



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY  
GOVERNOR

ANTHONY J. TATA  
SECRETARY

July 20, 2015

STATE PROJECT: 17BP.5.R.50 (SF-340026)  
COUNTY: Franklin  
DESCRIPTION: Bridge No. 26 on NC 98 over Crooked Creek  
SUBJECT: Geotechnical Report – Inventory

The Geotechnical Engineering Unit has completed a subsurface investigation for this project and presents the following inventory. No plans, profiles, or cross-sections will be submitted for this roadway project.

**Project Description**

The project consists of the replacement of Bridge No. 26 on NC 98 over Crooked Creek. The bridge will be replaced with a three span, 190 foot, pre-stressed concrete girder bridge. The total length of the roadway portion of the project is 0.1 miles. Bore logs from the bridge subsurface investigation performed in April 2015 were referenced for this roadway subsurface inventory.

**Physiography & Geology**

The project is located in gently rolling terrain of Franklin County. Crooked Creek is part of the Tar River Basin. Geologically the site is characterized by sands and silts derived from the weathering of intrusive volcanic rocks (granite) of the Raleigh Belt. These rocks were formed 270 to 320 million years ago during the collision of the North American and African plates to form the supercontinent Pangea.

**Soil Properties**

Soils encountered at the site are roadway embankment, alluvial, and residual soils. Roadway embankment soils consist of soft to medium stiff, sandy silt (A-4). This material varies in depth up to 11.0 feet at the bridge approaches. Alluvial soils consist of loose, coarse sand (A-1-b), and soft to stiff, sandy silt to silty clay (A-4 and A-7-6). Residual soil consists of moist, loose to very dense, saprolitic, coarse sand (A-1-b).

**Groundwater**

Groundwater is not expected to cause any problems during construction.

MAILING ADDRESS:  
NC DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL ENGINEERING UNIT  
1570 MAIL SERVICE CENTER  
RALEIGH NC 27699-1589

TELEPHONE: 919-662-4710  
[connect.ncdot.gov/resources/Geological](http://connect.ncdot.gov/resources/Geological)

LOCATION:  
3301 JONES SAUSAGE RD., SUITE 100  
GARNER, NC 27529-9489

**Water Wells**

One water well is located within the project limits. It is located at:

<u>Alignment</u>	<u>Station</u>	<u>Offset</u>
-L-	10+63	50' RT

**Rock Properties**

Weathered and crystalline rock (granite), were encountered in the bridge borings. Crystalline rock is not anticipated to be encountered during construction of the roadway portion of this project.

Prepared by,



*Nathan Mohs*  
7/20/15

Nathan Mohs, L.G.  
Project Geological Engineer

JLP/NTR/NDM



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION


PAT MCCRORY  
GOVERNOR

ANTHONY J. TATA  
SECRETARY

July 20, 2015

MEMORANDUM TO: Joey Hopkins, P.E.  
Division 5 Engineer

ATTENTION: Lisa B. Gilchrist, E.I.  
Division Bridge Program Manager

FROM: Kyung (K. J.) Kim, Ph.D., P.E.   
Eastern Regional Geotechnical Manager

STATE PROJECT: 17BP.5.R.50 (SF-340026)  
COUNTY: Franklin  
DESCRIPTION: Bridge No. 26 on NC 98 over Crooked Creek

SUBJECT: Geotechnical Report - Design and Construction Recommendations

I. Slope/Embankment Stability

A. Slope Design

Recommend that all slopes be constructed at a ratio of 2:1 (H:V) or flatter.

B. Undercut

A quantity of 100 cubic yards of undercut for embankment stability should be included in the project contract as a contingency item to be used at the discretion of the Engineer.

C. Geotextile for Soil Stabilization

A quantity of 100 square yards of geotextile for soil stabilization should be included in the project contract as a contingency item to be used at the discretion of the Engineer.

II. Subgrade Stability

A. Subgrade Undercut

Recommend a quantity of 100 cubic yards of subgrade undercut be included in the project contract as a contingency item for areas of unsuitable subgrade soil to be used at the discretion of the Engineer.

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NC DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL ENGINEERING UNIT  
1570 MAIL SERVICE CENTER  
RALEIGH NC 27699-1589

TELEPHONE: 919-662-4710

[connect.ncdot.gov/resources/Geological](http://connect.ncdot.gov/resources/Geological)

LOCATION:

3301 JONES SAUSAGE RD., SUITE 100  
GARNER, NC 27529-9489

B. Geotextile for Soil Stabilization

Recommend a quantity of 100 square yards of geotextile for soil stabilization be included in the project contract as a contingency item to be used at the discretion of the Engineer.

III. Borrow Specifications

A. Select Granular Material

Select Granular Material for embankment construction on geotextile for soil stabilization shall meet the criteria outlined in Standard Specification, Article 1016-3 Class II or Class III. Include 200 cubic yards of this material in the project contract as a contingency item. The backfill material should be placed on geotextile for soil stabilization to a height not less than three (3) feet above geotextile for soil stabilization.

B. Shrinkage Factor

A shrinkage factor of 20 percent is recommended in the calculation of all earthwork quantities. This is to compensate for loss of soils due to erosion, clearing and grubbing of fill areas, and an increase in embankment quantities required due to consolidation of underlying soils and other factors.

IV. Miscellaneous

A. Reduction of Unclassified Excavation – Clearing and Grubbing

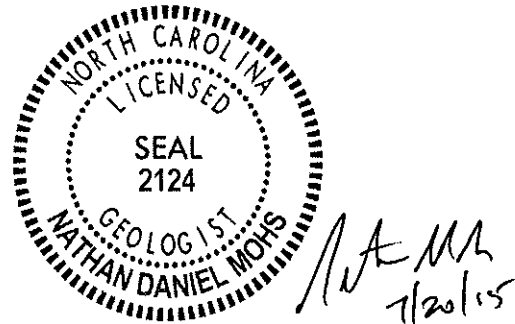
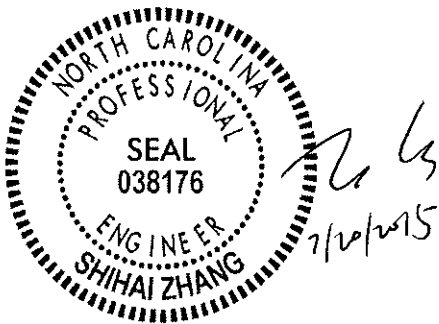
No significant loss of unclassified excavation is anticipated due to clearing and grubbing.

B. Reduction of Unclassified Excavation – Unsuitable Unclassified

Unclassified excavation will be derived from roadway, embankment abutment, and ditch excavation. It is anticipated that 100 percent of unclassified excavation is suitable for embankment construction.

Prepared by,

Prepared by,



Shihai Zhang, P.E.  
Geotechnical Operations Engineer

Nathan Mohs, L.G.  
Project Geological Engineer

JLP/CAK/SZ/NDM



**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL ENGINEERING UNIT**

Summary of Quantities

WBS Number: 17BP.5.R.50 County: Franklin Project Engineer: SZ  
 TIP Number: SF-340026 Field Office: RALEIGH Project Geologist: NDM  
 Description: Bridge No. 26 on NC 98 over Crooked Creek

Pay Item No.	Pay Item/ Quantity Adjustment	Spec Book Section No. or Special Provision (SP) Reference	Report Section	Alignment	Begin Station	End Station	Quantity	Units / %
0036000000-E	Undercut Excavation	225 - Roadway Excavation	I. B	Contingency	N/A	N/A	100	CY
0036000000-E	Undercut Excavation	225 - Roadway Excavation	II. A	Contingency	N/A	N/A	100	CY
				<b>Total Quantity of Undercut Excavation =</b>			<b>200</b>	<b>CY</b>
0194000000-E	Select Granular Material, Class III	SP - Select Granular Material	III. A	Contingency	N/A	N/A	200	CY
				<b>Total Quantity of Select Granular Material, Class III =</b>			<b>200</b>	<b>CY</b>
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	I. C	Contingency	N/A	N/A	100	SY
0196000000-E	Geotextile for Soil Stabilization	270 - Geotextile for Soil Stabilization	II. B	Contingency	N/A	N/A	100	SY
				<b>Total Quantity of Geotextile for Soil Stabilization =</b>			<b>200</b>	<b>SY</b>

These Items Only Impact Earthwork Totals			
N/A	Shrinkage Factor	III. B	%
		235 - Embankments	
		N/A	
		N/A	
		N/A	
		20	



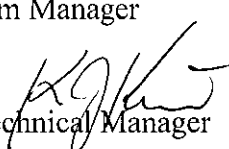
STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY  
GOVERNOR

NICHOLAS J. TENNYSON  
ACTING SECRETARY

August 5, 2015

MEMORANDUM TO: Lisa Gilchrist, E.I.  
Division Bridge Program Manager

FROM: K. J. Kim, Ph.D., P.E.   
Eastern Regional Geotechnical Manager

STATE PROJECT: 17BP.5.R.50 (SF-340026)  
COUNTY: Franklin

DESCRIPTION: Bridge No. 26 on -L- (NC 98) over Crooked Creek

SUBJECT: Bridge Foundation Recommendations

The Geotechnical Engineering Unit has completed the subsurface investigation and prepared the foundation design recommendations for the above structure and presents the following project data.

- Bridge Inventory ( 13 ) pages
- Foundation Design Recommendation ( 5 ) pages
- Design Calculations ( ) pages
- Special Provisions ( 4 ) pages

Please call Shihai Zhang, P.E. or Chris Kreider, P.E. at (919) 662-4710 if there are any questions concerning this memorandum.

KJK/CAK/SZ  
Attachment

MAILING ADDRESS:  
NCDOT EASTERN REGIONAL  
GEOTECHNICAL OFFICE  
1570 MAIL SERVICE CENTER  
RALEIGH NC 27699-1570

TELEPHONE: 919-662-4710  
FAX: 919-662-3095

[www.ncdot.gov/doh/preconstruct/highway/geotech](http://www.ncdot.gov/doh/preconstruct/highway/geotech)

LOCATION:  
EASTERN REGIONAL GEOTECHNICAL  
OFFICE  
3301 JONES SAUSAGE RD., SUITE 100  
GARNER, NC 27529-9489

# FOUNDATION RECOMMENDATIONS

WBS: 17BP.5.R.50

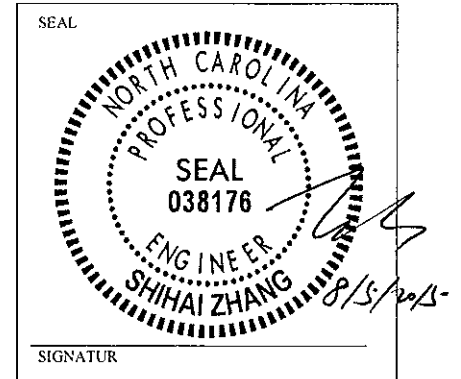
DESCRIPTION : Bridge No. 26 on NC 98 over Crooked Creek

T.I.P. NO.: SF-340026

COUNTY: Franklin

STATION: 15+46.00 -L-

	INITIALS	DATE
DESIGN	SZ	7/28/15
CHECK	CAK	8/5/15
APPROVAL	KJK	8/6/15



BENT	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS DETAILS
END BENT 1	14+51.00 -L-	Cap on HP 12x53 Steel Piles	70 tons/pile	Bottom of Cap El. = 161.7 ft ± Estimated Length of Pile = 25 ft (L), 30 ft (R) Number of Piles = 7
BENT 1	14+91.00 -L-	42" Diameter Drilled Piers	490 tons/pier	Bottom of Cap El. = 161.2 ft ± Top of Drilled Pier El. = 154.7 ft ± Point of Fixity El. = 126.0 ft Tip Elevation No Higher than = 122.0 ft (L), 121.0 ft (C), 120.0 ft (R) Number of Piers = 3
BENT 2	16+01.00 -L-	42" Diameter Drilled Piers	540 tons/pier	Bottom of Cap El. = 160.8 ft ± Top of Drilled Pier El. = 154.7 ft ± Point of Fixity El. = 142.0 ft (L), 139.0 ft (C), 136.0 ft (R) Tip Elevation No Higher than = 138.0 ft (L), 134.0 ft (C), 130.0 ft (R) Number of Piers = 3
END BENT 2	16+41.00 -L-	Cap on HP 12x53 Steel Piles	70 tons/pile	Bottom of Cap El. = 160.8 ft ± Estimated Length of Pile = 10 ft ✓ Number of Piles = 7

**NOTES ON PLANS & COMMENTS**

See Following Pages

## FOUNDATION RECOMMENDATION NOTES ON PLANS

- 1) FOR PILES, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 2) PILES AT END BENT NO. 1 AND END BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 70 TONS PER PILE.
- 3) DRIVE PILES AT END BENT NO. 1 AND END BENT NO. 2 TO A REQUIRED DRIVING RESISTANCE OF 120 TONS PER PILE.
- 4) STEEL H-PILE POINTS ARE REQUIRED FOR STEEL H-PILES AT END BENT NO. 2. FOR STEEL PILE POINTS, SEE SECTION 450 OF THE STANDARD SPECIFICATIONS.
- 5) FOR DRILLED PIERS, SEE GEOTECHNICAL SPECIAL PROVISIONS AND SECTION 411 OF THE STANDARD SPECIFICATIONS.
- 6) DRILLED PIERS AT BENT NO. 1 ARE DESIGNED FOR A FACTORED RESISTANCE OF 490 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 120 TSF.
- 7) INSTALL DRILLED PIERS AT BENT NO. 1 TO A TIP ELEVATION NO HIGHER THAN 122.0 FT (LT), 121.0 FT (CTR.), 120.0 FT (RT), RESPECTIVELY, WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 6 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.
- 8) PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 1 . DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATION 130.0 FT WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
- 9) IF REQUIRED, INSTALL PERMANENT STEEL CASINGS AT BENT NO. 1 BY VIBRATING, SCREWING OR DRIVING PERMANENT CASINGS BEFORE EXCAVATING OR DISTURBING ANY MATERIAL BELOW ELEVATION 146.9 FT.
- 10) DRILLED PIERS AT BENT NO. 2 ARE DESIGNED FOR A FACTORED RESISTANCE OF 540 TONS PER PIER. CHECK FIELD CONDITIONS FOR THE REQUIRED TIP RESISTANCE OF 130 TSF.
- 11) INSTALL DRILLED PIERS AT BENT NO. 2 TO A TIP ELEVATION NO HIGHER THAN 138.0 FT (LT), 134.0 FT (CTR.), 130.0 FT (RT), RESPECTIVELY, WITH THE REQUIRED TIP RESISTANCE AND A PENETRATION OF AT LEAST 6 FT INTO ROCK AS DEFINED BY ARTICLE 411-1 OF THE STANDARD SPECIFICATIONS.
- 12) PERMANENT STEEL CASINGS MAY BE REQUIRED FOR DRILLED PIERS AT BENT NO. 2 . DO NOT EXTEND PERMANENT CASINGS BELOW ELEVATIONS 146.0 FT (LT), 144 FT(CTR.), AND 141.0 FT (RT), RESPECTIVELY, WITHOUT PRIOR APPROVAL FROM THE ENGINEER.
- 13) IF REQUIRED, INSTALL PERMANENT STEEL CASINGS AT BENT NO. 2 BY VIBRATING, SCREWING OR DRIVING PERMANENT CASINGS BEFORE EXCAVATING OR DISTURBING ANY MATERIAL BELOW ELEVATION 148.8 FT.



**FOUNDATION RECOMMENDATION NOTES ON PLANS (CONTINUED)**

- 14) THE SCOUR CRITICAL ELEVATIONS FOR BENT NO. 1 AND BENT NO. 2 ARE ELEVATIONS 145.0 FT AND 147.0 FT, RESPECTIVELY. SCOUR CRITICAL ELEVATIONS ARE USED TO MONITOR POSSIBLE SCOUR PROBLEMS DURING THE LIFE OF THE STRUCTURE.
- 15) CSL TUBES ARE REQUIRED AND CSL TESTING MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR CSL TESTING. FOR CSL TESTING, SEE SECTION 411
- 16) SID INSPECTIONS MAY BE REQUIRED FOR DRILLED PIERS. THE ENGINEER WILL DETERMINE THE NEED FOR SID INSPECTIONS. FOR SID INSPECTIONS, SEE SECTION 411 OF THE STANDARD SPECIFICATIONS.

**FOUNDATION RECOMMENDATION COMMENTS**

- 1) 1½:1 (H:V) SLOPE AT THE END BENTS ARE OK WITH SLOPE PROTECTION.
- 2) REINFORCED BRIDGE APPROACH FILL DETAIL IS RECOMMENDED FOR USE AT EACH END BENT.
- 3) THE DESIGN SCOUR ELEVATIONS FOR BENT NO. 1 AND BENT NO. 2 ARE 146.9 AND 148.8 FT., RESPECTIVELY.
- 4) NO WAITING PERIOD IS REQUIRED BEFORE BEGINNING ANY WORK FOR END BENT CONSTRUCTION AFTER COMPLETION OF THE EMBANKMENT AT EACH BENT.
- 5) NO BATTERED PILES ALLOWED AT END BENTS DUE TO INTEGRAL ABUTMENT.
- 6) PILE DRIVING CRITERIA PROVISION IS NOT REQUIRED FOR THIS PROJECT.

## PILE PAY ITEMS

(Revised 8/15/12)

WBS ELEMENT	17BP.5.R.50		DATE	7/28/2015
TIP NO.	SF-340026		DESIGNED BY	SZ
COUNTY	Franklin		CHECKED BY	<i>CAH</i>
STATION	15+46.00 -L-			
DESCRIPTION	Bridge No. 26 on NC 98 over Crooked Creek			

NUMBER OF BENTS WITH PILES		} <div style="border: 1px solid black; padding: 5px; width: fit-content;">Only required for "Predrilling for Piles" &amp; "Pile Excavation" pay items</div>
NUMBER OF PILES PER BENT		
NUMBER OF END BENTS WITH PILES		
NUMBER OF PILES PER END BENT		

Bent # or End Bent #	PILE PAY ITEM QUANTITIES						PDA Testing (per each)
	Steel Pile Points (yes/no)	Pipe Pile Plates (yes/no/maybe)	Predrilling For Piles (per linear ft)	Pile Redrives (per each)	Pile Excavation (per linear ft)		
					In Soil	Not In Soil	
End Bent 1	no						X
End Bent 2	yes						
<b>TOTALS</b>			0	0	0	0	0

Notes:

Blanks or "no" represent quantity of zero.

If steel pile points are required, calculate quantity of "Steel Pile Points" as equal to the number of steel piles.

If pipe pile plates are or may be required, calculate the quantity of "Pipe Pile Plates" as equal to the number of pipe piles.

Show quantity of "PDA Testing" on the plans as total only.

If quantity of "PDA Testing" is 3 or less, reference "Pile Driving Criteria" provision in PDA notes on plans and include "Pile Driving Criteria" provision in the contract.

**DRILLED PIER PAY ITEMS**  
**(For LRFD Projects - Revised 6/20/12)**

WBS ELEMENT 17BP.5.R.50 DATE 7/28/2015  
 TIP NO. SF-340026 DESIGNED BY SZ  
 COUNTY Franklin CHECKED BY *CMF*  
 STATION 15+46.00 -L-  
 \_\_\_\_\_  
 DESCRIPTION Bridge No. 26 on NC 98 over Crooked Creek  
 \_\_\_\_\_

NUMBER OF BENTS WITH DRILLED PIERS 2  
 NUMBER OF DRILLED PIERS PER BENT 3  
 NUMBER OF END BENTS WITH DRILLED PIERS \_\_\_\_\_  
 NUMBER OF DRILLED PIERS PER END BENT \_\_\_\_\_

Bent # or End Bent #	DRILLED PIER PAY ITEM QUANTITIES				
	42" Dia. Drilled Piers Not In Soil (per linear ft/m)	Permanent Steel Casing For 42" Dia. Drilled Pier (yes/no/maybe)	SID Inspections (per each)	SPT Testing (per each)	CSL Testing (per each)
Bent 1	24	maybe			
Bent 2	26	maybe			
TOTALS	50	<del>                    </del>	2	0	2

Notes:

Blanks or "no" represent quantity of zero.

If drilled piers not in soil are required, calculate quantity of "42" Dia. Drilled Piers in Soil" as the difference between the total drilled pier length and the "42" Dia. Drilled Piers Not in Soil" from the table above. If there is none or zero quantity for drilled piers not in soil in the table above, calculate quantity of "42" Dia. Drilled Piers" as the total drilled pier length and do not use the "42" Dia. Drilled Piers in Soil" pay item.

If permanent steel casing is or may be required, calculate quantity of "Permanent Steel Casing for 42" Dia. Drilled Pier" as the difference between the ground line or top of drilled pier elevation, whichever is higher, and the elevation the permanent casing can not extend below from the foundation recommendations.

If "SID Inspections", "SPT Testing" or "CSL Testing" may be required, show quantities of these pay items on the plans as totals only. If "SID Inspections", "SPT Testing" or "CSL Testing" is required, show quantities of these pay items on the plans for each bent or end bent.

The number of CSL tubes required per drilled pier is equal to one tube per foot of design pier diameter with at least 4 tubes per pier. Calculate the length of each CSL tube as the total drilled pier length plus 1.5 ft.

**REFERENCE: SF-340026**

**PROJECT: 17BP.5.R.50**

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY FRANKLIN  
 PROJECT DESCRIPTION BRIDGE NO. 26 ON NC 98  
OVER CROOKED CREEK

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5, 6	CROSS SECTIONS
7-12	BORE LOGS & CORE REPORTS
13	CORE PHOTOGRAPHS
14	ROCK CORE TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-340026	1	14

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

N.D. MOHS

J.K. CRENSHAW

T.T. WALKER

D.G. PINTER

INVESTIGATED BY N.D. MOHS

DRAWN BY T.T. WALKER

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE MAY 2015



DocuSigned by:

*Nathan Mohs*

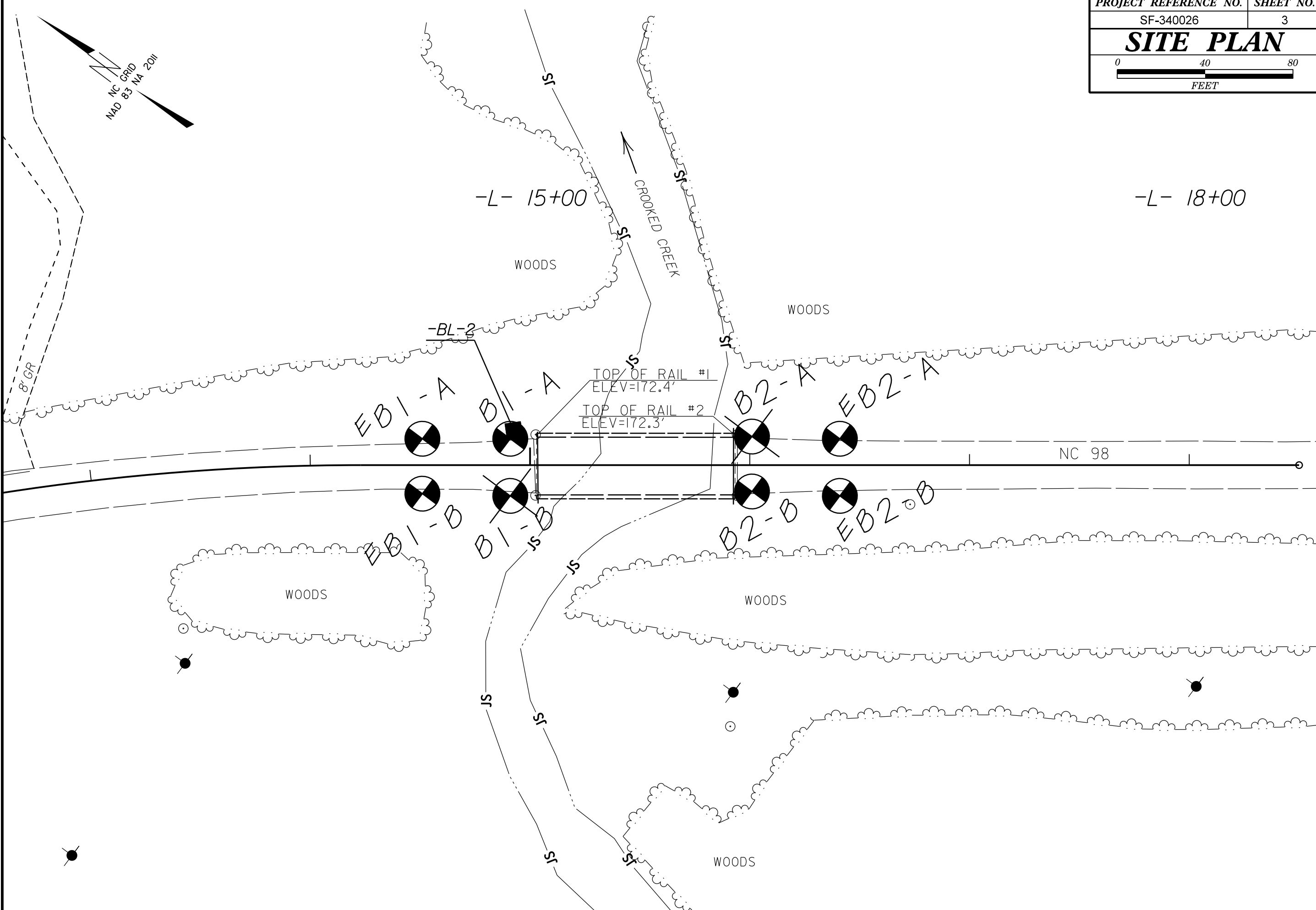
5/13/2015

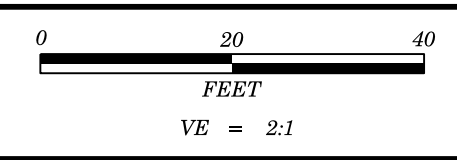
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SIGNATURE

DATE

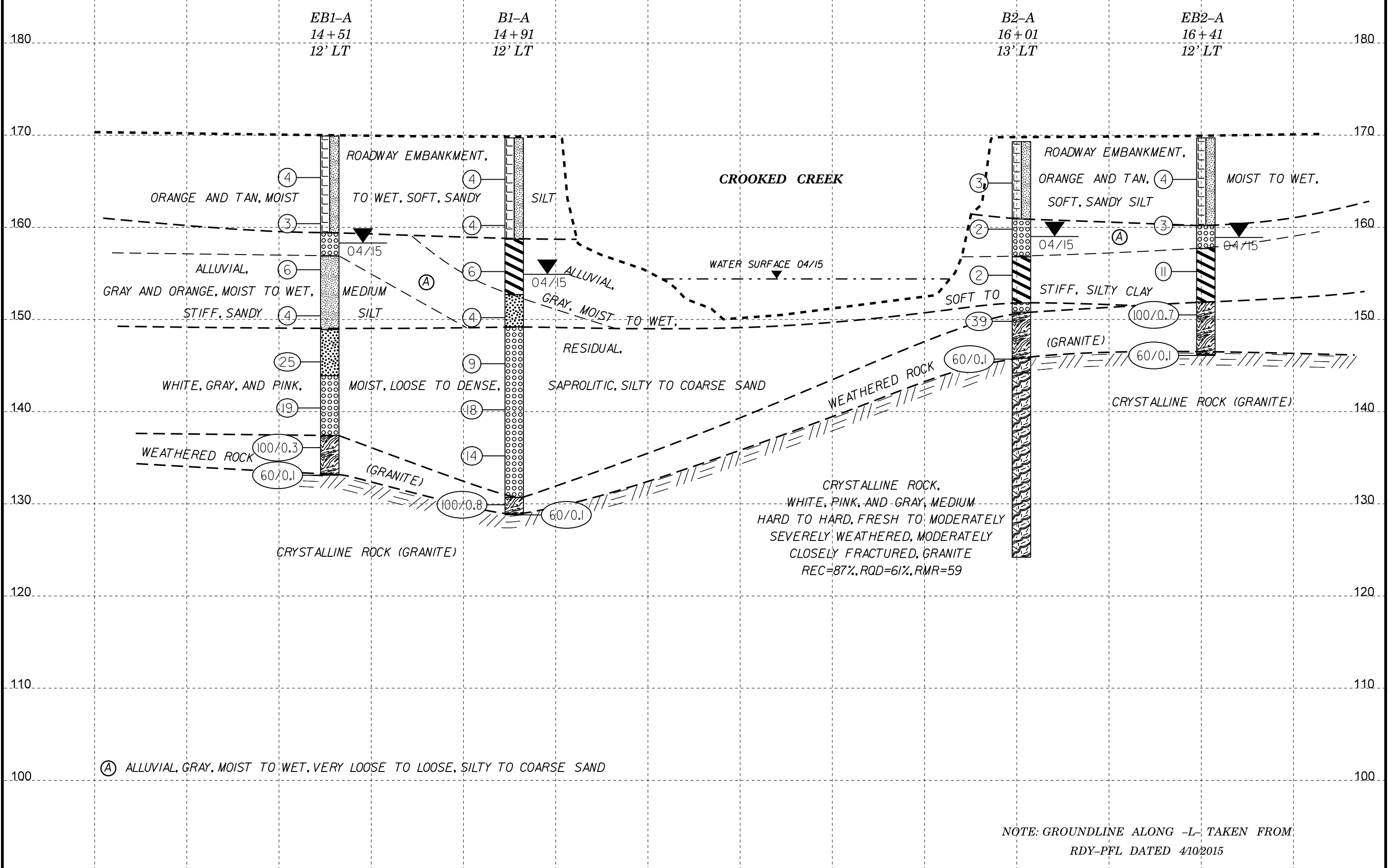


PROJECT REFERENCE NO.	SHEET NO.
SF-340026	3
<b>SITE PLAN</b>	
 0                      40                      80 FEET	





<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
SF-340026	4
<b>PROFILE BORINGS PROJECTED ALONG -L-</b>	



(A) ALLUVIAL, GRAY, MOIST TO WET, VERY LOOSE TO LOOSE, SILTY TO COARSE SAND

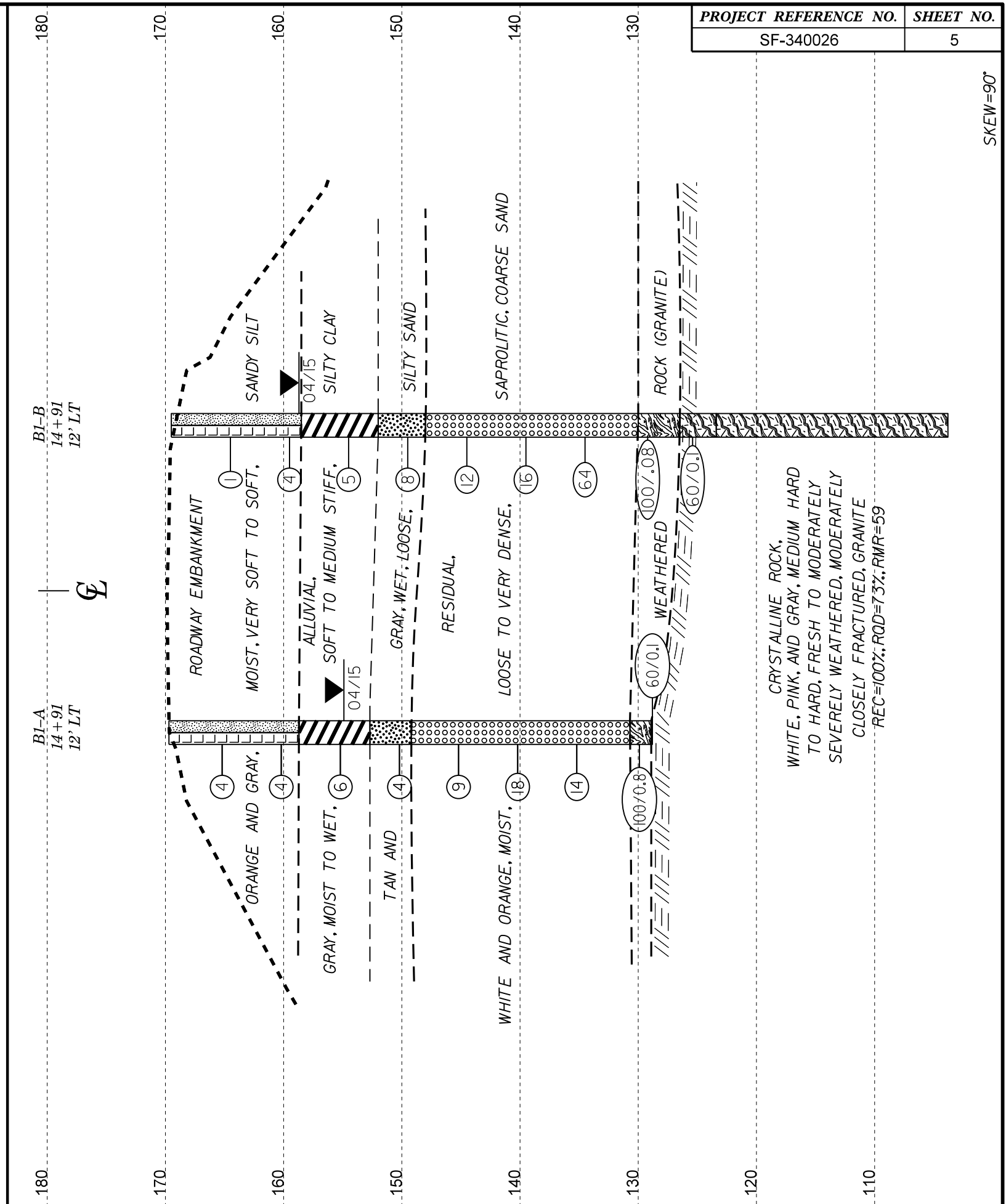
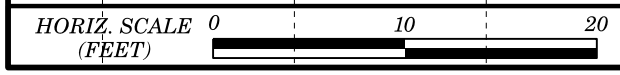
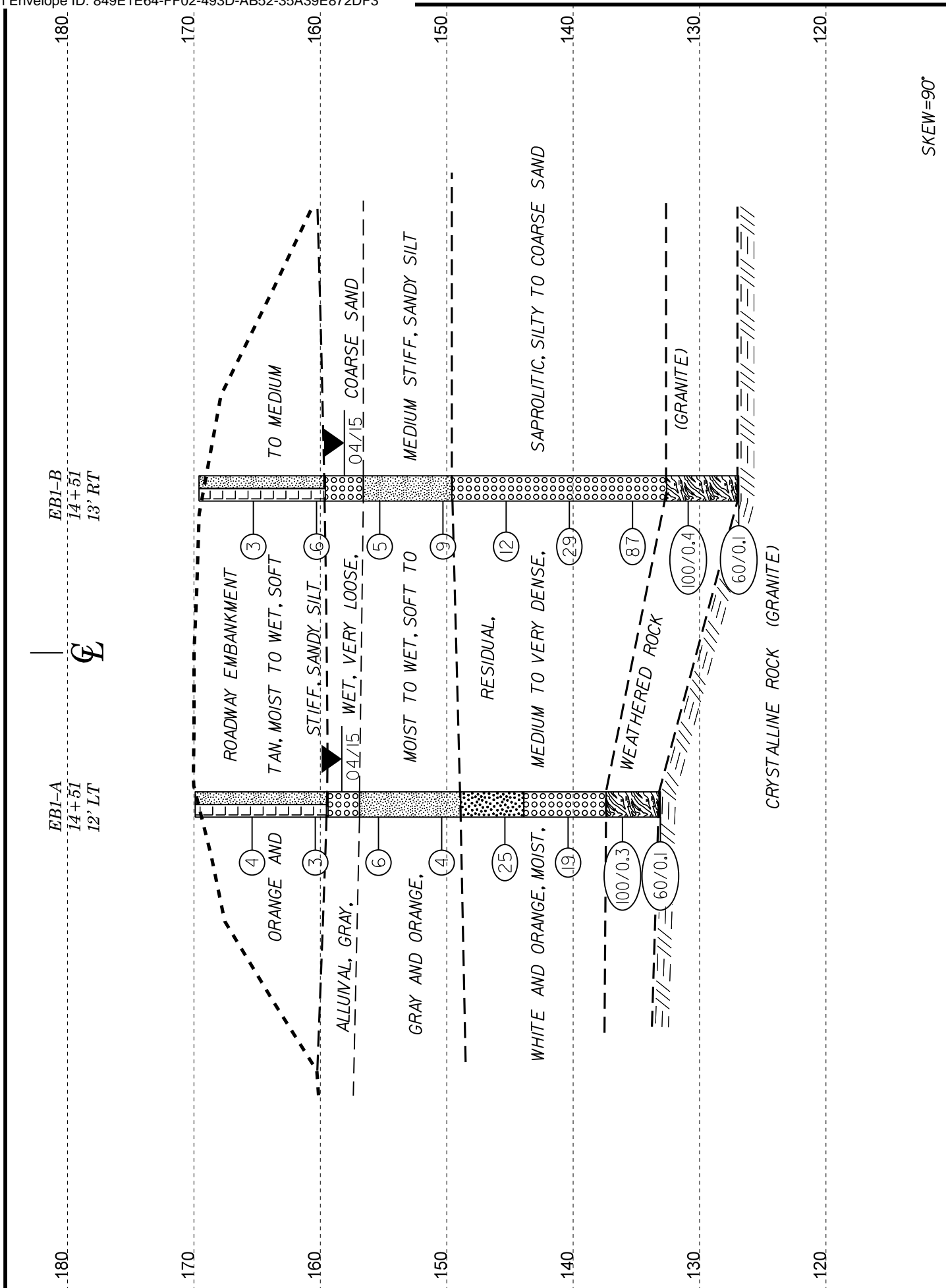
CRYSTALLINE ROCK,  
WHITE, PINK, AND GRAY, MEDIUM  
HARD TO HARD, FRESH TO MODERATELY  
SEVERELY WEATHERED, MODERATELY  
CLOSELY FRACTURED, GRANITE  
REC=87%, RQD=61%, RMR=59

NOTE: GROUNDLINE ALONG -L- TAKEN FROM  
RDY-PFL DATED 4/10/2015

14+00

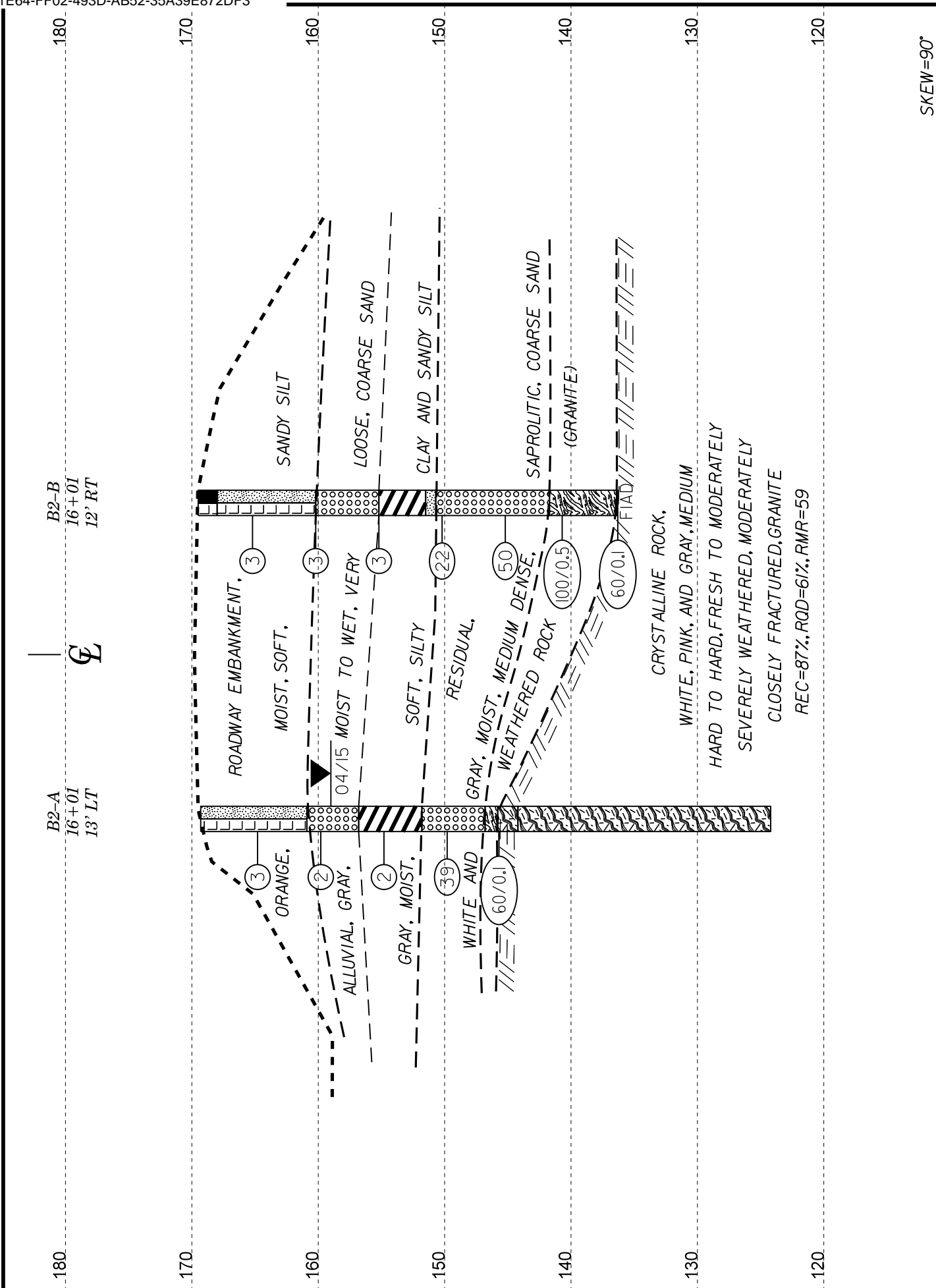
15+00

16+00



CRYSTALLINE ROCK,  
 WHITE, PINK, AND GRAY, MEDIUM HARD  
 TO HARD, FRESH TO MODERATELY  
 SEVERELY WEATHERED, MODERATELY  
 CLOSELY FRACTURED, GRANITE  
 REC=100%; ROD=73%; RMR=59



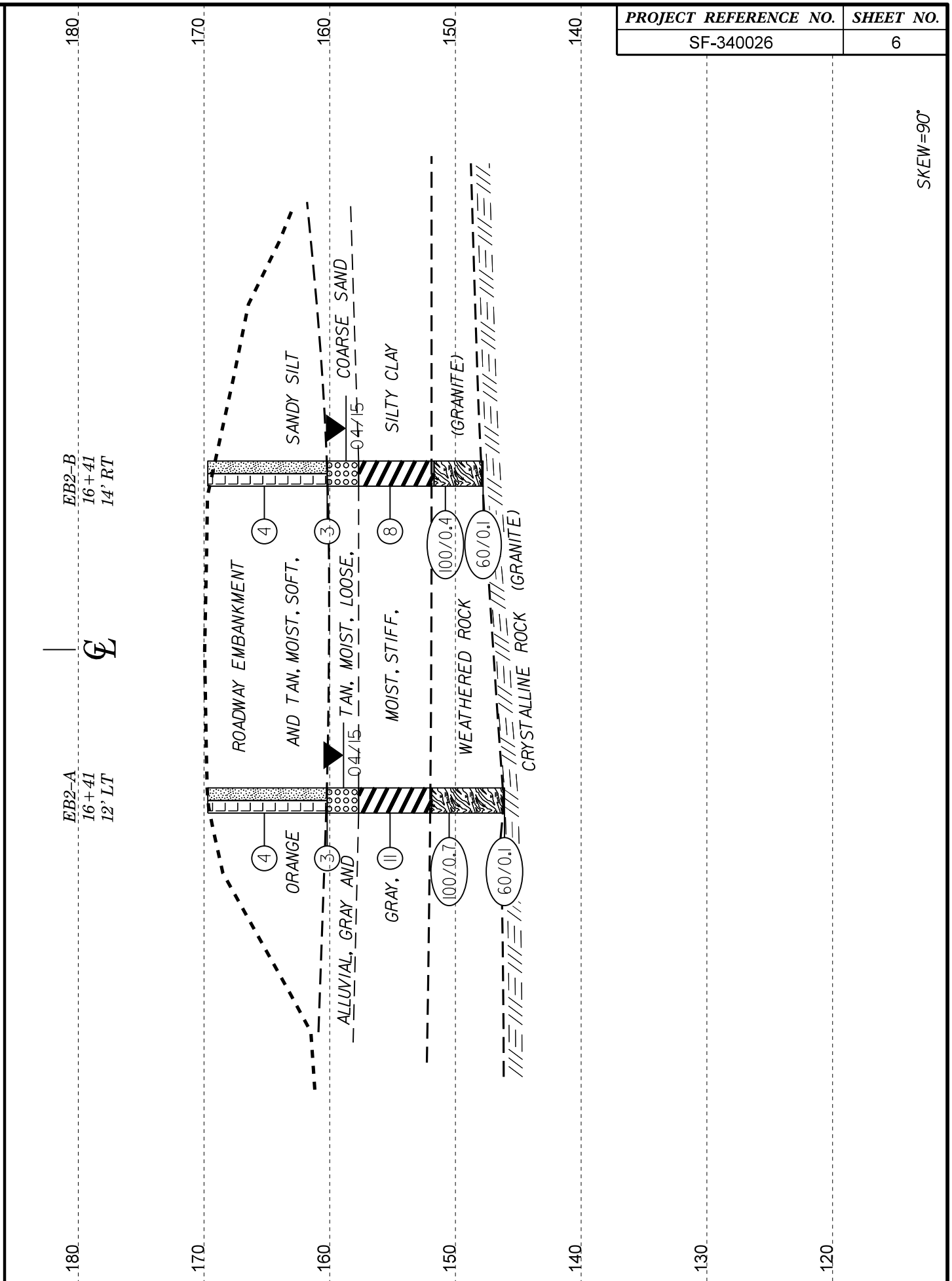


HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH BENT 2

SKEW = 90°



HORIZ. SCALE 0 10 20 (FEET)

VE = 1:1

CROSS SECTION THROUGH END BENT 2

SKEW = 90°

PROJECT REFERENCE NO.	SHEET NO.
SF-340026	6

 **NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 17BP.5.R.50	TIP SF-340026	COUNTY FRANKLIN	GEOLOGIST Mohs, N. D.		
SITE DESCRIPTION BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK					
BORING NO. EB1-A	STATION 14+51	OFFSET 12 ft LT	ALIGNMENT -L-	GROUND WTR (ft)	
COLLAR ELEV. 169.9 ft	TOTAL DEPTH 36.8 ft	NORTHING 797,556	EASTING 2,234,147	0 HR. 14.4	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Pinter, D. G.	START DATE 04/23/15	COMP. DATE 04/23/15	SURFACE WATER DEPTH N/A		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
170												M		169.9 GROUND SURFACE	0.0
												M		ROADWAY EMBANKMENT ORANGE AND TAN, SANDY SILT	
165	166.4	3.5	2	2	2							M			
160	161.4	8.5	2	2	1							W	▼	159.4 ALLUVIAL	10.5
														GRAY, COARSE SAND	
155	156.4	13.5	1	3	3							W		GRAY, SANDY SILT	13.0
150	151.4	18.5	1	1	3							M		RESIDUAL	21.0
														GRAY AND ORANGE, SILTY SAND	
145	146.4	23.5	9	13	12							W		148.9 WHITE AND ORANGE, SAPROLITIC,	26.0
														COARSE SAND	
140	141.4	28.5	5	7	12							M		143.9 WEATHERED ROCK	32.5
														(GRANITE)	
135	136.4	33.5	100/0.3											137.4 WEATHERED ROCK	
														(GRANITE)	
	133.2	36.7	60/0.1											133.2 CRYSTALLINE ROCK	36.7
														(GRANITE)	36.8
														Boring Terminated with Standard Penetration Test Refusal at Elevation 133.1 ft in CRYSTALLINE ROCK (GRANITE)	

WBS 17BP.5.R.50	TIP SF-340026	COUNTY FRANKLIN	GEOLOGIST Mohs, N. D.		
SITE DESCRIPTION BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK					
BORING NO. EB1-B	STATION 14+51	OFFSET 13 ft RT	ALIGNMENT -L-	GROUND WTR (ft)	
COLLAR ELEV. 169.6 ft	TOTAL DEPTH 42.7 ft	NORTHING 797,541	EASTING 2,234,127	0 HR. 11.5	
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015			DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Pinter, D. G.	START DATE 04/22/15	COMP. DATE 04/22/15	SURFACE WATER DEPTH N/A		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
170												M		169.6 GROUND SURFACE	0.0
												M		ROADWAY EMBANKMENT ORANGE, SANDY SILT	
165	166.3	3.3	1	2	1							M			
160	161.3	8.3	2	4	2							W	▼	159.6 ALLUVIAL	10.0
														GRAY, COARSE SAND	
155	156.3	13.3	2	2	3							W		GRAY, SANDY SILT	13.0
150	151.3	18.3	2	3	6							M		RESIDUAL	20.0
														GRAY, ORANGE, AND WHITE,	
145	146.3	23.3	5	5	7							M		SAPROLITIC, COARSE SAND WITH ROCK	
														FRAGMENTS	
140	141.3	28.3	10	14	15							M		149.6 WEATHERED ROCK	20.0
														(GRANITE)	
135	136.3	33.3	14	31	56							M		146.3 WEATHERED ROCK	
														(GRANITE)	
130	131.3	38.3	100/0.4											141.3 WEATHERED ROCK	37.0
														(GRANITE)	
	127.0	42.6	60/0.1											132.6 WEATHERED ROCK	37.0
														(GRANITE)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 126.9 ft in CRYSTALLINE ROCK (GRANITE)	

NCDOT BORE DOUBLE 340026\_GEO\_BH\_BRD0026.GPJ NC\_DOT.GDT 5/6/15

WBS 17BP.5.R.50		TIP SF-340026		COUNTY FRANKLIN		GEOLOGIST Mohs, N. D.									
SITE DESCRIPTION BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK							GROUND WTR (ft)								
BORING NO. B1-A		STATION 14+91		OFFSET 12 ft LT		ALIGNMENT -L-	0 HR. 13.0								
COLLAR ELEV. 169.7 ft		TOTAL DEPTH 40.9 ft		NORTHING 797,524		EASTING 2,234,171	24 HR. 14.8								
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Pinter, D. G.		START DATE 04/23/15		COMP. DATE 04/23/15		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					
170															169.7 GROUND SURFACE 0.0
	166.2	3.5											M		ROADWAY EMBANKMENT ORANGE, SANDY SILT
165			1	2	2										
	161.2	8.5											M		
160			2	2	2										
	156.2	13.5													158.7 GRAY, SILTY CLAY 11.0
155			2	3	3										
	151.2	18.5													152.7 TAN, SILTY SAND 17.0
150			4	2	2										
	146.2	23.5													149.2 RESIDUAL WHITE AND ORANGE, SAPROLITIC, COARSE SAND 20.5
145			3	4	5										
	141.2	28.5													
140			6	8	10										
	136.2	33.5													
135			6	7	7										
	131.2	38.5													
130			14	37	63/0.3										
	128.9	40.8													130.7 WEATHERED ROCK (GRANITE) 39.0
															128.9 WEATHERED ROCK (GRANITE) 40.8
															128.8 CRYSTALLINE ROCK (GRANITE) 40.9
															Boring Terminated with Standard Penetration Test Refusal at Elevation 128.8 ft in CRYSTALLINE ROCK (GRANITE)

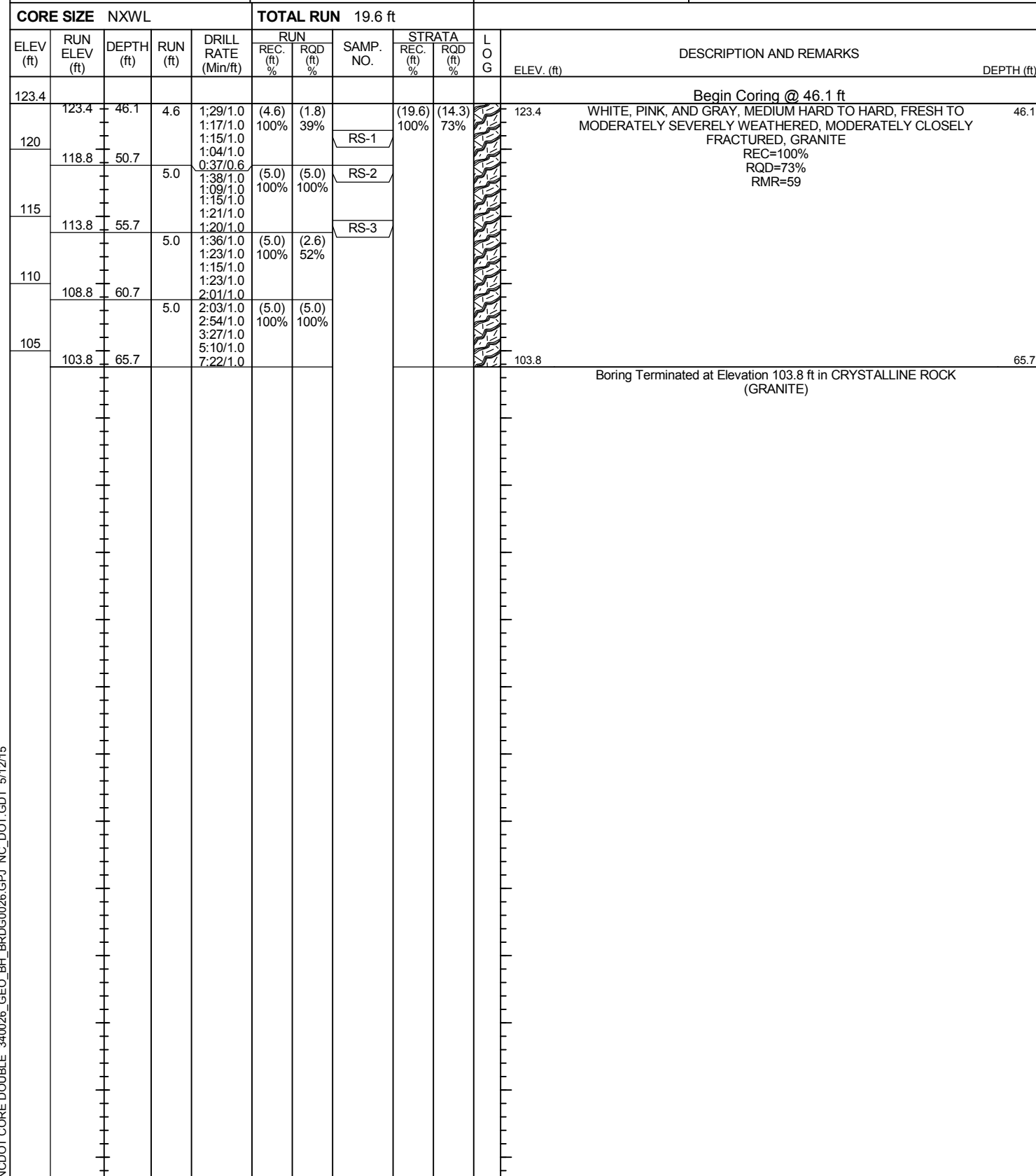
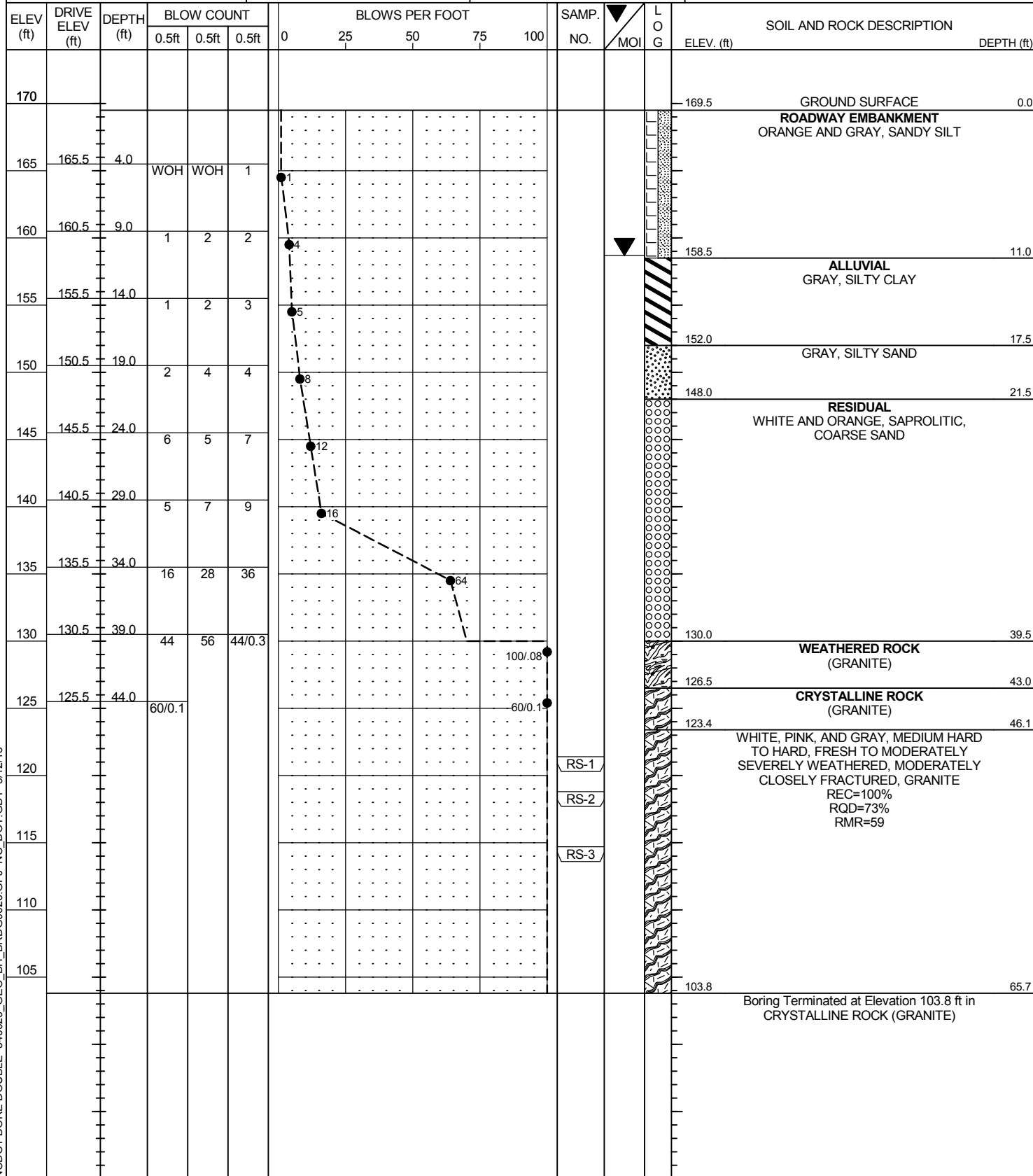
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

# CORE BORING REPORT

WBS 17BP.5.R.50	TIP SF-340026	COUNTY FRANKLIN	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 14+91	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 169.5 ft	TOTAL DEPTH 65.7 ft	NORTHING 797,509	EASTING 2,234,151
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 04/27/15	COMP. DATE 04/27/15	SURFACE WATER DEPTH N/A

WBS 17BP.5.R.50	TIP SF-340026	COUNTY FRANKLIN	GEOLOGIST Crenshaw, J. K.
SITE DESCRIPTION BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			GROUND WTR (ft)
BORING NO. B1-B	STATION 14+91	OFFSET 14 ft RT	ALIGNMENT -L-
COLLAR ELEV. 169.5 ft	TOTAL DEPTH 65.7 ft	NORTHING 797,509	EASTING 2,234,151
DRILL RIG/HAMMER EFF./DATE RFO0074 CME-55 89% 02/09/2015		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Pinter, D. G.	START DATE 04/27/15	COMP. DATE 04/27/15	SURFACE WATER DEPTH N/A



NCDOT BORE DOUBLE 340026\_GEO\_BH\_BRD0026.GPJ NC\_DOT\_GDT 5/12/15

NCDOT BORE DOUBLE 340026\_GEO\_BH\_BRD0026.GPJ NC\_DOT\_GDT 5/12/15

# NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

# CORE BORING REPORT

<b>WBS</b> 17BP.5.R.50	<b>TIP</b> SF-340026	<b>COUNTY</b> FRANKLIN	<b>GEOLOGIST</b> Crenshaw, J. K.
<b>SITE DESCRIPTION</b> BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> B2-A	<b>STATION</b> 16+01	<b>OFFSET</b> 13 ft RT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 169.3 ft	<b>TOTAL DEPTH</b> 45.1 ft	<b>NORTHING</b> 797,437	<b>EASTING</b> 2,234,238
<b>DRILL RIG/HAMMER EFF./DATE</b> RFO0074 CME-55 89% 02/09/2015		<b>DRILL METHOD</b> NW Casing W/SPT & Core	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Pinter, D. G.	<b>START DATE</b> 04/28/15	<b>COMP. DATE</b> 04/28/15	<b>SURFACE WATER DEPTH</b> N/A

<b>WBS</b> 17BP.5.R.50	<b>TIP</b> SF-340026	<b>COUNTY</b> FRANKLIN	<b>GEOLOGIST</b> Crenshaw, J. K.
<b>SITE DESCRIPTION</b> BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> B2-A	<b>STATION</b> 16+01	<b>OFFSET</b> 13 ft RT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 169.3 ft	<b>TOTAL DEPTH</b> 45.1 ft	<b>NORTHING</b> 797,437	<b>EASTING</b> 2,234,238
<b>DRILL RIG/HAMMER EFF./DATE</b> RFO0074 CME-55 89% 02/09/2015		<b>DRILL METHOD</b> NW Casing W/SPT & Core	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Pinter, D. G.	<b>START DATE</b> 04/28/15	<b>COMP. DATE</b> 04/28/15	<b>SURFACE WATER DEPTH</b> 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						
170													169.3	GROUND SURFACE	0.0	
														ROADWAY EMBANKMENT GRAY, SANDY SILT		
165	165.8	3.5	WOH	1	2											
160	160.8	8.5	2	1	1									ALLUVIAL GRAY, COARSE SAND	8.4	
155	155.8	13.5	WOH	WOH	2									GRAY, SILTY CLAY	12.5	
150	150.8	18.5	10	22	17									RESIDUAL GRAY, COARSE SAND WITH GRAVEL	17.5	
145	145.8	23.5	60/0.1											WEATHERED ROCK (GRANITE)	22.5	
														CRYSTALLINE ROCK (GRANITE)	23.5	
140														WHITE, PINK, AND GRAY, MEDIUM HARD TO HARD, FRESH TO MODERATELY SEVERELY WEATHERED, MODERATELY CLOSELY FRACTURED, GRANITE REC=87% RQD=61% RMR=59	25.1	
135																
130																
125																
															Boring Terminated at Elevation 124.2 ft in CRYSTALLINE ROCK (GRANITE)	45.1

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (%)	RQD (%)		REC. (%)	RQD (%)				
											Begin Coring @ 25.1 ft		
144.2	144.2	25.1	5.0	1:21/1.0 1:02/1.0 0:59/1.0 0:50/1.0 1:08/1.0	(3.5) 70%	(2.8) 56%	RS-4				144.2	WHITE, PINK, AND GRAY, MEDIUM HARD TO HARD, FRESH TO MODERATELY SEVERELY WEATHERED, MODERATELY CLOSELY FRACTURED, GRANITE REC=87% RQD=61% RMR=59	25.1
140	139.2	30.1	5.0	1:10/1.0 0:57/1.0 1:09/1.0 1:12/1.0 1:00/1.0	(4.0) 80%	(3.2) 64%	RS-5						
135	134.2	35.1	5.0	0:59/1.0 1:04/1.0 0:56/1.0 1:02/1.0 1:18/1.0	(5.0) 100%	(2.9) 58%	RS-6						
130	129.2	40.1	5.0	1:12/1.0 1:09/1.0 1:11/1.0 1:12/1.0 1:19/1.0	(4.8) 96%	(3.4) 68%							
125	124.2	45.1											

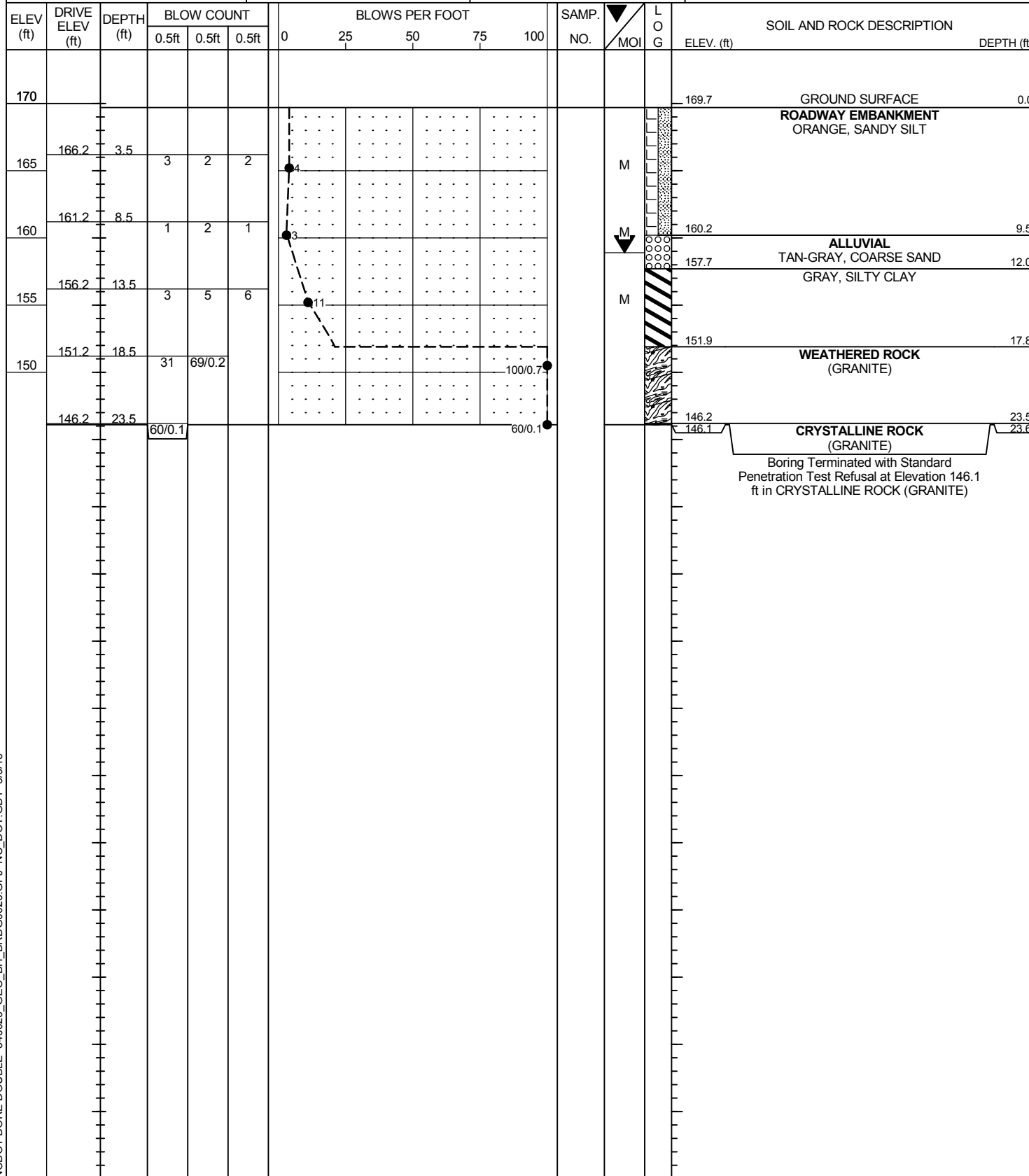
NCDOT BORE DOUBLE 340026\_GEO\_BH\_BRDG0026.GPJ NC\_DOT\_GDT 5/12/15

NCDOT CORE DOUBLE 340026\_GEO\_BH\_BRDG0026.GPJ NC\_DOT\_GDT 5/12/15

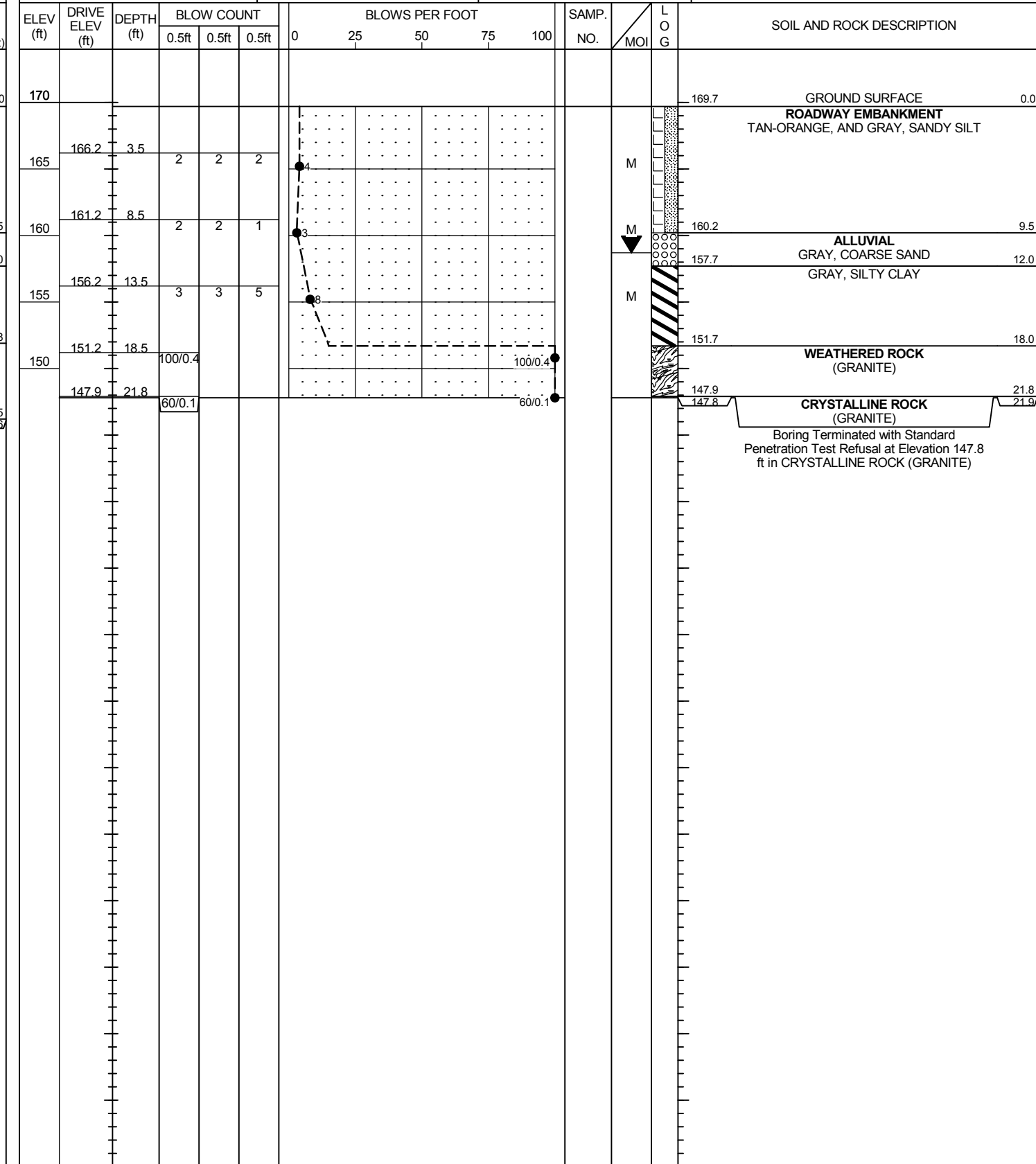
<b>WBS</b> 17BP.5.R.50		<b>TIP</b> SF-340026		<b>COUNTY</b> FRANKLIN		<b>GEOLOGIST</b> Mohs, N. D.								
<b>SITE DESCRIPTION</b> BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK							<b>GROUND WTR (ft)</b>							
<b>BORING NO.</b> B2-B		<b>STATION</b> 16+01		<b>OFFSET</b> 12 ft RT		<b>ALIGNMENT</b> -L-	0 HR. 13.0							
<b>COLLAR ELEV.</b> 169.5 ft		<b>TOTAL DEPTH</b> 33.2 ft		<b>NORTHING</b> 797,422		<b>EASTING</b> 2,234,218	24 HR. FIAD							
<b>DRILL RIG/HAMMER EFF./DATE</b> RFO0074 CME-55 89% 02/09/2015				<b>DRILL METHOD</b> H.S. Augers		<b>HAMMER TYPE</b> Automatic								
<b>DRILLER</b> Pinter, D. G.		<b>START DATE</b> 04/22/15		<b>COMP. DATE</b> 04/22/15		<b>SURFACE WATER DEPTH</b> N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
170														169.5 GROUND SURFACE 0.0
														168.0 ASPHALT 1.5
165	166.2	3.3	1	1	2	3						M		ROADWAY EMBANKMENT ORANGE, SANDY SILT
160	161.2	8.3	3	2	1	3						M		160.2 ALLUVIAL GRAY, COARSE SAND 9.3
155	156.2	13.3	WOH	1	2	3						M		155.2 GRAY, SILTY CLAY 14.3
150	151.2	18.3	4	7	15	22						M		151.5 GRAY, SANDY SILT 18.0 150.7 RESIDUAL WHITE AND ORANGE, SAPROLITIC, COARSE SAND 18.8
145	146.2	23.3	10	19	31	50						M		141.7 WEATHERED ROCK (GRANITE) 27.8
140	141.2	28.3	100/0.5											136.4 WEATHERED ROCK (GRANITE) 27.8 136.3 CRYSTALLINE ROCK (GRANITE) 33.1
	136.4	33.1	60/0.1											33.1 CRYSTALLINE ROCK (GRANITE) 33.2 Boring Terminated with Standard Penetration Test Refusal at Elevation 136.3 ft in CRYSTALLINE ROCK (GRANITE)

**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

<b>WBS</b> 17BP.5.R.50	<b>TIP</b> SF-340026	<b>COUNTY</b> FRANKLIN	<b>GEOLOGIST</b> Mohs, N. D.
<b>SITE DESCRIPTION</b> BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> EB2-A	<b>STATION</b> 16+41	<b>OFFSET</b> 12 ft LT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 169.7 ft	<b>TOTAL DEPTH</b> 23.6 ft	<b>NORTHING</b> 797,404	<b>EASTING</b> 2,234,261
<b>DRILL RIG/HAMMER EFF./DATE</b> RFO0074 CME-55 89% 02/09/2015		<b>DRILL METHOD</b> H.S. Augers	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Pinter, D. G.	<b>START DATE</b> 04/23/15	<b>COMP. DATE</b> 04/23/15	<b>SURFACE WATER DEPTH</b> N/A



<b>WBS</b> 17BP.5.R.50	<b>TIP</b> SF-340026	<b>COUNTY</b> FRANKLIN	<b>GEOLOGIST</b> Mohs, N. D.
<b>SITE DESCRIPTION</b> BRIDGE NO. 26 ON NC 98 OVER CROOKED CREEK			<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> EB2-B	<b>STATION</b> 16+41	<b>OFFSET</b> 14 ft RT	<b>ALIGNMENT</b> -L-
<b>COLLAR ELEV.</b> 169.7 ft	<b>TOTAL DEPTH</b> 21.9 ft	<b>NORTHING</b> 797,388	<b>EASTING</b> 2,234,240
<b>DRILL RIG/HAMMER EFF./DATE</b> RFO0074 CME-55 89% 02/09/2015		<b>DRILL METHOD</b> H.S. Augers	<b>HAMMER TYPE</b> Automatic
<b>DRILLER</b> Pinter, D. G.	<b>START DATE</b> 04/22/15	<b>COMP. DATE</b> 04/22/15	<b>SURFACE WATER DEPTH</b> N/A

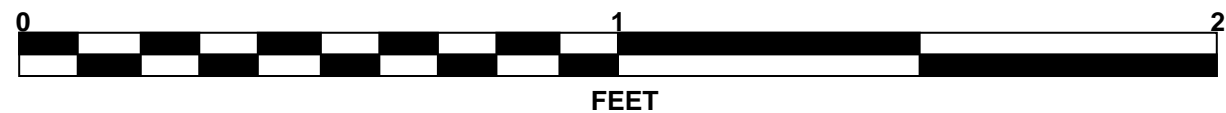
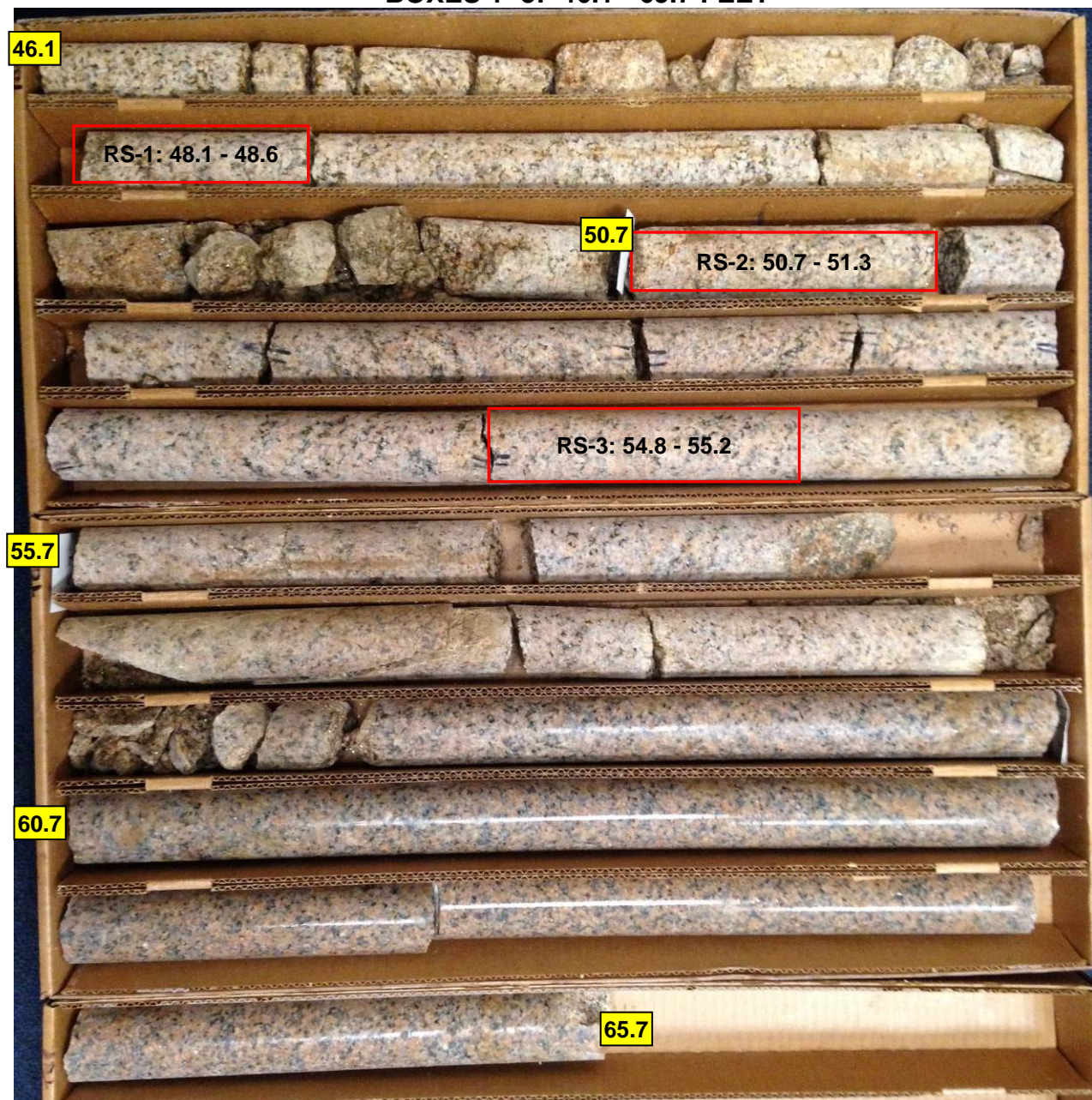


NCDOT BORE DOUBLE 340026\_GEO\_BH\_BRDG0026.GPJ NC\_DOT\_GDT 5/6/15

# CORE PHOTOGRAPHS

## B1-B

BOXES 1-3: 46.1 - 65.7 FEET



## B2-A

BOXES 1 & 2: 25.1 - 45.1 FEET





<b><i>ROCK TEST RESULTS</i></b>									
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	H/D RATIO	UNIT WT lbs/ft <sup>3</sup>	Ultimate lbf	Ultimate ksi	Ultimate (corrected) ksi	Sec. Mod. @ 40% Mpsi
RS-1	14' RT	14+91	48.1-48.6	1.97	157.5	10080	3.674	3.67	0.226
RS-2	14' RT	14+91	50.7-51.3	1.95	160.8	17800	6.481	6.46	0.608
RS-3	14' RT	14+91	54.8-55.2	1.78	161.1	18650	6.791	6.69	0.636
RS-4	13' LT	16+01	26.1-26.8	1.92	158.3	15440	5.628	5.60	0.349
RS-5	13' LT	16+01	30.5-31.1	1.89	155.2	10230	3.729	3.70	0.192
RS-6	13' LT	16+01	35.1-35.6	2.00	159.8	17530	6.383	6.38	0.562