

REFERENCE: A-0009CB

PROJECT: 32572

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0009CB	1	35

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5-16	CROSS SECTIONS
17-32	BORE LOGS, CORE LOGS & ROCK CORE PHOTOGRAPHS
33	LABORATORY TEST RESULTS
34-35	GEOPHYSICAL TEST RESULTS

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY GRAHAM
PROJECT DESCRIPTION UPGRADE NC 143 FROM SR 1223 (BEECH CREEK ROAD) TO 0.5 MILES NORTH OF APPALACHIAN TRAIL
SITE DESCRIPTION PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 AT -L- STATION 381+40

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 MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL
CG2 EXPLORATION
BRECCIA
D. GOODNIGHT
S. BRAUN

INVESTIGATED BY CG2, PLLC
DRAWN BY M. BREWER, P.E.
CHECKED BY R. KRAL, P.E.
SUBMITTED BY CG2, PLLC
DATE APRIL 2022

Prepared in the Office of:
 CAROLINAS
GEOTECHNICAL
GROUP
2400 CROWNPOINT EXECUTIVE DRIVE
SUITE 800
CHARLOTTE, NC 28227
(980) 339-8684



DocuSigned by:
D. Matthew Brewer 04/29/2022
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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 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 DISLODGED 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 (IN 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)										CRYSTALLINE ROCK (CR)																																																									
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<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																																																									
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OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M) - DRY - (D)	SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																					
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<table border="1"> <tr> <th>NON PLASTIC</th> <th colspan="2">PLASTICITY INDEX (PI)</th> <th colspan="2">DRY STRENGTH</th> </tr> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td></td> <td>VERY LOW</td> <td></td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td></td> <td>SLIGHT</td> <td></td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td></td> <td>MEDIUM</td> <td></td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td></td> <td>HIGH</td> <td></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>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>										<p>FRACURE SPACING</p>										<p>INDURATION</p>																																
NON PLASTIC	PLASTICITY INDEX (PI)		DRY STRENGTH																																																																																				
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	26 OR MORE		HIGH																																																																																				
COLOR										FRACURE SPACING										BEDDING										INDURATION																																																									
<p>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.</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>										<p>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>																																																									
ELEVATION										FRACURE SPACING										BEDDING										INDURATION																																																									
<p>ELEVATION: FEET</p>										<p>FRACURE SPACING</p>										<p>BEDDING</p>										<p>INDURATION</p>																																																									
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<p>ROADWAY DESIGN AND SURVEY INFORMATION PROVIDED BY TGS ENGINEERS</p>																																																																																							

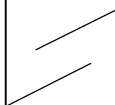
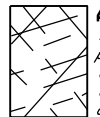
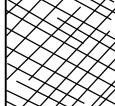
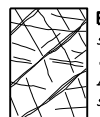





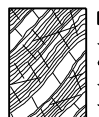


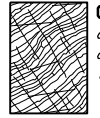

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

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

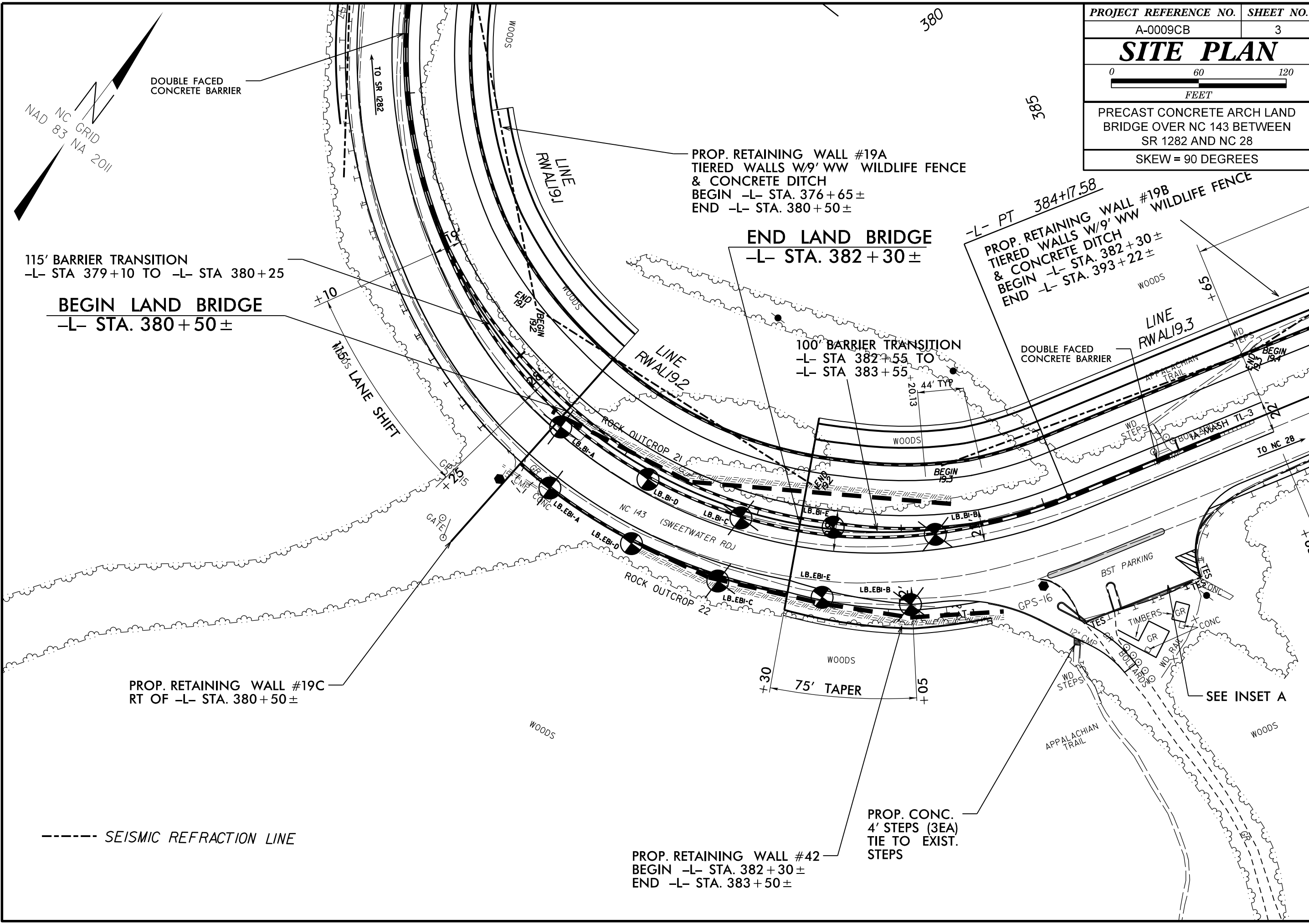
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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)				
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	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.		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	 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.
A-0009CB	3
SITE PLAN	
 0 60 120 FEET	
PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 SKEW = 90 DEGREES	



NAD 83 GRID
NA 2011

115' BARRIER TRANSITION
-L- STA 379+10 TO -L- STA 380+25

BEGIN LAND BRIDGE
-L- STA. 380+50±

PROP. RETAINING WALL #19A
TIERED WALLS W/9' WW WILDLIFE FENCE
& CONCRETE DITCH
BEGIN -L- STA. 376+65±
END -L- STA. 380+50±

END LAND BRIDGE
-L- STA. 382+30±

-L- PT 384+17.58

PROP. RETAINING WALL #19B
TIERED WALLS W/9' WW WILDLIFE FENCE
& CONCRETE DITCH
BEGIN -L- STA. 382+30±
END -L- STA. 393+22±

100' BARRIER TRANSITION
-L- STA 382+55 TO
-L- STA 383+55

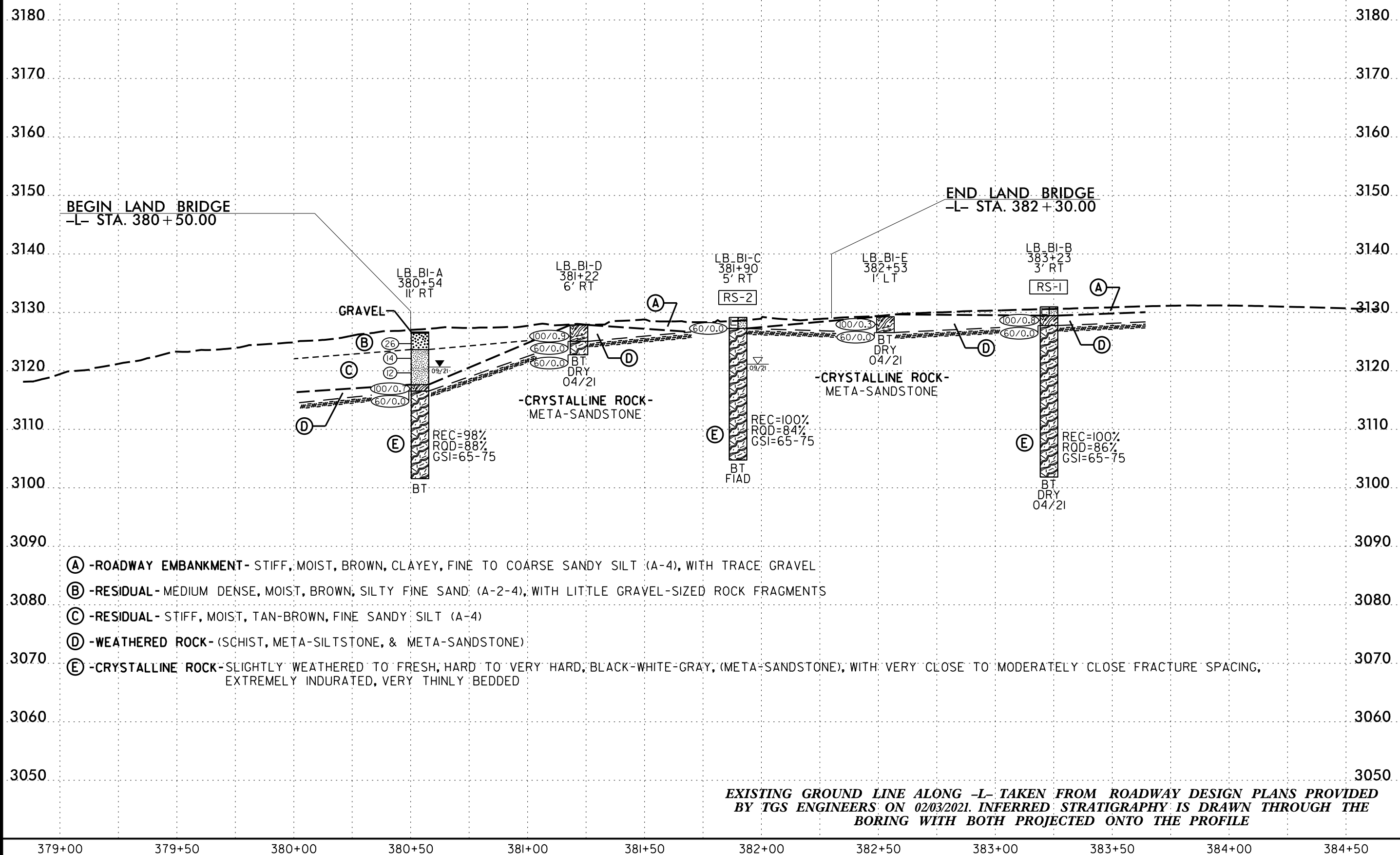
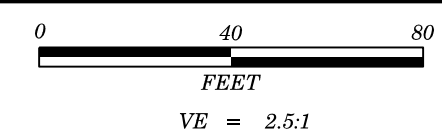
PROP. RETAINING WALL #19C
RT OF -L- STA. 380+50±

PROP. CONC.
4' STEPS (3EA)
TIE TO EXIST.
STEPS

PROP. RETAINING WALL #42
BEGIN -L- STA. 382+30±
END -L- STA. 383+50±

----- SEISMIC REFRACTION LINE

5/14/99




- (A) -ROADWAY EMBANKMENT- STIFF, MOIST, BROWN, CLAYEY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
- (B) -RESIDUAL- MEDIUM DENSE, MOIST, BROWN, SILTY FINE SAND (A-2-4), WITH LITTLE GRAVEL-SIZED ROCK FRAGMENTS
- (C) -RESIDUAL- STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A-4)
- (D) -WEATHERED ROCK- (SCHIST, META-SILTSTONE, & META-SANDSTONE)
- (E) -CRISTALLINE ROCK- SLIGHTLY WEATHERED TO FRESH, HARD TO VERY HARD, BLACK-WHITE-GRAY, (META-SANDSTONE), WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, EXTREMELY INDURATED, VERY THINLY BEDDED

EXISTING GROUND LINE ALONG -L- TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 02/03/2021. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE PROFILE

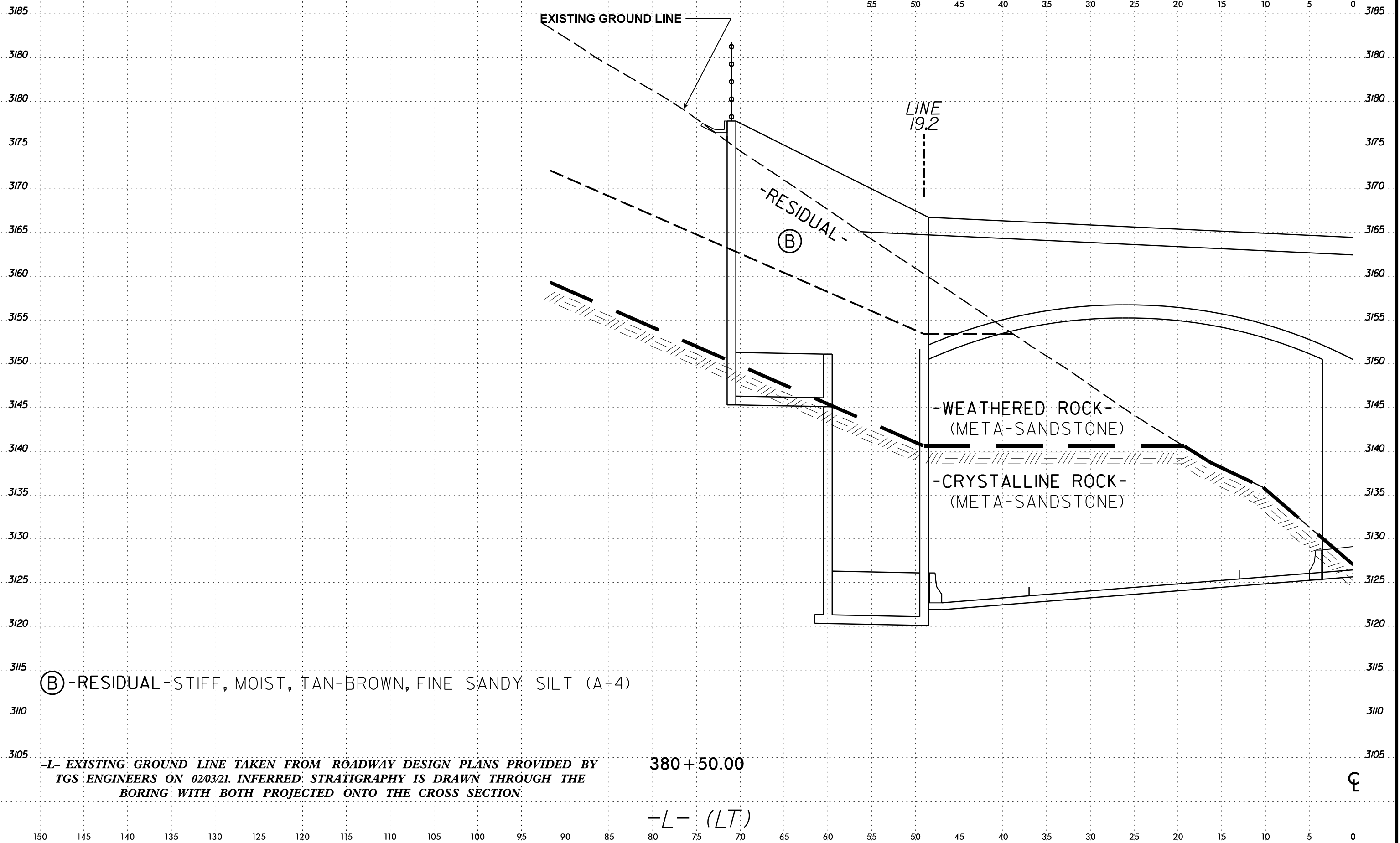
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Prepared in the Office of:
 CAROLINAS
GEOTECHNICAL
GROUP

0 5 10
FEET
VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	5
PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 BRIDGE SKEW = 90 DEGREES	



ⓑ - RESIDUAL - STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A+4)

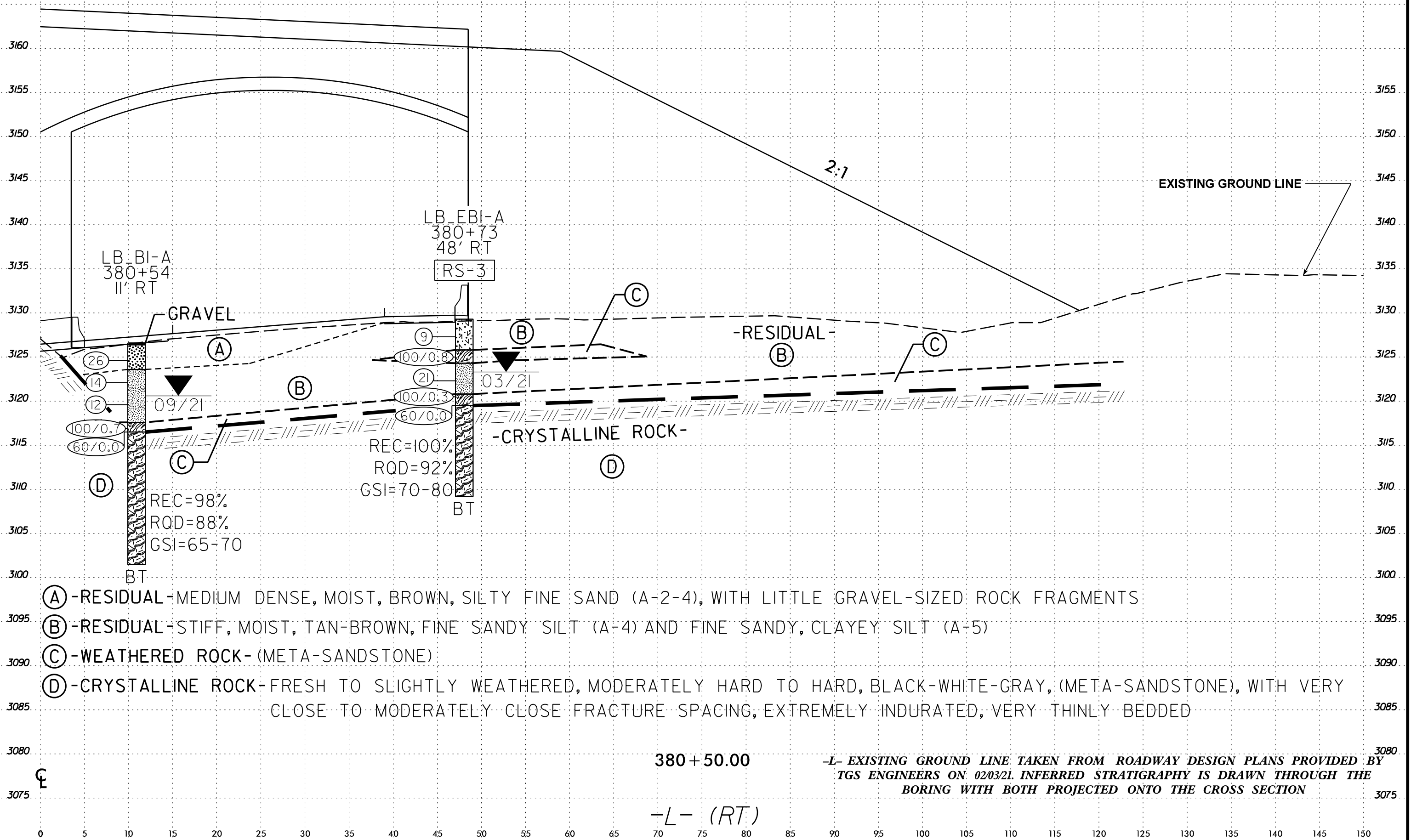
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380 + 50.00

-L- (LT)

Ⓢ

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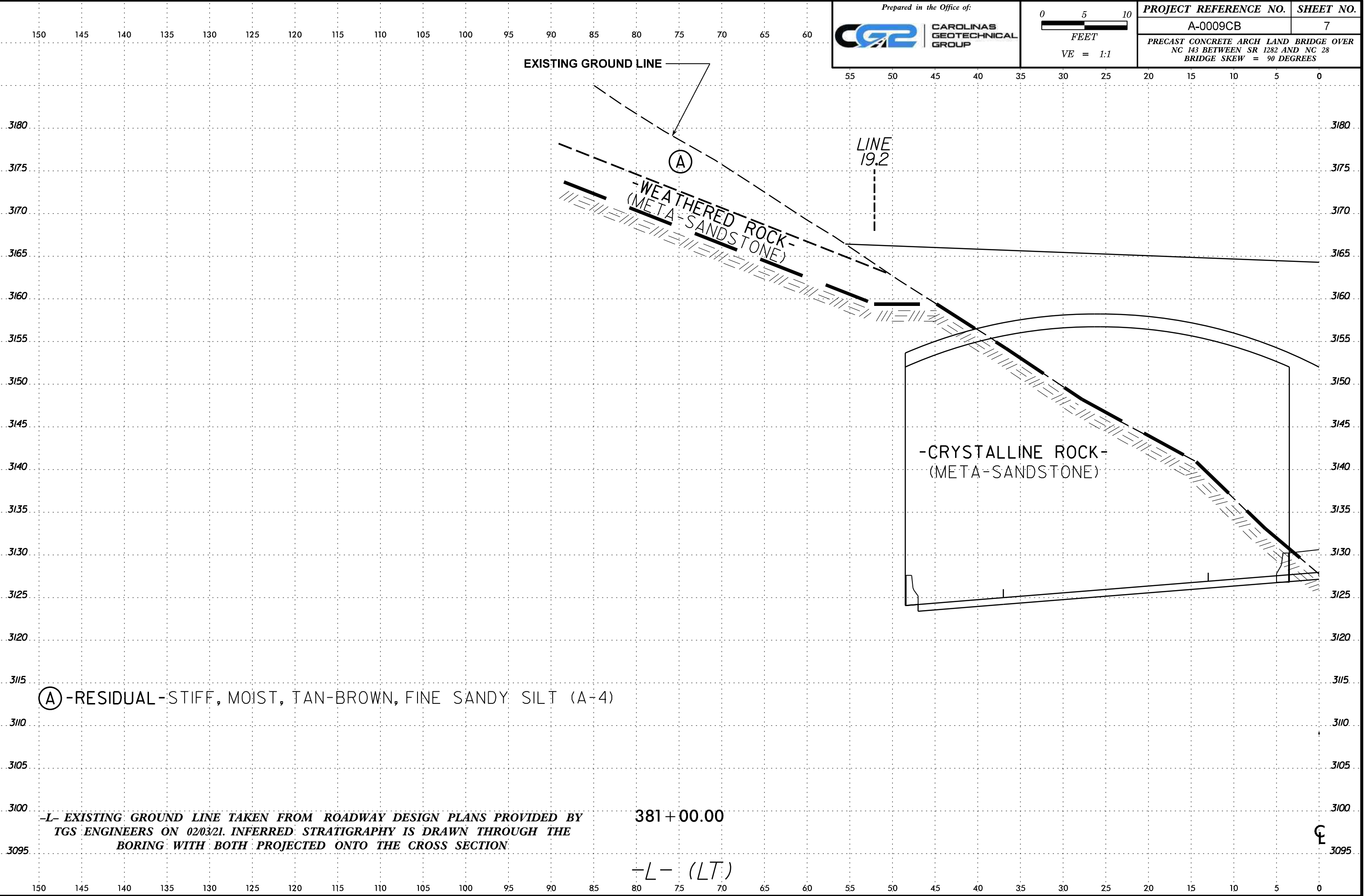


- (A) -RESIDUAL-MEDIUM DENSE, MOIST, BROWN, SILTY FINE SAND (A-2-4), WITH LITTLE GRAVEL-SIZED ROCK FRAGMENTS
- (B) -RESIDUAL-STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A-4) AND FINE SANDY, CLAYEY SILT (A-5)
- (C) -WEATHERED ROCK-(META-SANDSTONE)
- (D) -CRYSTALLINE ROCK-FRESH TO SLIGHTLY WEATHERED, MODERATELY HARD TO HARD, BLACK-WHITE-GRAY, (META-SANDSTONE), WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, EXTREMELY INDURATED, VERY THINLY BEDDED

380 + 50.00
-L- (RT)

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 02/03/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

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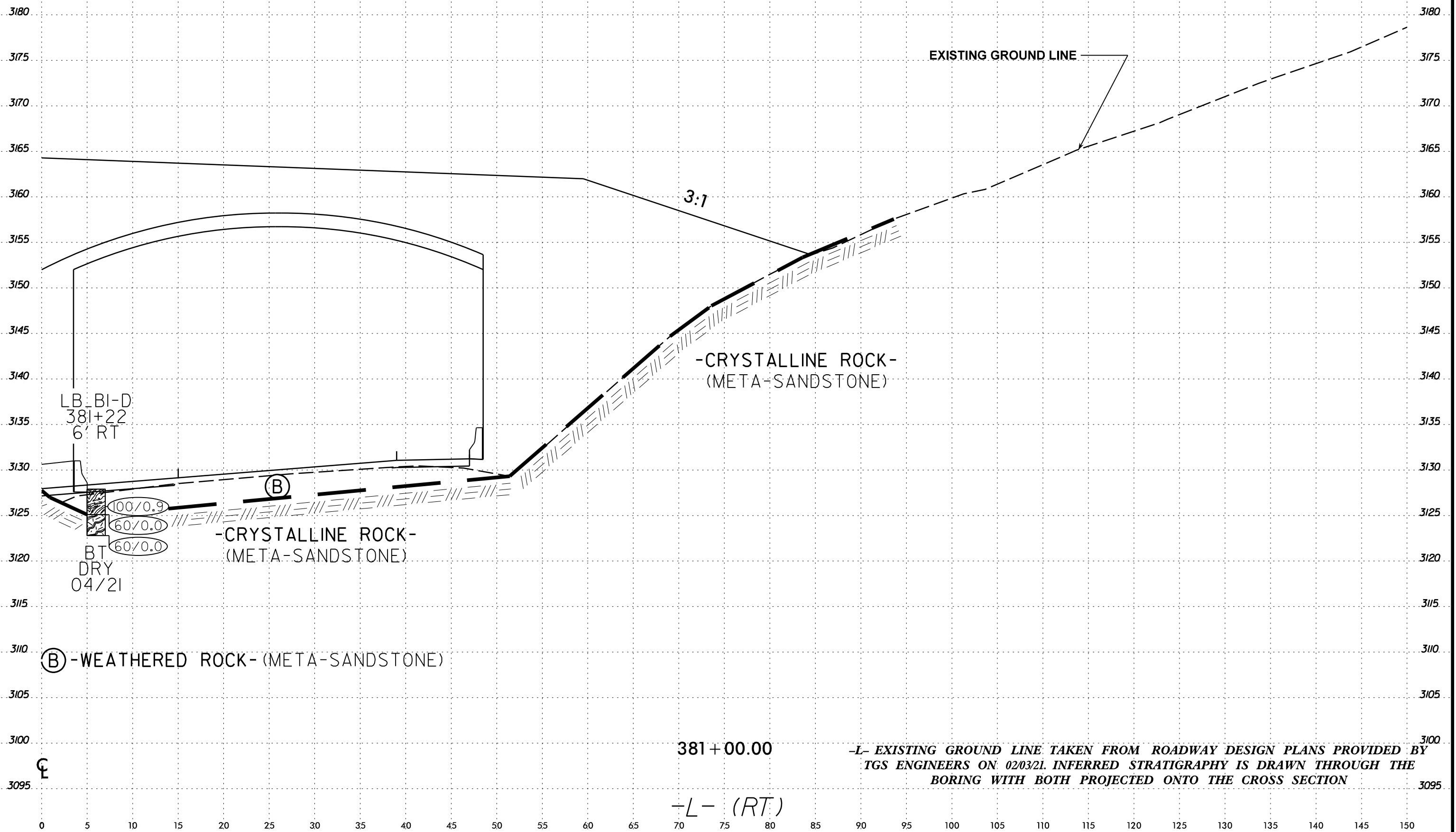


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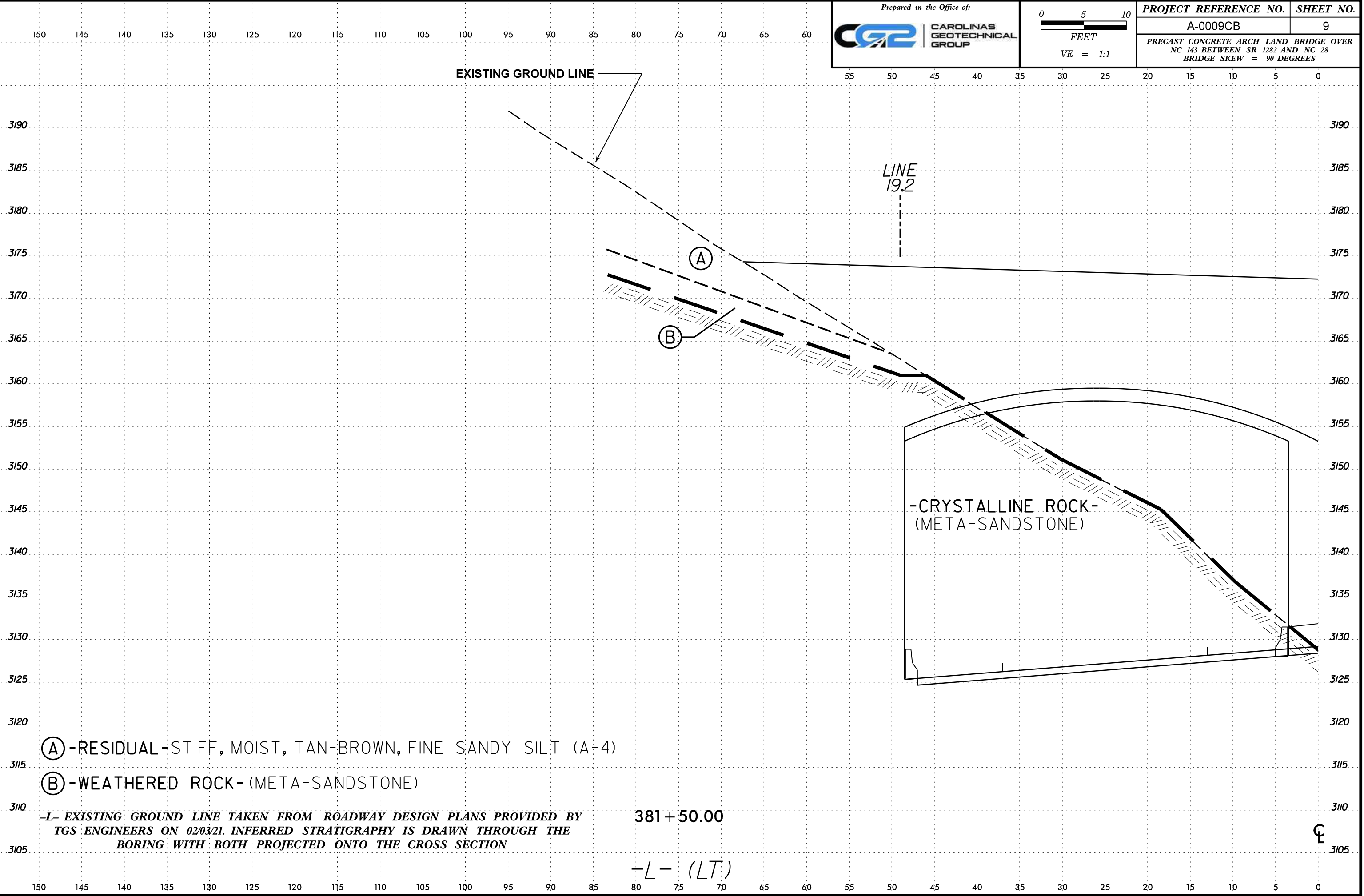
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0 5 10
FEET
VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	8
PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 BRIDGE SKEW = 90 DEGREES	



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Ⓐ - RESIDUAL - STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A-4)

Ⓑ - WEATHERED ROCK - (META-SANDSTONE)

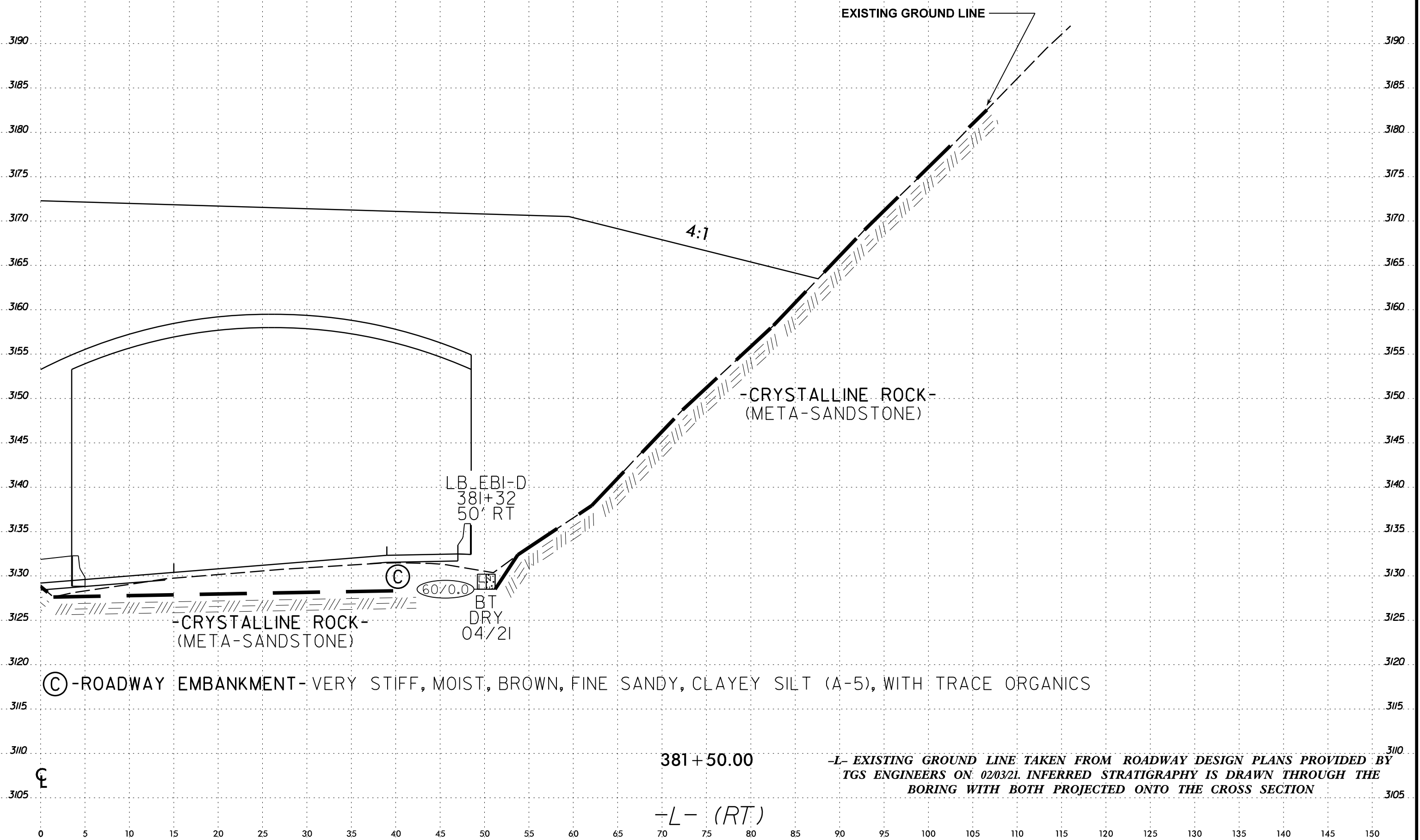
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381+50.00

-L- (LT)

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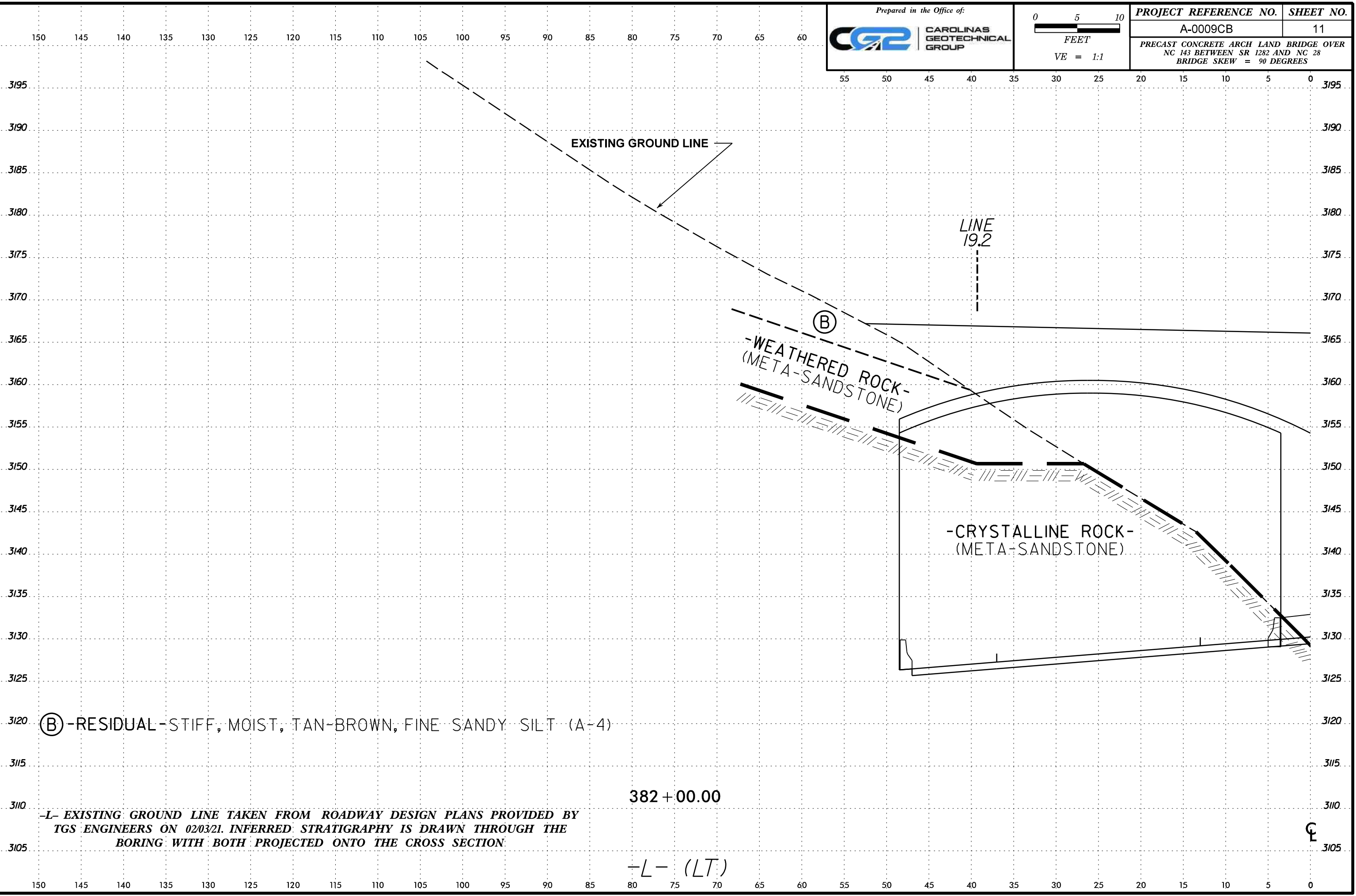


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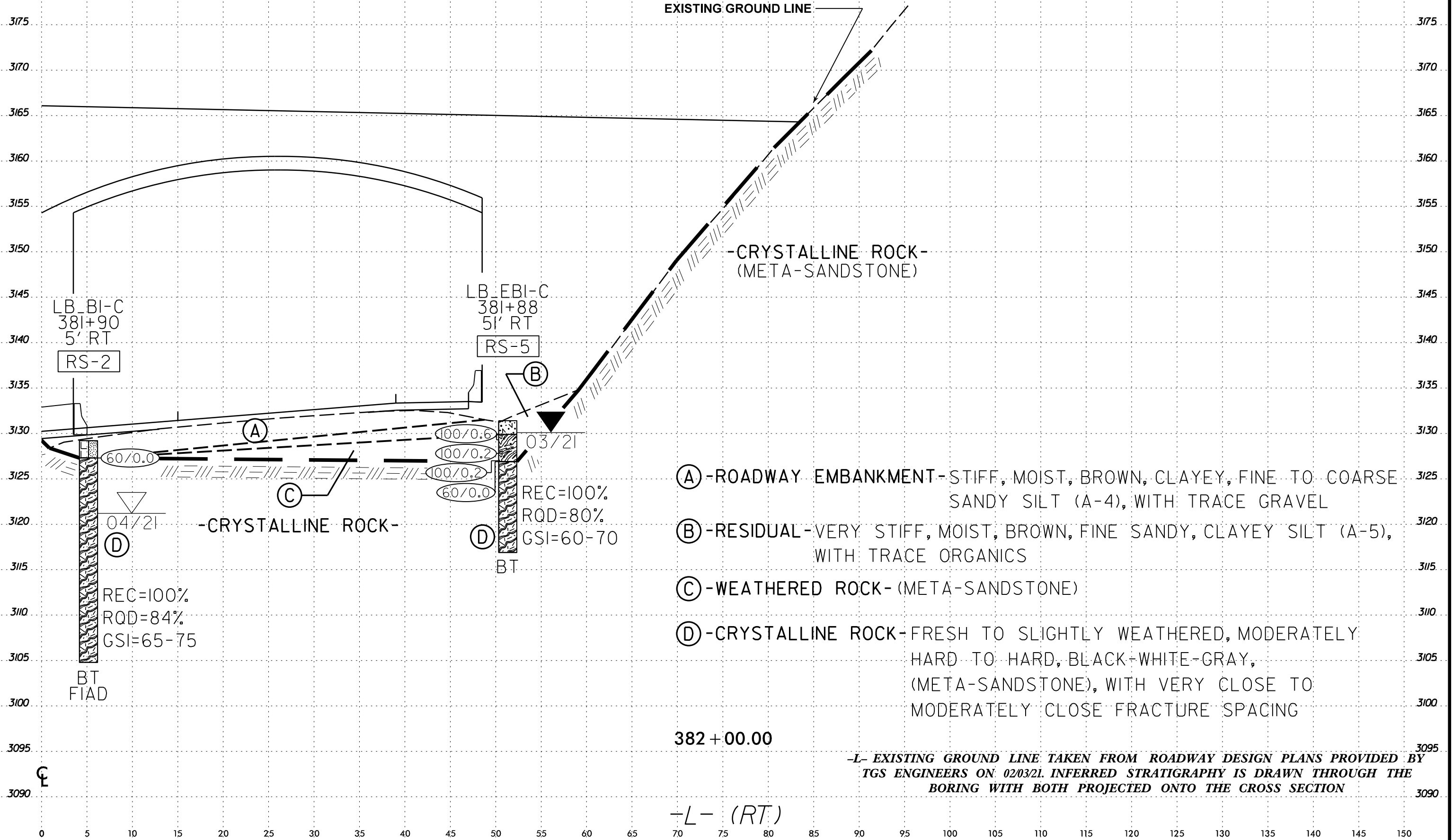
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GROUP

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VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
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PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 BRIDGE SKEW = 90 DEGREES	



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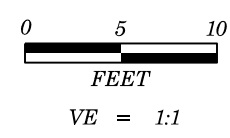


-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 02/03/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

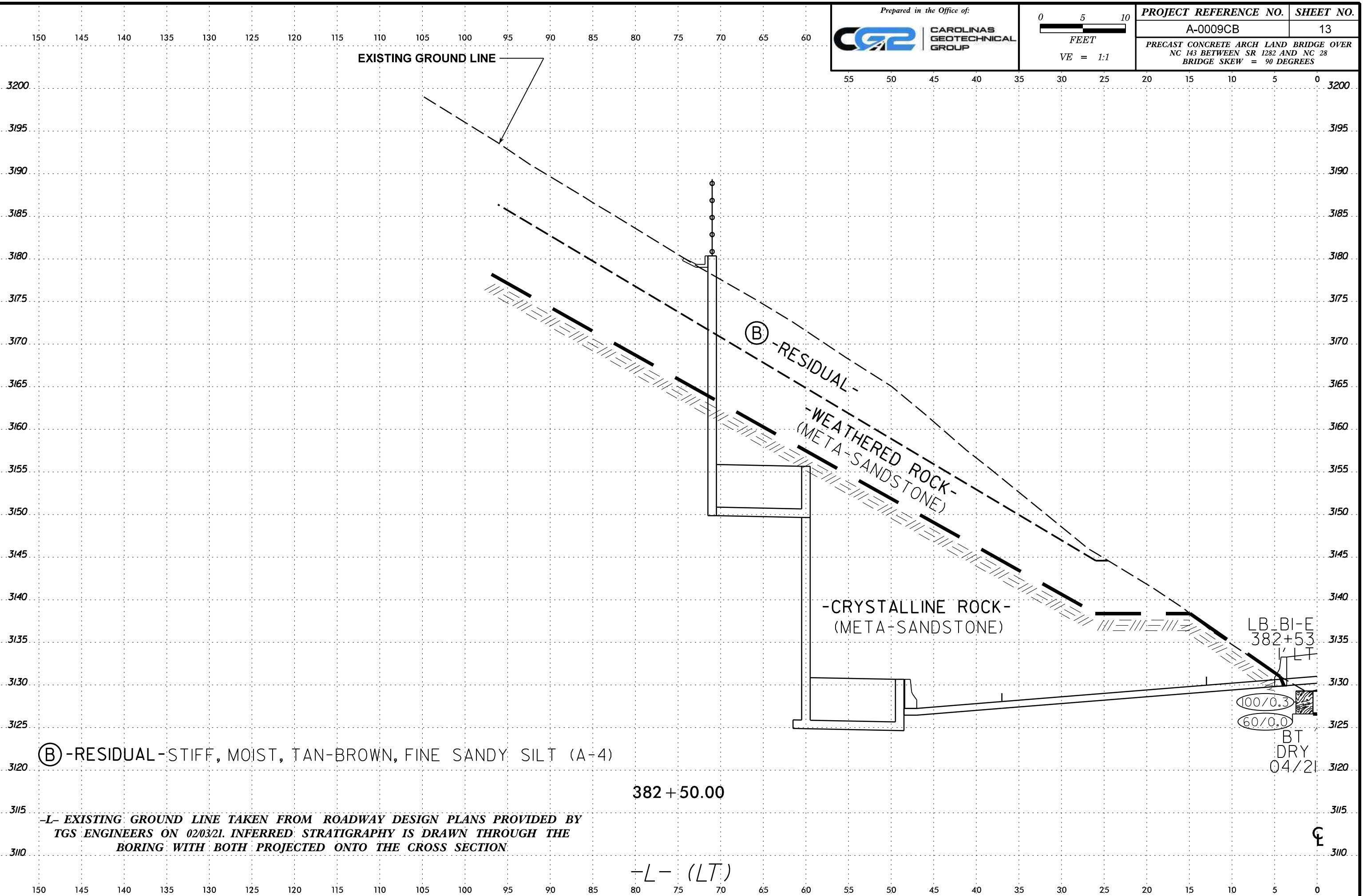
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GROUP



PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	13
PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 BRIDGE SKEW = 90 DEGREES	



EXISTING GROUND LINE

ⓑ -RESIDUAL-

-WEATHERED ROCK-
(META-SANDSTONE)

-CRYSTALLINE ROCK-
(META-SANDSTONE)

ⓑ -RESIDUAL- STIFF, MOIST, TAN-BROWN, FINE SANDY SILT (A-4)

382 + 50.00

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
TGS ENGINEERS ON 02/03/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE
BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION.

-L- (LT)

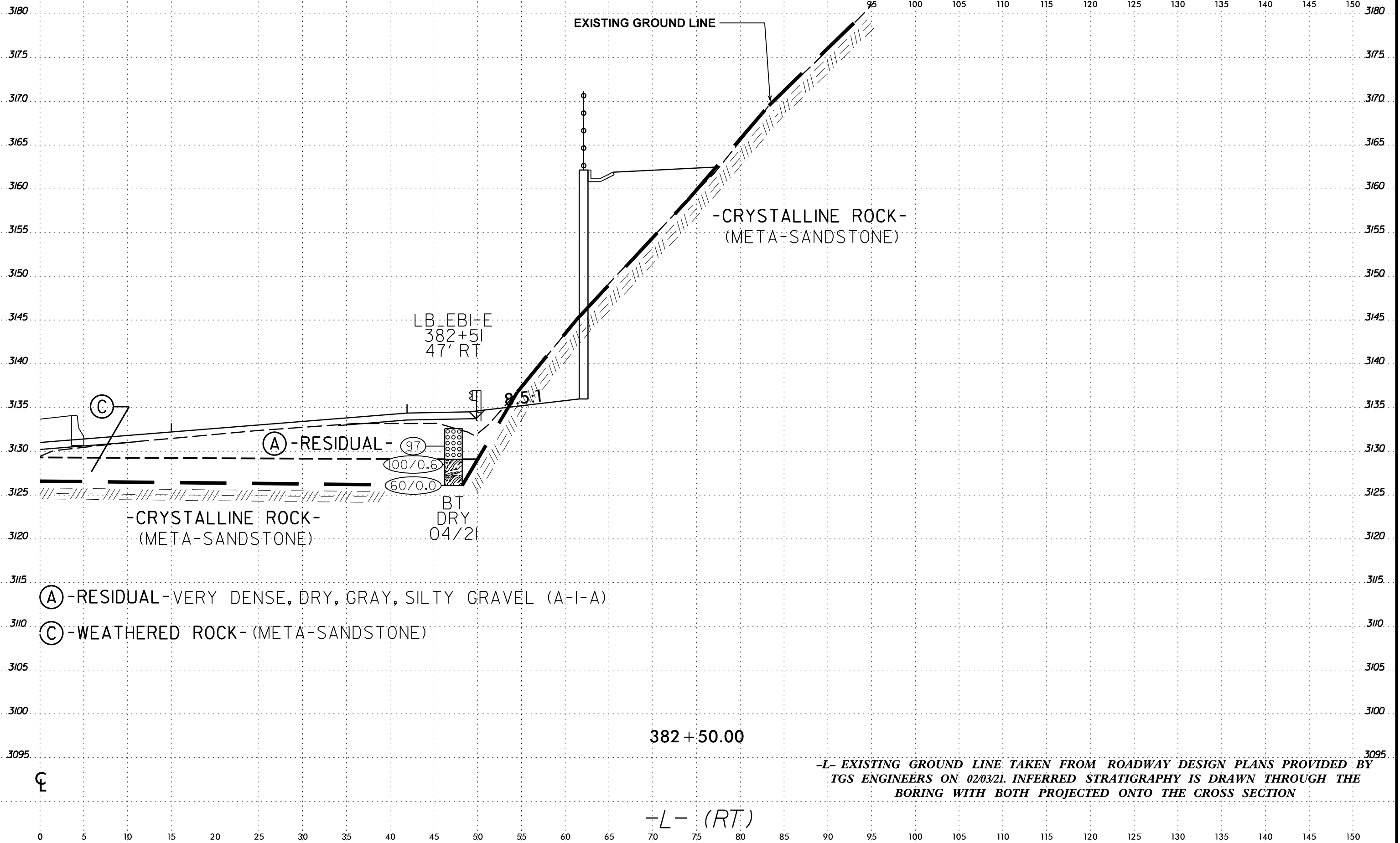
LB BI-E
382+53
KLT

100/0.3
60/0.0

BT
DRY
04/21

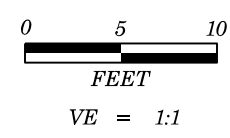
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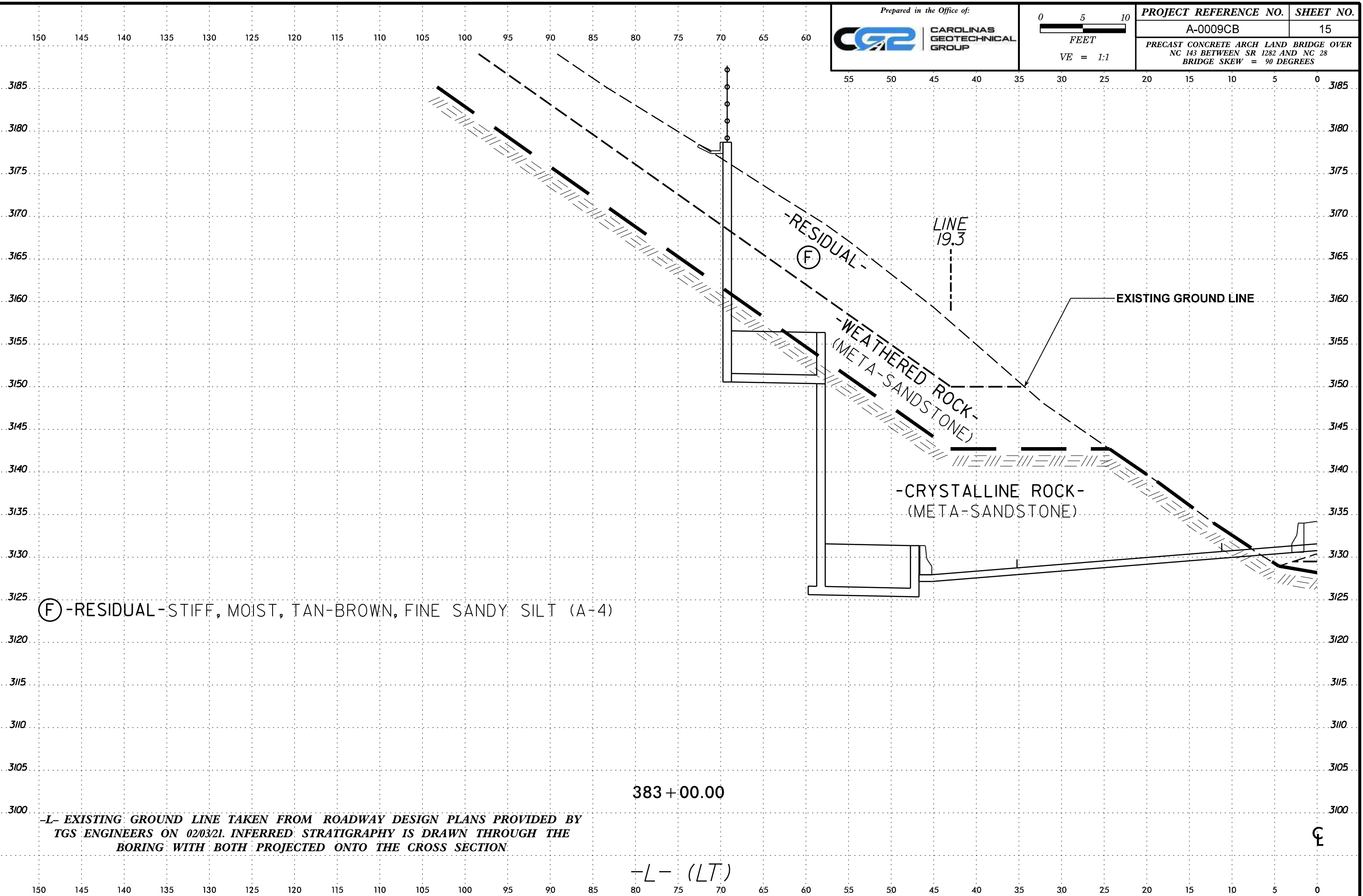


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GEOTECHNICAL
GROUP

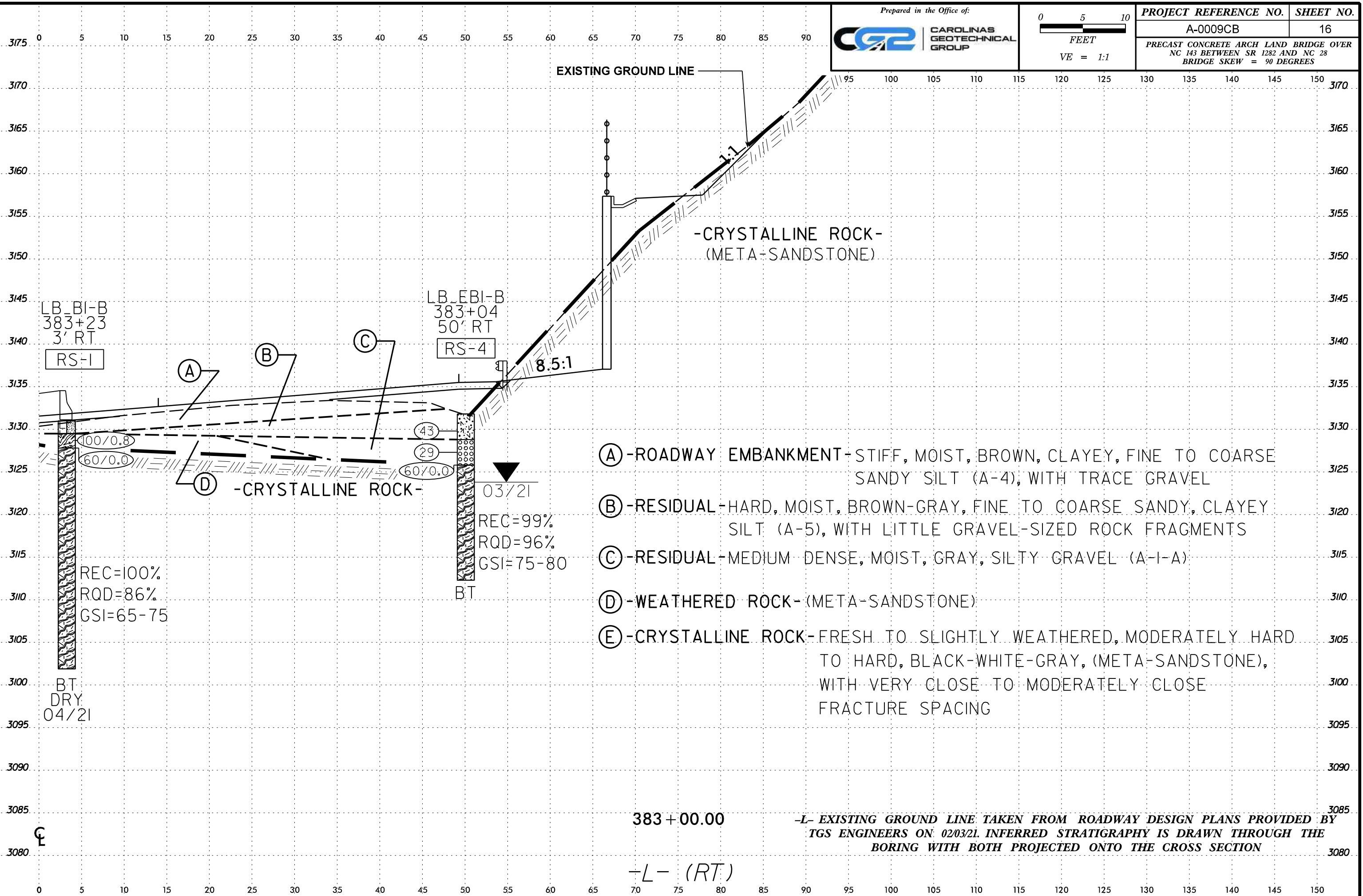


PROJECT REFERENCE NO.	SHEET NO.
A-0009CB	15
PRECAST CONCRETE ARCH LAND BRIDGE OVER NC 143 BETWEEN SR 1282 AND NC 28 BRIDGE SKEW = 90 DEGREES	



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383 + 00.00
 -L- (RT)

-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS ON 02/03/21. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT BORE LOG

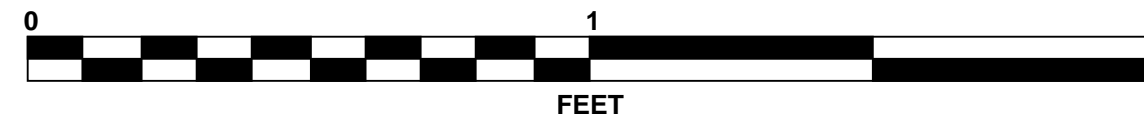
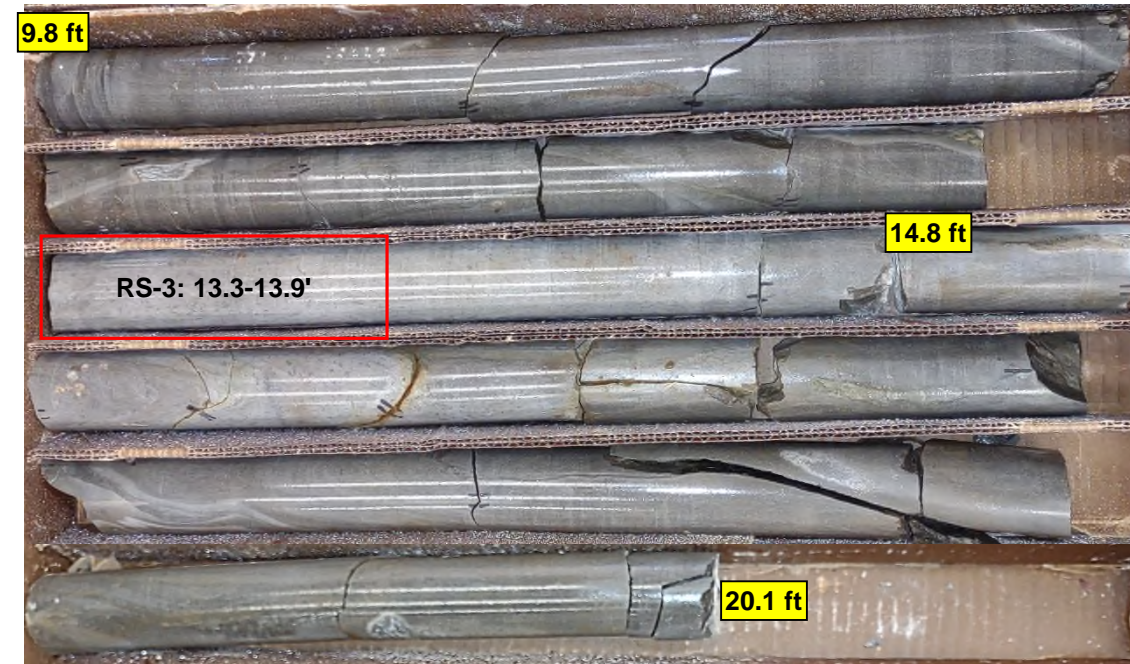
GEOTECHNICAL BORING REPORT CORE LOG

WBS 32572.1.FS10				TIP A-0009CB			COUNTY GRAHAM			GEOLOGIST S. Braun				
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28										GROUND WTR (ft)				
BORING NO. LB_EB1-A			STATION 380+73			OFFSET 48 ft RT			ALIGNMENT L		0 HR. 3.9			
COLLAR ELEV. 3,129.3 ft			TOTAL DEPTH 20.1 ft			NORTHING 618,546			EASTING 593,515		24 HR. 6.0			
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020						DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic				
DRILLER C. Odom			START DATE 03/30/21			COMP. DATE 03/30/21			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75					
3130													3,129.3 GROUND SURFACE	0.0
	3,128.3	1.0	4	4	5						M		RESIDUAL Stiff, Tan-Brown, Fine Sandy, Clayey SILT (A-5)	
3125	3,125.8	3.5	68	32/0.3									3,125.8 WEATHERED ROCK Gray-Brown-Tan (META-SANDSTONE)	3.5
	3,123.3	6.0	4	7	14				100/0.8		M		3,124.3 WEATHERED ROCK Gray-Brown-Tan (META-SANDSTONE)	5.0
3120	3,120.8	8.5							100/0.3				RESIDUAL Very Stiff, Brown-Tan, Fine to Coarse Sandy SILT (A-4), with trace gravel-sized rock fragments	8.5
	3,119.5	9.8	100/0.3						60/0.0				3,120.8 WEATHERED ROCK Gray-Brown-Tan, (META-SANDSTONE)	9.8
3115											RS-3		CRYSTALLINE ROCK Black-White-Gray, (META-SANDSTONE)	
3110													REC=100% RQD=92% GSI=70-80	
													3,109.2 Boring Terminated at Elevation 3,109.2 ft In Crystalline Rock (META-SANDSTONE)	20.1

WBS 32572.1.FS10				TIP A-0009CB			COUNTY GRAHAM			GEOLOGIST S. Braun			
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28										GROUND WTR (ft)			
BORING NO. LB_EB1-A			STATION 380+73			OFFSET 48 ft RT			ALIGNMENT L		0 HR. 3.9		
COLLAR ELEV. 3,129.3 ft			TOTAL DEPTH 20.1 ft			NORTHING 618,546			EASTING 593,515		24 HR. 6.0		
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020						DRILL METHOD SPT Core Boring				HAMMER TYPE Automatic			
DRILLER C. Odom			START DATE 03/30/21			COMP. DATE 03/30/21			SURFACE WATER DEPTH N/A				
CORE SIZE NQ						TOTAL RUN 10.3 ft							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC (%)	RQD (%)		REC (%)	RQD (%)				
3119.5	3,119.5	9.8	5.0	N=60/0.0 3:58/1.0 5:42/1.0 3:09/1.0 3:34/1.0 3:31/1.0	(5.0)	(5.0)		(10.3)	(9.5)		Begin Coring @ 9.8 ft CRYSTALLINE ROCK Fresh to Slightly Weathered, Moderately Hard to Hard, Black-White-Gray, (META-SANDSTONE), with Very Close to Moderately Close Fracture Spacing	9.8	
3115	3,114.5	14.8					RS-3						
			5.3	3:28/1.0 3:07/1.0 3:12/1.0 3:11/1.0 4:17/1.3	(5.3)	(4.5)					RS-3: 13.3 - 13.9 ft Unit Weight: 171.5 pcf Unconfined Compressive Strength: 20,620 psi (2,969 ksf)		
3110	3,109.2	20.1									Boring Terminated at Elevation 3,109.2 ft In Crystalline Rock (META-SANDSTONE)	20.1	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28
Rock Core Photographs
Boring: LB_EB1-A
9.8 to 20.1 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun									
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)								
BORING NO. LB_EB1-D		STATION 381+32		OFFSET 50 ft RT		ALIGNMENT L									
COLLAR ELEV. 3,130.2 ft		TOTAL DEPTH 1.7 ft		NORTHING 618,549		EASTING 593,583									
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER C. Odom		START DATE 03/29/21		COMP. DATE 03/29/21		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3135															
3130														3,130.2	0.0
	3,128.5	1.7	60/0.0									M		3,128.5	1.7

GROUND SURFACE
ROADWAY EMBANKMENT
 Very Stiff, Brown, Fine Sandy, Clayey SILT (A-5), with trace organics
 Boring Terminated with Standard Penetration Test Refusal at Elevation 3,128.5 ft On Crystalline Rock (META-SANDSTONE)

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

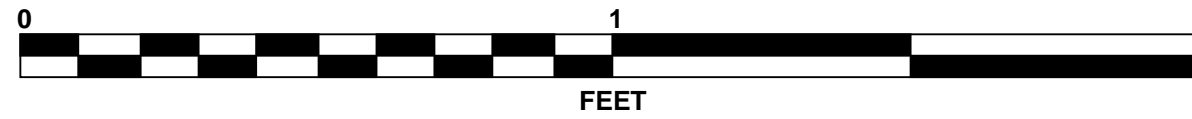
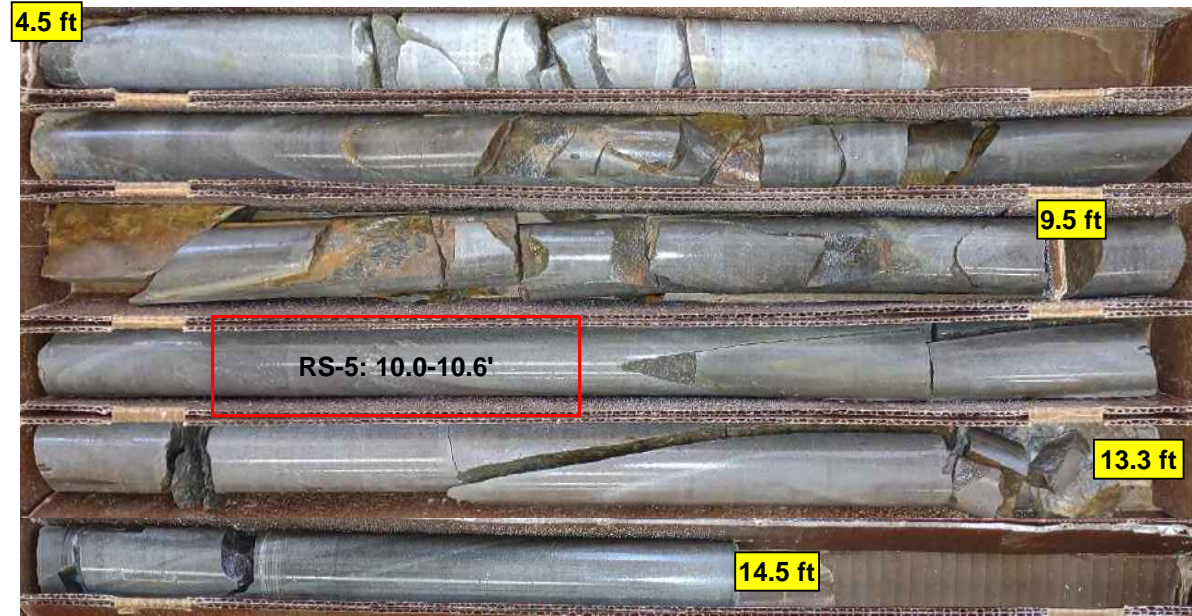
GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun												
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)											
BORING NO. LB_EB1-C		STATION 381+88		OFFSET 51 ft RT		ALIGNMENT L												
COLLAR ELEV. 3,131.7 ft		TOTAL DEPTH 14.5 ft		NORTHING 618,564		EASTING 593,646												
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic												
DRILLER C. Odom		START DATE 03/30/21		COMP. DATE 03/30/21		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)			
3135																		
3130	3,130.7	1.0	18	77	23/0.1									W	3,131.7	0.0		GROUND SURFACE
	3,128.3	3.4													3,130.2	1.5		RESIDUAL Very Stiff, Brown, Fine Sandy, Clayey SILT (A-5), with trace organics
	3,127.5	4.2	100/0.2												3,127.2	4.5		WEATHERED ROCK Gray (META-SANDSTONE)
	3,127.2	4.5	100/0.2															CRYSTALLINE ROCK Black-White-Gray, (META-SANDSTONE)
3125		60/0.0																
3120														RS-5				
															3,117.2	14.5		Boring Terminated at Elevation 3,117.2 ft In Crystalline Rock (META-SANDSTONE)

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun							
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)						
BORING NO. LB_EB1-C		STATION 381+88		OFFSET 51 ft RT		ALIGNMENT L							
COLLAR ELEV. 3,131.7 ft		TOTAL DEPTH 14.5 ft		NORTHING 618,564		EASTING 593,646							
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83%/06/16/2020				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic							
DRILLER C. Odom		START DATE 03/30/21		COMP. DATE 03/30/21		SURFACE WATER DEPTH N/A							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 10.0 ft		L O G	DESCRIPTION AND REMARKS					
					REC. (%)	RQD (%)			SAMP. NO.	STRATA REC. (%)	RQD (%)	ELEV. (ft)	DEPTH (ft)
3127.2													
3125	3,127.2	4.5	5.0	N=60/0.0 6:24/1.0 5:50/1.0 5:57/1.0 2:41/1.0 3:20/1.0	(5.0) 100%	(3.9) 78%			3,127.2	4.5		Begin Coring @ 4.5 ft CRYSTALLINE ROCK Fresh to Slightly Weathered, Moderately Hard to Hard, Black-White-Gray, (META-SANDSTONE), with Very Close to Moderately Close Fracture Spacing	
	3,122.2	9.5											
3120			5.0	3:16/1.0 2:48/1.0 2:46/1.0 4:34/1.0 5:36/1.0	(5.0) 100%	(4.1) 82%	RS-5						RS-5: 10.0-10.6 ft Unit Weight: 175.6 pcf Unconfined Compressive Strength: 22,000 psi (3,168 ksf)
	3,117.2	14.5											Boring Terminated at Elevation 3,117.2 ft In Crystalline Rock (META-SANDSTONE)

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28
Rock Core Photographs
Boring: LB_EB1-C
4.5 to 14.5 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_EB1-E		STATION 382+51		OFFSET 47 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,132.6 ft		TOTAL DEPTH 6.5 ft		NORTHING 618,598		EASTING 593,710										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 03/29/21		COMP. DATE 03/29/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
3135																
	3,131.6	1.0	38	44	53									3,132.6	GROUND SURFACE	0.0
3130	3,129.1	3.5	65	35/0.1								D		3,129.1	RESIDUAL Very Dense, Gray, Silty GRAVEL (A-1-a)	3.5
	3,126.1	6.5	60/0.0											3,126.1	WEATHERED ROCK Gray (META-SANDSTONE)	6.5
															Boring Terminated with Standard Penetration Test Refusal at Elevation 3,126.1 ft On Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_EB1-B		STATION 383+04		OFFSET 50 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,131.8 ft		TOTAL DEPTH 19.5 ft		NORTHING 618,630		EASTING 593,761										
DRILL RIGHAMMER EFF/DATE CG20446 Diedrich D50 83% 06/16/2020			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 03/30/21		COMP. DATE 03/30/21		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)	
3135																
3130	3,130.8	1.0	16	16	27										3,131.8	GROUND SURFACE
	3,128.3	3.5	22	16	13										3,128.8	RESIDUAL Hard, Brown-Gray, Fine to Coarse Sandy, Clayey SILT (A-5), with little gravel-sized rock fragments
3125	3,125.8	6.0	60/0.0												3,125.8	Medium Dense, Gray, Silty GRAVEL (A-1-a)
3120																CRSTALLINE ROCK Black-White-Gray, (META-SANDSTONE)
3115																REC=99% RQD=96% GSI=75-80
															3,112.3	Boring Terminated at Elevation 3,112.3 ft In Crystalline Rock (META-SANDSTONE)

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun						
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)					
BORING NO. LB_EB1-B		STATION 383+04		OFFSET 50 ft RT		ALIGNMENT L						
COLLAR ELEV. 3,131.8 ft		TOTAL DEPTH 19.5 ft		NORTHING 618,630		EASTING 593,761						
DRILL RIGHAMMER EFF/DATE CG20446 Diedrich D50 83% 06/16/2020			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic						
DRILLER C. Odom		START DATE 03/30/21		COMP. DATE 03/30/21		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 13.5 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			ELEV. (ft)
3125.8												
	3,125.8	6.0	3.5	N=60/0.0 4:21/1.0 5:30/1.0 4:39/1.0 2:50/0.5	(3.3) 94%	(2.9) 81%		(13.3) 99%	(12.9) 96%		3,125.8	Begin Coring @ 6.0 ft CRYSTALLINE ROCK Fresh to Slightly Weathered, Moderately Hard to Hard, Black-White-Gray, (META-SANDSTONE), with Very Close to Moderately Close Fracture Spacing
	3,122.3	9.5	5.0	3:02/1.0 2:06/1.0 2:19/1.0 2:36/1.0 3:26/1.0	(5.0) 100%	(5.0) 100%	RS-4					RS-4: 10.1 - 10.6 ft Unit Weight: 174.2 pcf Unconfined Compressive Strength: 15,620 psi (2,249 ksf)
	3,117.3	14.5	5.0	2:43/1.0 2:27/1.0 2:26/1.0 2:13/1.0 2:06/1.0	(5.0) 100%	(5.0) 100%						
	3,112.3	19.5										Boring Terminated at Elevation 3,112.3 ft In Crystalline Rock (META-SANDSTONE)

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28
Rock Core Photographs
Boring: LB_EB1-B
6.0 to 19.5 Feet



GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST D. Goodnight										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_B1-A		STATION 380+54		OFFSET 11 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 3,126.7 ft		TOTAL DEPTH 25.1 ft		NORTHING 618,584		EASTING 593,496										
DRILL RIGHAMMER EFF./DATE FIVE9553 CME-550X 80% 03/12/2021			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic										
DRILLER J. Phillips		START DATE 09/09/21		COMP. DATE 09/09/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
3130																
3125	3,125.7	1.0	9	15	11									3,125.7	0.0	GROUND SURFACE
	3,123.2	3.5	5	7	7									3,123.7	3.0	ROADWAY EMBANKMENT Gravel (0.2 ft)
3120	3,120.7	6.0	5	5	7									3,117.7	9.0	RESIDUAL Medium Dense, Brown, Silty Fine SAND (A-2-4), with little gravel-sized rock fragments
	3,118.2	8.5	15	42	58/0.2									3,116.6	10.1	Stiff, Tan-Brown, Fine Sandy SILT (A-4)
3115	3,116.6	10.1	60/0.0							100/0.7 60/0.0				3,116.6	10.1	WEATHERED ROCK Tan, (META-SANDSTONE)
																CRYSTALLINE ROCK Black-White-Gray, (META-SANDSTONE)
3110																REC=98% RQD=88% GSI=65-75
3105																
																Boring Terminated at Elevation 3,101.6 ft In Crystalline Rock (META-SANDSTONE)

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST D. Goodnight						
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)					
BORING NO. LB_B1-A		STATION 380+54		OFFSET 11 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 3,126.7 ft		TOTAL DEPTH 25.1 ft		NORTHING 618,584		EASTING 593,496						
DRILL RIGHAMMER EFF./DATE FIVE9553 CME-550X 80% 03/12/2021			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic						
DRILLER J. Phillips		START DATE 09/09/21		COMP. DATE 09/09/21		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 15.0 ft		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			ELEV. (ft)
3116.6												
3115	3,116.6	10.1	5.0	N=60/0.0 10:58/1.0 06:20/1.0 04:34/1.0 04:12/1.0 04:11/1.0	(4.7) 94%	(4.0) 80%		(14.7) 98%	(13.2) 88%		Begin Coring @ 10.1 ft CRYSTALLINE ROCK Fresh to Very Slightly Weathered, Hard to Very Hard, Black-White-Gray, (META-SANDSTONE), with moderately close fracture spacing, extremely indurated, very thinly bedded	
3110	3,111.6	15.1	5.0	03:56/1.0 04:26/1.0 05:36/1.0 06:16/1.0 06:03/1.0	(5.0) 100%	(4.2) 84%						
3105	3,106.6	20.1	5.0	04:46/1.0 05:54/1.0 05:22/1.0 05:04/1.0 04:53/1.0	(5.0) 100%	(5.0) 100%						
	3,101.6	25.1									Boring Terminated at Elevation 3,101.6 ft In Crystalline Rock (META-SANDSTONE)	

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28
Rock Core Photographs
Boring: LB_B1-A
10.1 to 25.1 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_B1-D		STATION 381+22		OFFSET 6 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,127.9 ft		TOTAL DEPTH 5.1 ft		NORTHING 618,591		EASTING 593,565										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/01/21		COMP. DATE 04/01/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	
3130																
	3,126.9	1.0												3,127.9	GROUND SURFACE	0.0
			29	71/0.4											WEATHERED ROCK	
3125	3,125.1	2.8												3,125.1	Gray (META-SANDSTONE)	2.8
			60/0.0												CRYSTALLINE ROCK	
	3,122.8	5.1												3,122.8	Gray (META-SANDSTONE)	5.1
			60/0.0												Boring Terminated with Standard Penetration Test Refusal at Elevation 3,122.8 ft In Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS		TIP		COUNTY		GEOLOGIST								
32572.1.FS10		A-0009CB		GRAHAM		S. Braun								
SITE DESCRIPTION							GROUND WTR (ft)							
Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28														
BORING NO.	LB_B1-C	STATION	381+90	OFFSET	5 ft RT	ALIGNMENT	L							
COLLAR ELEV.	3,129.2 ft	TOTAL DEPTH	24.4 ft	NORTHING	618,608	EASTING	593,632							
DRILL RIG/HAMMER EFF./DATE	CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD	SPT Core Boring	HAMMER TYPE	Automatic							
DRILLER	C. Odom		START DATE	04/02/21		COMP. DATE	04/02/21							
SURFACE WATER DEPTH			N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75			100	ELEV. (ft)	DEPTH (ft)
3130												3,129.2	GROUND SURFACE	0.0
	3,127.3	1.9										3,127.3	ROADWAY EMBANKMENT	1.9
													Stiff, Brown, Clayey, Fine to Coarse Sandy SILT (A-4), with trace gravel	
3125		60/0.0											CRYSTALLINE ROCK	
													Black-White-Gray, (META-SANDSTONE)	
3120													REC=100% RQD=84% GSI=65-75	
3115														
3110														
3105														
												3,104.8	Boring Terminated at Elevation 3,104.8 ft In Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

WBS		TIP		COUNTY		GEOLOGIST								
32572.1.FS10		A-0009CB		GRAHAM		S. Braun								
SITE DESCRIPTION							GROUND WTR (ft)							
Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28														
BORING NO.	LB_B1-C	STATION	381+90	OFFSET	5 ft RT	ALIGNMENT	L							
COLLAR ELEV.	3,129.2 ft	TOTAL DEPTH	24.4 ft	NORTHING	618,608	EASTING	593,632							
DRILL RIG/HAMMER EFF./DATE	CG20446 Diedrich D50 83%/06/16/2020			DRILL METHOD	SPT Core Boring	HAMMER TYPE	Automatic							
DRILLER	C. Odom		START DATE	04/02/21		COMP. DATE	04/02/21							
SURFACE WATER DEPTH			N/A											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS			
					REC (ft)	RQD (ft)		REC (ft)	RQD (ft)		ELEV. (ft)	DEPTH (ft)		
3127.3												Begin Coring @ 1.9 ft		
3125	3,127.3	1.9	2.5	N=60/0.0 3:41/1.0 4:49/1.0 2:48/0.5 2:30/1.0 1:56/1.0 2:11/1.0 2:21/1.0 2:47/1.0	(2.5) 100%	(2.2) 88%		(22.4) 100%	(19.0) 84%		3,127.3	CRYSTALLINE ROCK Fresh to Slightly Weathered, Moderately Hard to Hard, Black-White-Gray, (META-SANDSTONE), with Very Close to Moderately Close Fracture Spacing		
			5.0		(5.0) 100%	(5.0) 100%							RS-2	
3120	3,119.8	9.4	5.0	2:38/1.0 2:30/1.0 2:50/1.0 2:57/1.0 3:45/1.0	(5.0) 100%	(4.9) 98%							RS-2: 6.5 - 7.0 ft Unit Weight: 169.0 pcf Unconfined Compressive Strength: 16,160 psi (2,327 ksf)	
3115	3,114.8	14.4	5.0	2:45/1.0 3:04/1.0 3:11/1.0 3:23/1.0 3:16/1.0	(4.9) 98%	(3.3) 66%								
3110	3,109.8	19.4	5.0	3:24/1.0 3:04/1.0 2:52/1.0 3:05/1.0 2:48/1.0	(5.0) 100%	(3.6) 72%								
3105	3,104.8	24.4										3,104.8	Boring Terminated at Elevation 3,104.8 ft In Crystalline Rock (META-SANDSTONE)	

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28
Rock Core Photographs
Boring: LB_B1-C
1.9 to 24.4 Feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_B1-E		STATION 382+53		OFFSET 1 ft LT		ALIGNMENT L										
COLLAR ELEV. 3,129.3 ft		TOTAL DEPTH 2.7 ft		NORTHING 618,641		EASTING 593,687										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D50 83% 06/16/2020				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/01/21		COMP. DATE 04/01/21		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3130														3,129.3	GROUND SURFACE	0.0
	3,128.3	1.0													WEATHERED ROCK	
	3,126.6	2.7	100/0.3											3,126.6	Gray (META-SANDSTONE)	2.7
			60/0.0												Boring Terminated with Standard Penetration Test Refusal at Elevation 3,126.6 ft On Crystalline Rock (META-SANDSTONE)	

NCDOT BORE DOUBLE A-0009CB_GEO_RDY_GTM.GPJ NC_DOT.GDT 4/22/22

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun										
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)									
BORING NO. LB_B1-B		STATION 383+23		OFFSET 3 ft RT		ALIGNMENT L										
COLLAR ELEV. 3,131.0 ft		TOTAL DEPTH 29.1 ft		NORTHING 618,679		EASTING 593,746										
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D60 83%/06/16/2020			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic										
DRILLER C. Odom		START DATE 04/01/21		COMP. DATE 04/01/21		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)	
3135																
3130	3,130.0	1.0	6	35	65/0.3										3,131.0	0.0
	3,127.8	3.2	60/0.0												3,129.5	1.5
3125															3,127.8	3.2
3120																
3115																
3110																
3105																
															3,101.9	29.1
Boring Terminated at Elevation 3,101.9 ft In Crystalline Rock (META-SANDSTONE)																

WBS 32572.1.FS10		TIP A-0009CB		COUNTY GRAHAM		GEOLOGIST S. Braun						
SITE DESCRIPTION Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28							GROUND WTR (ft)					
BORING NO. LB_B1-B		STATION 383+23		OFFSET 3 ft RT		ALIGNMENT L						
COLLAR ELEV. 3,131.0 ft		TOTAL DEPTH 29.1 ft		NORTHING 618,679		EASTING 593,746						
DRILL RIGHAMMER EFF./DATE CG20446 Diedrich D60 83%/06/16/2020			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic						
DRILLER C. Odom		START DATE 04/01/21		COMP. DATE 04/01/21		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 25.9 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
3127.8	3,127.8	3.2	0.9	N=60/0.0 4:13/0.9	(0.8)	(0.0)		(25.8)	(22.3)		Begin Coring @ 3.2 ft	3.2
3125	3,126.9	4.1	5.0	3:15/1.0 5:12/1.0 4:03/1.0 4:17/1.0 3:53/1.0	89%	0%		100%	86%		Slightly Weathered to Fresh, Moderately Hard to Hard, Black-White-Gray, (META-SANDSTONE), with Close to Moderately Close Fracture Spacing	
3120	3,121.9	9.1	5.0	2:54/1.0 2:19/1.0 2:33/1.0 2:41/1.0 2:27/1.0	(5.0)	(4.5)	RS-1				RS-1: 8.0 - 8.6 ft Unit Weight: 173.8 pcf Unconfined Compressive Strength: 21,490 psi (3,095 ksf)	
3115	3,116.9	14.1	5.0	2:53/1.0 1:40/1.0 5:54/1.0 3:36/1.0 3:21/1.0	(5.0)	(4.4)						
3110	3,111.9	19.1	5.0	2:04/1.0 3:36/1.0 3:39/1.0 3:26/1.0 2:38/1.0	(5.0)	(4.6)						
3105	3,106.9	24.1	5.0	2:40/1.0 2:49/1.0 3:27/1.0 2:27/1.0 3:07/1.0	(5.0)	(4.7)						
	3,101.9	29.1									Boring Terminated at Elevation 3,101.9 ft In Crystalline Rock (META-SANDSTONE)	29.1

Precast Concrete Arch Land Bridge over NC 143 Between SR 1282 and NC 28

Rock Core Photographs

Boring: LB_B1-B

3.2 to 29.1 Feet

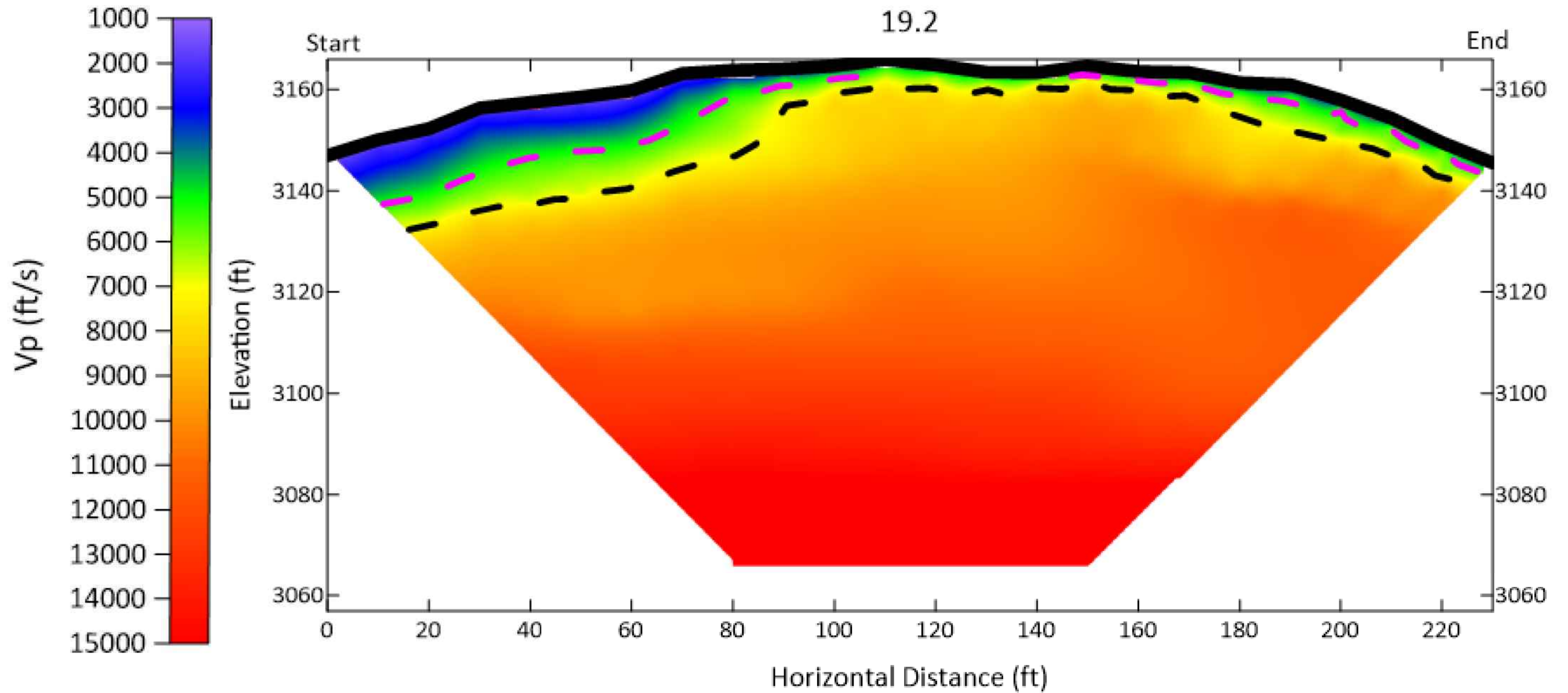


LAB RESULTS**ROCK TEST RESULTS**

SAMPLE NO.	BORING	STATION	OFFSET	DEPTH INTERVAL	ROCK TYPE	UNIT WEIGHT (PCF)	UNCONFINED COMPRESSIVE STRENGTH
RS-1	LB B1-B	383+23 -L-	3' RT	8.0 - 8.6'	META-SANDSTONE	173.8	21,490 psi / 3,095 ksf
RS-2	LB B1-C	381+90 -L-	5' RT	6.5 - 7.0'	META-SANDSTONE	169.0	16,160 psi / 2,327 ksf
RS-3	LB EBI-A	380+73 -L-	48' RT	13.3 - 13.9'	META-SANDSTONE	171.5	20,620 psi / 2,969 ksf
RS-4	LB EBI-B	383+04 -L-	50' RT	10.1 - 10.6'	META-SANDSTONE	174.2	15,620 psi / 2,249 ksf
RS-5	LB EBI-C	381+88 -L-	51' RT	10.0 - 10.6'	META-SANDSTONE	175.6	22,000 psi / 3,168 ksf

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

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.2

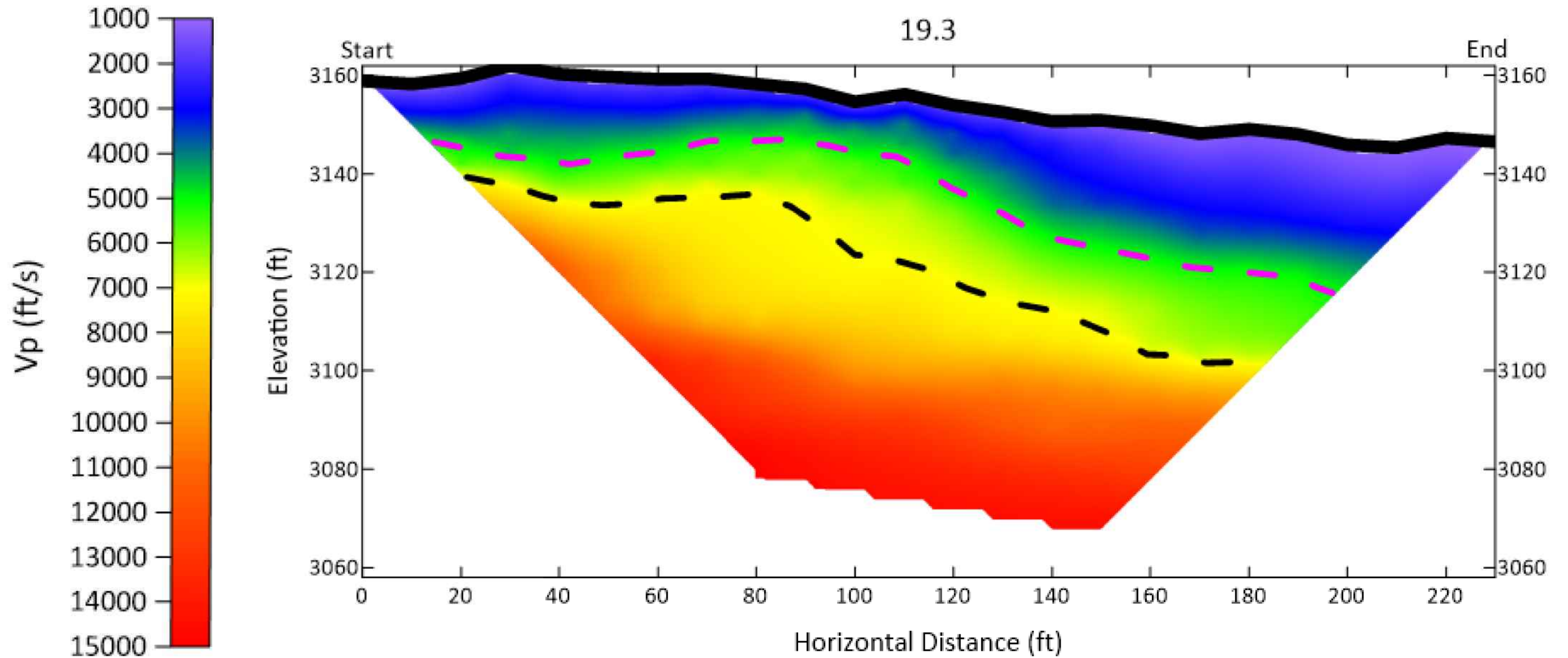


GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC

GEOPHYSICAL TEST RESULTS – SEISMIC REFRACTION LINE 19.3



GEOPHYSICAL TESTING PERFORMED BY GEL SOLUTIONS. REFERENCE "SEISMIC REFRACTION SURVEY FOR EVALUATION OF ROCK" DATED 10/01/2021

CG2 ESTIMATED WAVE SPEED FOR WEATHERED ROCK: 4,500 FT/SEC

CG2 ESTIMATED WAVE SPEED FOR CRYSTALLINE ROCK: 7,500 FT/SEC