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REFERENCE: B-4962

PROJECT: 40174

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-4962	1	24

STRUCTURE
SUBSURFACE INVESTIGATION

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-6	PROFILE(S)
7-9	CROSS SECTION(S)
10-17	BORE LOG(S) & CORE REPORT(S)
18-19	ROCK TEST RESULTS
20-22	CORE PHOTOGRAPH(S)
23	SITE PHOTOGRAPH(S)

COUNTY ORANGE
PROJECT DESCRIPTION REPLACE BRIDGE 46 OVER
ENO RIVER ON US 70 BYPASS

SITE DESCRIPTION _____

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.

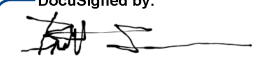
PERSONNEL

- B. SMITH, PG
- B. WORLEY, PG
- M. SHIPMAN, EI
- L. GONZALEZ
- D. SUTTON

INVESTIGATED BY B. SMITH, PG
DRAWN BY B. SMITH, PG
CHECKED BY B. WORLEY, PG
SUBMITTED BY B. SMITH, PG
DATE JULY, 2018

Prepared in the Office of: 
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DocuSigned by: 
BE61A49304C542E... 7/16/2018

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

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

Table with columns for GENERAL CLASS., GROUP CLASS., SYMBOL, % PASSING, MATERIAL PASSING #40 #100, GROUP INDEX, USUAL TYPES OF MAJOR MATERIALS, GEN. RATING AS SUBGRADE.

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

CONSISTENCY OR DENSENESS

Table mapping PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE, and RANGE OF UNCONFINED COMPRESSIVE STRENGTH.

TEXTURE OR GRAIN SIZE

Tables for U.S. STD. SIEVE SIZE OPENING (MM) and GRAIN SIZE (MM IN.), mapping to Boulder, Cobble, Gravel, Coarse Sand, Fine Sand, Silt, and Clay.

SOIL MOISTURE - CORRELATION OF TERMS

Table mapping SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, and GUIDE FOR FIELD MOISTURE DESCRIPTION.

PLASTICITY

Table mapping NON PLASTIC, SLIGHTLY PLASTIC, MODERATELY PLASTIC, and HIGHLY PLASTIC to PLASTICITY INDEX (PI) and DRY STRENGTH.

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

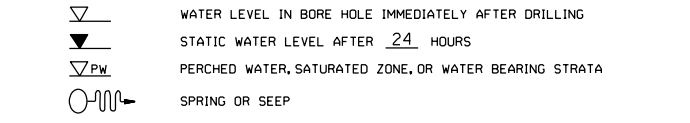
COMPRESSIBILITY

Table mapping SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, and HIGHLY COMPRESSIBLE to Liquid Limit (LL) values.

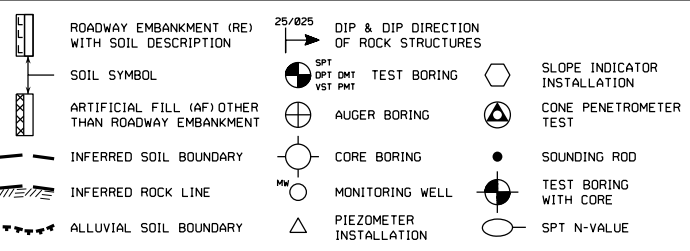
PERCENTAGE OF MATERIAL

Table mapping ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, and OTHER MATERIAL to percentage ranges.

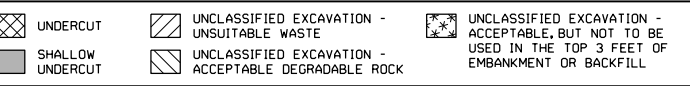
GROUND WATER



MISCELLANEOUS SYMBOLS



RECOMMENDATION SYMBOLS



ABBREVIATIONS

Table of abbreviations for AR, BT, CL, CPT, CSE, DMT, DPT, e, F, FOSS, FRAC, FRAGS, HI, MED, MICA, MOD, NP, ORG, PMT, SAP, SD, SL, SLI, TCR, u, V, VST, WE, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS, and CBR.

EQUIPMENT USED ON SUBJECT PROJECT

Checklist for equipment used including DRILL UNITS, ADVANCING TOOLS, HAMMER TYPE, CORE SIZE, HAND TOOLS, and others.

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL 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:

Table defining WEATHERED ROCK (WR), CRYSTALLINE ROCK (CR), NON-CRYSTALLINE ROCK (NCR), and COASTAL PLAIN SEDIMENTARY ROCK (CP) based on grain size and SPT values.

WEATHERING

Table defining FRESH, VERY SLIGHT (IV SLI), SLIGHT (SLI), MODERATE (MOD), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV), VERY SEVERE (IV SEV), and COMPLETE rock weathering grades.

ROCK HARDNESS

Table defining VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, and SOFT rock hardness grades.

FRACTURE SPACING

Table mapping FRACTURE SPACING and BEDDING terms to their corresponding thicknesses.

INDURATION

Table defining FRIABLE, MODERATELY INDURATED, INDURATED, and EXTREMELY INDURATED rock grades.

TERMS AND DEFINITIONS

List of geotechnical terms and definitions including ALLUVIUM, AQUIFER, ARENACEOUS, ARGILLACEOUS, ARTESIAN, CALCAREOUS, COLLUVIUM, CORE RECOVERY, DIKE, DIP, DIP DIRECTION, FAULT, FISSILE, FLOAT, FLOOD PLAIN, FORMATION, JOINT, LEDGE, LENS, MOTTLED, PERCHED WATER, RESIDUAL SOIL, ROCK QUALITY DESIGNATION, SAPROLITE, SILL, SLICKENISE, STANDARD PENETRATION TEST, STRATA CORE RECOVERY, STRATA ROCK QUALITY DESIGNATION, and TOPSOIL.

BENCH MARK: BL-4 (N: 846524 E: 1978896) ELEVATION: 516.8 FEET

NOTES: FIAD = FILLED IMMEDIATELY AFTER DRILLING

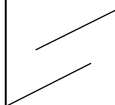
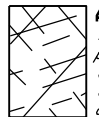
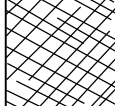

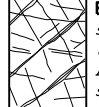



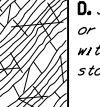

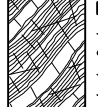

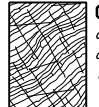

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

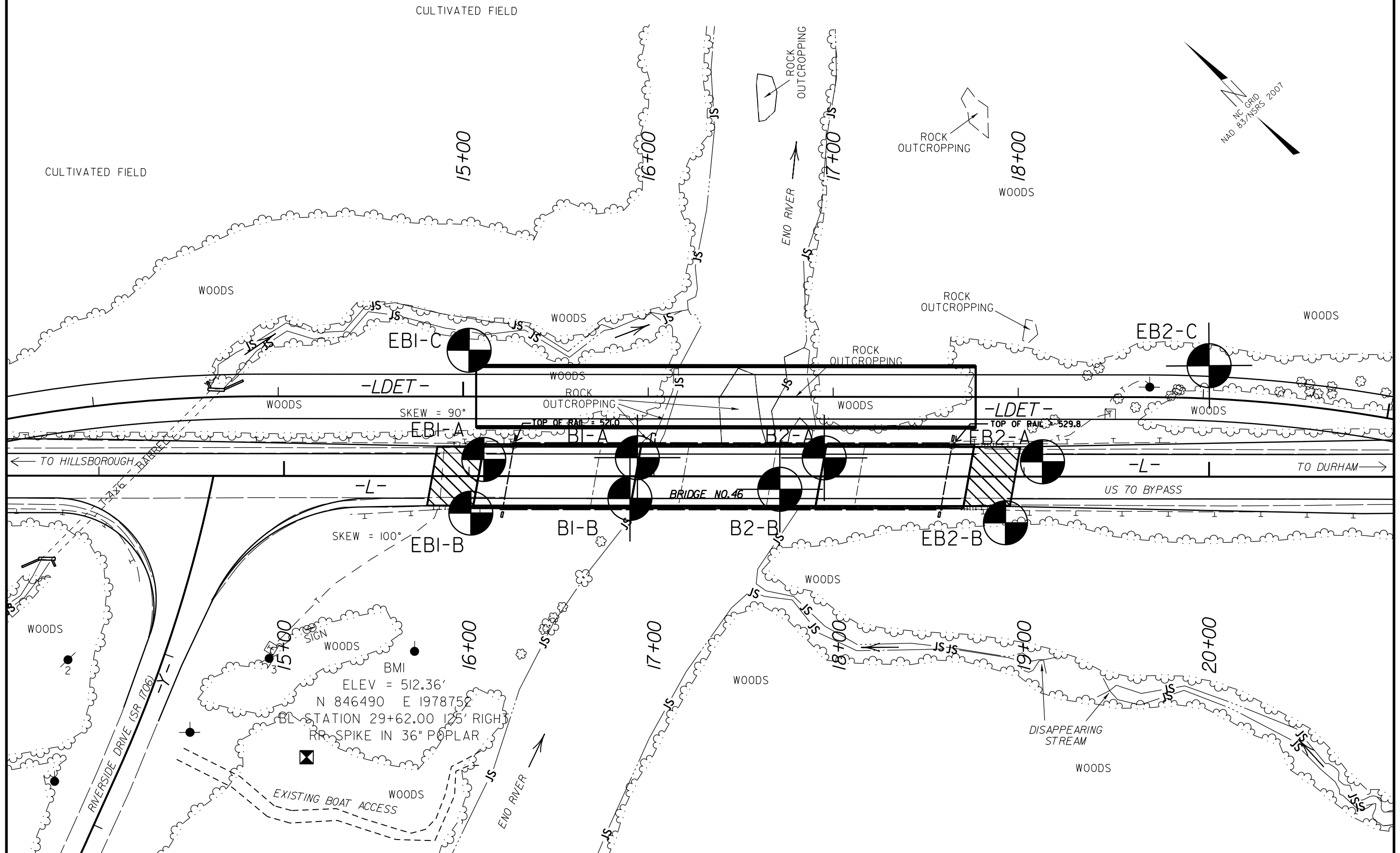
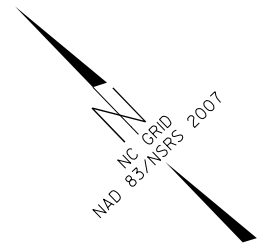
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

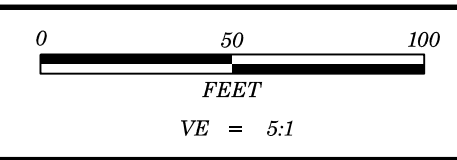
AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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	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		70						
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80					<i>A. Thick bedded, very blocky sandstone</i> 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.	60						
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70						50					
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60							40				
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces			50							30			
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes				40							20		
					30		<i>C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.</i>						10	
					20									
					10									
		N/A	N/A											

→ Means deformation after tectonic disturbance



560



PROJECT REFERENCE NO.	SHEET NO.
B-4962	4
BRIDGE NO. 46 (-L- PROFILE LEFT)	

550 (A) PAVEMENT: Asphalt, Concrete, and ABC Stone

(B) ROADWAY EMBANKMENT: orange-brown, red, and gray, moist to wet, medium stiff to stiff, sandy CLAY (A-6) and sandy SILT (A-4) with some to trace gravel, cobbles, and boulders

540 (C) ROADWAY EMBANKMENT: brown and black, wet, loose, fine to coarse SAND (A-1-b)

(F) WEATHERED ROCK: (Meta-Dacite)

530 (G) CRYSTALLINE ROCK: (Meta-Dacite)

(D) ALLUVIAL: gray-brown, wet to saturated, very dense, GRAVEL (A-1-a) and clayey SAND (A-2-6) with some to little cobbles and boulders

(E) RESIDUAL: tan-brown, red, and gray, saturated, very dense, silty SAND (A-2-4)

550

540

530

520

510

500

490

480

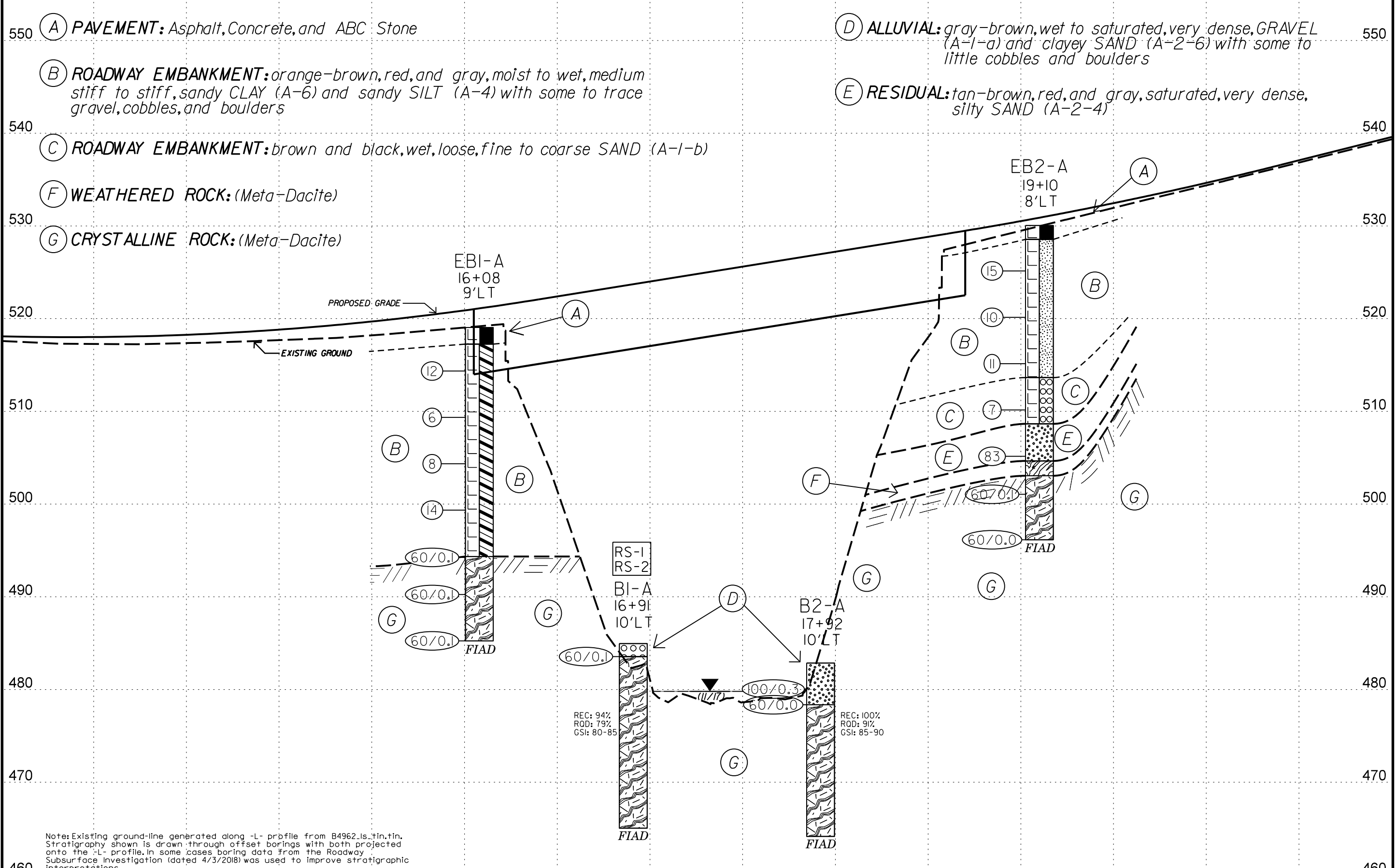
470

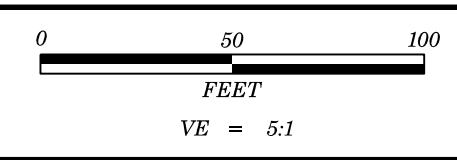
460

460

14+00 14+50 15+00 15+50 16+00 16+50 17+00 17+50 18+00 18+50 19+00 19+50 20+00 20+50

Note: Existing ground-line generated along -L- profile from B4962.ls.tin.tin. Stratigraphy shown is drawn through offset borings with both projected onto the -L- profile. In some cases boring data from the Roadway Subsurface Investigation (dated 4/3/2018) was used to improve stratigraphic interpretations.

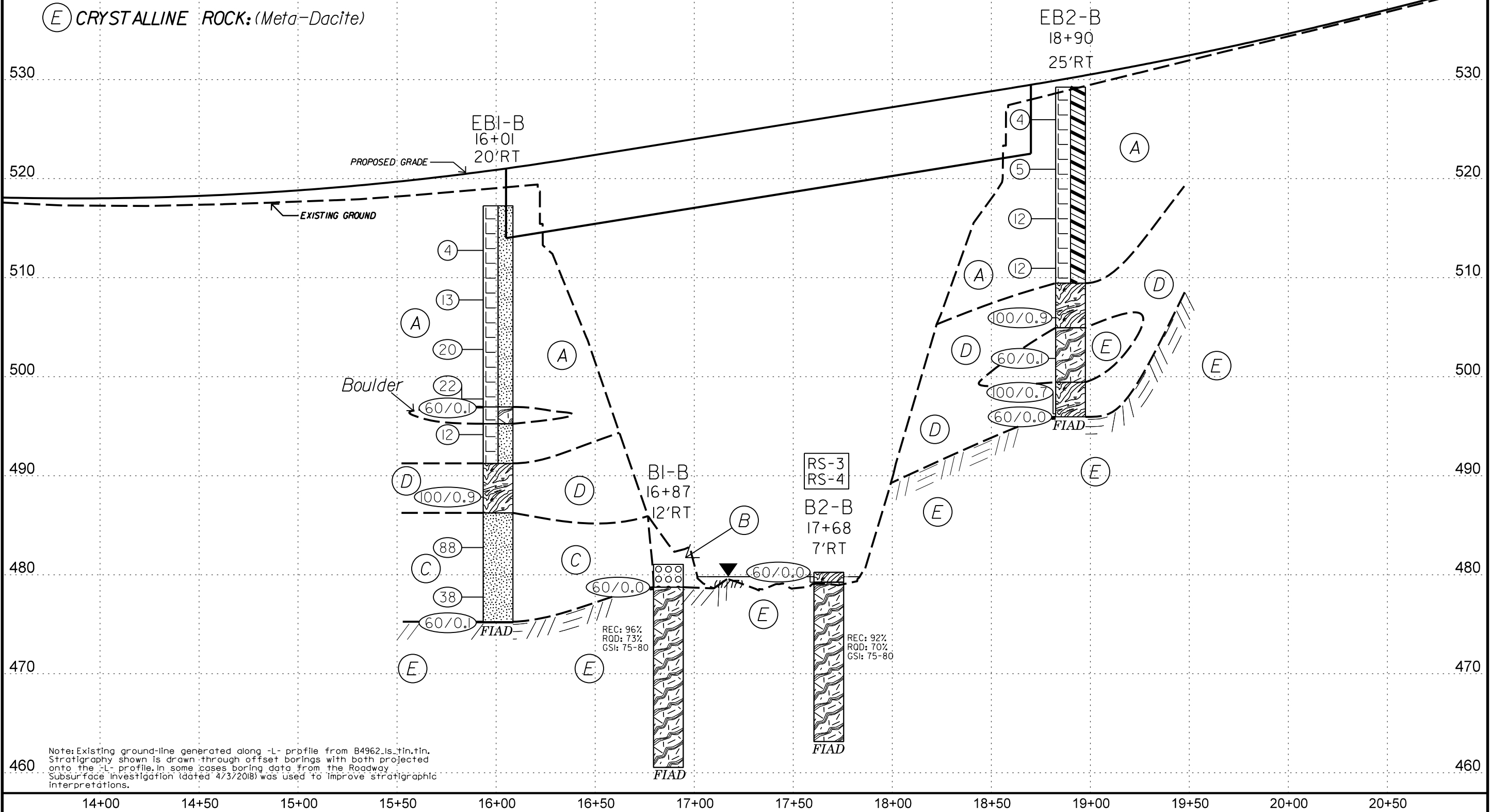




PROJECT REFERENCE NO.	SHEET NO.
B-4962	5
BRIDGE NO. 46 (-L- PROFILE RIGHT)	

- (A) **ROADWAY EMBANKMENT:** brown, red-brown, and gray, moist to saturated, soft to hard, sandy CLAY (A-6) and sandy SILT (A-4) with some to trace gravel, cobbles, and boulders, and trace wood fragments
- (C) **RESIDUAL:** tan-brown and brown, wet, hard, saprolitic, sandy SILT (A-4) with little to trace gravel sized rock fragments
- (E) **CRYSTALLINE ROCK:** (Meta-Dacite)

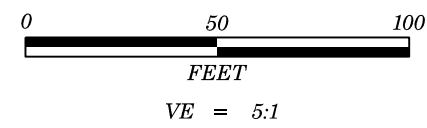
- (B) **ALLUVIAL:** gray-brown, wet to saturated, coarse SAND (A-1-b) with some cobbles and boulders
- (D) **WEATHERED ROCK:** (Meta-Dacite)



Note: Existing ground-line generated along -L- profile from B4962.ls.tin.tin. Stratigraphy shown is drawn through offset borings with both projected onto the -L- profile. In some cases boring data from the Roadway Subsurface Investigation (dated 4/3/2018) was used to improve stratigraphic interpretations.

570

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	25'LT	15+03	0.0' - 1.5'	A-4(0)	38	8	21.7	15.0	48.3	15.1	59	51	39	18.0	NA



PROJECT REFERENCE NO.	SHEET NO.
B-4962	6
BRIDGE NO. 46 (-LDET- PROFILE)	

560

(A) **ROADWAY EMBANKMENT:** brown, red-brown, and gray, moist to saturated, soft to hard, sandy CLAY (A-6) and sandy SILT (A-4) with some to trace gravel, cobbles, and boulders, and trace wood fragments

550

(B) **ALLUVIAL:** brown, soft, wet to saturated, highly organic, sandy SILT (A-4) with some gravel, little clay, trace cobbles and boulders

540

(C) **RESIDUAL:** gray, dry, very stiff, sandy SILT (A-4)

530

(D) **WEATHERED ROCK:** (Meta-Dacite)

520

(E) **CRYSTALLINE ROCK:** (Meta-Dacite)

510

PROPOSED GRADE

EXISTING GROUND

SS-8
EB1-C
15+03
25'LT

EB2-C
19+02
18'LT

(16)
(100/0.8)
(60/0.0)

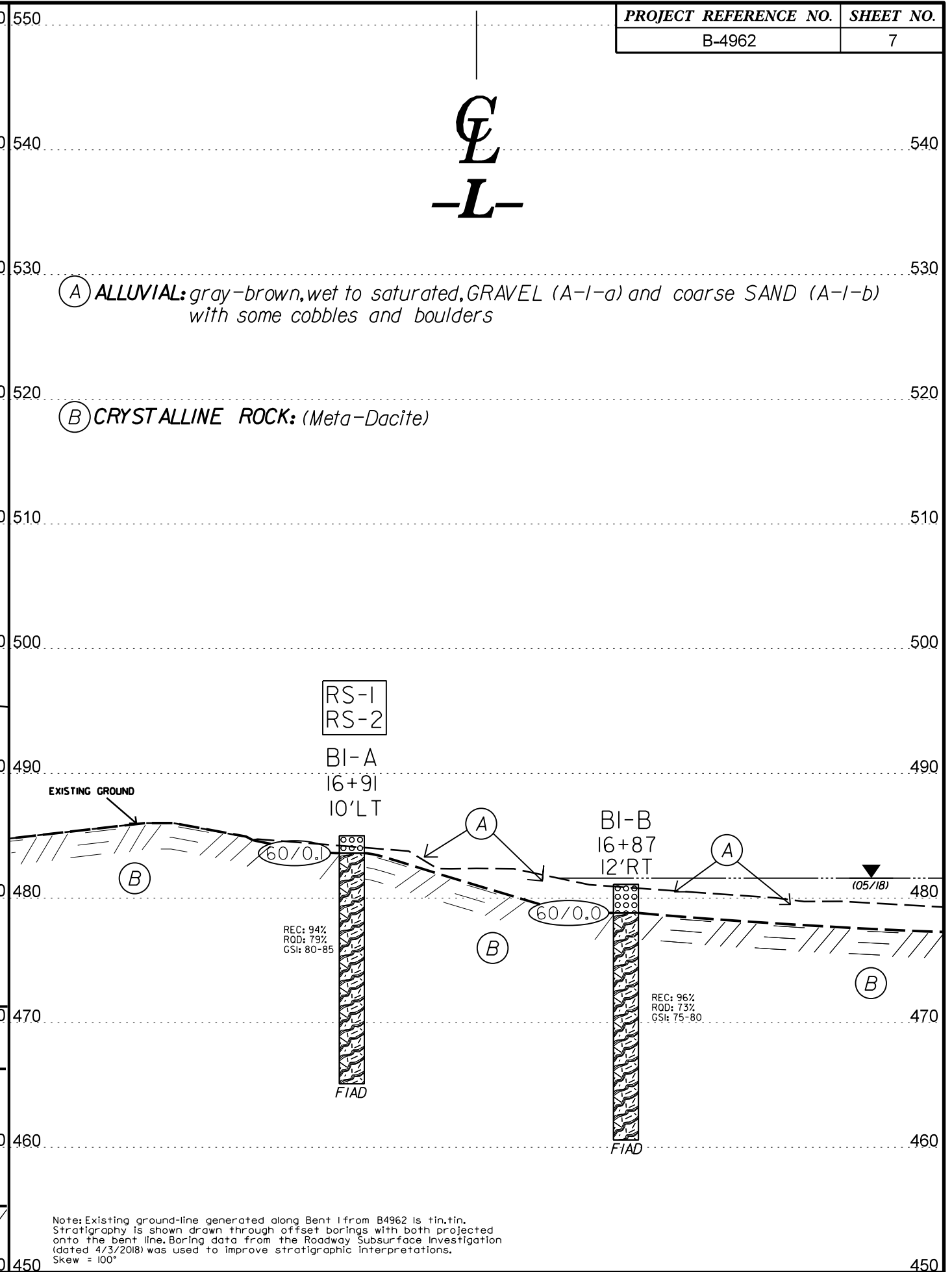
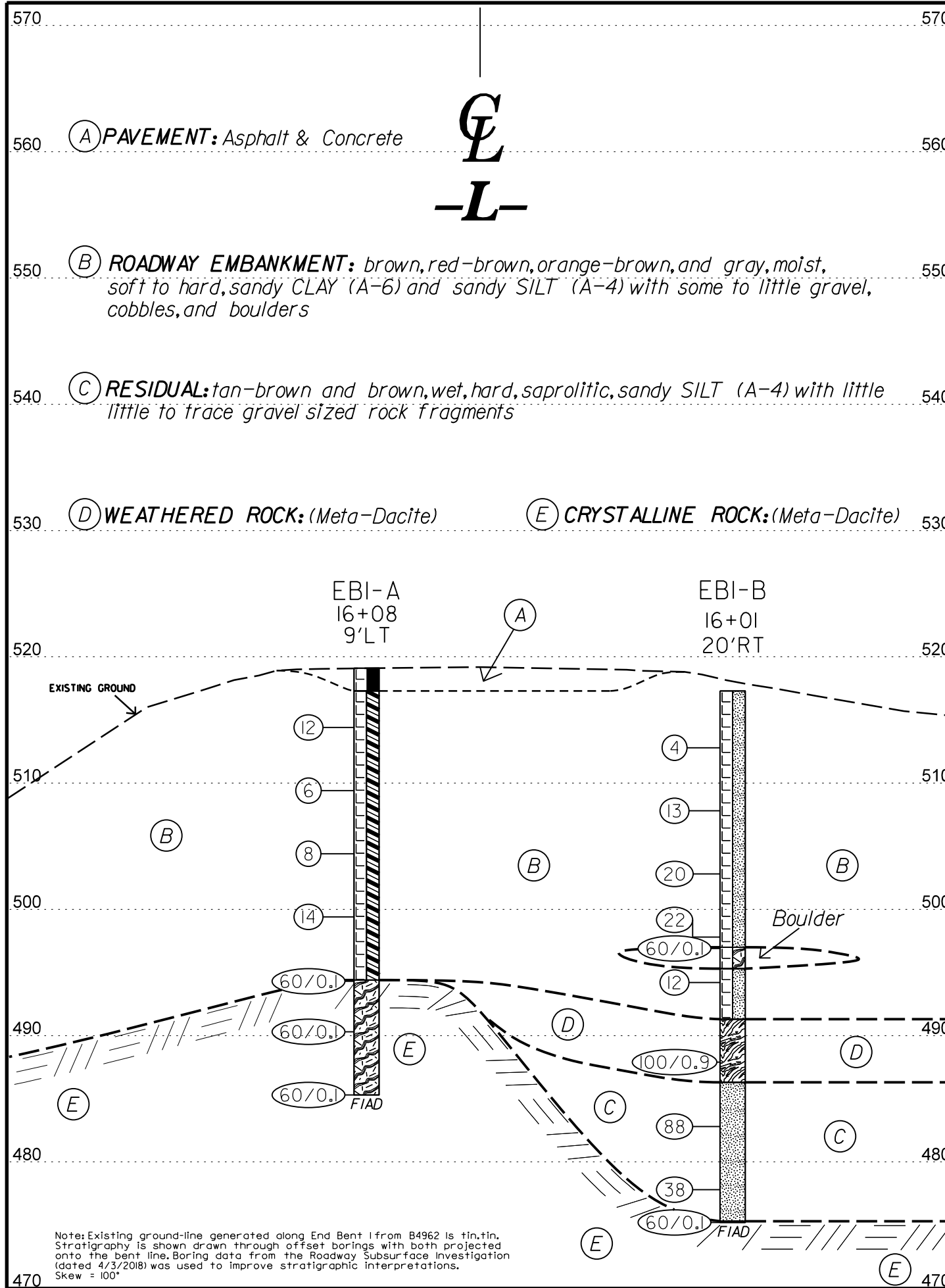
12/17
REC: 86%
ROD: 46%
GSI: 65-70

480

470

Note: Existing ground-line generated along -LDET- profile from B4962.ls.tin.tin. Stratigraphy shown is drawn through offset borings with both projected onto the -LDET- profile. Boring data from the Roadway Subsurface Investigation (dated 4/3/2018) and -L- Bridge Investigation was used to improve stratigraphic interpretations and descriptions.

13+50 14+00 14+50 15+00 15+50 16+00 16+50 17+00 17+50 18+00 18+50 19+00 19+50 20+00

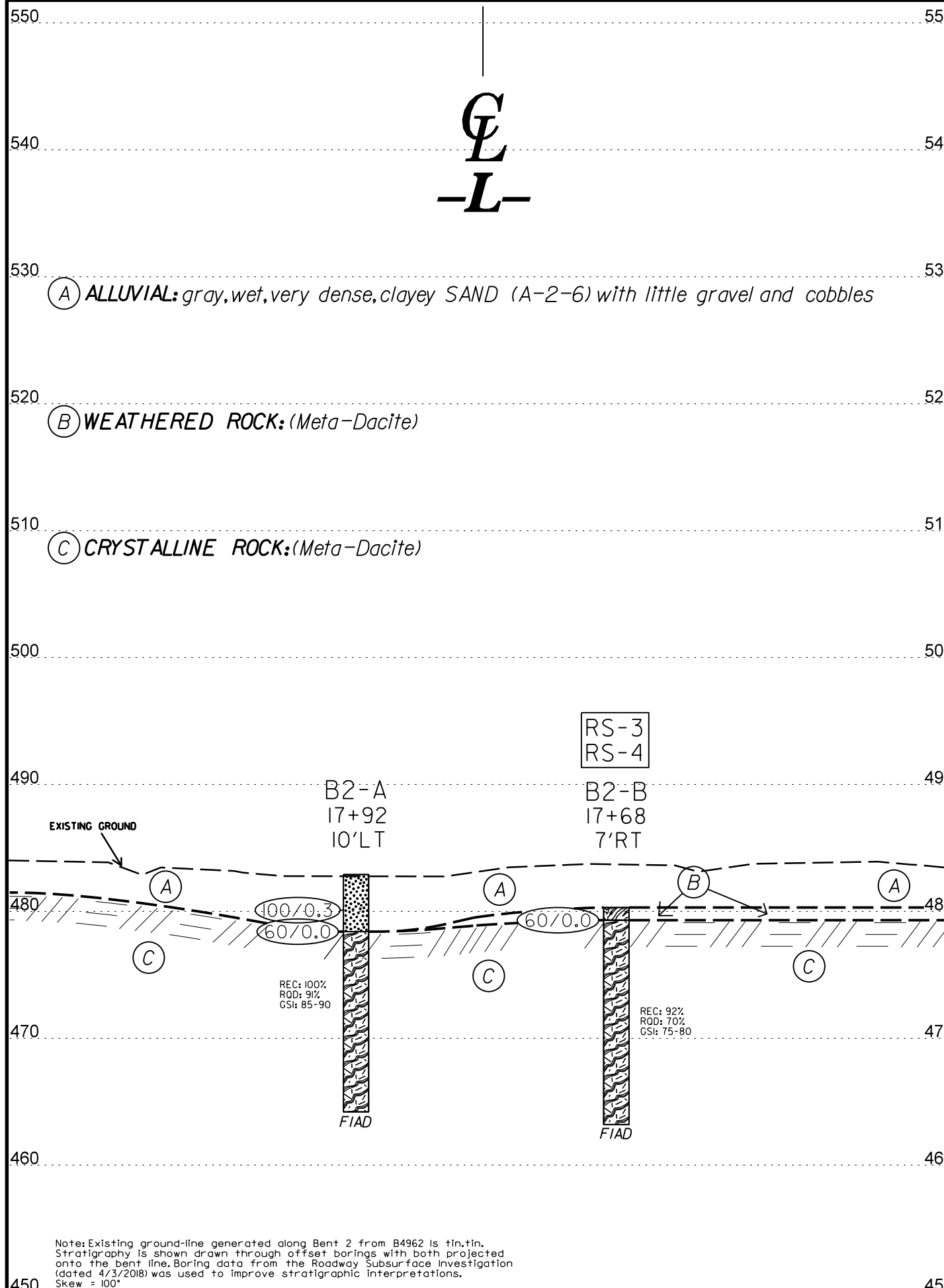


HORIZ. SCALE 0 10 20 (FEET) VE = 1:1

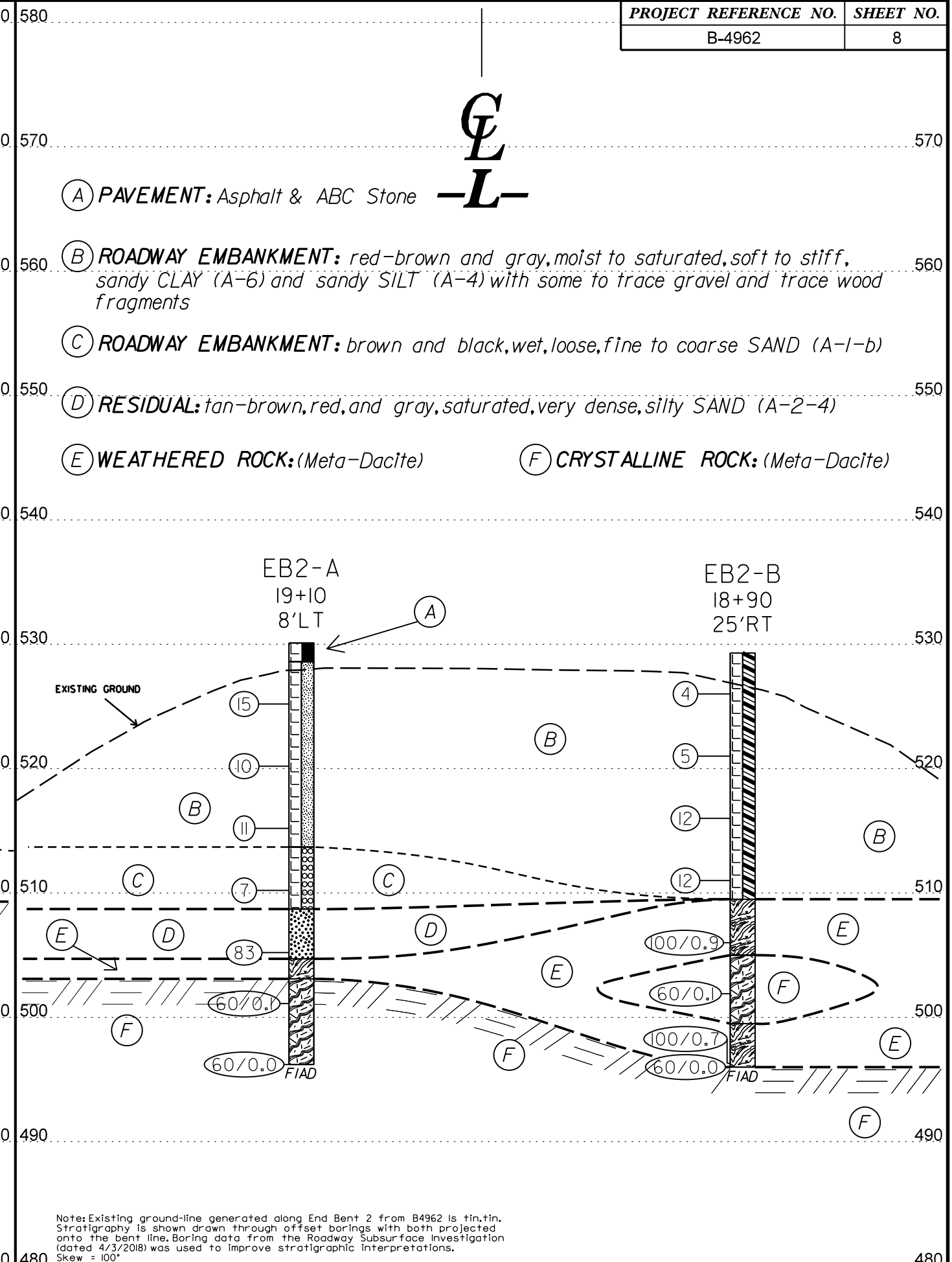
BRIDGE NO. 46 (END BENT 1)

HORIZ. SCALE 0 10 20 (FEET) VE = 1:1

BRIDGE NO. 46 (BENT 1)



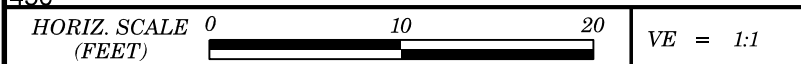
- (A) ALLUVIAL: gray, wet, very dense, clayey SAND (A-2-6) with little gravel and cobbles
- (B) WEATHERED ROCK: (Meta-Dacite)
- (C) CRYSTALLINE ROCK: (Meta-Dacite)



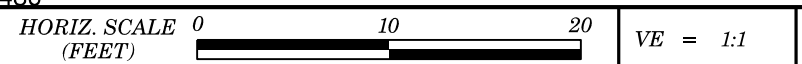
- (A) PAVEMENT: Asphalt & ABC Stone
- (B) ROADWAY EMBANKMENT: red-brown and gray, moist to saturated, soft to stiff, sandy CLAY (A-6) and sandy SILT (A-4) with some to trace gravel and trace wood fragments
- (C) ROADWAY EMBANKMENT: brown and black, wet, loose, fine to coarse SAND (A-1-b)
- (D) RESIDUAL: tan-brown, red, and gray, saturated, very dense, silty SAND (A-2-4)
- (E) WEATHERED ROCK: (Meta-Dacite)
- (F) CRYSTALLINE ROCK: (Meta-Dacite)

Note: Existing ground-line generated along Bent 2 from B4962 is tin, tin. Stratigraphy is shown drawn through offset borings with both projected onto the bent line. Boring data from the Roadway Subsurface Investigation (dated 4/3/2018) was used to improve stratigraphic interpretations. Skew = 100°

Note: Existing ground-line generated along End Bent 2 from B4962 is tin, tin. Stratigraphy is shown drawn through offset borings with both projected onto the bent line. Boring data from the Roadway Subsurface Investigation (dated 4/3/2018) was used to improve stratigraphic interpretations. Skew = 100°




BRIDGE NO. 46 (BENT 2)



BRIDGE NO. 46 (END BENT 2)

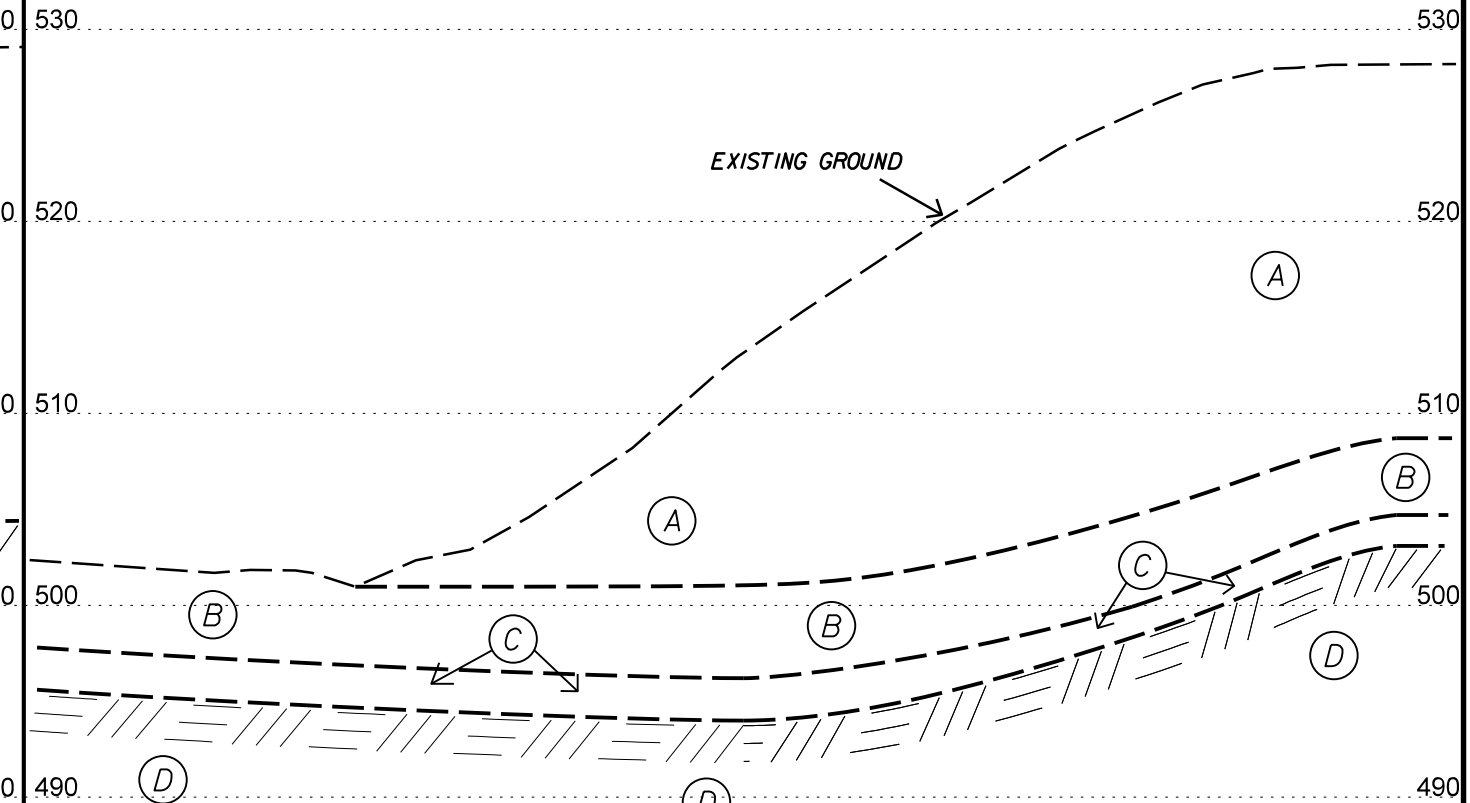
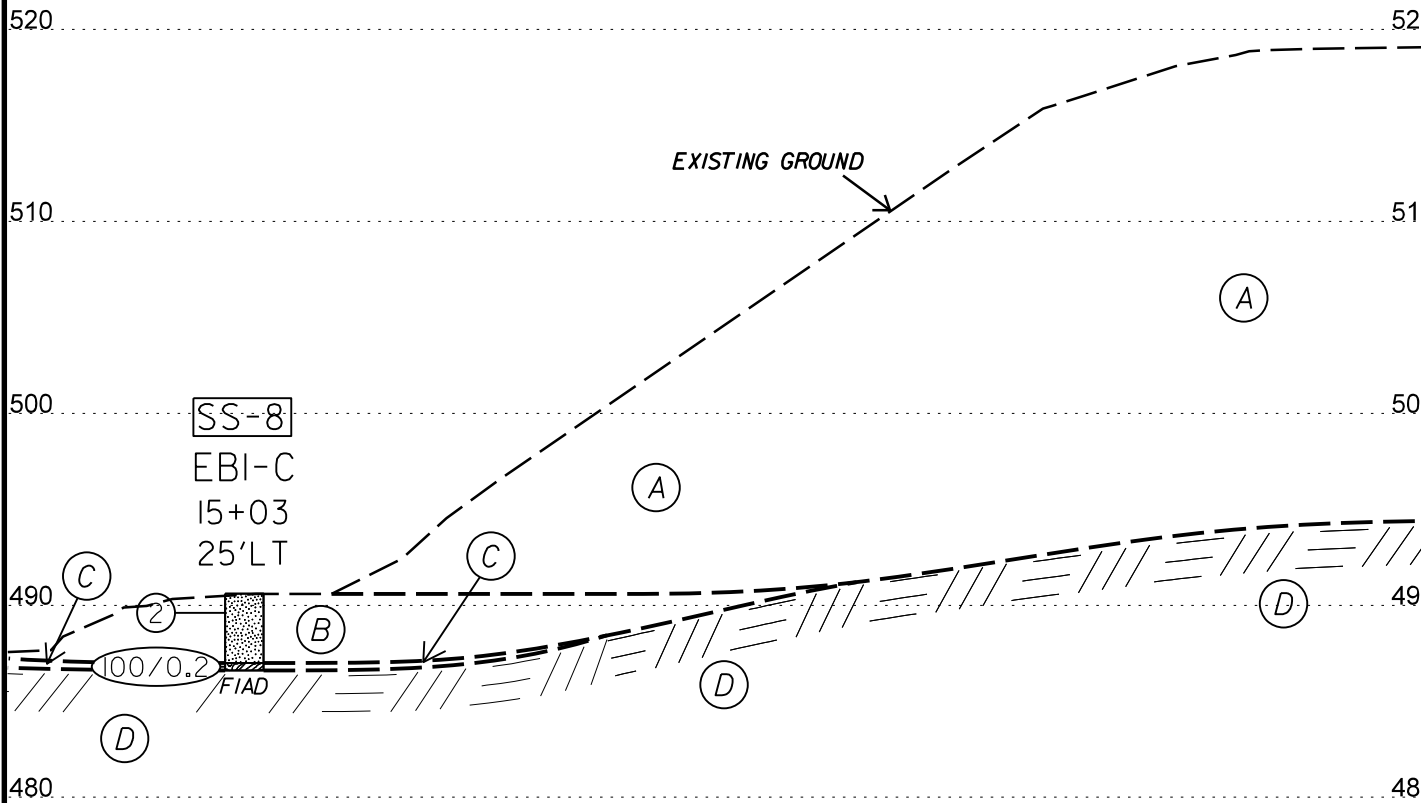

-LDET-


-LDET-

- (A) **ROADWAY EMBANKMENT:** brown, red-brown, orange-brown, and gray, moist, soft to hard, sandy CLAY (A-6) and sandy SILT (A-4) with some to little gravel, cobbles, and boulders
- (B) **ALLUVIAL:** brown, wet, soft, highly organic, sandy SILT (A-4) with some gravel, little clay, trace cobbles and boulders
- (C) **WEATHERED ROCK:** (Meta-Dacite)
- (D) **CRYSTALLINE ROCK:** (Meta-Dacite)

- (A) **ROADWAY EMBANKMENT:** red-brown and gray, moist to saturated, soft to stiff, sandy CLAY (A-6) and sandy SILT (A-4) with some to trace gravel and trace wood fragments
- (B) **RESIDUAL:** tan-brown, red, and gray, dry to saturated, very stiff, sandy SILT (A-4) and very dense silty SAND (A-2-4)
- (C) **WEATHERED ROCK:** (Meta-Dacite)
- (D) **CRYSTALLINE ROCK:** (Meta-Dacite)

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	25'LT	15+03	0.0' - 1.5'	A-4(0)	38	8	21.7	15.0	48.3	15.1	59	51	39	18.0	NA



Note: Existing ground-line generated along End Bent 1 from B4962_Is_tin.tin. Stratigraphy is shown drawn through offset borings with both projected onto the bent line. Boring data from the Roadway Subsurface Investigation (dated 4/3/2018) and -L- Bridge Investigation was used to improve stratigraphic interpretations and descriptions. Skew = 90°

Note: Existing ground-line generated along End Bent 2 from B4962_Is_tin.tin. Due to access issues, no borings could be performed in the vicinity of the proposed End Bent 2 location. Boring data from the Roadway Subsurface Investigation (dated 4/3/2018) and -L- Bridge Investigation was used to interpret the stratigraphy in this area. Skew = 90°

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Worley, B.											
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)										
BORING NO. EB1-A		STATION 16+08		OFFSET 9 ft LT		ALIGNMENT -L-											
COLLAR ELEV. 519.1 ft		TOTAL DEPTH 33.8 ft		NORTHING 846,539		EASTING 1,978,933											
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic													
DRILLER Gonzalez, L.		START DATE 05/24/18		COMP. DATE 05/24/18		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
520															519.1	0.0	GROUND SURFACE
															517.3	1.8	ROADWAY EMBANKMENT Asphalt & Concrete orange-brown, sandy CLAY (A-6) with little gravel, cobbles, and boulders
515	515.4	3.7	3	6	6												
510	510.4	8.7	2	2	4												
505	505.4	13.7	5	4	4												
500	500.4	18.7	2	4	10												
495	495.4	23.7	9	8	60/0.1												
490	490.4	28.7	60/0.1														
	485.4	33.7	60/0.1														
															494.4	24.7	CRYSTALLINE ROCK (Meta-Dacite)
															485.3	33.8	Boring Terminated with Standard Penetration Test Refusal at Elevation 485.3 ft in Crystalline Rock (Meta-Dacite)

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.											
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)										
BORING NO. EB1-B		STATION 16+01		OFFSET 20 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 517.3 ft		TOTAL DEPTH 42.1 ft		NORTHING 846,523		EASTING 1,978,908											
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic													
DRILLER Gonzalez, L.		START DATE 05/21/18		COMP. DATE 05/22/18		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
520															517.3	0.0	GROUND SURFACE
515	513.8	3.5	2	2	2												
510	508.8	8.5	5	7	6												
505	503.8	13.5	2	15	5												
500	498.8	18.5	7	15	7												
	497.0	20.3	60/0.1												497.0	20.3	BOULDER (Cored 20.3' - 22.0')
495	495.2	22.1	8	5	7										495.3	22.0	gray and red-brown, sandy SILT (A-4)
															491.3	26.0	WEATHERED ROCK (Meta-Dacite)
490	488.8	28.5	30	70/0.4													
485	483.8	33.5	24	49	39										486.3	31.0	RESIDUAL tan-brown and brown, saprolitic, sandy SILT (A-4) with little to trace gravel sized rock fragments
480	478.8	38.5	7	8	30												
	475.3	42.0	60/0.1												475.3	42.0	CRYSTALLINE ROCK (Meta-Dacite)
															475.2	42.1	Boring Terminated with Standard Penetration Test Refusal at Elevation 475.2 ft in Crystalline Rock (Meta-Dacite)

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. B1-A		STATION 16+91		OFFSET 10 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 485.0 ft		TOTAL DEPTH 19.9 ft		NORTHING 846,482		EASTING 1,978,993									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic											
DRILLER Gonzalez, L.		START DATE 05/23/18		COMP. DATE 05/23/18		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					
485														485.0	0.0
	483.7	1.3	60/0.1											483.6	1.4
480															
475															
470															
														465.1	19.9
Boring Terminated at Elevation 465.1 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 1.3 feet.															

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. B1-B		STATION 16+87		OFFSET 12 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 481.1 ft		TOTAL DEPTH 20.5 ft		NORTHING 846,469		EASTING 1,978,975									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic											
DRILLER Gonzalez, L.		START DATE 05/22/18		COMP. DATE 05/22/18		SURFACE WATER DEPTH 0.5ft									
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					
485															
480															
475															
470															
465															
														460.6	20.5
Boring Terminated at Elevation 460.6 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 2.3 feet.															

NCDOT BORE DOUBLE B4962_GEO_BRDG0046_L_GINT.GPJ NC_DOT.GDT 7/3/18

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.					
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)				
BORING NO. B1-A		STATION 16+91		OFFSET 10 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 485.0 ft		TOTAL DEPTH 19.9 ft		NORTHING 846,482		EASTING 1,978,993					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 05/23/18		COMP. DATE 05/23/18		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 18.5 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
483.6	483.6	1.4	3.5	0:45/0.5 3:13/1.0 2:50/1.0 6:00/1.0	(2.6) 74%	(1.5) 43%	(17.4) 94%	(14.6) 79%	483.6	Begin Coring @ 1.4 ft CRYSTALLINE ROCK gray and white, moderate to fresh weathering, hard, close to wide fracture spacing, META-DACITE, minor iron-oxide staining, fractures mostly high angle. GSI = 80-85	1.4
480	480.1	4.9	5.0	5:41/1.0 3:48/1.0 2:43/1.0 3:21/1.0 4:33/1.0	(4.8) 96%	(3.5) 70%			RS-1		
475	475.1	9.9	5.0	6:42/1.0 4:55/1.0 4:58/1.0 6:18/1.0 4:46/1.0	(5.0) 100%	(4.6) 92%			RS-2		
470	470.1	14.9	5.0	4:31/1.0 7:06/1.0 5:42/1.0 5:38/1.0 6:35/1.0	(5.0) 100%	(5.0) 100%					
465.1	465.1	19.9							465.1	Boring Terminated at Elevation 465.1 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 1.3 feet.	19.9

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.					
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)				
BORING NO. B1-B		STATION 16+87		OFFSET 12 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 481.1 ft		TOTAL DEPTH 20.5 ft		NORTHING 846,469		EASTING 1,978,975					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Gonzalez, L.		START DATE 05/22/18		COMP. DATE 05/22/18		SURFACE WATER DEPTH 0.5ft					
CORE SIZE NQ2		TOTAL RUN 18.2 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
478.8	478.8	2.3	3.2	N=60/0.0 0:49/0.2 3:05/1.0 2:58/1.0 3:16/1.0	(2.8) 88%	(2.6) 81%	(17.5) 96%	(13.3) 73%	478.8	Begin Coring @ 2.3 ft CRYSTALLINE ROCK white and gray, moderate to fresh weathering, hard, close to wide fracture spacing, META-DACITE, minor iron-oxide staining, heavily fractured 12.2 - 14.0 feet. GSI = 75-80	2.3
475	475.6	5.5	1.4	3:24/1.0 3:32/0.4 1:38/0.6 2:46/1.0 2:30/1.0	(1.3) 93%	(1.3) 93%			RS-1		
470	470.6	10.5	3.0	2:11/1.0 1:57/1.0 1:44/1.0 1:47/1.0	(3.4) 94%	(2.3) 64%					
465	465.6	15.5	2.0	2:58/1.0 2:25/1.0	(3.0) 100%	(1.4) 47%					
461.2	461.2	19.9	4.4	3:21/1.0 2:34/1.0 2:25/1.0 2:30/1.0	(4.4) 100%	(4.4) 100%					
460.6	460.6	20.5	0.6	0:40/0.4 1:15/0.6	(0.6) 100%	(0.6) 100%			460.6	Boring Terminated at Elevation 460.6 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 2.3 feet.	20.5

NCDOT CORE DOUBLE B4962_GEO_BRDG0046_L_GINT.GPJ NC_DOT.GDT 7/3/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Worley, B.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. B2-A		STATION 17+92		OFFSET 10 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 482.9 ft		TOTAL DEPTH 18.7 ft		NORTHING 846,412		EASTING 1,979,066									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic											
DRILLER Gonzalez, L.		START DATE 05/25/18		COMP. DATE 05/25/18		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					
485															
480	480.4	2.5												482.9	0.0
	478.4	4.5	100/0.3											478.4	4.5
475			60/0.0												
470															
465														464.2	18.7
Boring Terminated at Elevation 464.2 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 4.5 feet.															

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. B2-B		STATION 17+68		OFFSET 7 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 480.3 ft		TOTAL DEPTH 17.1 ft		NORTHING 846,416		EASTING 1,979,037									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017		DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic											
DRILLER Gonzalez, L.		START DATE 05/30/18		COMP. DATE 05/31/18		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					
485															
480	479.3	1.0												480.3	0.0
														479.3	1.0
475			60/0.0												
470															
465														463.2	17.1
Boring Terminated at Elevation 463.2 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Offset due to overhead power lines, Ok'd by NCDOT GEU - Casing advancer refusal at 1.0 feet.															

NCDOT BORE DOUBLE B4962_GEO_BRDG0046_L_GINT.GPJ NC_DOT.GDT 7/3/18

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Worley, B.					
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)				
BORING NO. B2-A		STATION 17+92		OFFSET 10 ft LT		ALIGNMENT -L-					
COLLAR ELEV. 482.9 ft		TOTAL DEPTH 18.7 ft		NORTHING 846,412		EASTING 1,979,066					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic						
DRILLER Gonzalez, L.		START DATE 05/25/18		COMP. DATE 05/25/18		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 14.2 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
478.4	478.4	4.5	4.2	N=60/0.0 8:20/1.0 8:54/1.0 8:08/1.0 8:16/1.0 2:13/0.2	(4.2) 100%	(3.7) 88%	(14.2) 100%	(12.9) 91%	L O G	Begin Coring @ 4.5 ft CRYSTALLINE ROCK light to dark gray and white, fresh, hard, moderately close to wide fracture spacing, META-DACITE. GSI = 85-90	4.5
475	474.2	8.7	5.0	7:22/1.0 5:28/1.0 5:25/1.0 6:45/1.0 5:58/1.0	(5.0) 100%	(4.2) 84%			L O G		
470	469.2	13.7	5.0	6:52/1.0 6:48/1.0 6:40/1.0 6:21/1.0 6:20/1.0	(5.0) 100%	(5.0) 100%			L O G		
465	464.2	18.7							L O G	Boring Terminated at Elevation 464.2 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Casing advancer refusal at 4.5 feet.	18.7

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.					
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)				
BORING NO. B2-B		STATION 17+68		OFFSET 7 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 480.3 ft		TOTAL DEPTH 17.1 ft		NORTHING 846,416		EASTING 1,979,037					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic						
DRILLER Gonzalez, L.		START DATE 05/30/18		COMP. DATE 05/31/18		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 16.1 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
479.3	479.3	1.0	1.1	N=60/0.0 5:04/1.0 0:20/0.1	(0.7) 64%	(0.6) 55%	(14.8) 92%	(11.3) 70%	L O G	Begin Coring @ 1.0 ft CRYSTALLINE ROCK light to dark gray, white, and black, moderate to fresh weathering, hard, very close to moderately close fracture spacing, Meta-Dacite, small layer of Meta-Andesite 12.1 - 12.7 feet, minor iron-oxide staining. GSI = 75-80	1.0
475	478.2	2.1	5.0	2:35/1.0 2:55/1.0 3:00/1.0 2:11/1.0 2:38/1.0	(4.1) 82%	(2.1) 42%			L O G		
470	473.2	7.1	4.0	1:39/1.0 2:28/1.0 2:43/1.0 2:20/1.0	(4.0) 100%	(4.0) 100%			L O G		
465	469.2	11.1	1.0	1:57/1.0	(1.0) 100%	(1.0) 100%			L O G		
465	468.2	12.1	4.2	1:41/1.0 1:54/1.0 2:06/1.0 2:41/1.0 1:00/0.2 2:01/0.8	(4.2) 100%	(2.8) 67%			L O G		
465	464.0	16.3	0.8	1:00/0.2 2:01/0.8	(0.8) 100%	(0.8) 100%			L O G	Boring Terminated at Elevation 463.2 ft in Crystalline Rock (Meta-Dacite) - Drilled through bridge deck with traffic control. - Offset due to overhead power lines, Ok'd by NCDOT GEU - Casing advancer refusal at 1.0 feet.	17.1

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 19+10		OFFSET 8 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 530.1 ft		TOTAL DEPTH 33.9 ft		NORTHING 846,328		EASTING 1,979,149									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic									
DRILLER Gonzalez, L.		START DATE 05/30/18		COMP. DATE 05/30/18		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					
535															
530															
525	526.2	3.9	8	8	7										
520	521.2	8.9	2	4	6										
515	516.2	13.9	3	4	7										
510	511.2	18.9	4	3	4										
505	506.2	23.9	7	12	71										
500	501.2	28.9	60/0.1												
	496.2	33.9	60/0.0												

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.									
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 18+90		OFFSET 25 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 529.3 ft		TOTAL DEPTH 33.3 ft		NORTHING 846,318		EASTING 1,979,112									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic									
DRILLER Gonzalez, L.		START DATE 05/31/18		COMP. DATE 05/31/18		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					
530															
525	527.0	2.3	4	2	2										
520	522.0	7.3	2	3	2										
515	517.0	12.3	4	4	8										
510	512.0	17.3	WOR WOH		12										
505	507.0	22.3	56	44/0.4											
500	502.0	27.3	60/0.1												
	497.0	32.3	59	41/0.2											
	496.0	33.3	60/0.0												

NCDOT BORE DOUBLE B4962_GEO_BRDG0046_L_GINT.GPJ NC_DOT.GDT 7/3/18

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Shipman, M.										
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)									
BORING NO. EB1-C		STATION 15+03		OFFSET 25 ft LT		ALIGNMENT -LDET-										
COLLAR ELEV. 490.6 ft		TOTAL DEPTH 4.0 ft		NORTHING 846,587		EASTING 1,978,968										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 95% 11/30/2017			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Gonzalez, L.		START DATE 11/22/17		COMP. DATE 11/22/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
495																
490	490.6	0.0	2	1	1							SS-8	18%		490.6	GROUND SURFACE
	487.0	3.6													487.0	ALLUVIAL brown, highly organic, sandy SILT (A-4) with some gravel, little clay, trace cobbles and boulders
		100/0.2													486.6	WEATHERED ROCK (Felsic Metavolcanic)
															486.6	CRYSTALLINE ROCK (Felsic Metavolcanic) Boring Terminated by Auger Refusal at Elevation 486.6 ft on Crystalline Rock (Felsic Metavolcanic) - Equivalent boring to L1600L from the roadway investigation.

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Gross, A.										
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)									
BORING NO. EB2-C		STATION 19+02		OFFSET 18 ft LT		ALIGNMENT -LDET-										
COLLAR ELEV. 551.3 ft		TOTAL DEPTH 27.2 ft		NORTHING 846,303		EASTING 1,979,250										
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017			DRILL METHOD Core Boring			HAMMER TYPE Automatic										
DRILLER Moseley, M.G.		START DATE 12/04/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
555																
550															551.3	GROUND SURFACE
	547.8	3.5	7	8	8											RESIDUAL gray, sandy SILT (A-4)
545	542.8	8.5	57	43/0.3											543.3	WEATHERED ROCK (Felsic Metavolcanic)
540	541.1	10.2	60/0.0												541.1	CRYSTALLINE ROCK (Felsic Metavolcanic) REC: 86% RQD: 46% GSI: 65-70
535																
530																
525															524.1	Boring Terminated at Elevation 524.1 ft in Crystalline Rock (Felsic Metavolcanic) - Topsoil 0.0 - 0.2 ft - Equivalent boring to L2000L from the roadway investigation.

NCDOT BORE DOUBLE B4962_GEO_BRDG0046_LDET_GINT.GPJ_NC_DOT.GDT 7/3/18

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 40174.1.1		TIP B-4962		COUNTY ORANGE		GEOLOGIST Gross, A.					
SITE DESCRIPTION Replace Bridge 46 over Eno River on US 70 Bypass							GROUND WTR (ft)				
BORING NO. EB2-C		STATION 19+02		OFFSET 18 ft LT		ALIGNMENT -LDET-					
COLLAR ELEV. 551.3 ft		TOTAL DEPTH 27.2 ft		NORTHING 846,303		EASTING 1,979,250					
DRILL RIG/HAMMER EFF./DATE SUM3359 CME-450 85% 11/30/2017				DRILL METHOD Core Boring		HAMMER TYPE Automatic					
DRILLER Moseley, M.G.		START DATE 12/04/17		COMP. DATE 12/05/17		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 17.0 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %	REC. (ft) %	RQD (ft) %			
541.07										Begin Coring @ 10.2 ft	
540	541.1 540.1	10.2 11.2	1.0 5.0	N=60/0.0 6:59/1.0	(0.8) 80%	(0.0) 0%	(14.7) 86%	(7.8) 46%		541.1 dark to light gray, very slightly weathered, hard, very close to moderately close fracture spacing, weakly foliated, Meta-Dacite	10.2
535	535.1	16.2	5.0	2:01/1.0 2:37/1.0 3:15/1.0 3:42/1.0 4:44/1.0	(3.9) 78%	(1.3) 26%				GSI = 65-70	
530	530.1	21.2	5.0	1:54/1.0 3:47/1.0 3:38/1.0 4:50/1.0 3:31/1.0	(4.1) 82%	(1.9) 38%					
525	525.1 524.1	26.2 27.2	5.0 1.0	3:13/1.0 4:23/1.0 4:12/1.0 3:33/1.0 3:15/1.0 3:46/1.0	(5.0) 100%	(4.0) 80%				524.1 Boring Terminated at Elevation 524.1 ft in Crystalline Rock (Felsic Metavolcanic)	27.2
					(0.9) 90%	(0.6) 60%				- Topsoil 0.0 - 0.2 ft - Equivalent boring to L2000L from the roadway investigation.	

NCDOT CORE DOUBLE B4962_GEO_BRDG0046_LDET_GINT.GPJ NC_DOT.GDT 7/13/18

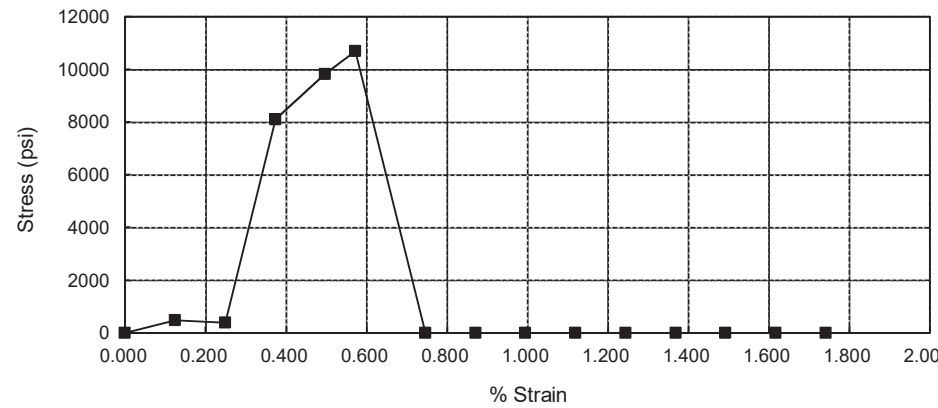
ROCK CORE UNIAXIAL COMPRESSIVE STRENGTH TEST
ASTM D-7012-10 METHOD C

Job No.: G17017.00 Job Name: Bridge No. 46 over Eno River
Date: 6/11/2018 Sample No.: RS-1
Boring No.: B1-A Depth (ft): 3.7-4.7
Description: TIP No. B-4962, WBS No. 40174.1.1

Length (in.): 4.020 Volume (in³): 12.40289979
Diameter (in.): 1.982 Volume (cf): 0.007177604
Area (sq. in.): 3.085 Unit Weight (pcf): 167.9976

Compressive Strength (psi): 10693

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0.0	
0.005	0.124	1490	482.9	388,280
0.010	0.249	1190	385.7	155,051
0.015	0.373	24980	8096.5	2,169,852
0.020	0.498	30310	9824.0	1,974,626
0.023	0.572	32990	10692.6	1,868,888
0.030	0.746		0.0	0
0.035	0.871		0.0	0
0.040	0.995		0.0	0
0.045	1.119		0.0	0
0.050	1.244		0.0	0
0.055	1.368		0.0	0
0.060	1.493		0.0	0
0.065	1.617		0.0	0
0.070	1.741		0.0	0



Notes:

Young's modulus is calculated using the secant modulus at each data interval per Figure 2 (C) in ASTM D 7012.

Michael J Bauer

NCDOT Cert No. 105-02-0803



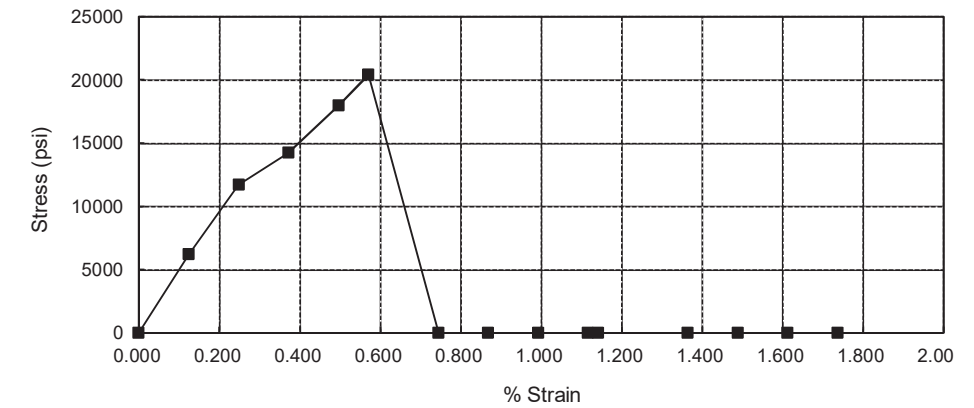
ROCK CORE UNIAXIAL COMPRESSIVE STRENGTH TEST
ASTM D-7012-10 METHOD C

Job No.: G17017.00 Job Name: Bridge No. 46 over Eno River
Date: 6/11/2018 Sample No.: RS-2
Boring No.: B1-A Depth (ft): 11.3-12.2
Description: TIP No. B-4962, WBS No. 40174.1.1

Length (in.): 4.030 Volume (in³): 12.44630261
Diameter (in.): 1.983 Volume (cf): 0.007202721
Area (sq. in.): 3.088 Unit Weight (pcf): 169.5193

Compressive Strength (psi): 20392

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0.0	
0.005	0.124	19210	6220.0	5,013,339
0.010	0.248	36120	11695.3	4,713,217
0.015	0.372	43930	14224.1	3,821,551
0.020	0.496	55490	17967.2	3,620,383
0.023	0.571	62980	20392.4	3,573,095
0.030	0.744		0.0	0
0.035	0.868		0.0	0
0.040	0.993		0.0	0
0.045	1.117		0.0	0
0.046	1.141		0.0	0
0.055	1.365		0.0	0
0.060	1.489		0.0	0
0.065	1.613		0.0	0
0.070	1.737		0.0	0



Notes:

Young's modulus is calculated using the secant modulus at each data interval per Figure 2 (C) in ASTM D 7012.

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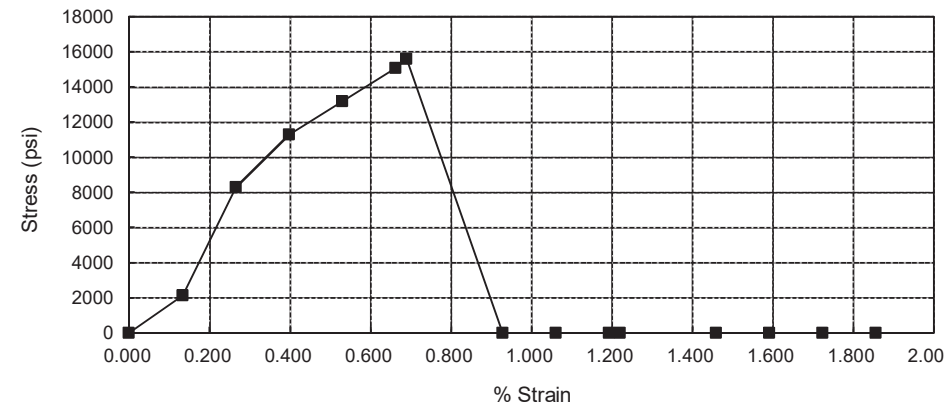
ROCK CORE UNIAXIAL COMPRESSIVE STRENGTH TEST
ASTM D-7012-10 METHOD C

Job No.: G17017.00 Job Name: Bridge No. 46 over Eno River
 Date: 6/11/2018 Sample No.: RS-3
 Boring No.: B2-B Depth (ft): 2.5-3.1
 Description: TIP No. B-4962, WBS No. 40174.1.1

Length (in.): 3.771 Volume (in³): 10.23540881
 Diameter (in.): 1.859 Volume (cf): 0.005923269
 Area (sq. in.): 2.714 Unit Weight (pcf): 168.5488

Compressive Strength (psi): 15603

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0.0	
0.005	0.133	5810	2140.6	1,614,411
0.010	0.265	22510	8293.3	3,127,400
0.015	0.398	30630	11284.9	2,837,028
0.020	0.530	35740	13167.6	2,482,747
0.025	0.663	40910	15072.3	2,273,512
0.026	0.689	42350	15602.9	2,263,018
0.035	0.928		0.0	0
0.040	1.061		0.0	0
0.045	1.193		0.0	0
0.046	1.220		0.0	0
0.055	1.458		0.0	0
0.060	1.591		0.0	0
0.065	1.724		0.0	0
0.070	1.856		0.0	0



Notes:

Young's modulus is calculated using the secant modulus at each data interval per Figure 2 (C) in ASTM D 7012.

Michael J Bauer
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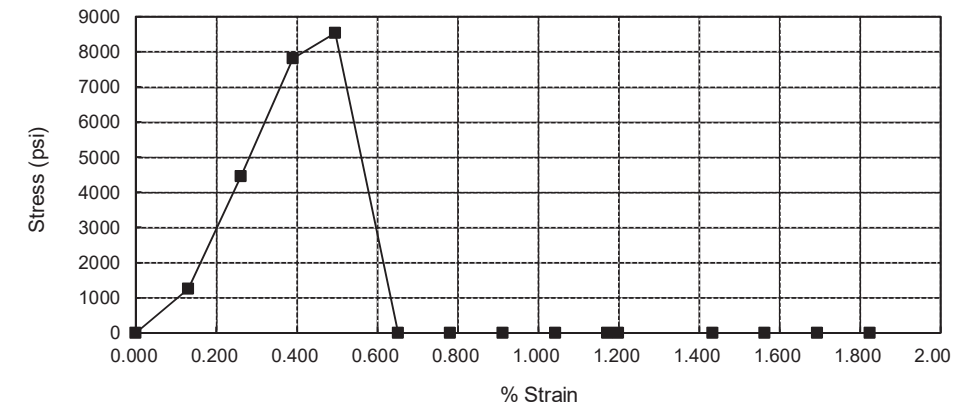
ROCK CORE UNIAXIAL COMPRESSIVE STRENGTH TEST
ASTM D-7012-10 METHOD C

Job No.: G17017.00 Job Name: Bridge No. 46 over Eno River
 Date: 6/11/2018 Sample No.: RS-4
 Boring No.: B2-B Depth (ft): 13.5-14.2
 Description: TIP No. B-4962, WBS No. 40174.1.1

Length (in.): 3.838 Volume (in³): 10.43968989
 Diameter (in.): 1.861 Volume (cf): 0.006041487
 Area (sq. in.): 2.720 Unit Weight (pcf): 164.2311

Compressive Strength (psi): 8525

Deflection (in.)	Strain (%)	Load (lbf)	Compressive Strength (psi)	Young's Modulus (psi)
0.000	0.000	0	0.0	
0.005	0.130	3410	1253.6	962,292
0.010	0.261	12130	4459.4	1,711,525
0.015	0.391	21250	7812.3	1,998,895
0.019	0.495	23190	8525.5	1,722,144
0.025	0.651		0.0	0
0.030	0.782		0.0	0
0.035	0.912		0.0	0
0.040	1.042		0.0	0
0.045	1.172		0.0	0
0.046	1.199		0.0	0
0.055	1.433		0.0	0
0.060	1.563		0.0	0
0.065	1.694		0.0	0
0.070	1.824		0.0	0



Notes:

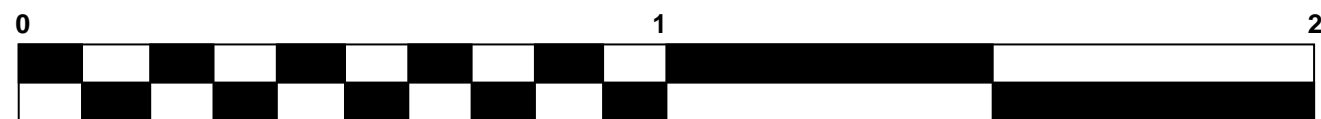
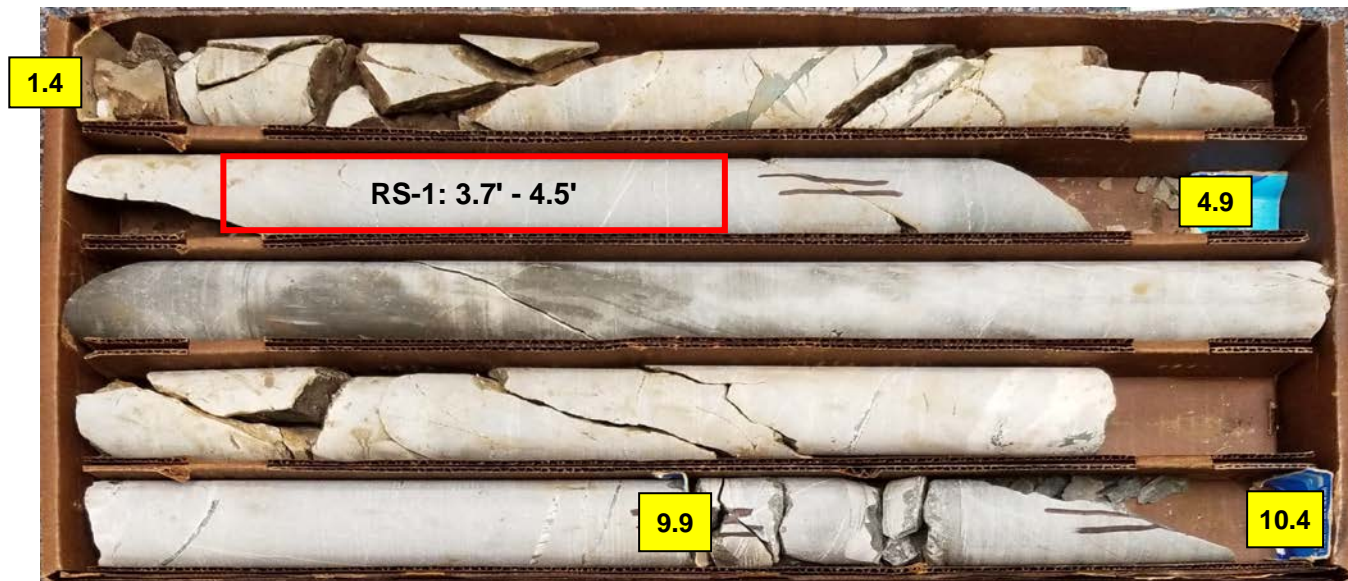
Young's modulus is calculated using the secant modulus at each data interval per Figure 2 (C) in ASTM D 7012.

Michael J Bauer
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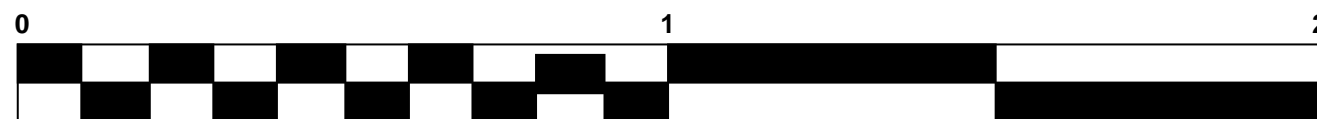
CORE PHOTOGRAPHS

B1-A
1.4 - 19.9 FEET



FEET

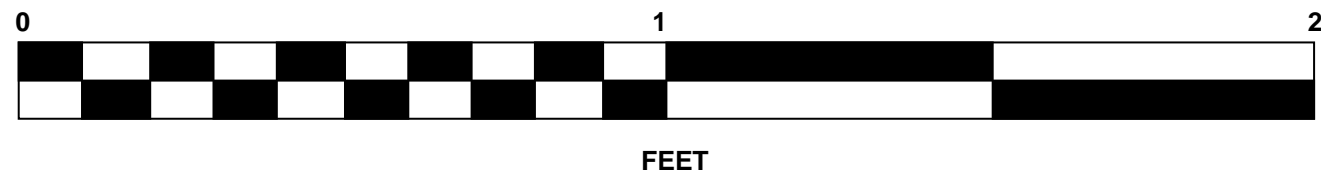
B1-B
2.3 - 19.3 FEET



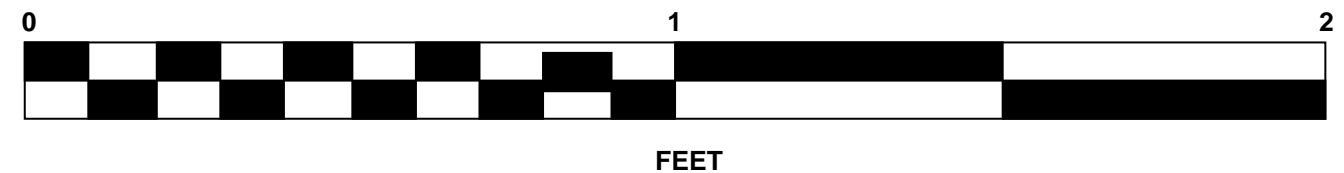
FEET

CORE PHOTOGRAPHS

B1-B (CONTINUED)
19.3 - 20.5 FEET

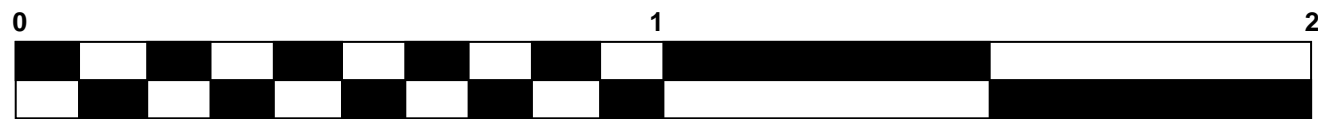
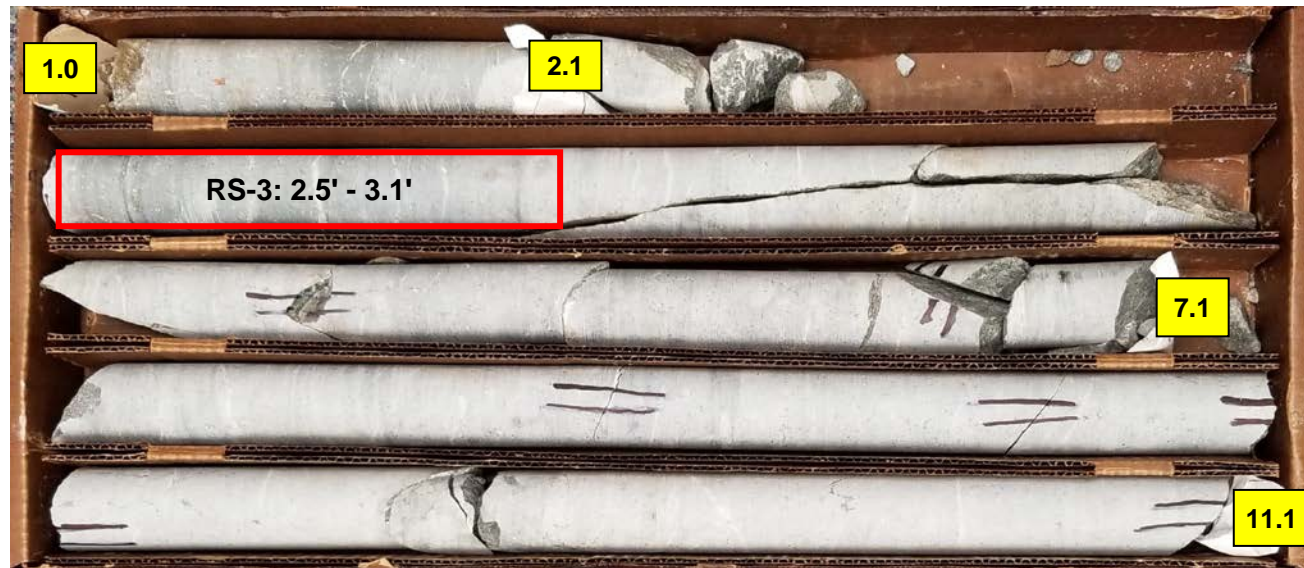


B2-A
4.5 - 18.7 FEET



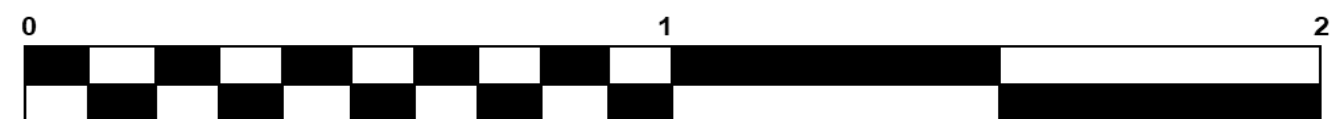
CORE PHOTOGRAPHS

B2-B
1.0 - 17.1 FEET



FEET

EB2-C
10.2 - 27.2 FEET



FEET

SITE PHOTOGRAPHS

Bridge No. 46 over the Eno River on US 70 Bypass



Standing near End Bent 2 facing toward End Bent 1



Standing near End Bent 2 facing toward End Bent 1