDRICH D-50</p>										<p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input checked="" type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH <input checked="" type="checkbox"/> TRICONE 2-3/4" TUNG-CARB. <input checked="" type="checkbox"/> CORE BIT <input checked="" type="checkbox"/> 2-7/8 PDC BIT</p>										<p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input checked="" type="checkbox"/> -N Q HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>										<p>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.</p>																																											
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COLOR										ELEVATION: 903.25 FEET										NOTES:										ELEVATION: 903.25 FEET																																																																									
<p>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.</p>																				<p>F.I.A.D. = FILLED IMMEDIATELY AFTER DRILLING ROADWAY DESIGN AND SURVEY INFORMATION PROVIDED BY NCDOT CT = CORING TERMINATED</p>																																																																																			

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**

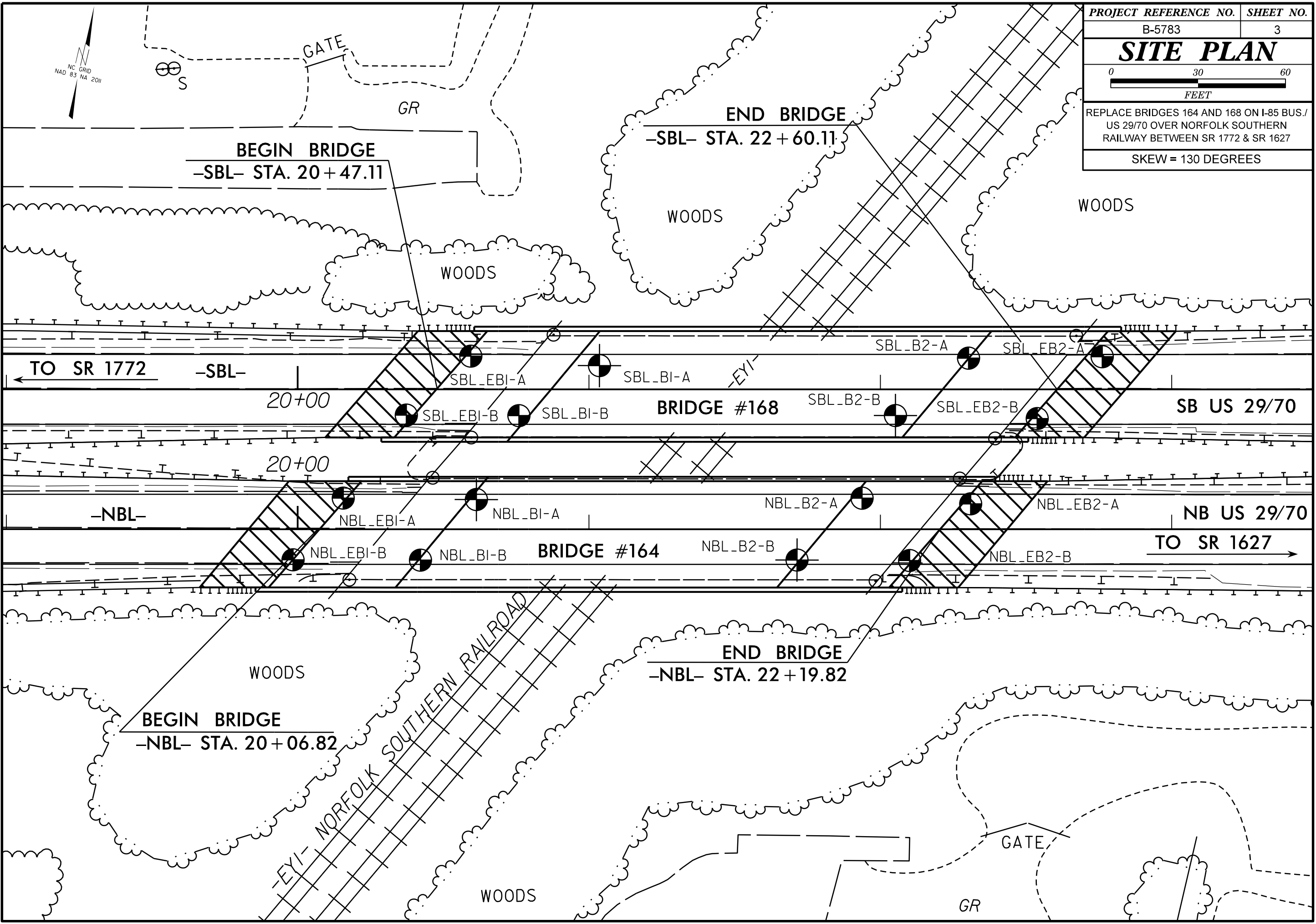
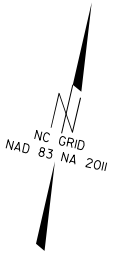
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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)					
<p>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.</p>		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	<p>From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.</p>		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	
		Very rough, fresh unweathered surfaces	Rough, slightly weathered, iron stained surfaces	Smooth, moderately weathered and altered surfaces	Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	Slickensided, highly weathered surfaces with soft clay coatings or fillings			Very Rough, fresh unweathered surfaces	Rough, slightly weathered surfaces	Smooth, moderately weathered and altered surfaces	Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	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		A. 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. 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		70					C. 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		60					D. Siltstone or silty shale with sandstone layers	40					
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces		50					E. Weak siltstone or clayey shale with sandstone layers	30					
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes		40					F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure	20					
			30					G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers	10					
			20					H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.						
			10											
			N/A											
			N/A											

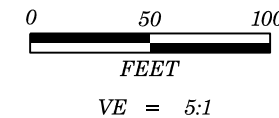
→ Means deformation after tectonic disturbance

PROJECT REFERENCE NO.	SHEET NO.
B-5783	3
SITE PLAN	
 0 30 60 FEET	
REPLACE BRIDGES 164 AND 168 ON I-85 BUS./	
US 29/70 OVER NORFOLK SOUTHERN	
RAILWAY BETWEEN SR 1772 & SR 1627	
SKEW = 130 DEGREES	



-SBL-

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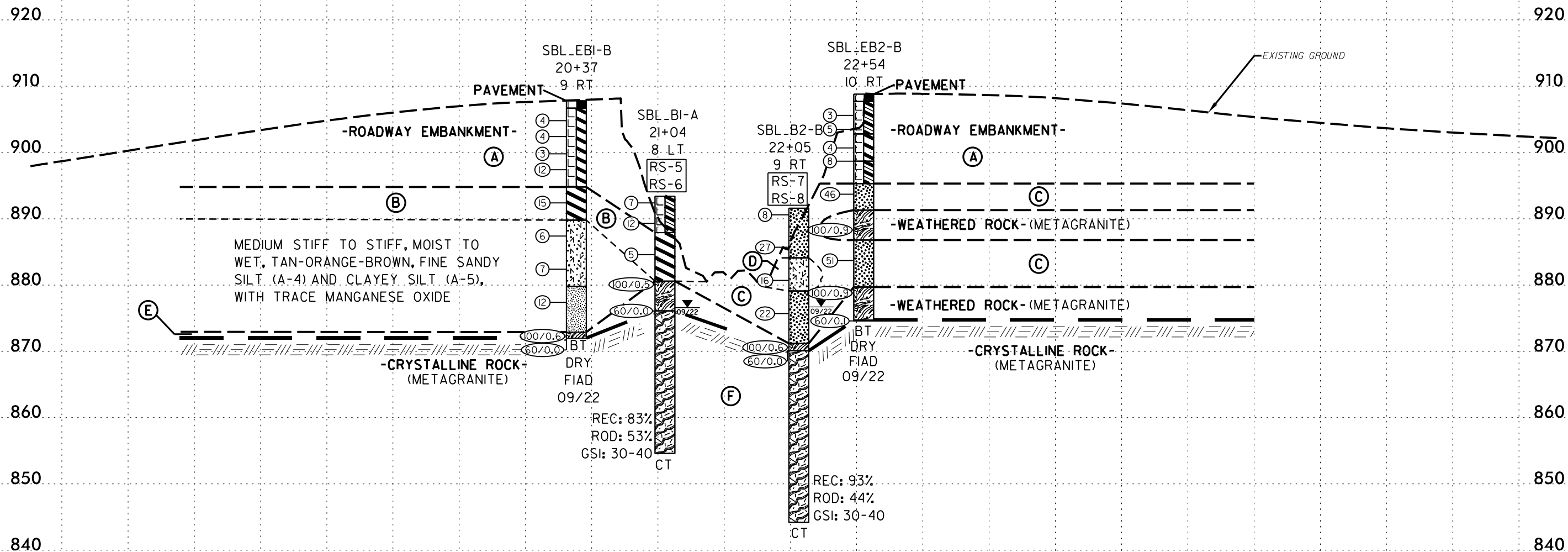


PROJECT REFERENCE NO. SHEET NO.

B-5783

5

PROFILE ALONG CENTERLINE OF -SBL-



(A) -ROADWAY EMBANKMENT-SOFT TO STIFF, MOIST, TAN-GRAY-BLUE-ORANGE-RED-BROWN, FINE TO COARSE SANDY CLAY (A-6) AND SILTY CLAY (A-7), WITH TRACE ORGANICS AND ASPHALT FRAGMENTS

(B) -RESIDUAL- MEDIUM STIFF TO STIFF, HIGHLY PLASTIC, MOIST, ORANGE-TAN-WHITE, SILTY CLAY (A-7)

(C) -RESIDUAL- LOOSE TO VERY DENSE, DRY TO MOIST, ORANGE-TAN-BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS

(D) -RESIDUAL- STIFF, MOIST, BROWN-ORANGE, CLAYEY SILT (A-5)

(E) -WEATHERED ROCK- (METAGRANITE)

(F) -CRYSTALLINE ROCK-MODERATELY WEATHERED TO FRESH, MODERATELY HARD TO HARD, BROWN-WHITE-GRAY, (METAGRANITE), WITH VERY CLOSE TO WIDE FRACTURE SPACING


EXISTING GROUND LINE ALONG -SBL- TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE PROFILE

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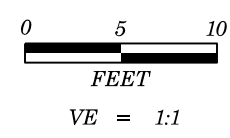
16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00

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 Sierra Patterson
 AT DESK TOP-H35N1C1

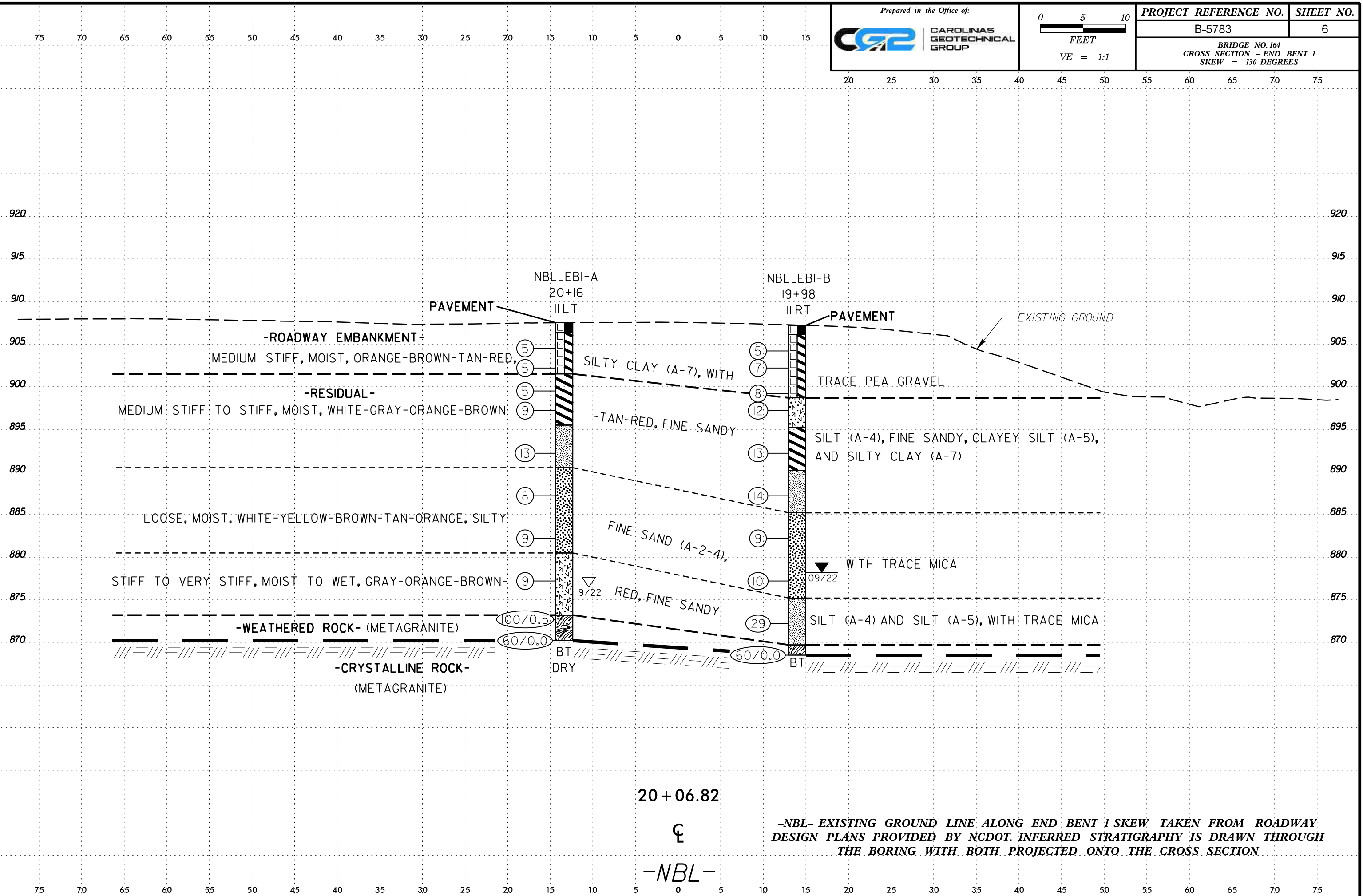
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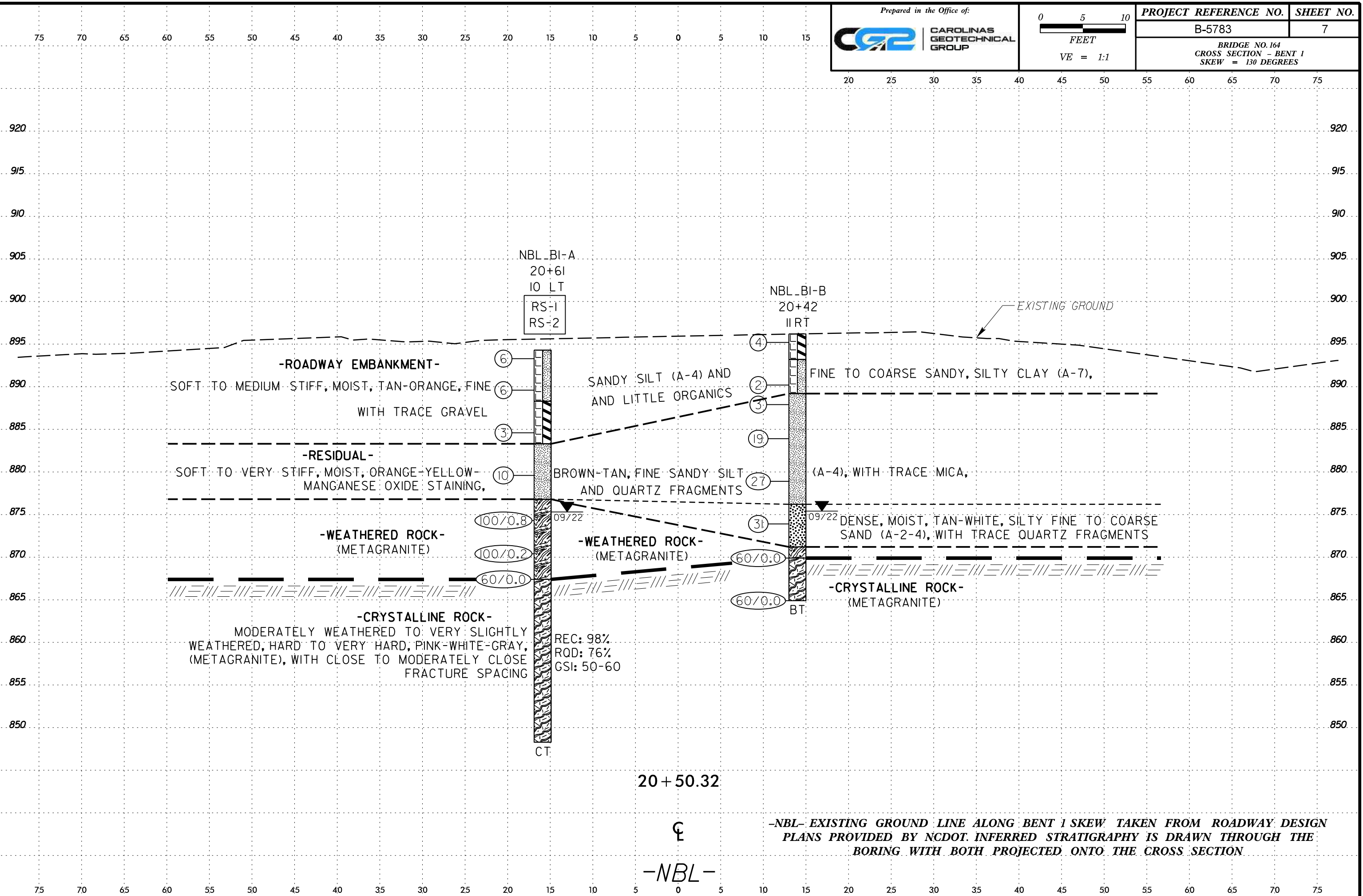
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GEOTECHNICAL
GROUP



PROJECT REFERENCE NO.	SHEET NO.
B-5783	6
BRIDGE NO. 164 CROSS SECTION - END BENT 1 SKEW = 130 DEGREES	



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 6/23/16
 Sierra Patterson
 AT DESK TOP-H35N1C1

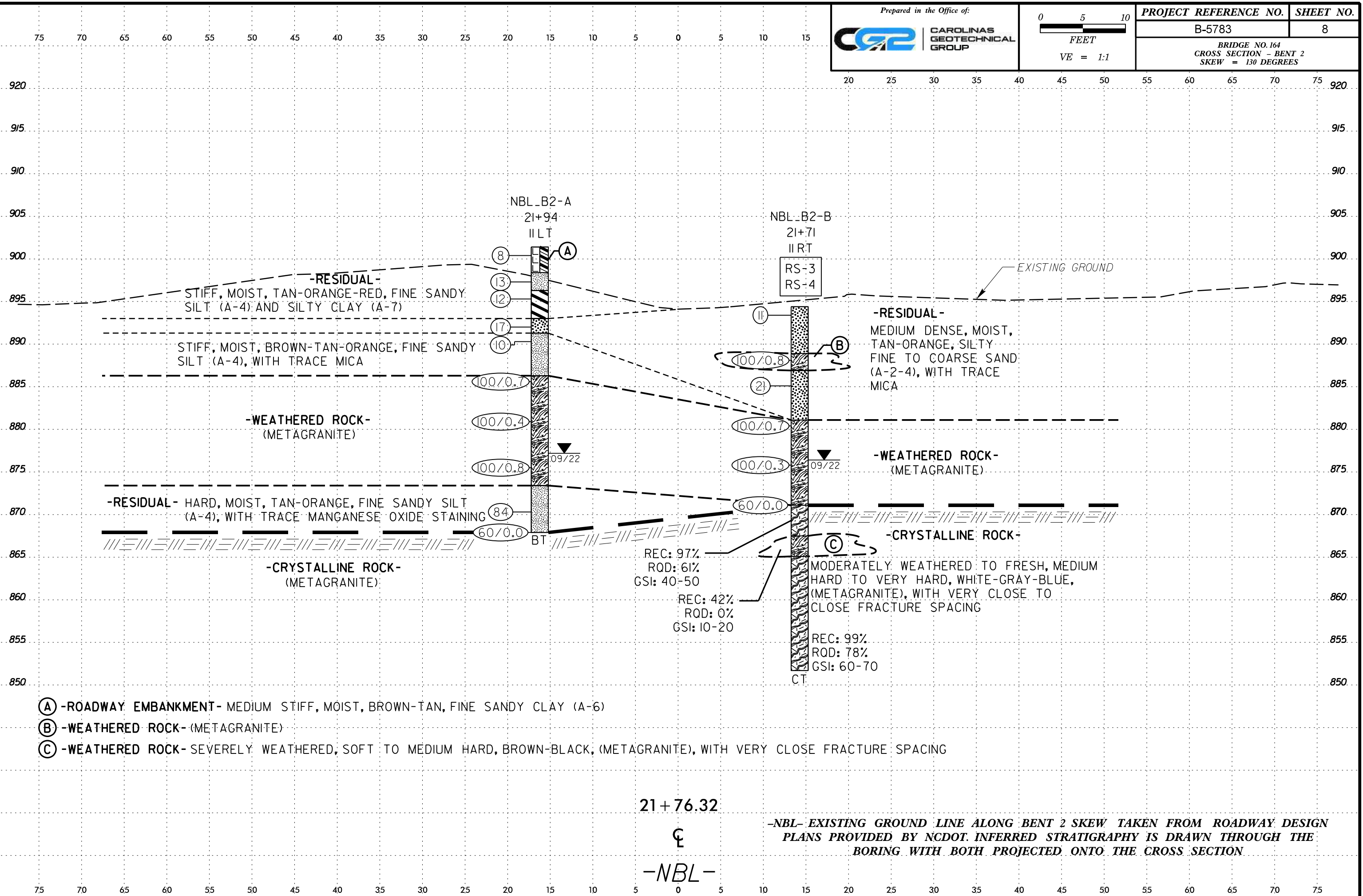


-NBL- EXISTING GROUND LINE ALONG BENT 1 SKEW TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

20 + 50.32

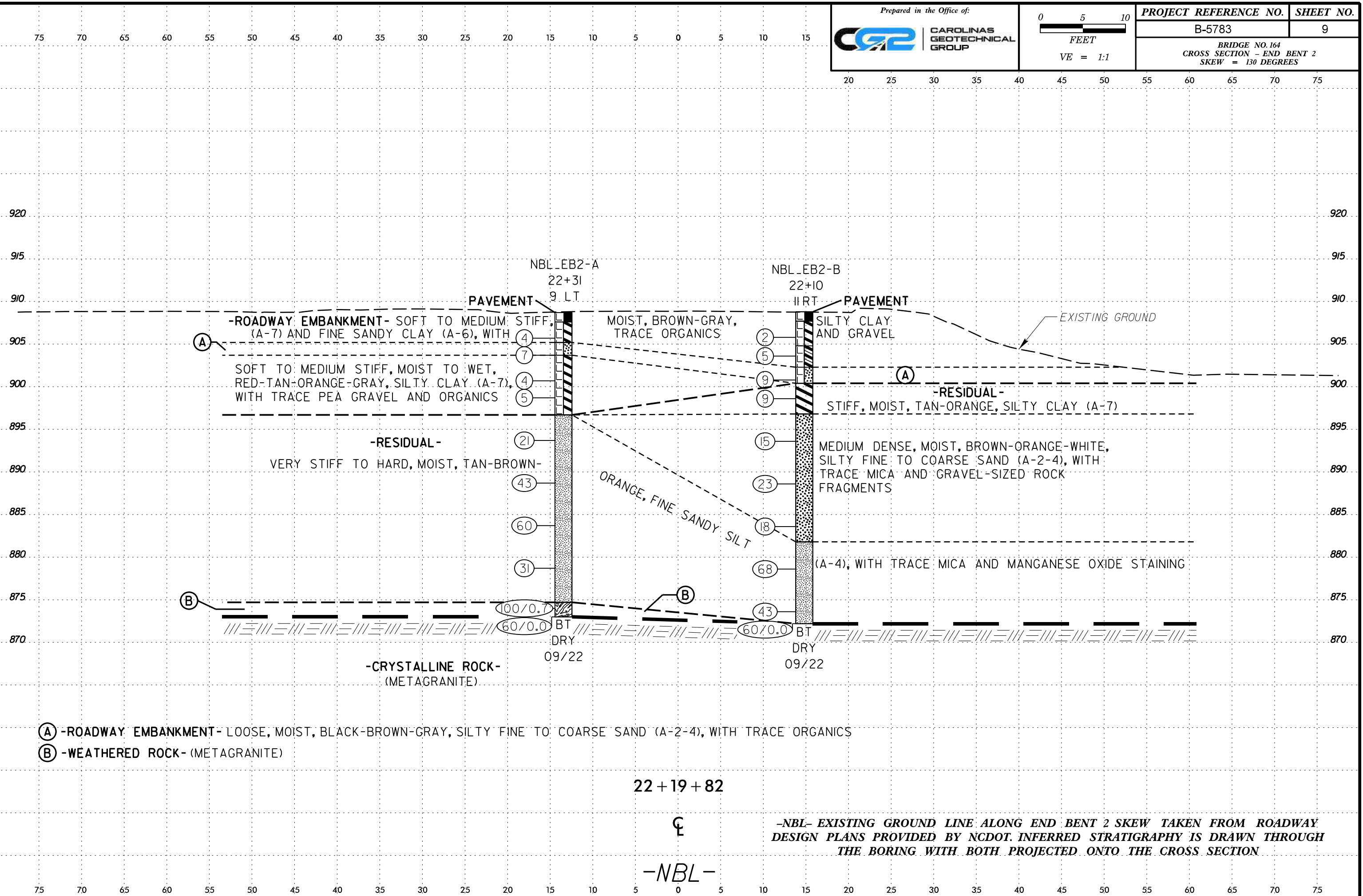
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-NBL-

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 Sierra Patterson
 AT DESK TOP-H35N1C1



- (A) -ROADWAY EMBANKMENT- MEDIUM STIFF, MOIST, BROWN-TAN, FINE SANDY CLAY (A-6)
- (B) -WEATHERED ROCK- (METAGRANITE)
- (C) -WEATHERED ROCK- SEVERELY WEATHERED, SOFT TO MEDIUM HARD, BROWN-BLACK, (METAGRANITE), WITH VERY CLOSE FRACTURE SPACING

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 6/23/16
 Sierra Patterson
 AT DESK TOP-H35N1C1



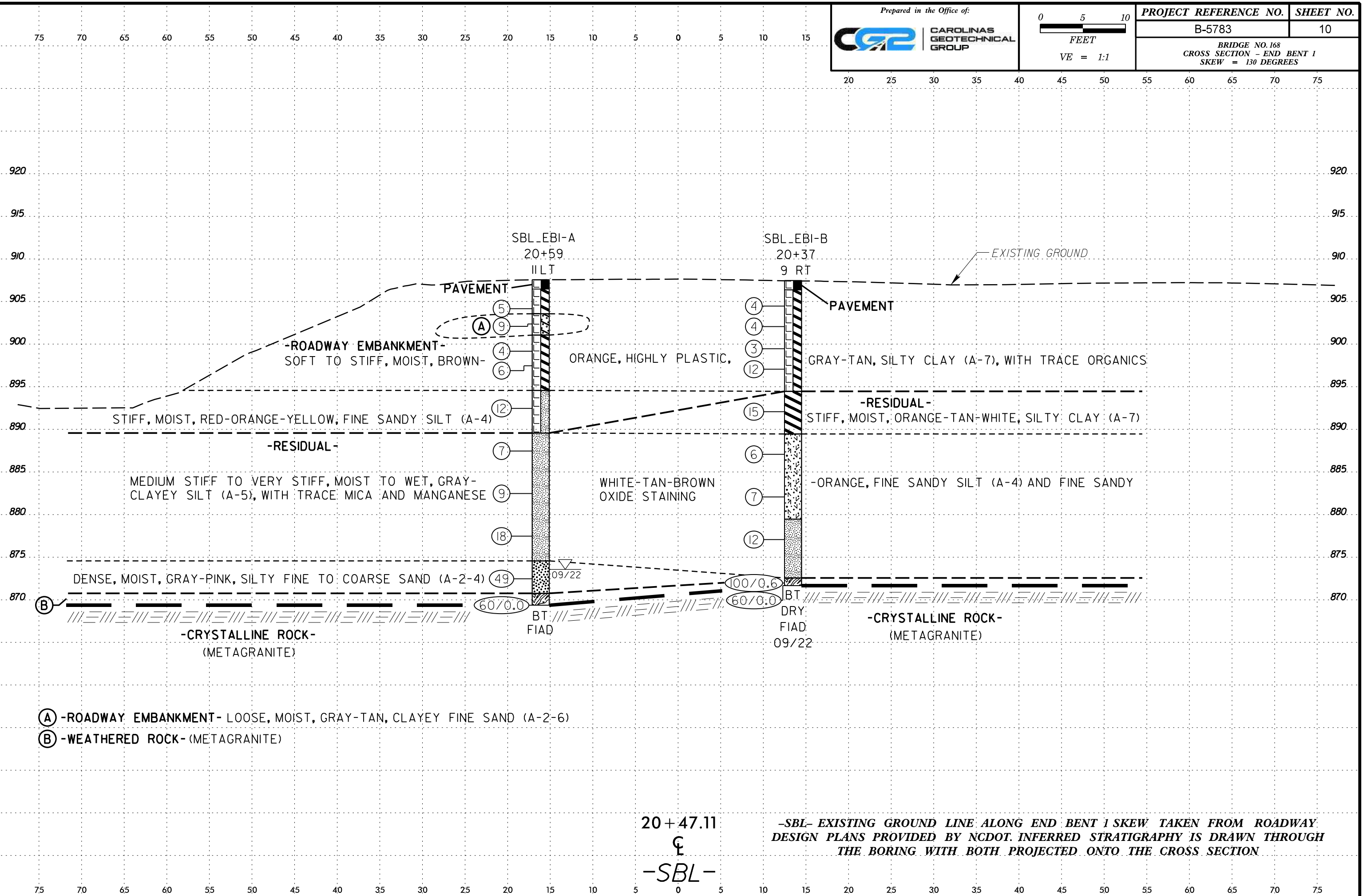
(A) -ROADWAY EMBANKMENT- LOOSE, MOIST, BLACK-BROWN-GRAY, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE ORGANICS
 (B) -WEATHERED ROCK- (METAGRANITE)

22 + 19 + 82

⊕
 -NBL-

-NBL- EXISTING GROUND LINE ALONG END BENT 2 SKEW TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

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 Sierra Patterson
 AT DESK TOP-H35N1C1




- (A) -ROADWAY EMBANKMENT- LOOSE, MOIST, GRAY-TAN, CLAYEY FINE SAND (A-2-6)
- (B) -WEATHERED ROCK- (METAGRANITE)

20+47.11
 CL
 -SBL-

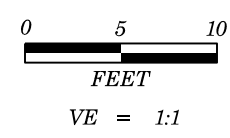
-SBL- EXISTING GROUND LINE ALONG END BENT 1 SKEW TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

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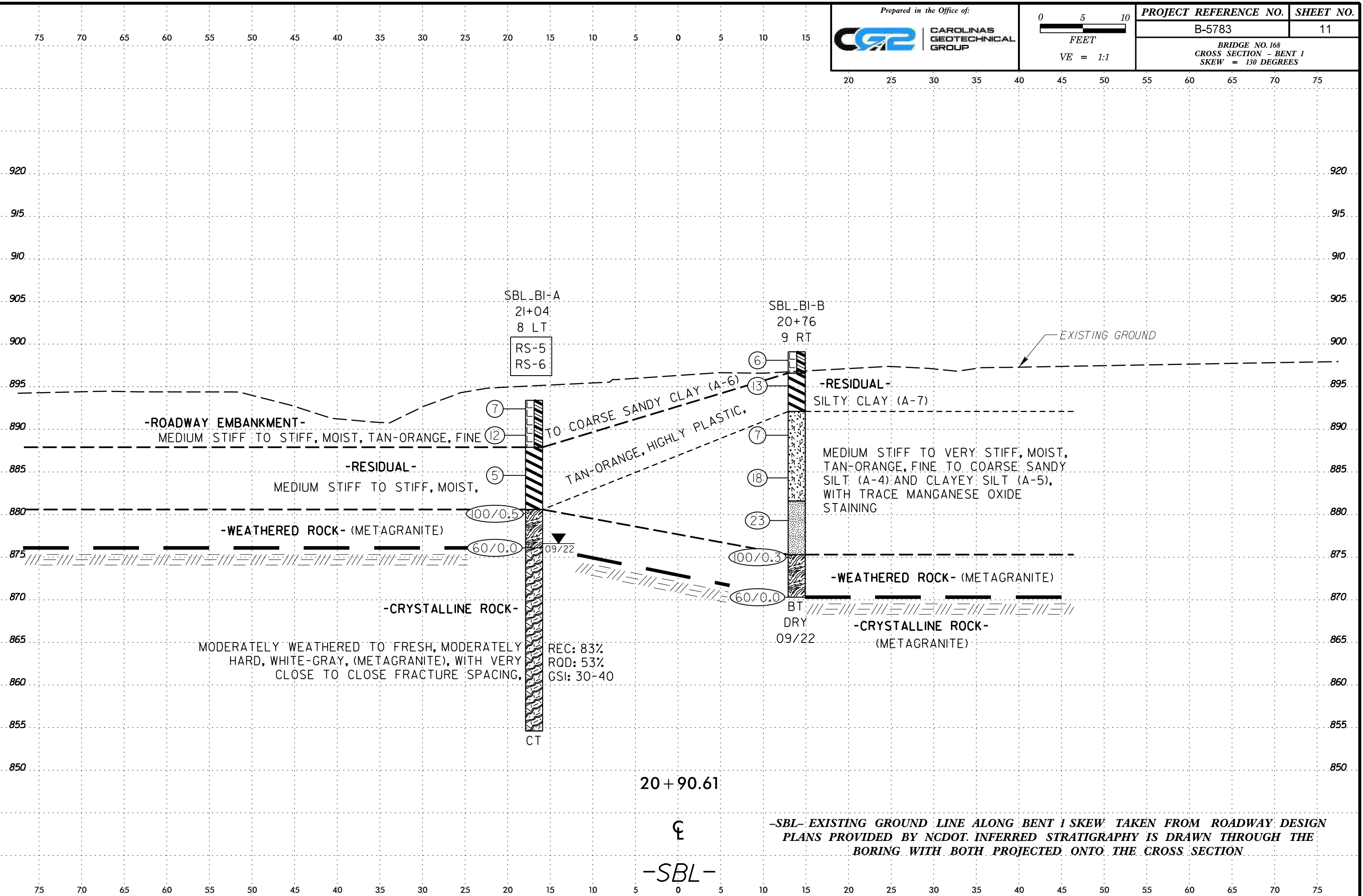
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GROUP



PROJECT REFERENCE NO.	SHEET NO.
B-5783	11
BRIDGE NO. 168 CROSS SECTION - BENT 1 SKEW = 130 DEGREES	



-ROADWAY EMBANKMENT-
 MEDIUM STIFF TO STIFF, MOIST, TAN-ORANGE, FINE

-RESIDUAL-
 MEDIUM STIFF TO STIFF, MOIST,

-WEATHERED ROCK- (METAGRANITE)

-CRYSTALLINE ROCK-

MODERATELY WEATHERED TO FRESH, MODERATELY HARD, WHITE-GRAY, (METAGRANITE), WITH VERY CLOSE TO CLOSE FRACTURE SPACING,

REC: 83%
 RQD: 53%
 GSI: 30-40

TO COARSE SANDY CLAY (A-6)
 TAN-ORANGE, HIGHLY PLASTIC,

-RESIDUAL-
 SILTY CLAY (A-7)

MEDIUM STIFF TO VERY STIFF, MOIST, TAN-ORANGE, FINE TO COARSE SANDY SILT (A-4) AND CLAYEY SILT (A-5), WITH TRACE MANGANESE OXIDE STAINING

-WEATHERED ROCK- (METAGRANITE)

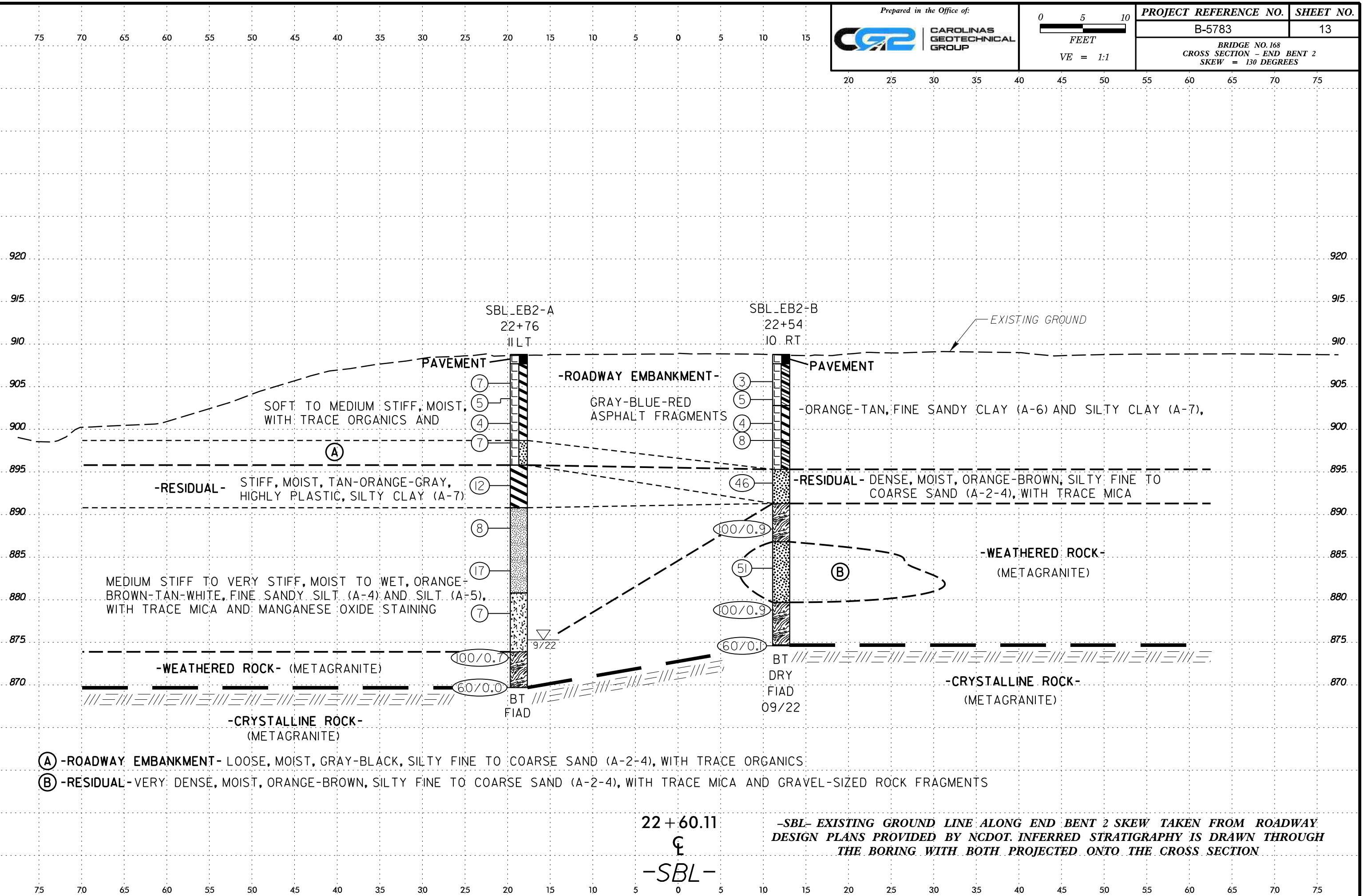
-CRYSTALLINE ROCK-
 (METAGRANITE)

20+90.61

☺
-SBL-

-SBL- EXISTING GROUND LINE ALONG BENT 1 SKEW TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

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- (A) -ROADWAY EMBANKMENT- LOOSE, MOIST, GRAY-BLACK, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE ORGANICS
- (B) -RESIDUAL- VERY DENSE, MOIST, ORANGE-BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE MICA AND GRAVEL-SIZED ROCK FRAGMENTS

22 + 60.11
 ⊕
 -SBL-

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer									
SITE DESCRIPTION							GROUND WTR (ft)								
BORING NO. NBL_EB1-A		STATION 20+16		OFFSET 11 ft LT		ALIGNMENT -NBL-									
COLLAR ELEV. 907.5 ft		TOTAL DEPTH 37.3 ft		NORTHING 788,338		EASTING 1,689,559									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 08/31/22		COMP. DATE 08/31/22		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					
910														907.5 GROUND SURFACE 0.0	
														906.4 ROADWAY EMBANKMENT 1.1	
	905.5	2.0	3	2	3									Medium Stiff, Tan-Brown-Red, Silty CLAY (A-7), with trace pea gravel	
905	903.2	4.3	1	2	3										
	900.5	7.0	2	2	3									RESIDUAL 6.0	
	898.2	9.3	2	3	6									Medium Stiff to Stiff, Gray-Orange-Tan, Silty CLAY (A-7)	
900															
	893.2	14.3	5	6	7									Stiff, White-Tan-Orange, Fine Sandy SILT (A-4) 12.0	
895															
	888.2	19.3	2	3	5									Loose, White-Yellow-Orange, Silty Fine SAND (A-2-4), with trace mica 17.0	
890															
	883.2	24.3	4	4	5									Stiff, Orange-Brown, SILT (A-5), with trace mica 27.0	
885															
	878.2	29.3	4	4	5									WEATHERED ROCK 34.3	
880														White-Tan-Orange, (METAGRANITE)	
	873.2	34.3	100/0.5												
875															
	870.2	37.3	60/0.0												

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer									
SITE DESCRIPTION							GROUND WTR (ft)								
BORING NO. NBL_EB1-B		STATION 19+98		OFFSET 11 ft RT		ALIGNMENT -NBL-									
COLLAR ELEV. 907.2 ft		TOTAL DEPTH 38.7 ft		NORTHING 788,314		EASTING 1,689,546									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 09/01/22		COMP. DATE 09/01/22		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					
910														907.2 GROUND SURFACE 0.0	
														906.1 ROADWAY EMBANKMENT 1.1	
	905.2	2.0	3	3	2									Medium Stiff, Brown-Tan-Orange, Silty CLAY (A-7)	
905	903.2	4.0	2	3	4										
	900.2	7.0	3	3	5									RESIDUAL 8.5	
	898.2	9.0	4	5	7									Stiff, Red-Tan-Orange, Fine Sandy, Clayey SILT (A-5) 12.0	
900															
	893.2	14.0	4	6	7									Stiff, Orange-White, Silty CLAY (A-7) 17.0	
895															
	888.2	19.0	6	6	8									Stiff, Tan-Brown, Fine Sandy SILT (A-4) 22.0	
890															
	883.2	24.0	3	4	5									Loose, Brown-Tan-Orange, Silty Fine SAND (A-2-4) 27.0	
885															
	878.2	29.0	3	4	6									Very Stiff, Gray-Red, Fine Sandy SILT (A-4), with trace mica 32.0	
880															
	873.2	34.0	7	11	18										
875															
	868.5	38.7	60/0.0												
870															

NCDOT BORE DOUBLE B-5783_GEO_BRD.G164_168.GPJ_NC_DOT.GDT 10/28/22

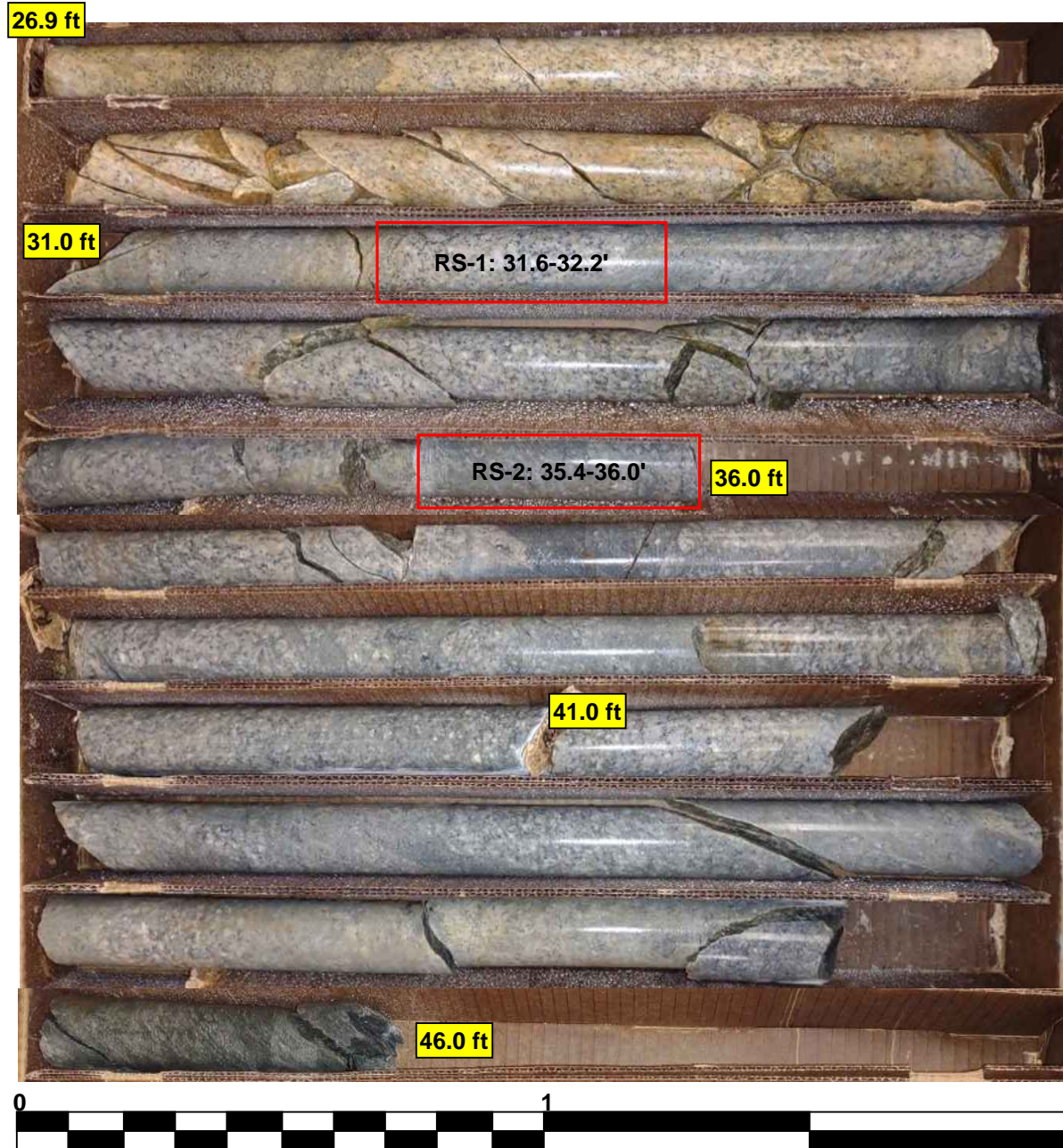
Notes:

Hard drilling encountered at approximately 37.5 feet



Rock Core Photographs
Boring: NBL_B1-A
26.9 to 46.0 Feet

Rock Core Photographs
Boring: NBL_B1-A
26.9 to 46.0 Feet



FEET

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer								
SITE DESCRIPTION							GROUND WTR (ft)							
BORING NO. NBL_B1-B		STATION 20+42		OFFSET 11 ft RT		ALIGNMENT -NBL-								
COLLAR ELEV. 896.2 ft		TOTAL DEPTH 31.3 ft		NORTHING 788,322		EASTING 1,689,589								
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 09/01/22		COMP. DATE 09/01/22		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 ELEV. (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
900														
895	896.2	0.0	WOH	2	2								M	896.2 GROUND SURFACE 0.0
													M	893.2 ROADWAY EMBANKMENT Soft, Tan-Orange, Silty CLAY (A-7) 3.0
890	891.2	5.0		2	1	1							M	889.2 Soft, Tan-Orange, Fine Sandy SILT (A-4) 7.0
	888.9	7.3		2	2	1							M	RESIDUAL Soft to Very Stiff, Tan-Orange-Yellow, Fine Sandy SILT (A-4), with trace mica, manganese oxide staining, and quartz fragments 7.0
885	884.9	11.3		7	8	11							M	
880	879.9	16.3		8	11	16							M	
875	874.9	21.3		6	11	20							M	876.2 Dense, Tan-White, Silty Fine to Coarse SAND (A-2-4), with trace quartz fragments 20.0
870	869.9	26.3											M	871.2 WEATHERED ROCK (METAGRANITE) 25.0
		60/0.0												869.9 CRYSTALLINE ROCK (METAGRANITE) 26.3
865	864.9	31.3												864.9 Boring Terminated with Standard Penetration Test Refusal at Elevation 864.9 ft In Crystalline Rock (METAGRANITE) 31.3
		60/0.0												
		60/0.0												

Notes:
Hard drilling encountered at approximately 25.0 feet

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST R. Kral								
SITE DESCRIPTION							GROUND WTR (ft)							
BORING NO. NBL_B2-A		STATION 21+94		OFFSET 11 ft LT		ALIGNMENT -NBL-								
COLLAR ELEV. 901.4 ft		TOTAL DEPTH 33.5 ft		NORTHING 788,371		EASTING 1,689,734								
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 09/07/22		COMP. DATE 09/07/22		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 ELEV. (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
905														
900	901.4	0.0		2	3	5							M	901.4 GROUND SURFACE 0.0
													M	898.4 ROADWAY EMBANKMENT Medium Stiff, Brown-Tan, Fine Sandy CLAY (A-6) 3.0
895	898.3	3.1		7	7	6							M	896.3 RESIDUAL Stiff, Tan-Orange, Fine Sandy SILT (A-4) 5.1
	896.3	5.1		3	5	7							M	893.0 Stiff, Tan-Orange-Red, Silty CLAY (A-7) 8.4
890	893.0	8.4		5	5	12							M	891.3 Medium Dense, Tan-Orange, Silty Fine to Coarse SAND (A-2-4) 10.1
	891.3	10.1		6	4	6							M	886.3 Stiff, Brown-Tan-Orange, Fine Sandy SILT (A-4), with trace mica 15.1
885	886.3	15.1		52	48/0.2									100/0.7 WEATHERED ROCK White-Tan-Brown, (METAGRANITE) 15.1
880	881.3	20.1												100/0.4
875	876.3	25.1		60	40/0.3									100/0.8
870	871.3	30.1		26	30	54							M	873.4 RESIDUAL Hard, Tan-Orange, Fine Sandy SILT (A-4), with trace manganese oxide staining 28.0
		60/0.0												867.9 Boring Terminated with Standard Penetration Test Refusal at Elevation 867.9 ft On Crystalline Rock (METAGRANITE) 33.5
		60/0.0												

NCDOT BORE DOUBLE B-5783_GEO_BRDGI64_168.GPJ_NC_DOT.GDT 10/28/22

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer										
SITE DESCRIPTION							GROUND WTR (ft)									
BORING NO. NBL_B2-B		STATION 21+71		OFFSET 11 ft RT		ALIGNMENT -NBL-										
COLLAR ELEV. 894.4 ft		TOTAL DEPTH 42.7 ft		NORTHING 788,346		EASTING 1,689,716										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic											
DRILLER C. Odom		START DATE 09/01/22		COMP. DATE 09/02/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
895	894.4	0.0	2	5	6							M		894.4	0.0	GROUND SURFACE
																RESIDUAL
																Medium Dense, White-Tan, Silty Fine SAND (A-2-4), with trace mica
890	888.9	5.5	45	55/0.3										888.9	5.5	WEATHERED ROCK
																White-Orange-Tan, (METAGRANITE)
885	886.1	8.3	12	14	7							M		886.9	7.5	RESIDUAL
																Medium Dense, White-Tan, Silty Fine SAND (A-2-4), with trace mica
880	881.1	13.3	69	31/0.2										881.1	13.3	WEATHERED ROCK
																Tan-Orange-Gray, (METAGRANITE)
875	876.1	18.3	100/0.3													
870	871.1	23.3	60/0.0											871.1	23.3	CRYSTALLINE ROCK (METAGRANITE)
																REC=97% RQD=61% GSI=40-50
865														867.5	26.9	WEATHERED ROCK
																Brown-Black, (METAGRANITE)
860														865.1	29.3	CRYSTALLINE ROCK (METAGRANITE)
																REC=42% RQD=0% GSI=10-20
855																CRYSTALLINE ROCK (METAGRANITE)
																REC=99% RQD=78% GSI=60-70
														851.7	42.7	Boring Terminated at Elevation 851.7 ft In Crystalline Rock (METAGRANITE)

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer					
SITE DESCRIPTION							GROUND WTR (ft)				
BORING NO. NBL_B2-B		STATION 21+71		OFFSET 11 ft RT		ALIGNMENT -NBL-					
COLLAR ELEV. 894.4 ft		TOTAL DEPTH 42.7 ft		NORTHING 788,346		EASTING 1,689,716					
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic						
DRILLER C. Odom		START DATE 09/01/22		COMP. DATE 09/02/22		SURFACE WATER DEPTH N/A					
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 19.4 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (ft)	RQD (ft)		REC. (ft)	RQD (ft)		
871.13											Begin Coring @ 23.3 ft
870	871.1	23.3	1.9	N=60/0.0 03:43/0.9 04:20/1.0	(1.8) 95%	(1.4) 74%	RS-3	(3.5) 97%	(2.2) 61%		CRYSTALLINE ROCK
			5.0	03:00/1.0 03:12/1.0 04:48/1.0 03:43/1.0 06:09/1.0	(3.5) 70%	(1.3) 26%		(1.0) 42%	(0.0) 0%		Moderately to Slightly Weathered, Moderately Hard, White-Gray, (METAGRANITE), with close to very close fracture spacing
865	864.2	30.2	5.0	05:18/1.0 04:18/1.0 03:36/1.0 03:22/1.0 04:12/1.0	(5.0) 100%	(4.3) 86%	RS-4	(13.3) 99%	(10.4) 78%		RS-3: 23.5-24.1' Unit Weight: 162.4 pcf Unconfined Compressive Strength: 2,290 psi (330 ksf)
860	859.2	35.2	5.0	04:19/1.0 08:20/1.0 15:54/1.0 06:36/1.0 07:03/1.0	(5.0) 100%	(4.2) 84%					GSI=40-50
			2.5	08:47/1.0 11:04/1.0 15:29/0.5	(2.5) 100%	(1.4) 56%					WEATHERED ROCK
											Severely Weathered, Medium Hard to Soft, Brown-Black, (METAGRANITE), with very close fracture spacing
855	854.2	40.2									CRYSTALLINE ROCK
			2.5								Moderately Weathered to Fresh, Medium Hard to Very Hard, White-Gray-Blue, (METAGRANITE), with very close to close fracture spacing
	851.7	42.7									RS-4: 29.4-29.8' Unit Weight: 165.9 pcf Unconfined Compressive Strength: 13,650 psi (1,966 ksf)
											GSI=60-70
											Boring Terminated at Elevation 851.7 ft In Crystalline Rock (METAGRANITE)

NCDOT BORE DOUBLE B-5783_GEO_BRD164_168.GPJ NC_DOT.GDT 10/28/22

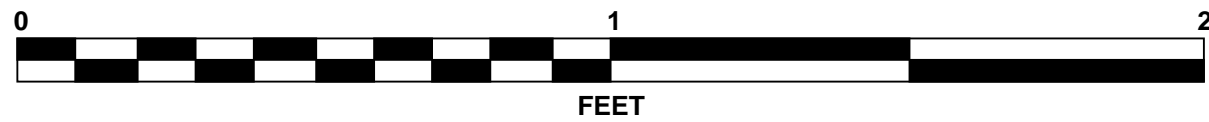
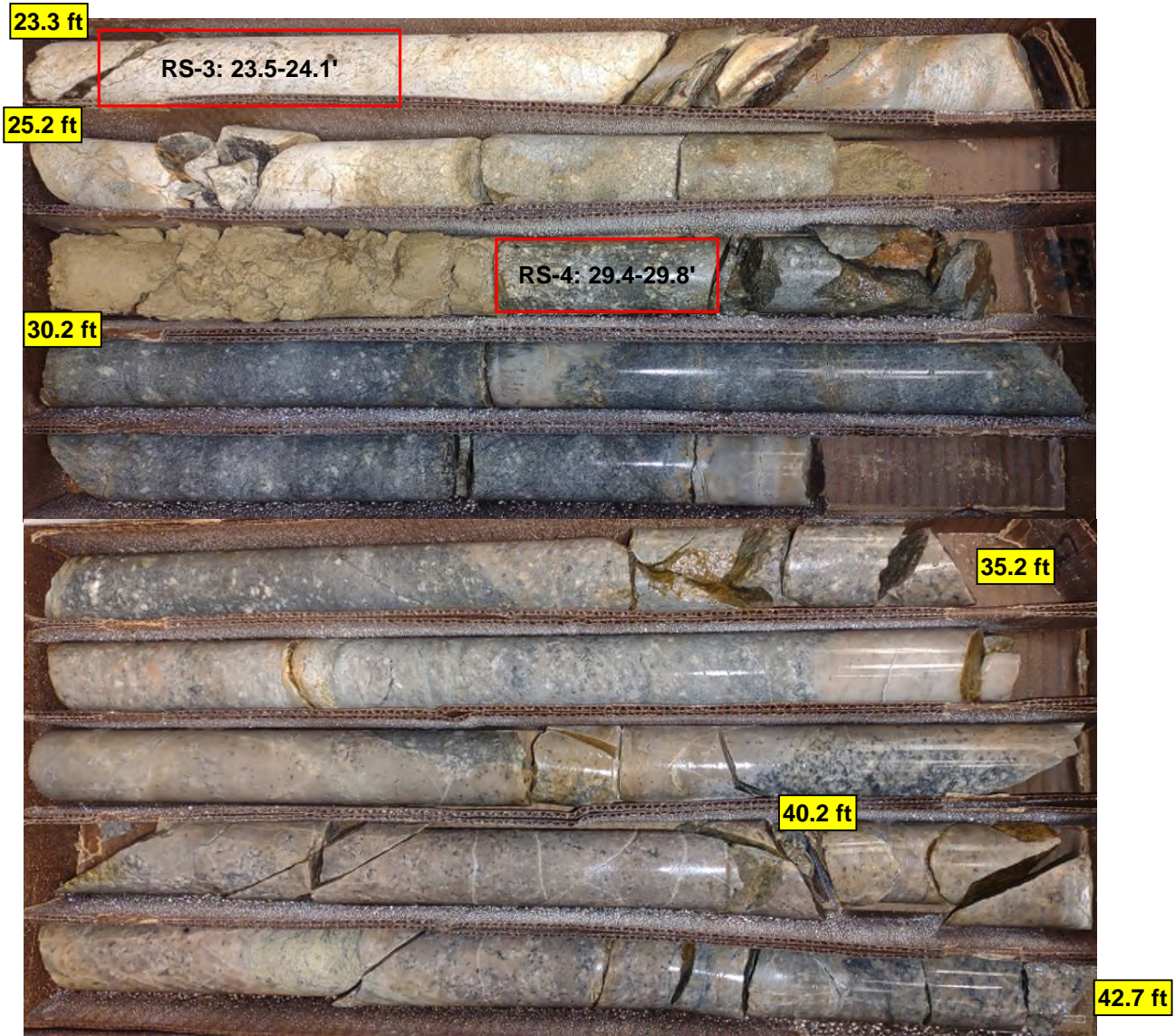


FYd`UW`6 f]X[Yg`% (`UbX`% , `cb`l G`& #`\$`cj Yf`BcfZ`_ `Gci H Yfb`FU]k Um Davidson County, NC`

Rock Core Photographs`

Boring: NBL_B2-B`

23.3 to 42.7 Feet`



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer										
SITE DESCRIPTION							GROUND WTR (ft)									
BORING NO. SBL_EB1-A		STATION 20+59		OFFSET 11 ft LT		ALIGNMENT -SBL-										
COLLAR ELEV. 907.9 ft		TOTAL DEPTH 38.2 ft		NORTHING 788,394		EASTING 1,689,593										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER C. Odom		START DATE 09/12/22		COMP. DATE 09/12/22		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						
910														907.9	GROUND SURFACE	0.0
														906.8	ROADWAY EMBANKMENT Asphalt (0.4 ft) and Concrete (0.7 ft)	1.1
905	905.5	2.4	3	2	3									903.9	Medium Stiff, Brown-Orange, Silty CLAY (A-7)	4.0
	903.7	4.2	3	4	5									901.4	Loose, Gray-Tan, Clayey Fine SAND (A-2-6)	6.5
900	900.5	7.4	2	2	2										Soft to Medium Stiff, Highly Plastic, Gray-Tan, Silty CLAY (A-7)	
	898.8	9.1	2	3	3											
895														894.9	Stiff, Red-Orange-Yellow, Fine Sandy SILT (A-4)	13.0
	893.8	14.1	5	5	7											
890														889.9	RESIDUAL Medium Stiff to Very Stiff, Gray-White-Tan-Orange, Fine Sandy SILT (A-4), with trace mica	18.0
	888.8	19.1	2	3	4											
885																
	883.8	24.1	4	4	5											
880																
	878.8	29.1	6	5	13											
875																
	873.8	34.1	7	14	35											
870																
	869.7	38.2	60/0.0			60/0.0										
														874.9	Dense, Gray-Pink, Silty Fine to Coarse SAND (A-2-4)	33.0
														871.1	WEATHERED ROCK (METAGRANITE)	36.8
														869.7	WEATHERED ROCK (METAGRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 869.7 ft On Crystalline Rock (METAGRANITE)	38.2

Notes:
Hard drilling encountered at approximately 36.8 feet

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer										
SITE DESCRIPTION							GROUND WTR (ft)									
BORING NO. SBL_EB1-B		STATION 20+37		OFFSET 9 ft RT		ALIGNMENT -SBL-										
COLLAR ELEV. 907.8 ft		TOTAL DEPTH 35.8 ft		NORTHING 788,370		EASTING 1,689,575										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER C. Odom		START DATE 09/12/22		COMP. DATE 09/12/22		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						
910														907.8	GROUND SURFACE	0.0
														906.7	ROADWAY EMBANKMENT Asphalt (0.4 ft) and Concrete (0.7 ft)	1.1
905	905.8	2.0	3	2	2									903.4	Soft to Stiff, Gray-Orange-Brown, Silty CLAY (A-7), with trace organics	4.4
	900.8	7.0	2	1	2									898.4		9.4
900																
	898.4	9.4	3	4	8											
895																
	893.4	14.4	6	6	9											
890																
	888.4	19.4	2	3	3											
885																
	883.4	24.4	3	3	4											
880																
	878.4	29.4	4	4	8											
875																
	873.4	34.4	11	66	34/0.1											
	872.0	35.8	60/0.0			60/0.0										
														872.9	WEATHERED ROCK Gray-Brown, (METAGRANITE) Boring Terminated with Standard Penetration Test Refusal at Elevation 872.0 ft On Crystalline Rock (METAGRANITE)	34.9
														872.0		35.8

NCDOT BORE DOUBLE B-5783_GEO_BRDG164_168.GPJ_NC_DOT.GDT 10/28/22

GEOTECHNICAL BORING REPORT

BORE LOG

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST T. Wenner										
SITE DESCRIPTION							GROUND WTR (ft)									
BORING NO. SBL_B1-A		STATION 21+04		OFFSET 8 ft LT		ALIGNMENT -SBL-										
COLLAR ELEV. 893.4 ft		TOTAL DEPTH 38.8 ft		NORTHING 788,399		EASTING 1,689,637										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 09/08/22		COMP. DATE 09/08/22		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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
895	893.4	0.0	2	2	5							M		GROUND SURFACE	0.0	
890	890.3	3.1	7	6	6							M		ROADWAY EMBANKMENT Medium Stiff to Stiff, Tan-Orange, Fine to Coarse Sandy CLAY (A-6)		
885	885.6	7.8	2	2	3							M		RESIDUAL Medium Stiff, Tan-Orange, Highly Plastic, Silty CLAY (A-7)	5.5	
880	880.6	12.8	100/0.5											WEATHERED ROCK Tan-Gray, (METAGRANITE)	12.8	
875	876.1	17.3	60/0.0											CRYSTALLINE ROCK (METAGRANITE)	17.3	
870														RS-5 REC=83% RQD=53% GSI=30-40		
865														RS-6		
860																
855																
															Boring Terminated at Elevation 854.6 ft In Crystalline Rock (METAGRANITE)	38.8

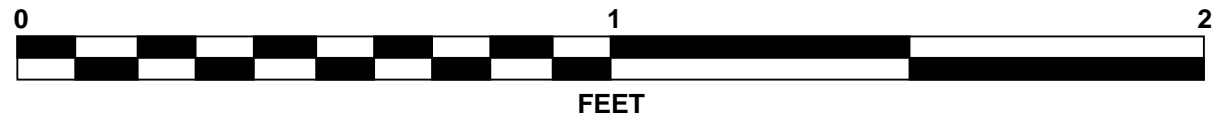
WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST T. Wenner						
SITE DESCRIPTION							GROUND WTR (ft)					
BORING NO. SBL_B1-A		STATION 21+04		OFFSET 8 ft LT		ALIGNMENT -SBL-						
COLLAR ELEV. 893.4 ft		TOTAL DEPTH 38.8 ft		NORTHING 788,399		EASTING 1,689,637						
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic						
DRILLER C. Odom		START DATE 09/08/22		COMP. DATE 09/08/22		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 21.5 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
876.14											Begin Coring @ 17.3 ft	
875	876.1	17.3	2.5	N=60/0.0 2:15/1.0 1:34/1.0	(2.5) 100%	(1.4) 56%		(17.9) 83%	(11.3) 53%		CRYSTALLINE ROCK	17.3
	873.6	19.8	5.0	0:14/0.5 2:55/1.0 2:06/1.0 2:29/1.0 2:37/1.0 3:38/1.0	(5.0) 100%	(3.9) 78%	RS-5				Moderately Weathered to Fresh, Moderately Hard, White-Gray, (METAGRANITE), with very close to moderately close fracture spacing, severely weathered seam from 19.3 to 20.2 feet, and soil seam from 26.8 to 27.3 feet	
	868.6	24.8	5.0	3:42/1.0 2:41/1.0 3:15/1.0 3:13/1.0 5:56/1.0	(4.4) 88%	(3.3) 66%	RS-6				RS-5: 20.6-21.2' Unit Weight: 172.5 pcf Unconfined Compressive Strength: 4,820 psi (694 ksf)	
	863.6	29.8	5.0	2:12/1.0 2:07/1.0 4:07/1.0 7:39/1.0 6:50/1.0	(3.8) 76%	(1.9) 38%					RS-6: 23.2-23.7' Unit Weight: 167.1 pcf Unconfined Compressive Strength: 7,800 psi (1,123 ksf)	
	858.6	34.8	4.0	4:20/1.0 2:53/1.0 5:16/1.0 6:50/1.0	(2.2) 55%	(0.8) 20%					GSI=30-40	
	854.6	38.8									Boring Terminated at Elevation 854.6 ft In Crystalline Rock (METAGRANITE)	38.8

FYd`UW`6 f]X[Yg`% (`UbX`% , `cb`l G`& #`\$`cj Yf`B`cfZc` _ `Gci h Yfb`FU]`k Um Davidson County, NC`

Rock Core Photographs`

Boring: SBL_B1-A`

17.3 to 38.8 Feet`



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST T. Wenner										
SITE DESCRIPTION R^ a&^ O: a^ ^• A^ i A } A U^ A G U B e A c^ A P : - \ A U [~ c @ : } A U a a , a e A							GROUND WTR (ft)									
BORING NO. SBL_B1-B		STATION 20+76		OFFSET 9 ft RT		ALIGNMENT -SBL-										
COLLAR ELEV. 899.1 ft		TOTAL DEPTH 28.8 ft		NORTHING 788,377		EASTING 1,689,613										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 09/08/22		COMP. DATE 09/08/22		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						
900	899.1	0.0												899.1	GROUND SURFACE	0.0
	896.1	3.0	2	3	3									896.6	ROADWAY EMBANKMENT Medium Stiff, Tan-Orange, Fine Sandy CLAY (A-6)	2.5
895			6	7										892.1	RESIDUAL Stiff, Tan-Orange, Highly Plastic, Silty CLAY (A-7)	7.0
890	890.3	8.8	2	3	4									882.1	Medium Stiff to Very Stiff, Tan-Orange, Clayey SILT (A-5)	
885	885.3	13.8	3	7	11									881.6	Very Stiff, Tan-Orange, SILT (A-4), with trace manganese oxide staining	17.5
880	880.3	18.8	10	12	11									875.3	WEATHERED ROCK Tan, (METAGRANITE)	23.8
875	875.3	23.8	100/0.3											870.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 870.3 ft On Crystalline Rock (METAGRANITE)	28.8
	870.3	28.8	60/0.0													

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer										
SITE DESCRIPTION R^ a&^ O: a^ ^• A^ i A } A U^ A G U B e A c^ A P : - \ A U [~ c @ : } A U a a , a e A							GROUND WTR (ft)									
BORING NO. SBL_B2-A		STATION 22+30		OFFSET 11 ft LT		ALIGNMENT -SBL-										
COLLAR ELEV. 894.4 ft		TOTAL DEPTH 28.3 ft		NORTHING 788,425		EASTING 1,689,761										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 09/11/22		COMP. DATE 09/11/22		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						
895	894.4	0.0												894.4	GROUND SURFACE	0.0
	891.1	3.3	3	6	12									887.6	RESIDUAL Very Stiff, Tan-Orange-Brown, Fine Sandy SILT (A-4), with trace organics, mica, and manganese oxide staining	6.8
890			12	13	10									876.9	WEATHERED ROCK Tan-Orange-Brown, (METAGRANITE)	17.5
885	886.1	8.3	86	14/0.1										872.9	RESIDUAL Hard, Gray-Tan-Orange, Fine Sandy SILT (A-4), with trace mica and gravel-sized rock fragments	21.5
880	881.1	13.3	73	27/0.1										868.8	WEATHERED ROCK Gray-Tan-Orange-Brown, (METAGRANITE)	25.6
875	876.1	18.3	18	27	29									866.1	CRYSTALLINE ROCK (METAGRANITE)	28.3
870	871.1	23.3	36	64/0.5												
	866.1	28.3	60/0.0													

Notes:
Softer drilling encountered at approximately 17.5 feet
Hard drilling encountered at approximately 6.8 and 21.5 feet
Very hard drilling encountered at approximately 25.6 feet

NCDOT BORE DOUBLE B-5783_GEO_BRDG164_168.GPJ NC_DOT.GDT 10/26/22

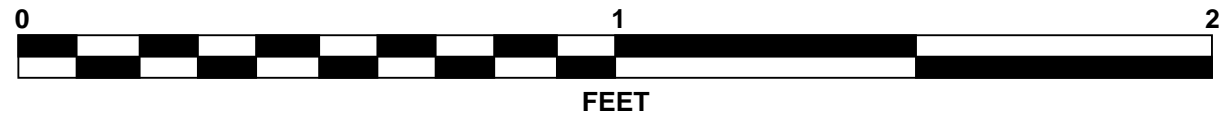
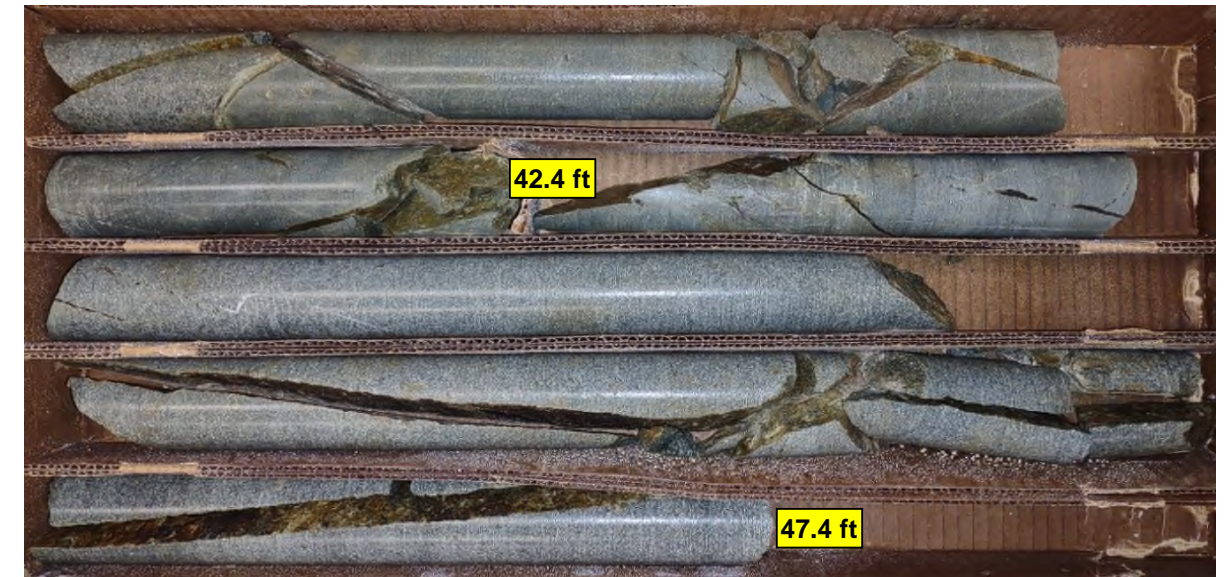
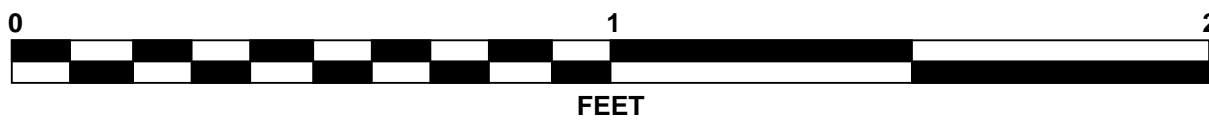


FYd`UW'6 f]X[Yg`% (`UbX`% , `cb`l G`& #`\$`cj Yf `BcfZ` _ `Gci h Yfb`FU]`k Um Davidson County, NC`

Rock Core Photographs`

Boring: SBL_B2-B`

21.5 to 47.4 Feet`



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer									
SITE DESCRIPTION							GROUND WTR (ft)								
BORING NO. SBL_EB2-A		STATION 22+76		OFFSET 11 ft LT		ALIGNMENT -SBL-									
COLLAR ELEV. 908.8 ft		TOTAL DEPTH 39.1 ft		NORTHING 788,434		EASTING 1,689,806									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 09/11/22		COMP. DATE 09/11/22		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					
910														908.8 GROUND SURFACE 0.0	
														907.7 ROADWAY EMBANKMENT 1.1	
	906.4	2.4	2	3	4									Asphalt (0.4 ft) and Concrete (0.7 ft)	
905	904.6	4.2	2	2	3									Soft to Medium Stiff, Red-Orange-Tan, Silty CLAY (A-7), with trace organics	
	901.7	7.1	2	2	2										
900	899.4	9.4	2	3	4										
	894.4	14.4	3	5	7										
895	889.4	19.4	3	3	5									Loose, Gray-Black, Silty Fine to Coarse SAND (A-2-4), with trace organics	13.0
	884.4	24.4	6	7	10									RESIDUAL Stiff, Tan-Orange-Gray, Highly Plastic, Silty CLAY (A-7)	18.0
890	879.4	29.4	2	2	5									Medium Stiff to Very Stiff, Tan-Orange-White, Fine Sandy SILT (A-4), with trace mica and manganese oxide staining	28.0
	874.4	34.4	12	36	64/0.2									Medium Stiff, Orange-Brown-Tan, SILT (A-5), with trace mica and manganese oxide staining	34.9
875	869.7	39.1												WEATHERED ROCK Tan-Orange-Brown, (METAGRANITE)	39.1
														Boring Terminated with Standard Penetration Test Refusal at Elevation 869.7 ft On Crystalline Rock (METAGRANITE)	

WBS 45738.1.2		TIP B-5783		COUNTY DAVIDSON		GEOLOGIST M. Brewer									
SITE DESCRIPTION							GROUND WTR (ft)								
BORING NO. SBL_EB2-B		STATION 22+54		OFFSET 10 ft RT		ALIGNMENT -SBL-									
COLLAR ELEV. 908.8 ft		TOTAL DEPTH 34.2 ft		NORTHING 788,409		EASTING 1,689,788									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 09/12/22		COMP. DATE 09/12/22		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					
910														908.8 GROUND SURFACE 0.0	
														907.7 ROADWAY EMBANKMENT 1.1	
	906.6	2.2	2	1	2									Asphalt (0.4 ft) and Concrete (0.7 ft)	
905	904.5	4.3	3	3	2									Soft to Medium Stiff, Gray-Blue, Fine Sandy CLAY (A-6), with trace organics and asphalt fragments	
	901.7	7.1	2	1	3									Soft, Red-Orange, Silty CLAY (A-7)	6.0
900	899.7	9.1	2	1	7										
	894.7	14.1	12	21	25									Medium Stiff, Gray-Blue, Fine Sandy CLAY (A-6), with trace asphalt fragments	10.1
895	889.7	19.1	40	59	41/0.4									RESIDUAL Dense, Orange-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica	17.5
	884.7	24.1	24	28	23									WEATHERED ROCK Orange-Tan, (METAGRANITE)	22.0
890	879.7	29.1	28	72/0.4										Very Dense, Orange-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and gravel-sized rock fragments	29.1
	874.7	34.1												WEATHERED ROCK Tan, (METAGRANITE)	34.1
875	869.7	39.1												CRYSTALLINE ROCK (METAGRANITE)	34.2
														Boring Terminated with Standard Penetration Test Refusal at Elevation 874.6 ft In Crystalline Rock (METAGRANITE)	
Notes:															
Hard drilling encountered at approximately 17.5 feet															

NCDOT BORE DOUBLE B-5783_GEO_BRDG164_168.GPJ NC_DOT.GDT 10/28/22

LAB RESULTS**ROCK TEST RESULTS**

SAMPLE NO.	BORING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS-1	NBL_B1-A	20+61 -NBL-	10' LT	31.6 - 32.2'	METAGRANITE	176.5	5,230 psi / 753 ksf
RS-2	NBL_B1-A	20+61 -NBL-	10' LT	35.4 - 36.0'	METAGRANITE	173.4	15,930 psi / 2,294 ksf
RS-3	NBL_B2-B	21+71 -NBL-	11' RT	23.5 - 24.1'	METAGRANITE	162.4	2,290 psi / 330 ksf
RS-4	NBL_B2-B	21+71 -NBL-	11' RT	29.4 - 29.8'	METAGRANITE	165.9	13,650 psi / 1,966 ksf
RS-5	SBL_B1-A	21+04 -SBL-	8' LT	20.6 - 21.2'	METAGRANITE	172.5	4,820 psi / 694 ksf
RS-6	SBL_B1-A	21+04 -SBL-	8' LT	23.2 - 23.7'	METAGRANITE	167.1	7,800 psi / 1,123 ksf
RS-7	SBL_B2-B	22+05 -SBL-	9' RT	26.2 - 26.8'	METAGRANITE	185.3	3,880 psi / 559 ksf
RS-8	SBL_B2-B	22+05 -SBL-	9' RT	29.5 - 30.0'	METAGRANITE	180.2	3,550 psi / 511 ksf

LAB TESTING PERFORMED BY NCDOT LAB CERT NO. 117-1104

SITE PHOTOS



PHOTO #1: END BENT 2 OF EXISTING BRIDGE 164 LOOKING WEST (DOWNSTATION)



PHOTO #2: END BENT 1 OF EXISTING BRIDGES 164 AND 168 LOOKING EAST (UPSTATION)



PHOTO #3: END BENT 1 OF EXISTING BRIDGE 168 LOOKING EAST (UPSTATION)



PHOTO #4: END BENT 1 OF EXISTING BRIDGE 164 LOOKING EAST (UPSTATION)