

REFERENCE: BP11.R005

PROJECT: SF-850015

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY SURRY  
PROJECT DESCRIPTION REPLACE BRIDGE NO. 15 ON SR  
1315 (ZEPHYR MOUNTAIN PARK RD.) OVER  
MITCHELL RIVER

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4	PROFILE
5-8	CROSS SECTIONS
9-16	BORE LOGS, CORE LOGS, AND ROCK CORE PHOTOS
17	LAB RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BP11.R005	1	17

**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:
1. 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.
  2. 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

- BRECCIA
- J. MORLOWE
- D. GOODNIGHT
- F&R, INC.
- D. TIGNOR
- C. WANG

INVESTIGATED BY CG2, PLLC.

DRAWN BY M. BREWER, P.E.

CHECKED BY R. KRAL, P.E.

SUBMITTED BY CG2, PLLC.

DATE MAY 2022

Prepared in the Office of:



**CAROLINAS  
GEOTECHNICAL  
GROUP**  
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CHARLOTTE, NC 28227  
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DocuSigned by:  
D. Matthew Brewer 8/7/2022  
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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 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.  <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.  <b>GAP-GRADED</b> - 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><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.  <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA.  <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.  <b>ARGILLACEOUS</b> - 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.  <b>ARTESIAN</b> - 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.  <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.  <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.  <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.  <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.  <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.  <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.  <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.  <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.  <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.  <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.  <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.  <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.  <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.  <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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.  <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.  <b>SILL</b> - 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.  <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.  <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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.  <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.  <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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.  <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																
<p style="text-align: center;"><b>SOIL LEGEND AND AASHTO CLASSIFICATION</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th colspan="5"></th> </tr> <tr> <th>SYMBOL</th> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> <td colspan="5">[Table]</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td colspan="5">FAIR TO POOR, POOR, UNSUITABLE</td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7						SYMBOL	[Pattern]					[Pattern]					[Pattern]					% PASSING #10 #40 #200	[Table]					[Table]					[Table]					MATERIAL PASSING #40 LL PI	[Table]					[Table]					[Table]					GROUP INDEX	[Table]					[Table]					[Table]					USUAL TYPES OF MAJOR MATERIALS	[Table]					[Table]					[Table]					GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR, POOR, UNSUITABLE					<p style="text-align: center;"><b>MINERALOGICAL COMPOSITION</b></p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p style="text-align: center;"><b>WEATHERING</b></p> <p>FRESH: ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (IV SLI.): ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLI.): ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.): SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</i></p> <p>VERY SEVERE (IV SEV.): ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i></p> <p>COMPLETE: ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>									
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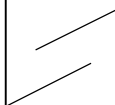
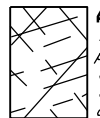
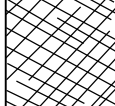
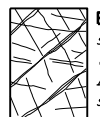





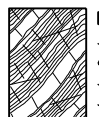


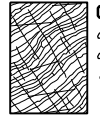

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
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GEOTECHNICAL ENGINEERING UNIT

**SUBSURFACE INVESTIGATION**

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

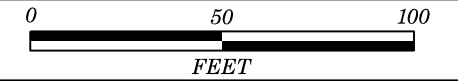
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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	GOOD	FAIR	POOR	VERY POOR	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	GOOD	FAIR	POOR	VERY POOR	
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

# SITE PLAN

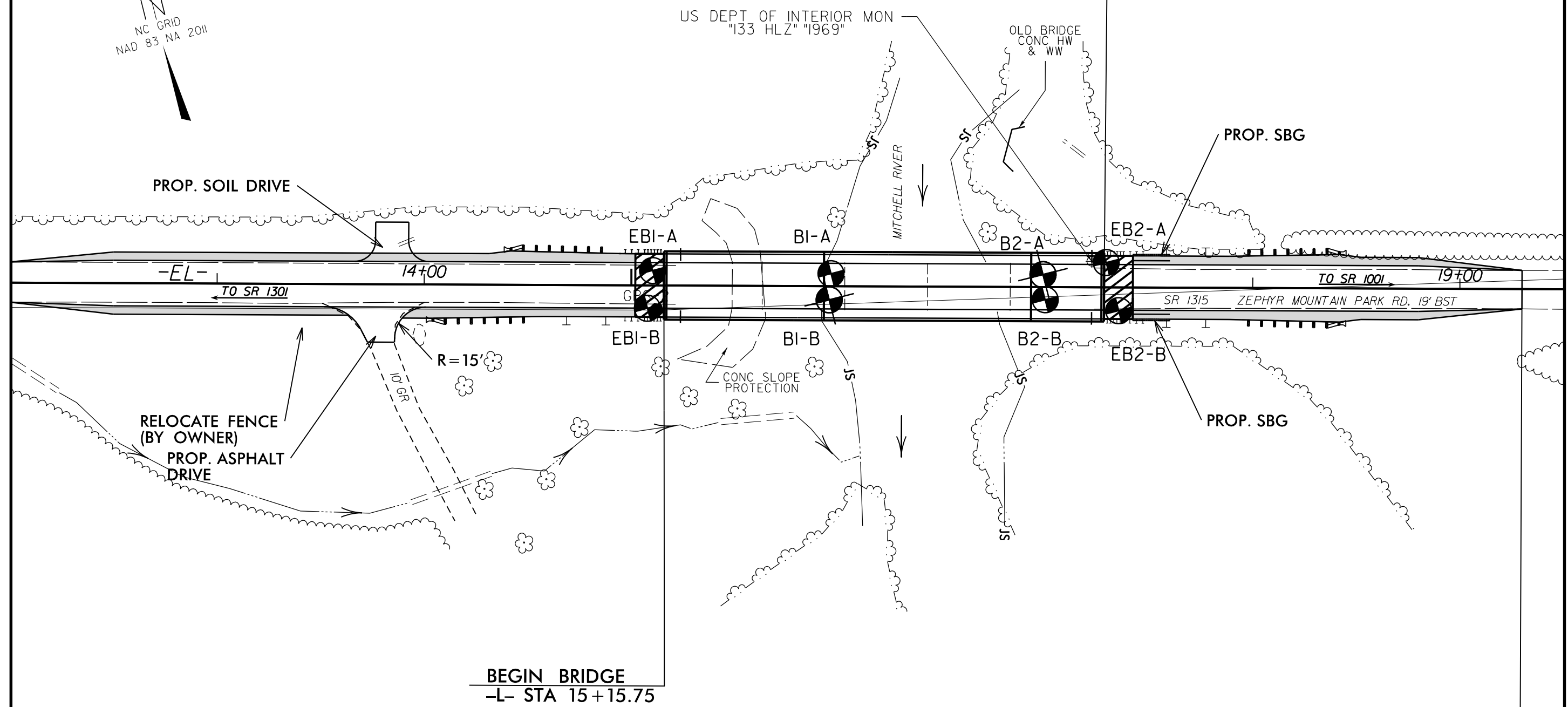
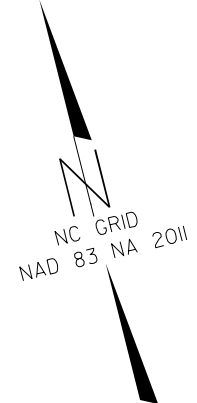


REPLACE BRIDGE NO. 15 ON SR 1315 (ZEPHYR MOUNTAIN PARK RD.) OVER MITCHELL RIVER

SKEW = 90 DEGREES

BEGIN PROJECT BP11.R005  
-L- POT 12 + 00.00

END BRIDGE  
-L- STA 17 + 28.25



BEGIN BRIDGE  
-L- STA 15 + 15.75

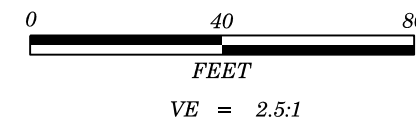
END PROJECT BP11.R005  
-L- POT 19 + 30.00

EBI-A, EBI-B, EB2-A, AND EB2-B WERE PERFORMED BY F&R, INC. AND SUBSURFACE DATA OBTAINED FROM THEIR REPORT DATED APRIL 20, 2016.

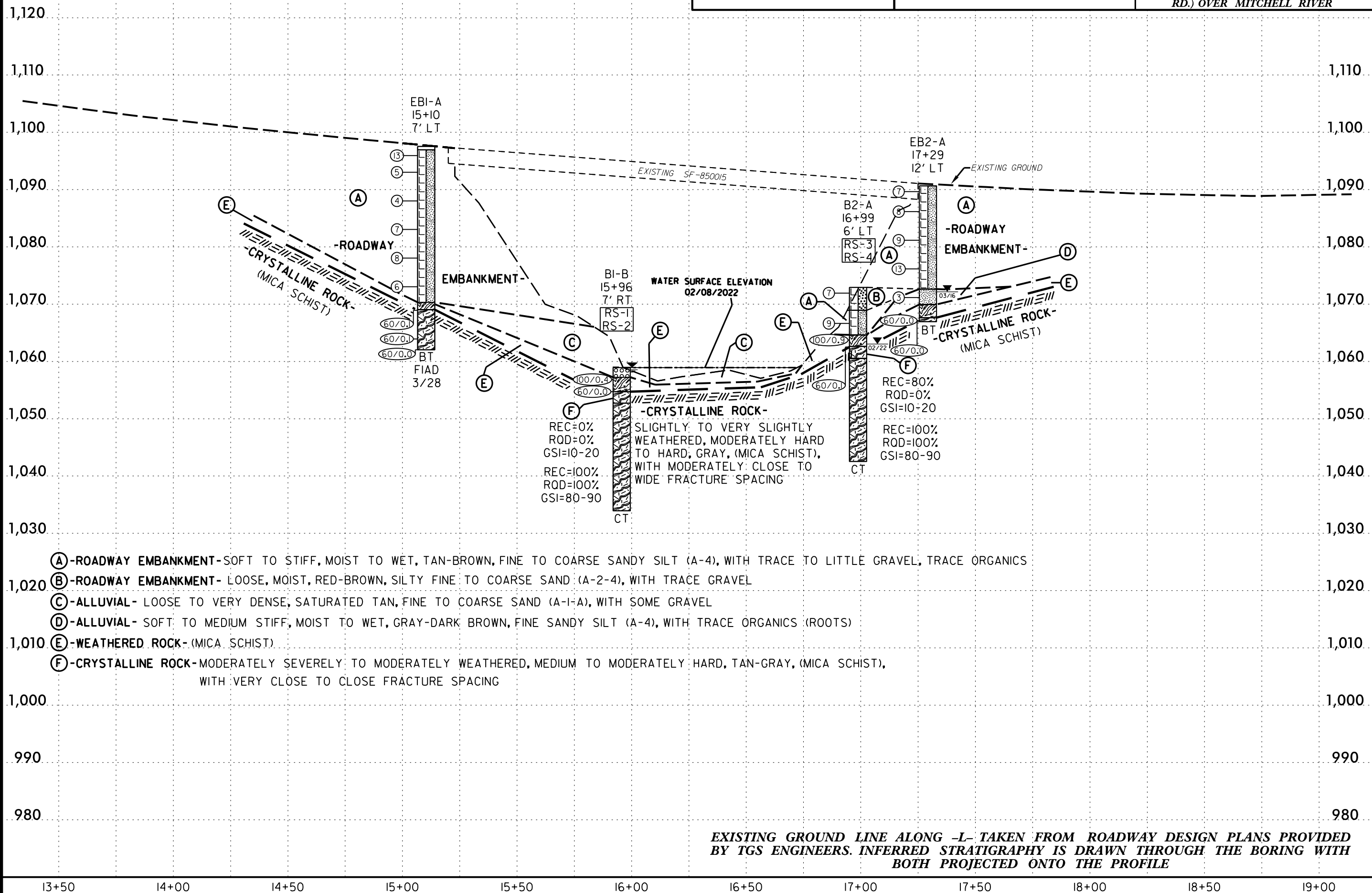
5/14/99



Prepared in the Office of:



<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
BP11.R005	4
REPLACE BRIDGE NO. 15 ON SR 1315 (ZEPHYR MOUNTAIN PARK RD.) OVER MITCHELL RIVER	



- (A) -ROADWAY EMBANKMENT-SOFT TO STIFF, MOIST TO WET, TAN-BROWN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE TO LITTLE GRAVEL, TRACE ORGANICS
- (B) -ROADWAY EMBANKMENT- LOOSE, MOIST, RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- (C) -ALLUVIAL- LOOSE TO VERY DENSE, SATURATED TAN, FINE TO COARSE SAND (A-I-A), WITH SOME GRAVEL
- (D) -ALLUVIAL- SOFT TO MEDIUM STIFF, MOIST TO WET, GRAY-DARK BROWN, FINE SANDY SILT (A-4), WITH TRACE ORGANICS (ROOTS)
- (E) -WEATHERED ROCK- (MICA SCHIST)
- (F) -CRYSTALLINE ROCK-MODERATELY SEVERELY TO MODERATELY WEATHERED, MEDIUM TO MODERATELY HARD, TAN-GRAY, (MICA SCHIST), WITH VERY CLOSE TO CLOSE FRACTURE SPACING

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

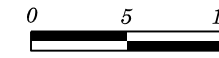
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6/23/16

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GEOTECHNICAL  
GROUP

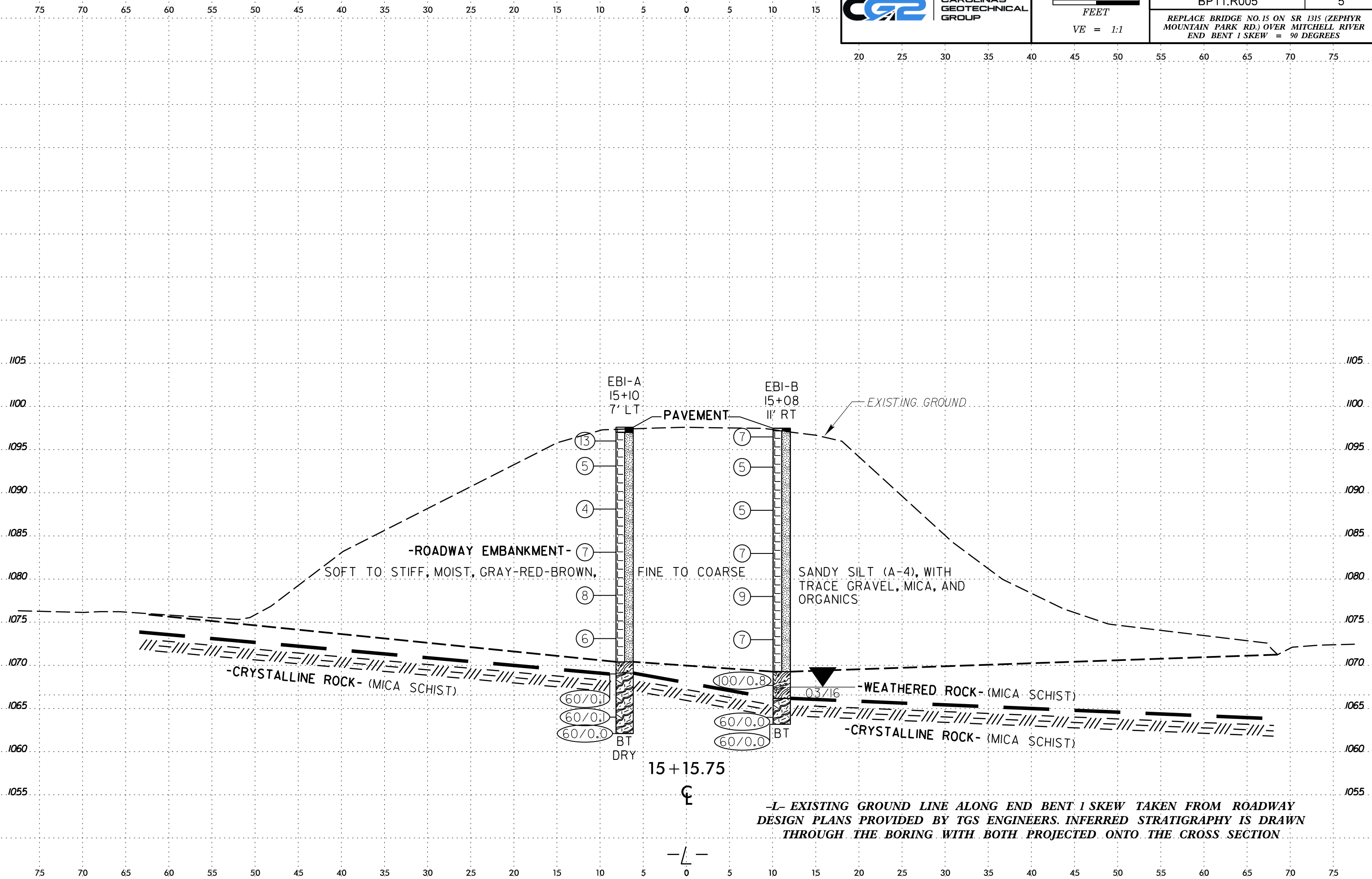


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PROJECT REFERENCE NO. SHEET NO.

BP11.R005 5

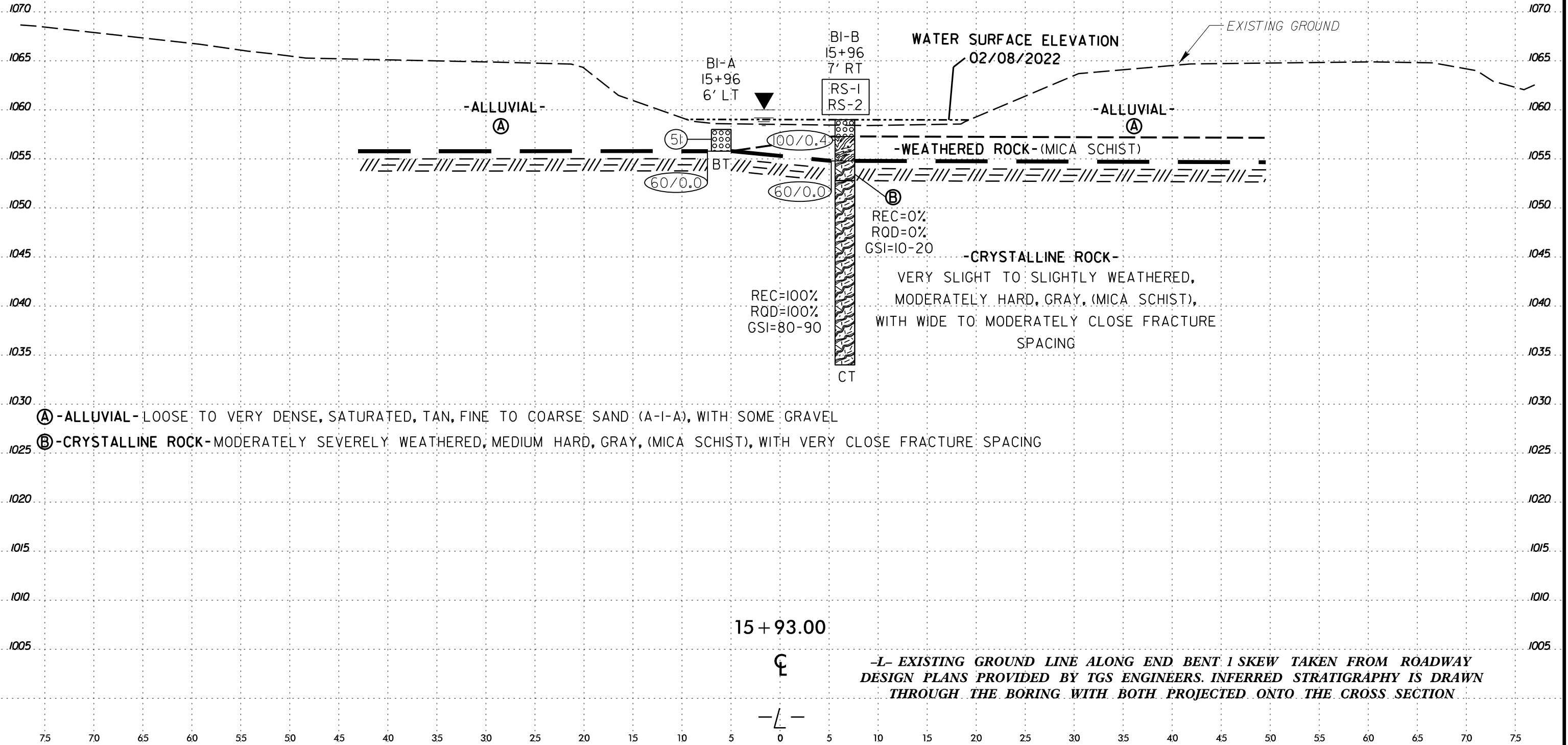
REPLACE BRIDGE NO. 15 ON SR 1315 (ZEPHYR MOUNTAIN PARK RD.) OVER MITCHELL RIVER  
END BENT 1 SKEW = 90 DEGREES



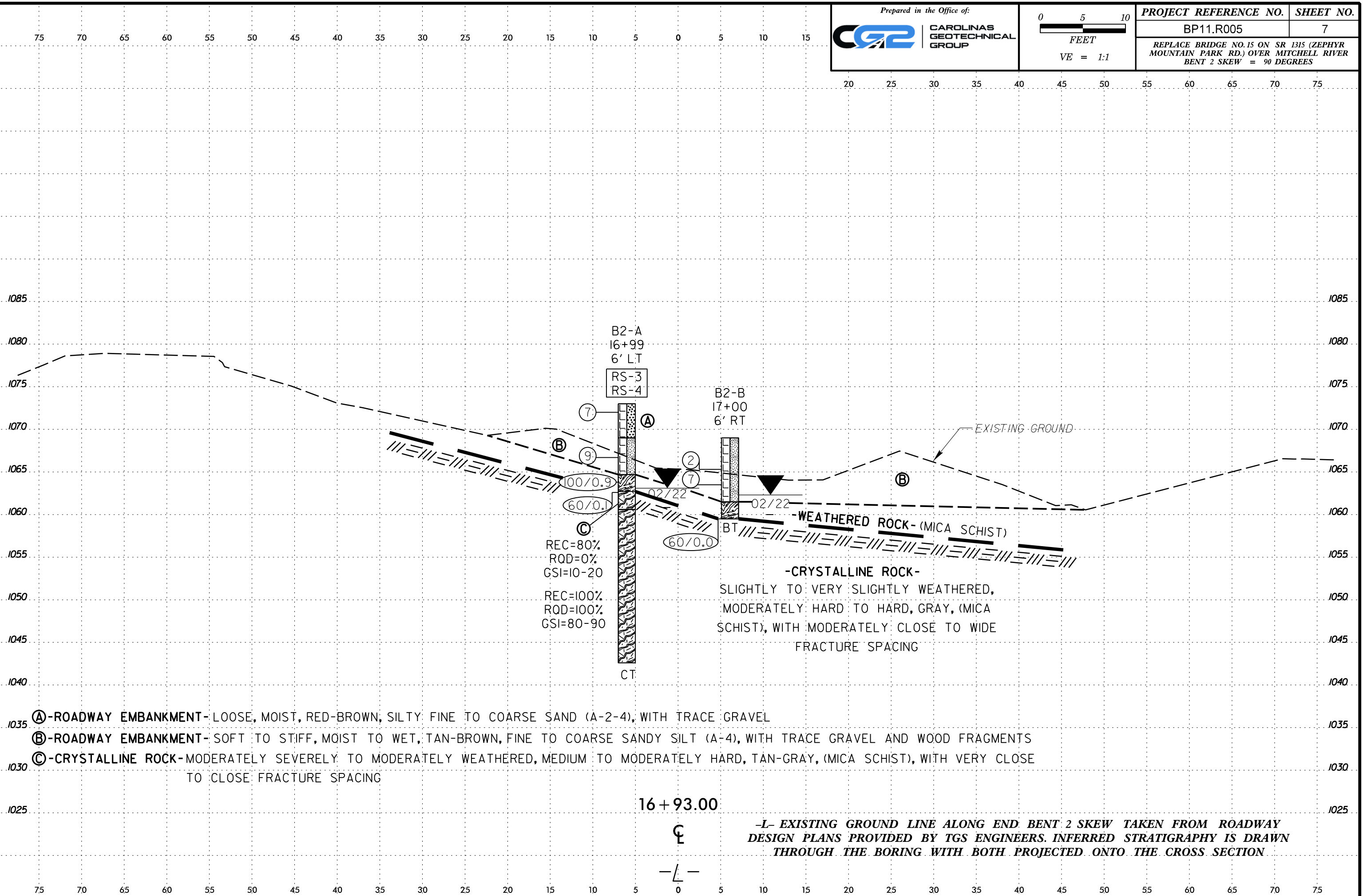
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-L- EXISTING GROUND LINE ALONG END BENT 1 SKEW TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY TGS ENGINEERS. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

6/23/16  
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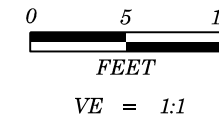
- (A) -ROADWAY EMBANKMENT- LOOSE, MOIST, RED-BROWN, SILTY FINE TO COARSE SAND (A-2-4), WITH TRACE GRAVEL
- (B) -ROADWAY EMBANKMENT- SOFT TO STIFF, MOIST TO WET, TAN-BROWN, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL AND WOOD FRAGMENTS
- (C) -CRYSTALLINE ROCK- MODERATELY SEVERELY TO MODERATELY WEATHERED, MEDIUM TO MODERATELY HARD, TAN-GRAY, (MICA SCHIST), WITH VERY CLOSE TO CLOSE FRACTURE SPACING

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

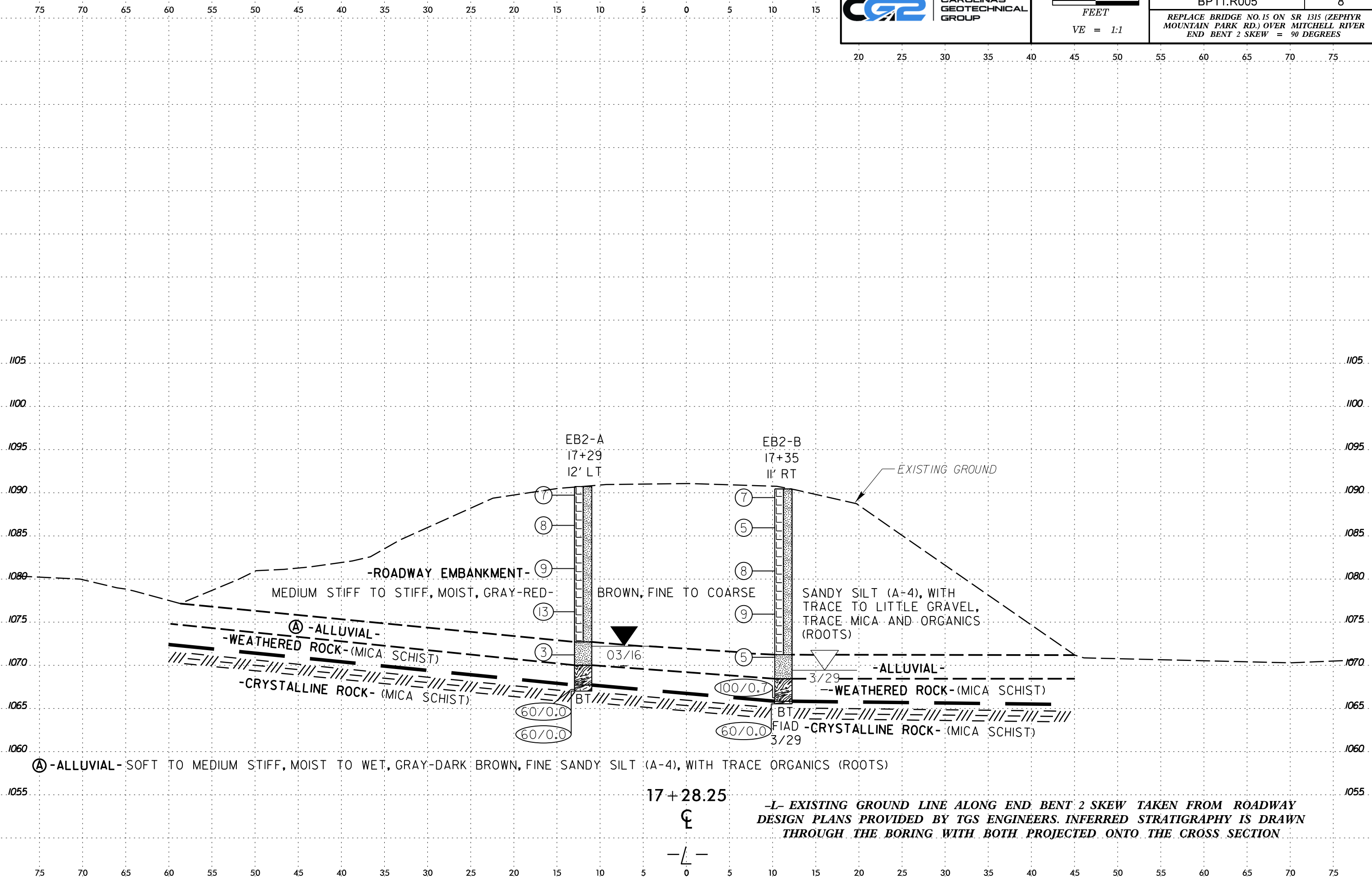


6/23/16

Prepared in the Office of:



<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
BP11.R005	8
REPLACE BRIDGE NO. 15 ON SR 1315 (ZEPHYR MOUNTAIN PARK RD.) OVER MITCHELL RIVER END BENT 2 SKEW = 90 DEGREES	



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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST C. Wang										
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 15+10		OFFSET 7 ft LT		ALIGNMENT L										
COLLAR ELEV. 1,097.6 ft		TOTAL DEPTH 35.5 ft		NORTHING 960,588		EASTING 1,457,988										
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 80%/02/16/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER D. Tignor		START DATE 03/28/16		COMP. DATE 03/28/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1100																
	1,097.0	0.6	10	8	5									1,097.6	0.0	GROUND SURFACE Asphalt
1095	1,094.1	3.5	4	3	2									1,097.6	0.6	ROADWAY EMBANKMENT Gray-Brown and Red-Brown, Fine to Coarse Sandy SILT (A-4), with Trace Gravel and Mica
1090	1,089.1	8.5	3	2	2											
1085	1,084.1	13.5	3	3	4											
1080	1,079.1	18.5	2	4	4											
1075	1,074.1	23.5	3	3	3											
1070	1,069.1	28.5	60/0.1											1,070.4	27.2	WEATHERED ROCK Gray (MICA SCHIST)
														1,069.1	28.5	CRYSTALLINE ROCK Gray and Gray-Brown (MICA SCHIST)
1065	1,064.1	33.5	60/0.1													
	1,062.1	35.5	60/0.0											1,062.1	35.5	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,062.1 ft in Crystalline Rock (MICA SCHIST)
NOTES: 1) Auger Refusal at 35.5' Bore Logs Provided by NCDOT, Prepared by F&R, Inc.																

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST C. Wang										
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 15+08		OFFSET 11 ft RT		ALIGNMENT L										
COLLAR ELEV. 1,097.5 ft		TOTAL DEPTH 34.3 ft		NORTHING 960,571		EASTING 1,457,981										
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 80%/02/16/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER D. Tignor		START DATE 03/28/16		COMP. DATE 03/28/16		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1100																
	1,097.5	0.0	3	3	4									1,087.5	0.0	GROUND SURFACE ABC Stone
1095	1,094.0	3.5	4	3	2											ROADWAY EMBANKMENT Gray-Brown and Red-Brown, Fine Sandy SILT (A-4), with Trace Gravel, Mica, and Organics
1090	1,089.0	8.5	3	2	3											
1085	1,084.0	13.5	4	4	3											
1080	1,079.0	18.5	3	5	4											
1075	1,074.0	23.5	3	3	4											
1070	1,069.0	28.5	24	58	42/0.3									1,069.3	28.2	WEATHERED ROCK Gray (MICA SCHIST)
														1,066.2	31.3	CRYSTALLINE ROCK Gray (MICA SCHIST)
1065	1,064.0	33.5	60/0.0											1,063.2	34.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,063.2 ft in Crystalline Rock (MICA SCHIST)
	1,063.2	34.3	60/0.0											1,063.2	34.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 1,063.2 ft in Crystalline Rock (MICA SCHIST)
NOTES: 1) 0.0-0.1' = Surficial Organic Soil 2) Auger Refusal at 34.3' Bore Logs Provided by NCDOT, Prepared by F&R, Inc.																

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight											
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)										
BORING NO. B1-A		STATION 15+96		OFFSET 6 ft LT		ALIGNMENT L											
COLLAR ELEV. 1,058.0 ft		TOTAL DEPTH 2.2 ft		NORTHING 960,565		EASTING 1,458,071											
DRILL RIGHAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
DRILLER J. Morlowe		START DATE 02/08/22		COMP. DATE 02/08/22		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							
1060																	
	1,058.0	0.0	3	2	49										1,058.0	GROUND SURFACE	0.0
	1,055.8	2.2												Sat.	1,055.8	<b>ALLUVIAL</b> Very Dense, Tan, Fine to Coarse SAND (A-1-a), with some gravel Boring Terminated with Standard Penetration Test Refusal at Elevation 1,055.8 ft On Crystalline Rock (MICA SCHIST)	2.2

NCDOT BORE DOUBLE SURRY 15.GPJ NC\_DOT\_GDT 5/18/22

# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight									
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)								
BORING NO. B1-B		STATION 15+96		OFFSET 7 ft RT		ALIGNMENT L									
COLLAR ELEV. 1,059.0 ft		TOTAL DEPTH 25.0 ft		NORTHING 960,553		EASTING 1,458,067									
DRILL RIG/HAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic									
DRILLER J. Morlowe		START DATE 02/08/22		COMP. DATE 02/08/22		SURFACE WATER DEPTH 0.2ft									
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					
1060														1,059.0 WATER SURFACE (02/08/22) 0.0	
	1,057.3	1.7												1,057.3 ALLUVIAL 1.7	
			100/0.4											1,054.8 Loose, Tan, Fine to Coarse SAND (A-1-a), 4.2	
1055	1,054.8	4.2												1,054.8 WEATHERED ROCK 4.2	
			60/0.0											1,052.8 CRYSTALLINE ROCK 6.2	
														Gray, (MICA SCHIST)	
1050														Gray, (MICA SCHIST)	
														REC=0% RQD=0% GSI=10-20	
1045														Gray, (MICA SCHIST)	
														REC=100% RQD=100% GSI=80-90	
1040															
1035															
															1,034.0 Boring Terminated at Elevation 1,034.0 ft In Crystalline Rock (MICA SCHIST) 25.0

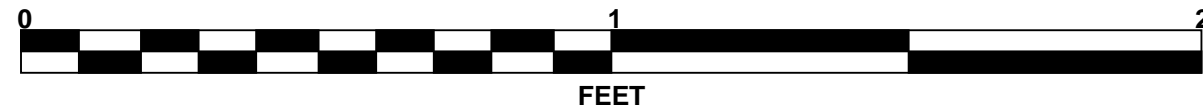
WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight						
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)					
BORING NO. B1-B		STATION 15+96		OFFSET 7 ft RT		ALIGNMENT L						
COLLAR ELEV. 1,059.0 ft		TOTAL DEPTH 25.0 ft		NORTHING 960,553		EASTING 1,458,067						
DRILL RIG/HAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic						
DRILLER J. Morlowe		START DATE 02/08/22		COMP. DATE 02/08/22		SURFACE WATER DEPTH 0.2ft						
CORE SIZE NQ2		TOTAL RUN 20.8 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) %			
1054.8	1,054.8	4.2	0.8	N=60/0.0 0.52/0.8	(0.0)	(0.0)		(0.0)	(0.0)		Begin Coring @ 4.2 ft	4.2
	1,054.0	5.0	5.0	2:12/1.0 2:18/1.0 2:15/1.0 2:18/1.0 1:42/1.0	0%	0%		0%	0%		CRYSTALLINE ROCK Moderately Severely Weathered, Medium Hard, Gray, (MICA SCHIST), with very close fracture spacing	6.2
1050					(3.8)	(3.8)		(18.8)	(18.8)		GSI=10-20	
	1,049.0	10.0	5.0	2:28/1.0 2:08/1.0 2:00/1.0 1:46/1.0 1:42/1.0	100%	100%	RS-1	100%	100%		Very Slight to Slightly Weathered, Moderately Hard, Gray, (MICA SCHIST), with wide to moderately close fracture spacing	
1045					(5.0)	(5.0)					RS-1: 8.8 - 9.3' Unit Weight: 170.9 pcf Unconfined Compressive Strength: 11,800 psi (1,699 ksf)	
	1,044.0	15.0	5.0	2:19/1.0 1:55/1.0 1:56/1.0 2:00/1.0 1:45/1.0	100%	100%	RS-2				RS-2: 12.9 - 13.4' Unit Weight: 173.3 pcf Unconfined Compressive Strength: 9,980 psi (1,437 ksf)	
1040					(5.0)	(5.0)						
	1,039.0	20.0	5.0	1:45/1.0 2:01/1.0 1:47/1.0 2:09/1.0 2:30/1.0	100%	100%					GSI=80-90	
1035												
	1,034.0	25.0									Boring Terminated at Elevation 1,034.0 ft In Crystalline Rock (MICA SCHIST)	25.0



# Replace Bridge No. 15 on SR 1315 (Zephyr Mountain Park Rd.) over Mitchell River Rock Core Photographs

**Boring: B1-B**  
4.2 to 25.0 Feet

Note: No recovery from 4.2 to 5.0 feet.



## GEOTECHNICAL BORING REPORT BORE LOG

## GEOTECHNICAL BORING REPORT CORE LOG

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight									
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)								
BORING NO. B2-A		STATION 16+99		OFFSET 6 ft LT		ALIGNMENT L									
COLLAR ELEV. 1,073.0 ft		TOTAL DEPTH 30.4 ft		NORTHING 960,539		EASTING 1,458,170									
DRILL RIGHAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021			DRILL METHOD NW Casing WSPT & Core			HAMMER TYPE Automatic									
DRILLER J. Morlowe		START DATE 02/09/22		COMP. DATE 02/09/22		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					
1075	1,073.0	0.0												GROUND SURFACE	0.0
1070	1,067.7	5.3	2	4	3							M	ROADWAY EMBANKMENT Loose, Red-Brown, Silty Fine to Coarse SAND (A-2-4), with trace gravel	4.0	
1065	1,065.2	7.8	5	3	6							M	Stiff, Brown, Fine to Coarse Sandy SILT (A-4), with trace gravel and wood fragments	8.3	
1060	1,062.7	10.3	4	36	64/0.4								WEATHERED ROCK Tan-Gray, (MICA SCHIST)	10.3	
													CRYSTALLINE ROCK Tan-Gray, (MICA SCHIST)	10.4	
													REC=80% RQD=0% GSI=10-20	12.4	
1055													Tan-Gray, (MICA SCHIST)		
1050													REC=100% RQD=100% GSI=80-90		
1045															
														Boring Terminated at Elevation 1,042.6 ft In Crystalline Rock (MICA SCHIST)	30.4

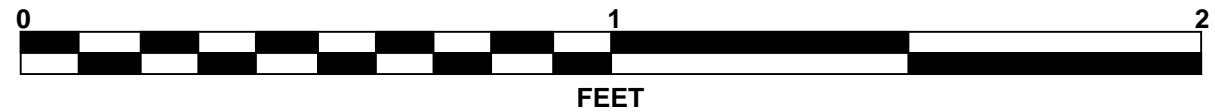
WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight					
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)				
BORING NO. B2-A		STATION 16+99		OFFSET 6 ft LT		ALIGNMENT L					
COLLAR ELEV. 1,073.0 ft		TOTAL DEPTH 30.4 ft		NORTHING 960,539		EASTING 1,458,170					
DRILL RIGHAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021			DRILL METHOD NW Casing WSPT & Core			HAMMER TYPE Automatic					
DRILLER J. Morlowe		START DATE 02/09/22		COMP. DATE 02/09/22		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 20.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)			
1062.6	1,062.6	10.4	5.0	1:52/1.0 1:50/1.0 1:47/1.0 1:51/1.0 1:44/1.0	(4.6) 92%	(3.0) 60%	(1.6) 80%	(0.0) 0%		Begin Coring @ 10.4 ft	10.4
1060										CRYSTALLINE ROCK Moderately Severely to Moderately Weathered, Medium to Moderately Hard, Tan-Gray, (MICA SCHIST), with very close to close fracture spacing	12.4
	1,057.6	15.4								GSI=10-20	
1055			5.0	1:49/1.0 1:58/1.0 1:59/1.0 1:52/1.0 1:47/1.0	(5.0) 100%	(5.0) 100%	(18.0) 100%	(18.0) 100%		Slightly to Very Slightly Weathered, Moderately Hard to Hard, Gray, (MICA SCHIST), with moderately close to wide fracture spacing, contains intermittent zones of gneissic material	
	1,052.6	20.4								RS-1: 14.1-14.6' Unit Weight: 173.1 pcf Unconfined Compressive Strength: 11,470 psi (1,651 ksf)	
1050			5.0	1:49/1.0 1:59/1.0 2:14/1.0 1:58/1.0 1:48/1.0	(5.0) 100%	(5.0) 100%				RS-2: 20.4-21.0' Unit Weight: 174.1 pcf Unconfined Compressive Strength: 5,520 psi (795 ksf)	
	1,047.6	25.4								GSI=80-90	
1045			5.0	2:00/1.0 1:59/1.0 1:46/1.0 1:54/1.0 1:45/1.0	(5.0) 100%	(5.0) 100%					
	1,042.6	30.4								Boring Terminated at Elevation 1,042.6 ft In Crystalline Rock (MICA SCHIST)	30.4



CAROLINAS  
GEOTECHNICAL  
GROUP

# Replace Bridge No. 15 on SR 1315 (Zephyr Mountain Park Rd.) over Mitchell River Rock Core Photographs

Boring: B2-A  
10.4 to 30.4 Feet



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST D. Goodnight										
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)									
BORING NO. B2-B		STATION 17+00		OFFSET 6 ft RT		ALIGNMENT L										
COLLAR ELEV. 1,069.0 ft		TOTAL DEPTH 9.5 ft		NORTHING 960,527		EASTING 1,458,168										
DRILL RIG/HAMMER EFF./DATE FIVE4593 CME-550X 82% 03/12/2021			DRILL METHOD NV Casing w/ SPT			HAMMER TYPE Automatic										
DRILLER J. Morlowe		START DATE 02/07/22		COMP. DATE 02/07/22		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						
1070														1,069.0	GROUND SURFACE	0.0
	1,066.3	2.7	1	1	1										<b>ROADWAY EMBANKMENT</b>	
1065	1,064.5	4.5	2	2	5										Soft to Medium Stiff, Tan-Brown, Fine to Coarse Sandy SILT (A-4), with trace gravel	
1060	1,059.5	9.5												1,061.5	<b>WEATHERED ROCK</b>	7.5
														1,059.5	White-Gray, (MICA SCHIST)	9.5
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,059.5 ft On Crystalline Rock (MICA SCHIST)	

WBS BP11.R005		TIP SF-850015		COUNTY SURRY		GEOLOGIST C. Wang										
SITE DESCRIPTION Replace Br. 015 on SR 1315 (Zephyr Mountain Park Road) over Mitchell River							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 17+29		OFFSET 12 ft LT		ALIGNMENT L										
COLLAR ELEV. 1,090.7 ft		TOTAL DEPTH 23.7 ft		NORTHING 960,537		EASTING 1,458,201										
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 80% 02/16/2016			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER D. Tignor		START DATE 03/28/16		COMP. DATE 03/28/16		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						
1095														1,090.7	GROUND SURFACE	0.0
1090	1,090.7	0.0	2	4	3										<b>ROADWAY EMBANKMENT</b>	
	1,087.2	3.5													Gray-Brown, Red-Brown, and Brown, Fine to Coarse Sandy SILT (A-4) with Trace to Little Gravel, Trace Mica, and Organics (Roots)	
1085														1,082.2	<b>WEATHERED ROCK</b>	8.5
	1,082.2	8.5	4	5	4										White-Gray, (MICA SCHIST)	
1080														1,077.2	<b>WEATHERED ROCK</b>	13.5
	1,077.2	13.5	4	8	5										White-Gray, (MICA SCHIST)	
1075														1,072.2	<b>WEATHERED ROCK</b>	18.5
	1,072.2	18.5	2	1	2										White-Gray, (MICA SCHIST)	
1070														1,072.7	<b>ALLUVIAL</b>	18.0
															Gray, Fine Sandy SILT (A-4) with Trace Organics (Roots)	
	1,070.0	20.7												1,070.0	<b>WEATHERED ROCK</b>	20.7
	1,067.7	23.0												1,067.7	Gray (MICA SCHIST)	23.0
	1,067.0	23.7												1,067.0	<b>CRYSTALLINE ROCK</b>	23.7
															Gray (MICA SCHIST)	
															Boring Terminated with Standard Penetration Test Refusal at Elevation 1,067.0 ft in Crystalline Rock (MICA SCHIST)	

NOTES:  
 1) 0.0-0.3'= Surficial Organic Soil  
 2) Auger Refusal at 23.7'

Bore Logs Provided by NCDOT, Prepared by F&R, Inc.

NCDOT BORE DOUBLE SURRY 15.GPJ NC\_DOT\_GDT 5/18/22





**LAB RESULTS****ROCK TEST RESULTS**

<i>SAMPLE NO.</i>	<i>BORING</i>	<i>STATION</i>	<i>OFFSET</i>	<i>DEPTH INTERVAL</i>	<i>ROCK TYPE</i>	<i>UNIT WEIGHT (PCF)</i>	<i>UNCONFINED COMPRESSIVE STRENGTH</i>
<i>RS-1</i>	<i>B1-B</i>	<i>15+96 -L-</i>	<i>7' RT</i>	<i>8.8-9.3</i>	<i>MICA SCHIST</i>	<i>170.9</i>	<i>11,800 psi /1,699 ksf</i>
<i>RS-2</i>	<i>B1-B</i>	<i>15+96 -L-</i>	<i>7' RT</i>	<i>13.3-13.8</i>	<i>MICA SCHIST</i>	<i>173.3</i>	<i>9,980 psi /1,437 ksf</i>
<i>RS-3</i>	<i>B2-A</i>	<i>16+99 -L-</i>	<i>6' LT</i>	<i>14.6-15.1</i>	<i>MICA SCHIST</i>	<i>173.1</i>	<i>11,470 psi /1,651 ksf</i>
<i>RS-4</i>	<i>B2-A</i>	<i>16+99 -L-</i>	<i>6' LT</i>	<i>20.4-21.0</i>	<i>MICA SCHIST</i>	<i>174.1</i>	<i>5,520 psi /795 ksf</i>

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