

REFERENCE: B-5527

PROJECT: 55027

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY SURRY  
PROJECT DESCRIPTION BRIDGE NO. 122 OVER  
TOMS CREEK ON US 52 NB

**CONTENTS**

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22	ROCK TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5527	1	

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  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

H. FISCHER, GIT

A. GROSS, PG

M. SHIPMAN, PE

M. B. MOSELEY

C. BOWEN

INVESTIGATED BY H. FISCHER, GIT & A. GROSS, PG

DRAWN BY H. FISCHER, GIT

CHECKED BY \_\_\_\_\_

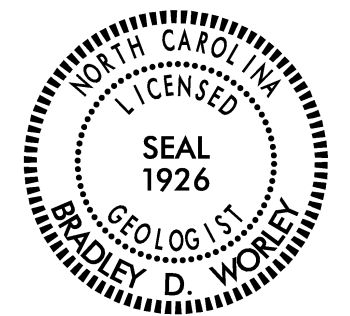
SUBMITTED BY B. WORLEY, PG

DATE MARCH, 2023

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Bradley D. Worley 03/27/2023  
GA8724209FCB476 SIGNATURE DATE

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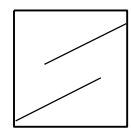
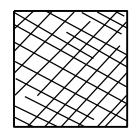
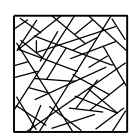
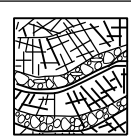
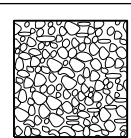
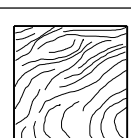
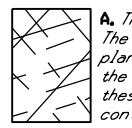
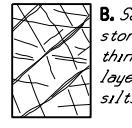
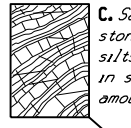
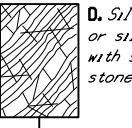
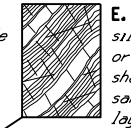
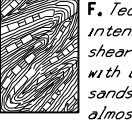
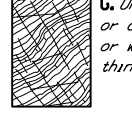
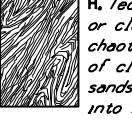
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 DIVISION OF HIGHWAYS  
 GEOTECHNICAL ENGINEERING UNIT

**SUBSURFACE INVESTIGATION**

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

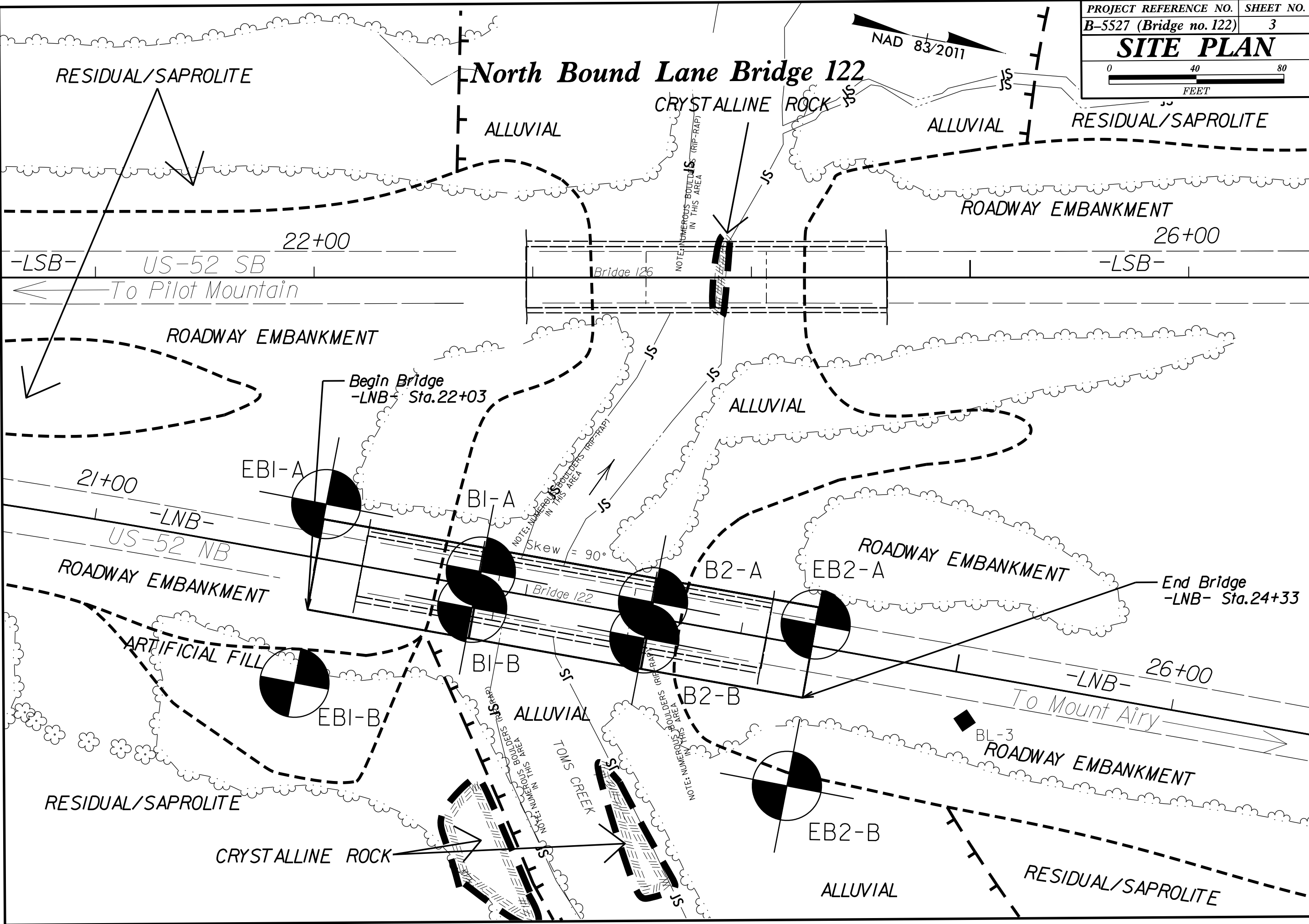
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

<p><b>GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)</b></p> <p>From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.</p> <p><b>STRUCTURE</b></p>	<p><b>SURFACE CONDITIONS</b></p> <p><b>VERY GOOD</b> Very rough, fresh unweathered surfaces</p> <p><b>GOOD</b> Rough, slightly weathered, iron stained surfaces</p> <p><b>FAIR</b> Smooth, moderately weathered and altered surfaces</p> <p><b>POOR</b> Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments</p> <p><b>VERY POOR</b> Slickensided, highly weathered surfaces with soft clay coatings or fillings</p> <p>DECREASING SURFACE QUALITY →</p>	<p><b>GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)</b></p> <p>From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.</p> <p><b>SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)</b></p> <p><b>VERY GOOD</b> - Very Rough, fresh unweathered surfaces</p> <p><b>GOOD</b> - Rough, slightly weathered surfaces</p> <p><b>FAIR</b> - Smooth, moderately weathered and altered surfaces</p> <p><b>POOR</b> - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments</p> <p><b>VERY POOR</b> - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings</p> <p><b>COMPOSITION AND STRUCTURE</b></p>	
<p><b>DECREASING INTERLOCKING OF ROCK PIECES</b></p> <p>↓</p> <p> <b>INTACT OR MASSIVE</b> - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p> <p> <b>BLOCKY</b> - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p> <p> <b>VERY BLOCKY</b> - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p> <p> <b>BLOCKY/DISTURBED/SEAMY</b> - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p> <p> <b>DISINTEGRATED</b> - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p> <p> <b>LAMINATED/SHEARED</b> - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	<p>90</p> <p>80</p> <p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p> <p>N/A</p> <p>N/A</p>	<p> <b>A. Thick bedded, very blocky sandstone</b> 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.</p> <p> <b>B. Sandstone with thin inter-layers of siltstone</b></p> <p> <b>C. Sandstone and siltstone in similar amounts</b></p> <p> <b>D. Siltstone or silty shale with sandstone layers</b></p> <p> <b>E. Weak siltstone or clayey shale with sandstone layers</b></p> <p> <b>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</b></p> <p> <b>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</b></p> <p> <b>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.</b></p> <p>→ Means deformation after tectonic disturbance</p>	<p>70</p> <p>60</p> <p>50</p> <p>40</p> <p>30</p> <p>20</p> <p>10</p> <p>A</p> <p>B</p> <p>C</p> <p>D</p> <p>E</p> <p>F</p> <p>G</p> <p>H</p>

PROJECT REFERENCE NO.	SHEET NO.
B-5527 (Bridge no. 122)	3
<b>SITE PLAN</b>	

NAD 83/2011



# North Bound Lane Bridge 122

RESIDUAL/SAPROLITE

ALLUVIAL

CRYSTALLINE ROCK

ALLUVIAL

RESIDUAL/SAPROLITE

ROADWAY EMBANKMENT

22+00

26+00

-LSB-

US-52 SB

-LSB-

To Pilot Mountain

ROADWAY EMBANKMENT

Begin Bridge  
-LNB- Sta. 22+03

ALLUVIAL

21+00

EBI-A

BI-A

Skew = 90°

B2-A

EB2-A

ROADWAY EMBANKMENT

End Bridge  
-LNB- Sta. 24+33

ROADWAY EMBANKMENT

-LNB-  
US-52 NB

ARTIFICIAL FILL

BI-B

B2-B

-LNB- 26+00

To Mount Airy

RESIDUAL/SAPROLITE

CRYSTALLINE ROCK

ALLUVIAL

TOMS CREEK

NUMEROUS BOULDERS (RIP-RAP) IN THIS AREA

EB2-B

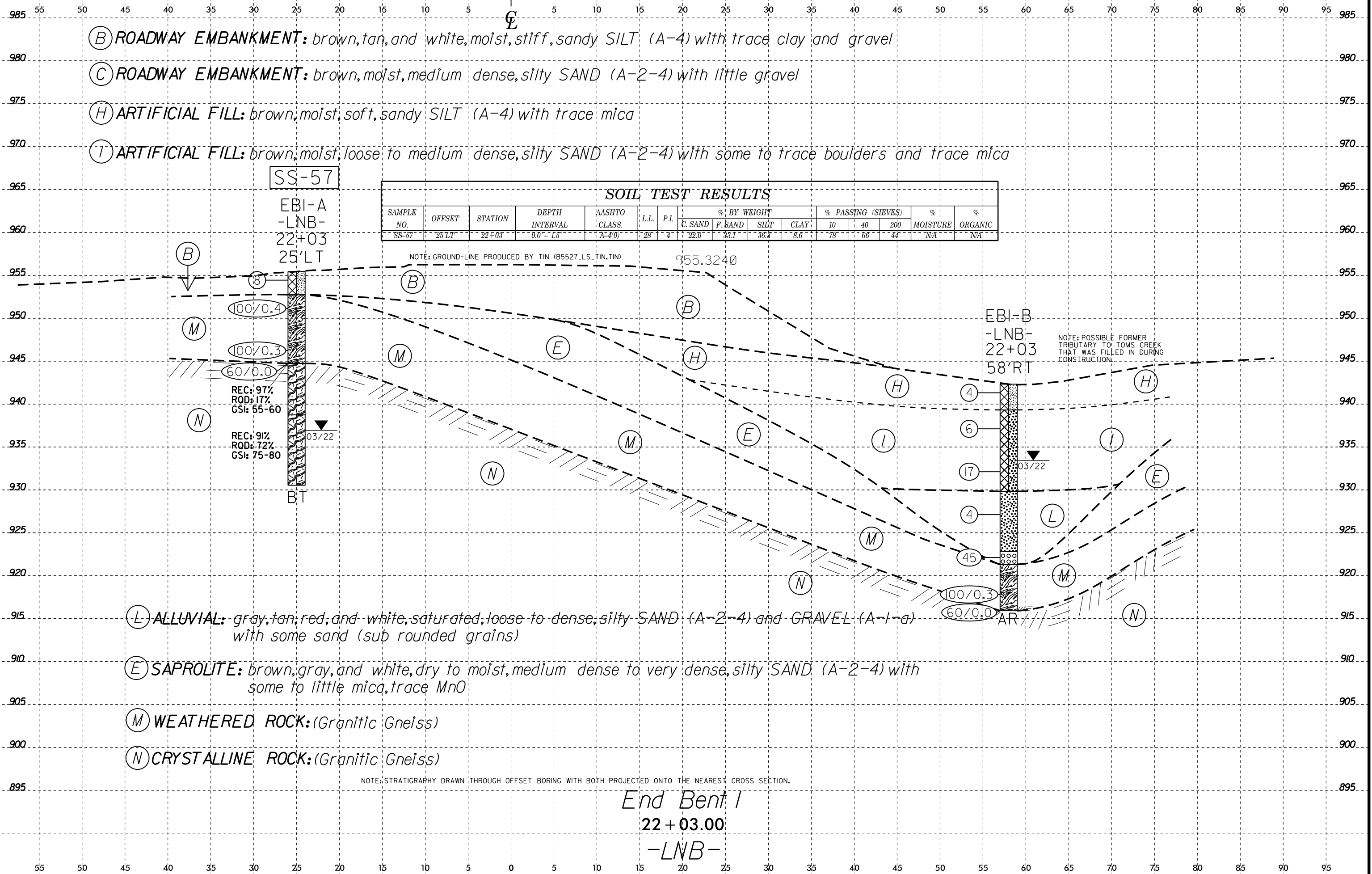
BL-3

ROADWAY EMBANKMENT

ALLUVIAL

RESIDUAL/SAPROLITE

24-FEB-2023 08:43 K:\Geotech\2022 Projects\B-5527 Bridges 122 & 126 for GEU\B5527\_BRDG\B5527\_GEO\_BRDG0122\_BRDG0126\_Inventory\_Summit\_REV2\CADD\_GEO\TECH\sec\BRDG\B5527\_BRDG\_NBL\_xst\_REV2.dgn



- (B) ROADWAY EMBANKMENT: brown, tan, and white, moist, stiff, sandy SILT (A-4) with trace clay and gravel
- (C) ROADWAY EMBANKMENT: brown, moist, medium dense, silty SAND (A-2-4) with little gravel
- (H) ARTIFICIAL FILL: brown, moist, soft, sandy SILT (A-4) with trace mica
- (I) ARTIFICIAL FILL: brown, moist, loose to medium dense, silty SAND (A-2-4) with some to trace boulders and trace mica

**SOIL TEST RESULTS**

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-57	25'LT	22+03	0.0'-1.5'	A-4(0)	28	4	22.0	33.1	36.3	8.6	78	66	44	NA	NA

REC: 97%  
 ROD: 17%  
 GSI: 55-60

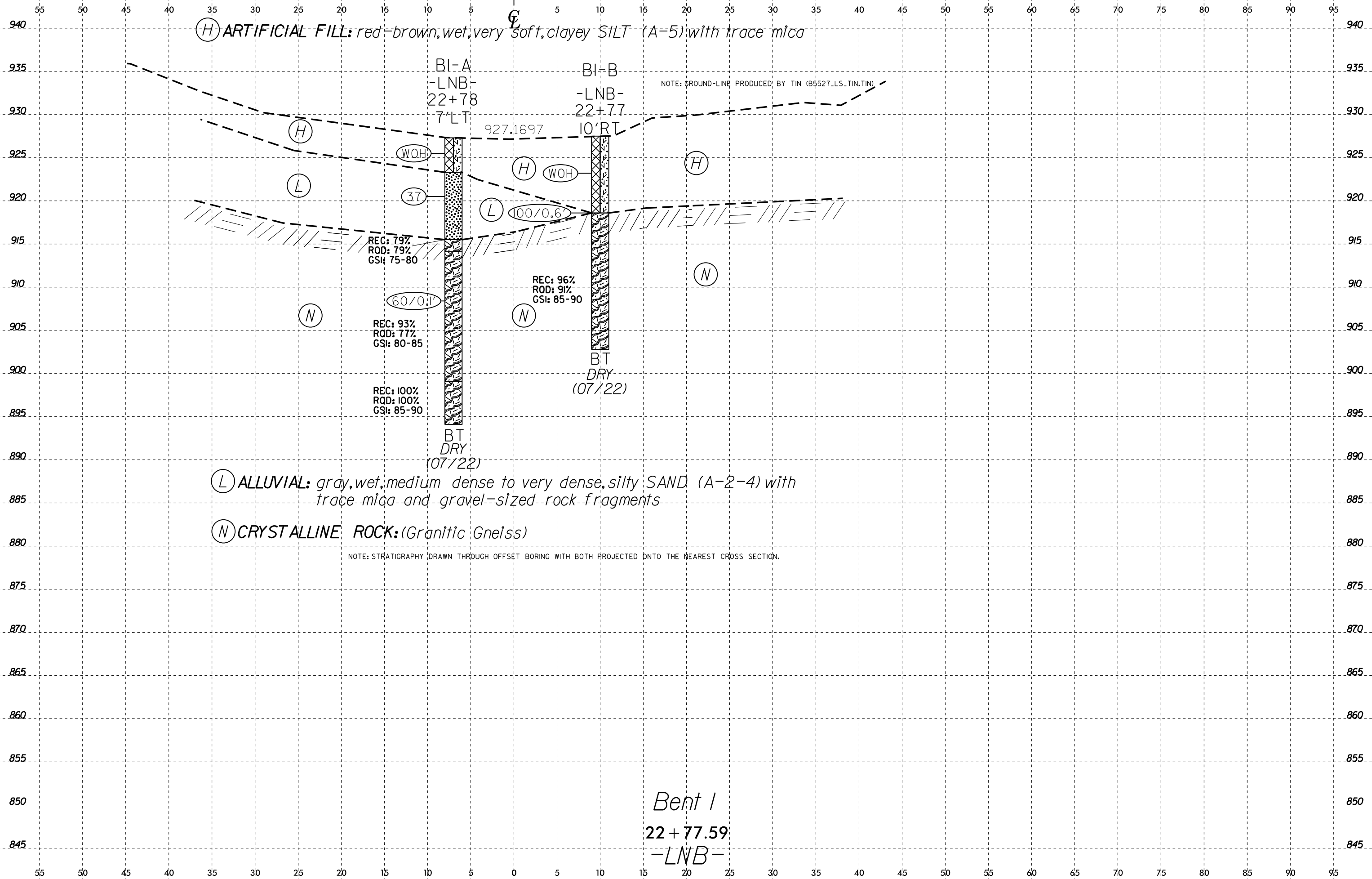
REC: 91%  
 ROD: 72%  
 GSI: 75-80

NOTE: POSSIBLE FORMER TRIBUTARY TO TOMS CREEK THAT WAS FILLED IN DURING CONSTRUCTION.

- (L) ALLUVIAL: gray, tan, red, and white, saturated, loose to dense, silty SAND (A-2-4) and GRAVEL (A-1-a) with some sand (sub rounded grains)
- (E) SAPROLITE: brown, gray, and white, dry to moist, medium dense to very dense, silty SAND (A-2-4) with some to little mica, trace MnO
- (M) WEATHERED ROCK: (Granitic Gneiss)
- (N) CRYSTALLINE ROCK: (Granitic Gneiss)

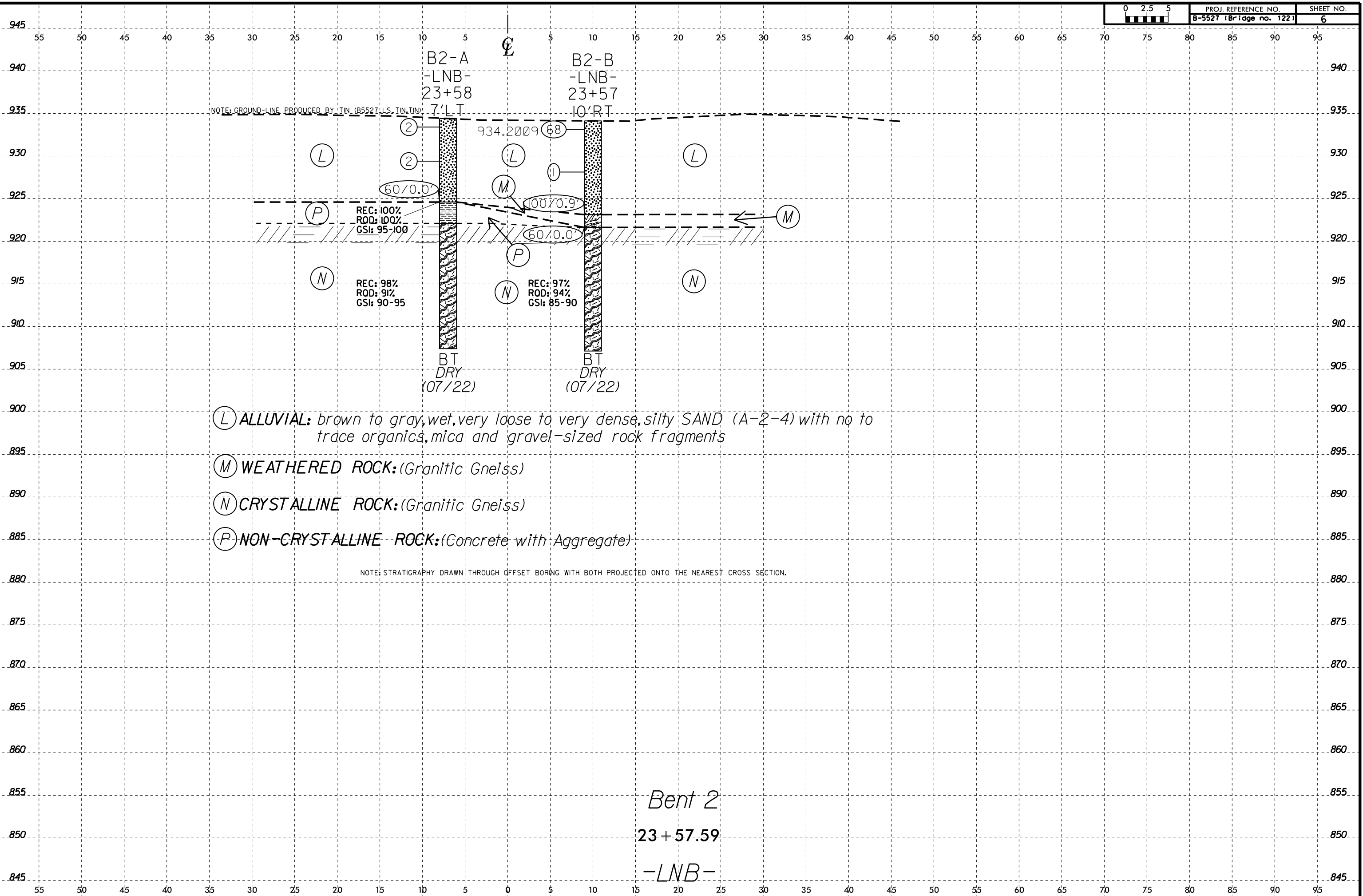
NOTE: STRATIGRAPHY DRAWN THROUGH OFFSET BORING WITH BOTH PROJECTED ONTO THE NEAREST CROSS SECTION.

End Bent 1  
 22 + 03.00  
 -LNB-



Bent 1  
22 + 77.59  
-LNB-

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 \$\$\$SUBERRNAME\$\$\$



- (L) **ALLUVIAL:** brown to gray, wet, very loose to very dense, silty SAND (A-2-4) with no to trace organics, mica, and gravel-sized rock fragments
- (M) **WEATHERED ROCK:** (Granitic Gneiss)
- (N) **CRYSTALLINE ROCK:** (Granitic Gneiss)
- (P) **NON-CRYSTALLINE ROCK:** (Concrete with Aggregate)

REC: 100%  
 ROD: 100%  
 GSI: 95-100

REC: 97%  
 ROD: 94%  
 GSI: 85-90

BT  
 DRY  
 (07/22)

BT  
 DRY  
 (07/22)

NOTE: GROUND-LINE PRODUCED BY TIN (B5527-LS-TIN.TIN)

934.2009 (68)

60/0.0'

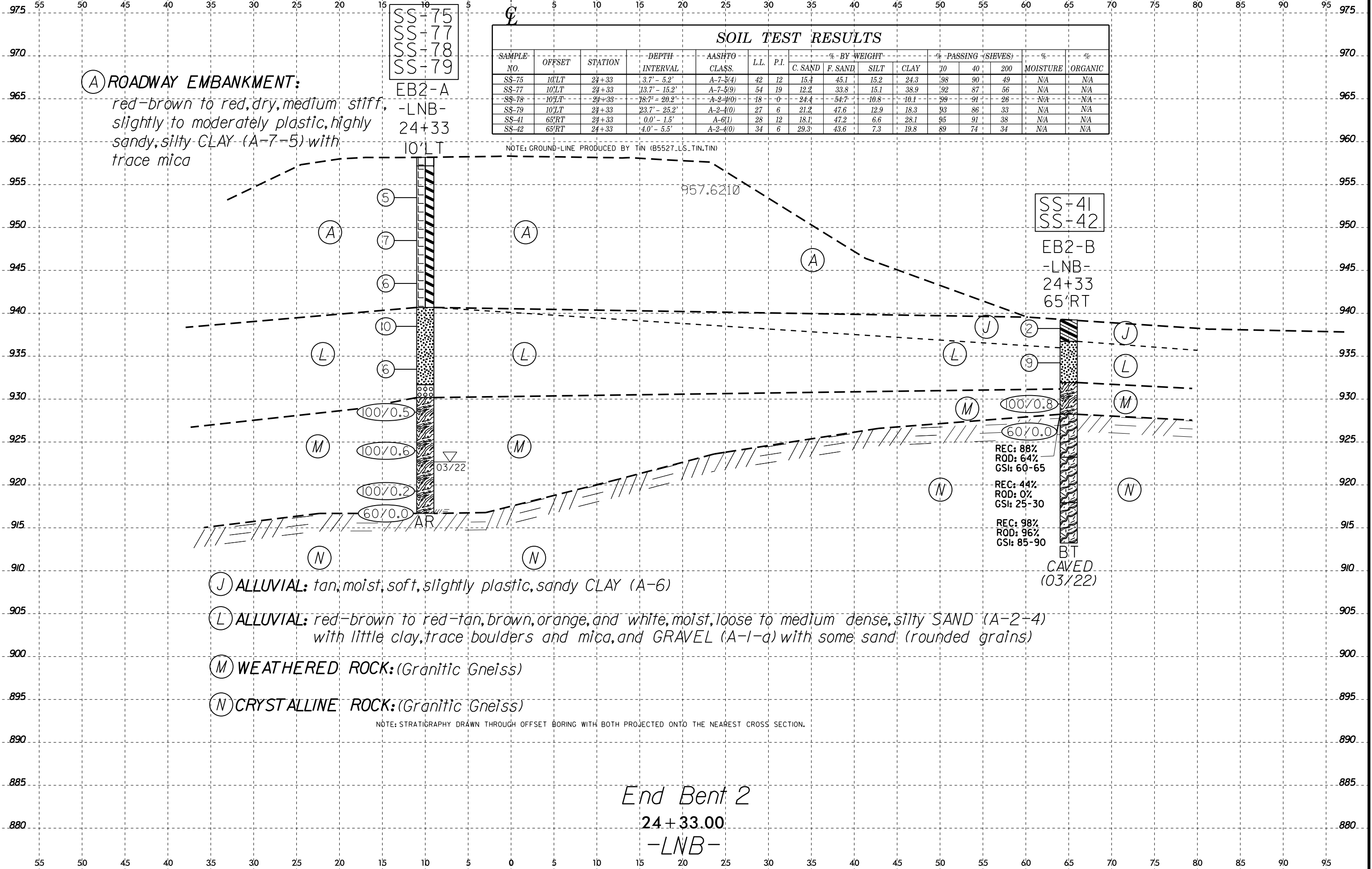
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60/0.0'

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 6/23/16

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% - BY WEIGHT				% - PASSING (SIEVES)			% -	
							C. SAND	F. SAND	SILT	CLAY	70	40	200	MOISTURE	ORGANIC
SS-75	10'LT	24+33	3.7' - 5.2'	A-7-5(4)	42	12	15.4	45.1	15.2	24.3	98	90	49	NA	NA
SS-77	10'LT	24+33	13.7' - 15.2'	A-7-5(9)	54	19	12.2	33.8	15.1	38.9	92	87	56	NA	NA
SS-78	10'LT	24+33	18.7' - 20.2'	A-2-4(0)	18	0	24.4	54.7	10.8	10.1	99	91	26	NA	NA
SS-79	10'LT	24+33	23.7' - 25.2'	A-2-4(0)	27	6	21.2	47.6	12.9	18.3	93	86	33	NA	NA
SS-41	65'RT	24+33	0.0' - 1.5'	A-6(1)	28	12	18.1	47.2	6.6	28.1	95	91	38	NA	NA
SS-42	65'RT	24+33	4.0' - 5.5'	A-2-4(0)	34	6	29.3	43.6	7.3	19.8	89	74	34	NA	NA

NOTE: GROUND-LINE PRODUCED BY TIN (B5527\_LS.TIN.TIN)



**(A) ROADWAY EMBANKMENT:**  
 red-brown to red, dry, medium stiff, slightly to moderately plastic, highly sandy, silty CLAY (A-7-5) with trace mica

EB2-A  
 -LNB-  
 24+33  
 10'LT

EB2-B  
 -LNB-  
 24+33  
 65'RT

REC: 88%  
 ROD: 64%  
 GSI: 60-65  
 REC: 44%  
 ROD: 0%  
 GSI: 25-30  
 REC: 98%  
 ROD: 96%  
 GSI: 85-90

B.T.  
 CAVED  
 (03/22)

- (J) ALLUVIAL: tan, moist, soft, slightly plastic, sandy CLAY (A-6)
- (L) ALLUVIAL: red-brown to red-tan, brown, orange, and white, moist, loose to medium dense, silty SAND (A-2-4) with little clay, trace boulders and mica, and GRAVEL (A-1-a) with some sand (rounded grains)
- (M) WEATHERED ROCK: (Granitic Gneiss)
- (N) CRYSTALLINE ROCK: (Granitic Gneiss)

NOTE: STRATIGRAPHY DRAWN THROUGH OFFSET BORING WITH BOTH PROJECTED ONTO THE NEAREST CROSS SECTION.

End Bent 2  
 24 + 33.00  
 -LNB-



# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Fischer, H. & Gross, A.										
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)									
BORING NO. LNB_EB1A		STATION 22+03		OFFSET 25 ft LT		ALIGNMENT -LNB-										
COLLAR ELEV. 955.4 ft		TOTAL DEPTH 24.9 ft		NORTHING 966,670		EASTING 1,560,974										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER Moseley, M.B.		START DATE 02/24/22		COMP. DATE 03/03/22		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						
960																
955	955.4	0.0	2	3	5									955.4	GROUND SURFACE	0.0
950	951.5	3.9	100/0.4											952.7	ARTIFICIAL FILL brown, tan, and white, sandy SILT (A-4) with trace clay and gravel	2.7
945	946.5	8.9	100/0.3											944.7	WEATHERED ROCK (Granitic Gneiss)	10.7
940	944.7	10.7	60/0.0											944.7	CRYSTALLINE ROCK (Begin Core at 10.7 Feet)	10.7
935														938.7	(Granitic Gneiss) REC: 97% RQD: 17% GSI: 55-60	16.7
														930.5	(Granitic Gneiss) REC: 91% RQD: 72% GSI: 75-80	24.9
Boring Terminated at Elevation 930.5 ft in Crystalline Rock (Granitic Gneiss)																
- Topsoil Thickness = 0.3 Feet																
- Boring deepened on 3/3/22 to confirm in-situ bedrock.																

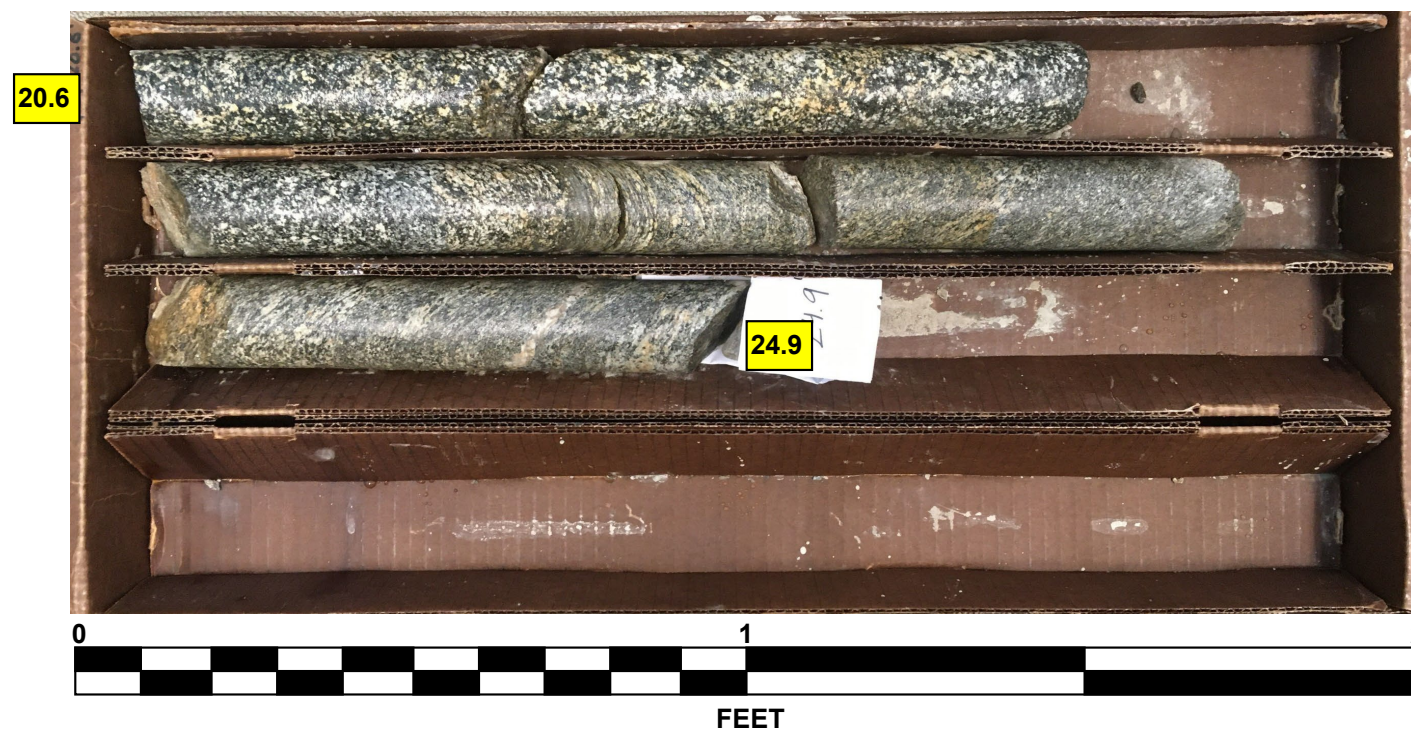
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Fischer, H. & Gross, A.						
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)					
BORING NO. LNB_EB1A		STATION 22+03		OFFSET 25 ft LT		ALIGNMENT -LNB-						
COLLAR ELEV. 955.4 ft		TOTAL DEPTH 24.9 ft		NORTHING 966,670		EASTING 1,560,974						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic						
DRILLER Moseley, M.B.		START DATE 02/24/22		COMP. DATE 03/03/22		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		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
944.74	944.7	10.7	4.2	N=60/0.0 0:51/1.2 0:47/1.0 1:03/1.0 1:18/1.0	(4.0) 95%	(0.6) 14%		(5.8) 97%	(1.0) 17%		Begin Coring @ 10.7 ft	
940	940.5	14.9	5.0	0:51/1.0 0:51/1.0 1:03/1.0 1:04/1.0 1:08/1.0	(4.4) 88%	(2.7) 54%		(7.5) 91%	(5.9) 72%		CRYSTALLINE ROCK white, dark green, black, and brown, moderate to moderate severe weathering, medium hard to moderately hard, close fracture spacing, GRANITIC GNEISS	10.7
935	935.5	19.9	5.0	0:56/1.0 0:52/1.0 0:55/1.0 0:47/1.0 1:06/1.0	(4.8) 96%	(3.6) 72%					GSI: 55-60 white, gray, dark green, and black, slight to very slight weathering, hard to very hard, close fracture spacing, GRANITIC GNEISS	16.7
	930.5	24.9									GSI: 75-80	24.9
Boring Terminated at Elevation 930.5 ft in Crystalline Rock (Granitic Gneiss)												
- Topsoil Thickness = 0.3 Feet												
- Boring deepened on 3/3/22 to confirm in-situ bedrock.												

# CORE PHOTOGRAPHS

**LNB\_EB1A**  
BOX 1 : 10.7 - 20.6 FEET



**LNB\_EB1A**  
BOX 2: 20.6 - 24.9 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

<b>WBS</b> 55027.1.FS1		<b>TIP</b> B-5527		<b>COUNTY</b> SURRY		<b>GEOLOGIST</b> Gross, A.	
<b>SITE DESCRIPTION</b> BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> LNB_EB1B		<b>STATION</b> 22+03		<b>OFFSET</b> 58 ft RT		<b>ALIGNMENT</b> -LNB-	0 HR. 11.7
<b>COLLAR ELEV.</b> 942.3 ft		<b>TOTAL DEPTH</b> 26.4 ft		<b>NORTHING</b> 966,672		<b>EASTING</b> 1,561,057	24 HR. 8.9
<b>DRILL RIG/HAMMER EFF./DATE</b> SUM3123 CME-550X 86% 11/2/2021				<b>DRILL METHOD</b> H.S. Augers		<b>HAMMER TYPE</b> Automatic	
<b>DRILLER</b> Moseley, M.B.		<b>START DATE</b> 02/28/22		<b>COMP. DATE</b> 02/28/22		<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				
945														
	942.3	0.0												942.3 GROUND SURFACE 0.0
940			1	2	2	4						M		ARTIFICIAL FILL brown, sandy SILT (A-4) with trace mica 939.3 3.0
	938.1	4.2	13	4	2	6						M		brown, silty SAND (A-2-4) with some to trace boulders and trace mica
935														
	933.1	9.2	7	9	8	17						M		
930														929.8 ALLUVIAL 12.5
	928.1	14.2	1	2	2	4						Sat.		gray and tan, silty SAND (A-2-4)
925														
	923.1	19.2	7	22	23	45						Sat.		922.8 19.5 921.3 21.0 red and white, GRAVEL (A-1-a) with some sand (sub-rounded grains)
920														WEATHERED ROCK (Granitic Gneiss)
	918.1	24.2												
	915.9	26.4	100/0.3							100/0.3				915.9 26.4 CRYSTALLINE ROCK (Granitic Gneiss) Boring Terminated with Standard Penetration Test Refusal at Elevation 915.9 ft on Crystalline Rock (Granitic Gneiss)  - Topsoil Thickness = Not Reported
			60/0.0							60/0.0				

NCDOT BORE DOUBLE B5527\_GEO\_BRDG\_LNB\_REV2/UPDATED.GPJ\_NC\_DOT.GDT\_2/24/23

# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

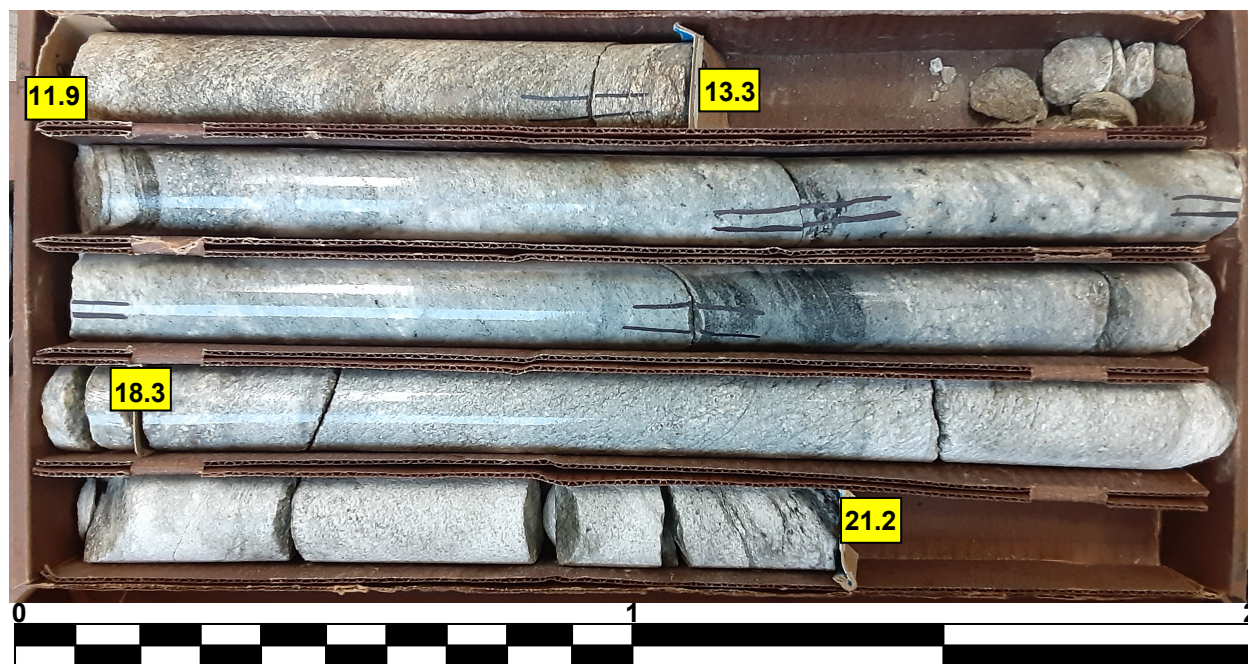
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.							
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)						
BORING NO. LNB_B1A		STATION 22+78		OFFSET 7 ft LT		ALIGNMENT -LNB-							
COLLAR ELEV. 927.3 ft		TOTAL DEPTH 33.3 ft		NORTHING 966,746		EASTING 1,560,990							
DRILL RIG/HAMMER EFF./DATE SUMB123 CME-550X 86% 11/2/2021			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic							
DRILLER Moseley, M.B.		START DATE 07/22/22		COMP. DATE 07/22/22		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				
930													
925	926.5	0.8	WOH	WOH	WOH						W	GROUND SURFACE	0.0
920	921.5	5.8									W	ARTIFICIAL FILL red-brown, clayey SILT (A-5)	4.0
915	915.5	11.8										ALLUVIAL gray, silty SAND (A-2-4) with trace gravel-sized rock fragments and trace mica	11.8
910												CRYSTALLINE ROCK (Begin Core at 11.8 Feet)	13.2
905												(Granitic Gneiss) REC: 79% RQD: 79% GSI: 75-80	
900												(Granitic Gneiss) REC: 93% RQD: 77% GSI: 80-85	
895												(Granitic Gneiss) REC: 100% RQD: 100% GSI: 85-90	
												Boring Terminated at Elevation 894.0 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck	33.3

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.				
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)			
BORING NO. LNB_B1A		STATION 22+78		OFFSET 7 ft LT		ALIGNMENT -LNB-				
COLLAR ELEV. 927.3 ft		TOTAL DEPTH 33.3 ft		NORTHING 966,746		EASTING 1,560,990				
DRILL RIG/HAMMER EFF./DATE SUMB123 CME-550X 86% 11/2/2021			DRILL METHOD SPT Core Boring			HAMMER TYPE Automatic				
DRILLER Moseley, M.B.		START DATE 07/22/22		COMP. DATE 07/22/22		SURFACE WATER DEPTH N/A				
CORE SIZE NQ2		TOTAL RUN 21.4 ft		DESCRIPTION AND REMARKS						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DEPTH (ft)
					REC. (%)	RQD (%)	REC. (%)	RQD (%)		
915.4	915.4	11.9	1.4	1:52/1.0	(1.1)	(1.1)				
910	914.0	13.3	5.0	0:41/0.4	79%	79%				Begin Coring @ 11.9 ft CRYSTALLINE ROCK
905	909.0	18.3	5.0	2:45/1.0	(4.3)	(3.7)				white and gray, slight to moderate weathering, moderately hard to hard, close fracture spacing, GRANITIC GNEISS
900	904.0	23.3	5.0	2:18/1.0	86%	74%				GSI: 75-80 (continued)
895	899.0	28.3	5.0	2:23/1.0	100%	78%				white and gray to dark gray, very slight to slight weathering, moderately hard to hard, close to moderately close fracture spacing, GRANITIC GNEISS
	894.0	33.3	5.0	2:06/1.0	(4.7)	(3.9)				GSI: 80-85
				3:01/1.0						
				3:27/1.0						
				2:08/1.0						
				2:14/1.0						
				2:32/1.0						
				1:54/1.0						
				1:57/1.0						
				2:08/1.0	(5.0)	(5.0)				dark gray and white, very slight to fresh weathering, hard, moderately close fracture spacing, GRANITIC GNEISS
				2:21/1.0	100%	100%				GSI: 85-90
				2:41/1.0						
				2:14/1.0						
				2:51/1.0						
										Boring Terminated at Elevation 894.0 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck

# CORE PHOTOGRAPHS

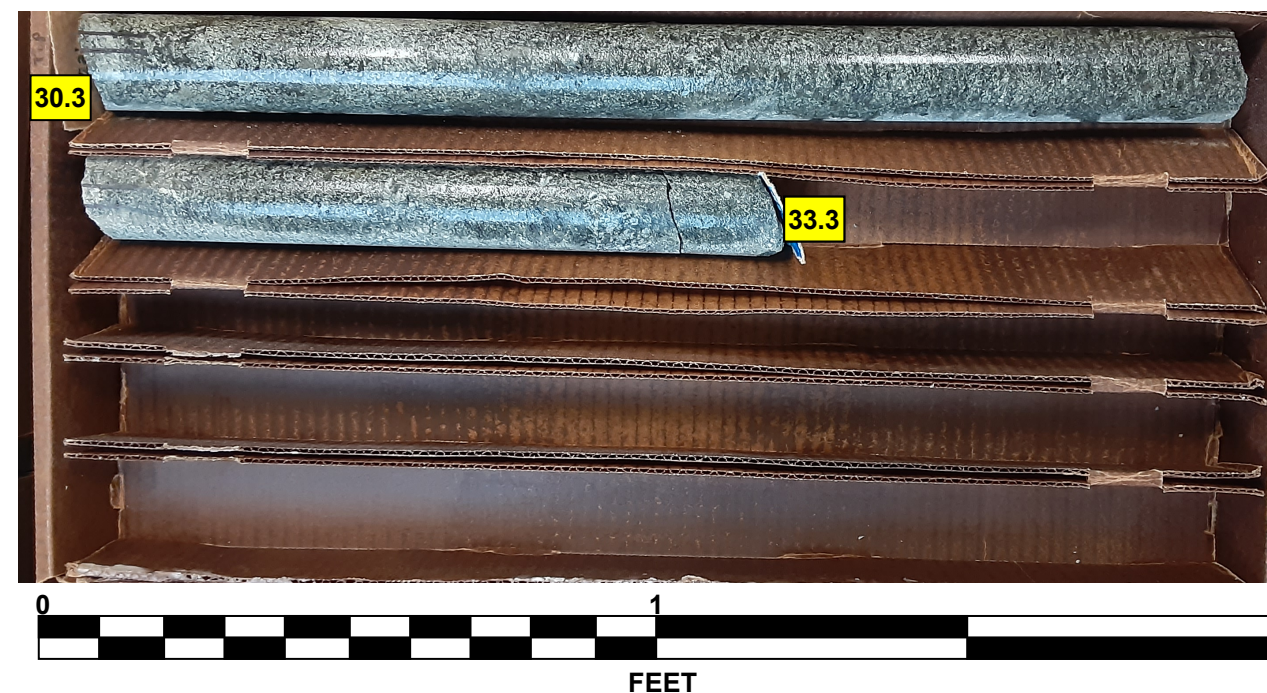
## LNB\_B1A

BOXES 1 & 2: 11.9 - 30.3 FEET



## LNB\_B1A

BOX 3: 30.3 - 33.3 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

# GEOTECHNICAL BORING REPORT

## CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.		
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)	
BORING NO. LNB_B1B		STATION 22+77		OFFSET 10 ft RT		ALIGNMENT -LNB-		
COLLAR ELEV. 927.5 ft		TOTAL DEPTH 24.7 ft		NORTHING 966,745		EASTING 1,561,008		
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic		
DRILLER Moseley, M.B.		START DATE 07/19/22		COMP. DATE 07/19/22		SURFACE WATER DEPTH N/A		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT				SAMP. NO.	LOG
			0.5ft	0.5ft	0.5ft	BLOWS PER FOOT		
			0	25	50	75	100	SOIL AND ROCK DESCRIPTION
							ELEV. (ft)	
930								927.5 GROUND SURFACE 0.0
925	924.2	3.3	WOH	WOH	WOH			<b>ARTIFICIAL FILL</b> red-brown, clayey SILT (A-5) with trace mica
920	919.2	8.3	9	91/0.1				918.6 <b>CRYSTALLINE ROCK</b> (Begin Core at 8.9 Feet)  (Granitic Gneiss)  REC: 96% RQD: 91% GSI: 85-90
915								
910								
905								
								902.8 Boring Terminated at Elevation 902.8 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck

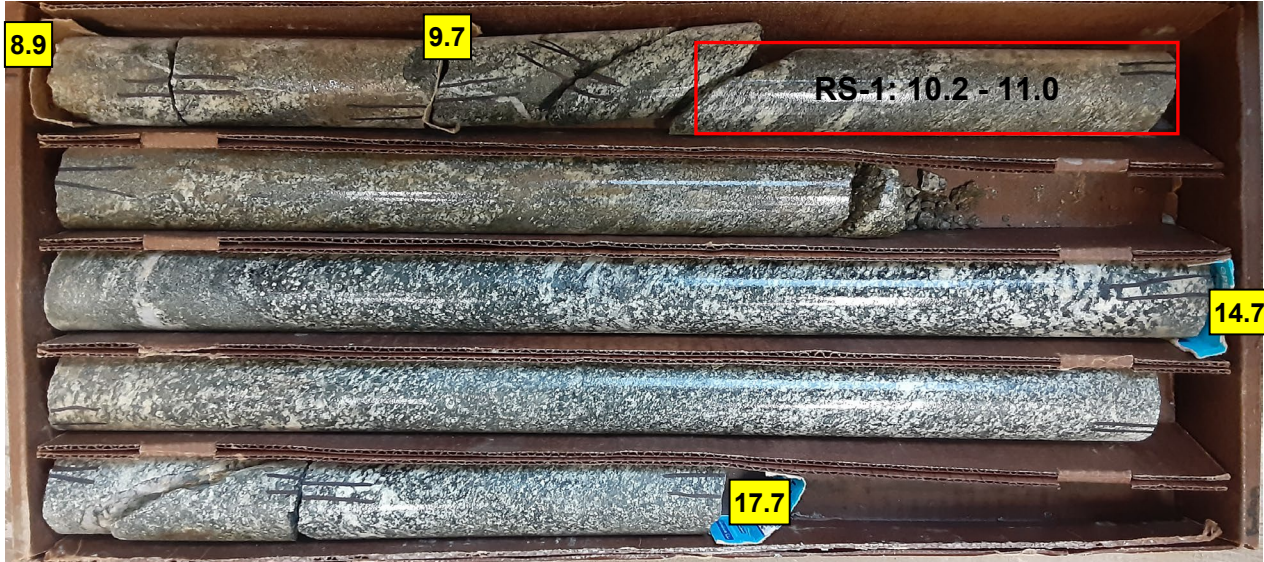
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.					
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)				
BORING NO. LNB_B1B		STATION 22+77		OFFSET 10 ft RT		ALIGNMENT -LNB-					
COLLAR ELEV. 927.5 ft		TOTAL DEPTH 24.7 ft		NORTHING 966,745		EASTING 1,561,008					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic					
DRILLER Moseley, M.B.		START DATE 07/19/22		COMP. DATE 07/19/22		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2			TOTAL RUN 15.8 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (%)	RQD (%)		REC. (%)	RQD (%)		
918.6	917.8	8.9	0.8	1:12/0.8	(0.6)	(0.4)					918.6 Begin Coring @ 8.9 ft
915			5.0	2:06/1.0	75%	50%	RS-1				gray and white, slight to fresh weathering, close to wide fracture spacing, GRANITIC GNEISS
				1:36/1.0	(4.7)	(4.3)					GSI: 85-90
		912.8	14.7	1:45/1.0	94%	86%					
				2:22/1.0							
910			5.0	1:46/1.0							
				1:34/1.0	(5.0)	(4.6)					
				2:08/1.0	100%	92%					
				1:21/1.0							
		907.8	19.7	2:10/1.0							
				1:43/1.0							
905			5.0	2:00/1.0	(5.0)	(5.0)					
				2:00/1.0	100%	100%					
				2:14/1.0							
		902.8	24.7	1:56/1.0							
				2:48/1.0							
											Boring Terminated at Elevation 902.8 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck

NCDOT BORE SINGLE B5527\_GEO\_BRDG\_LNB\_REV2/UPDATED.GPJ NC\_DOT.GDT 3/15/23

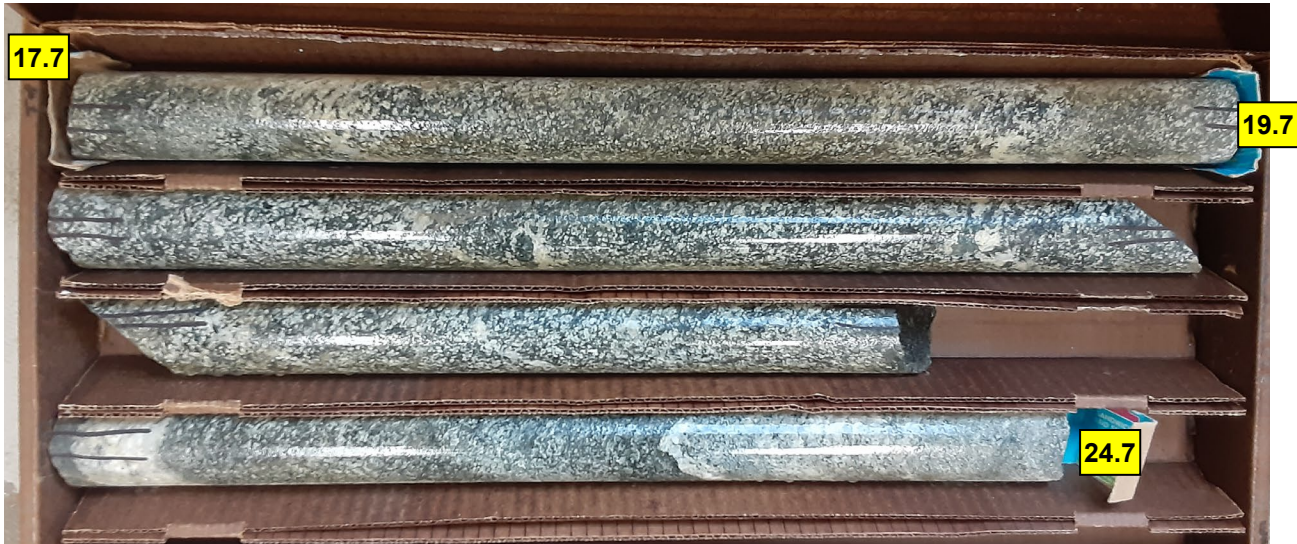
NCDOT BORE SINGLE B5527\_GEO\_BRDG\_LNB\_REV2/UPDATED.GPJ NC\_DOT.GDT 3/15/23

# CORE PHOTOGRAPHS

**LNB-B1B**  
BOX 1: 8.9 - 17.7 FEET



**LNB\_B1B**  
BOX 2: 17.7 - 24.7 FEET



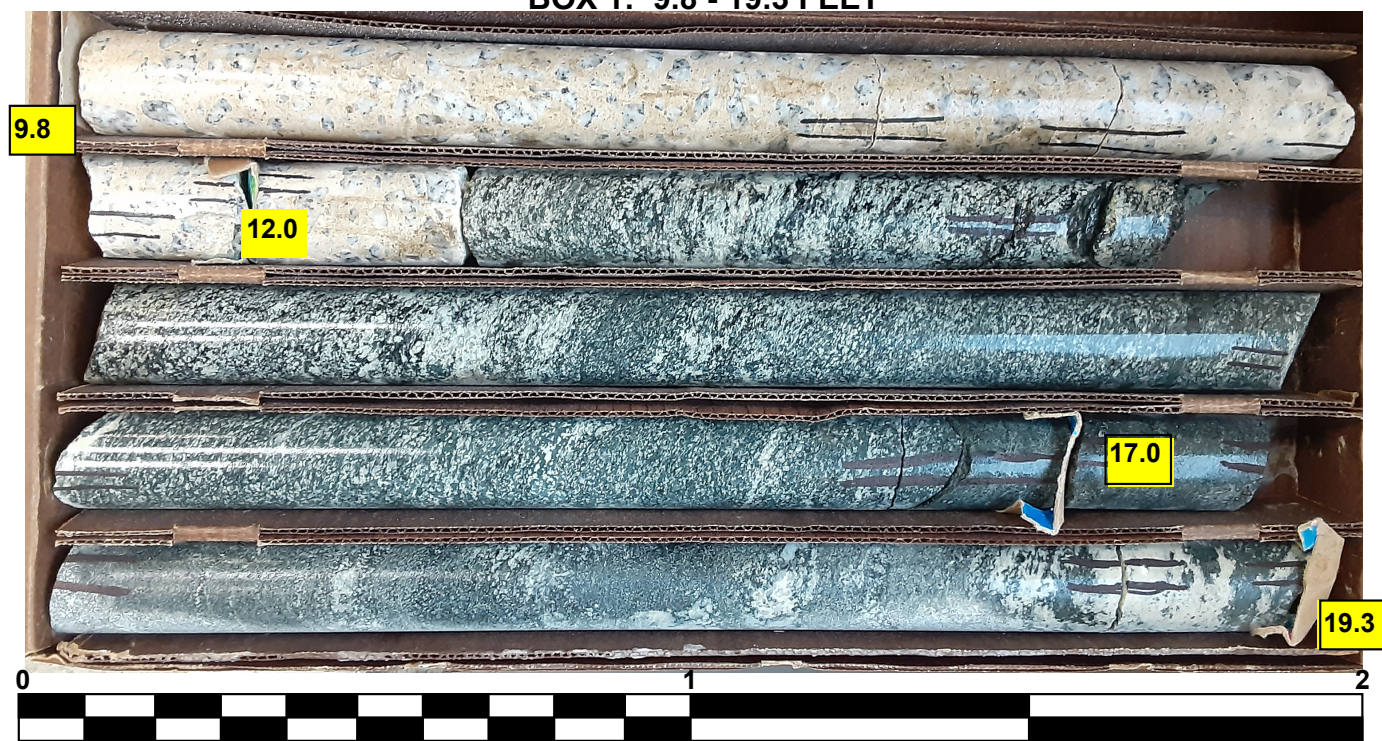




# CORE PHOTOGRAPHS

## LNB\_B2A

BOX 1: 9.8 - 19.3 FEET



## LNB\_B2A

BOX 2: 19.3 - 27.0 FEET



# GEOTECHNICAL BORING REPORT BORE LOG

# GEOTECHNICAL BORING REPORT CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.								
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)							
BORING NO. LNB_B2B		STATION 23+57		OFFSET 10 ft RT		ALIGNMENT -LNB-								
COLLAR ELEV. 934.1 ft		TOTAL DEPTH 27.0 ft		NORTHING 966,825		EASTING 1,561,007								
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER Moseley, M.B.		START DATE 07/20/22		COMP. DATE 07/20/22		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
935	934.1	0.0	3	64	4									934.1 GROUND SURFACE 0.0
930	929.1	5.0	2	1	0									ALLUVIAL brown to gray, silty SAND (A-2-4) with no to trace organics, mica, and gravel-sized rock fragments (layer of boulders/cobbles from 0.8'-1.0')
925	924.1	10.0	3	3	97/0.4									WEATHERED ROCK (Granitic Gneiss) 11.0
920	921.6	12.5	60/0.0											CRYSTALLINE ROCK (Begin Core at 12.5 Feet) 12.5
915														(Granitic Gneiss) REC: 97% RQD: 94% GSI: 85-90
910														907.1 Boring Terminated at Elevation 907.1 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck 27.0

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.						
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)					
BORING NO. LNB_B2B		STATION 23+57		OFFSET 10 ft RT		ALIGNMENT -LNB-						
COLLAR ELEV. 934.1 ft		TOTAL DEPTH 27.0 ft		NORTHING 966,825		EASTING 1,561,007						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER Moseley, M.B.		START DATE 07/20/22		COMP. DATE 07/20/22		SURFACE WATER DEPTH N/A						
CORE SIZE NQ2		TOTAL RUN 14.5 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
921.6	921.6	12.5	4.5	N=60/0.0 2:32/1.0 1:51/1.0 1:46/1.0 1:43/1.0 0:36/0.5	(4.5)	(4.3)					921.6 Begin Coring @ 12.5 ft 12.5	
920	917.1	17.0	5.0	1:56/1.0 2:52/1.0 2:25/1.0 2:40/1.0 3:10/1.0	(5.0)	(4.7)					CRYSTALLINE ROCK gray to blue-gray and white, slight to fresh weathering, moderately hard to hard, close to wide fracture spacing, GRANITIC GNEISS GSI: 85-90	
915	912.1	22.0	5.0	1:55/1.0 2:20/1.0 2:12/1.0 2:26/1.0 1:40/1.0	(4.7)	(4.4)						
910	907.1	27.0										907.1 Boring Terminated at Elevation 907.1 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck 27.0

NCDOT CORE DOUBLE B5527\_GEO\_BRDG\_LNB\_REV2UPDATED.GPJ NC\_DOT\_GDT 2/24/23

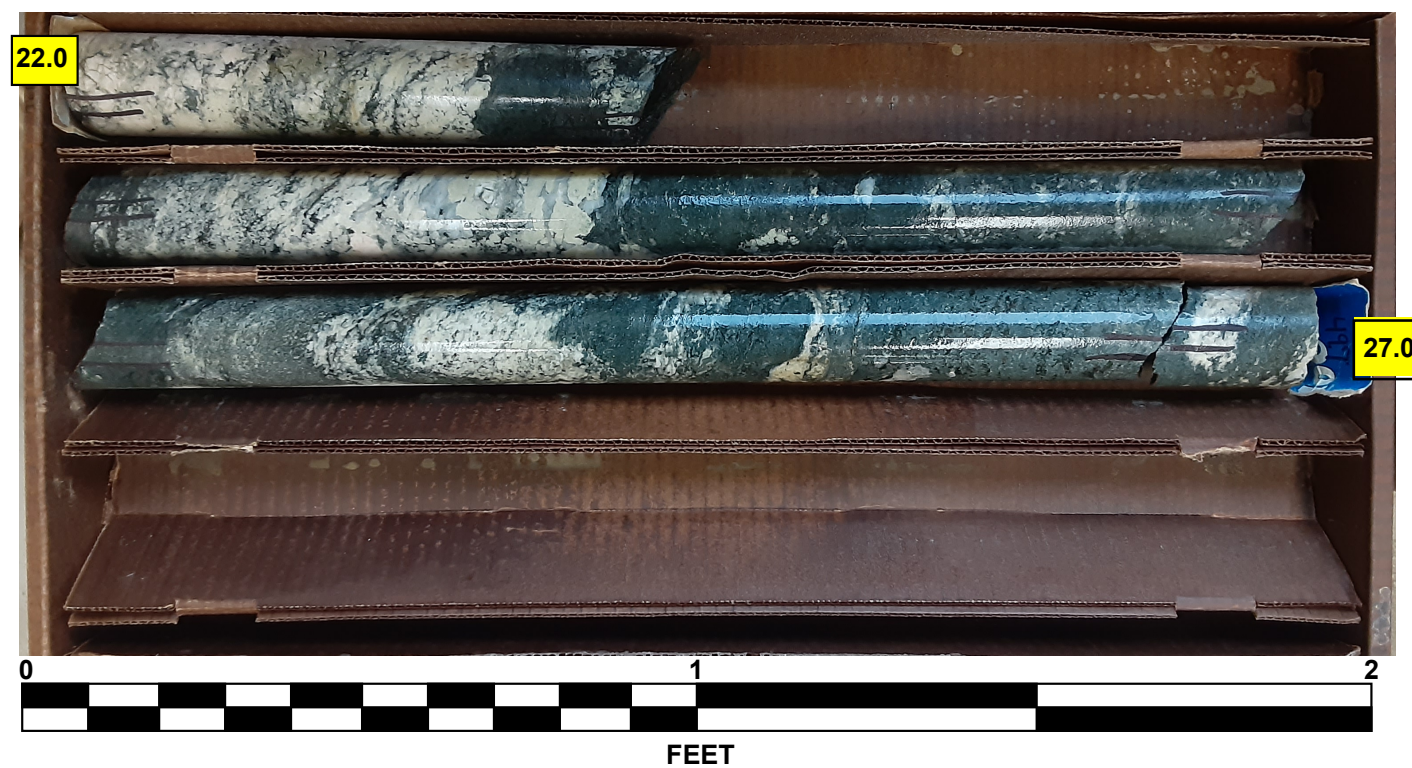
NCDOT CORE SINGLE B5527\_GEO\_BRDG\_LNB\_REV2UPDATED.GPJ NC\_DOT\_GDT 3/15/23

# CORE PHOTOGRAPHS

**LNB\_B2B**  
BOX 1: 12.5 - 22.0 FEET



**LNB\_B2B**  
BOX 2: 22.0 - 27.0 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Gross, A.									
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)								
BORING NO. LNB_EB2A		STATION 24+33		OFFSET 10 ft LT		ALIGNMENT -LNB-									
COLLAR ELEV. 958.2 ft		TOTAL DEPTH 41.5 ft		NORTHING 966,901		EASTING 1,560,986									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Moseley, M.B.		START DATE 03/01/22		COMP. DATE 03/01/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
960														GROUND SURFACE	0.0
														ROADWAY EMBANKMENT CONCRETE	1.0
955	954.5	3.7	2	2	3	5					SS-75	D	red-brown to red, slightly to moderately plastic, highly sandy, silty CLAY (A-7-5) with trace mica		
950	949.5	8.7	5	4	3	7						D			
945	944.5	13.7	3	3	3	6					SS-77	D			
940	939.5	18.7	8	6	4	10					SS-78	M	ALLUVIAL red-brown to red-tan, silty SAND (A-2-4) with little clay	17.5	
935	934.5	23.7	2	3	3	6					SS-79	M			
930	929.5	28.7	70	30/0.0					100/0.5				red-brown to red-tan, GRAVEL (A-1-a) with some sand (rounded grains)	26.5	
925	924.5	33.7	12	75	25/0.1				100/0.6				WEATHERED ROCK (Granitic Gneiss)	28.0	
920	919.5	38.7							100/0.2						
	916.7	41.5	60/0.0						60/0.0					CRYSTALLINE ROCK (Granitic Gneiss)	41.5
Boring Terminated with Standard Penetration Test Refusal at Elevation 916.7 ft on Crystalline Rock (Granitic Gneiss) - Topsoil Thickness = N/A - Boring drilled through existing roadway.															

NCDOT BORE DOUBLE B5527\_GEO\_BRDG\_LNB\_REV2/UPDATED.GPJ NC\_DOT.GDT 2/24/23

## GEOTECHNICAL BORING REPORT BORE LOG

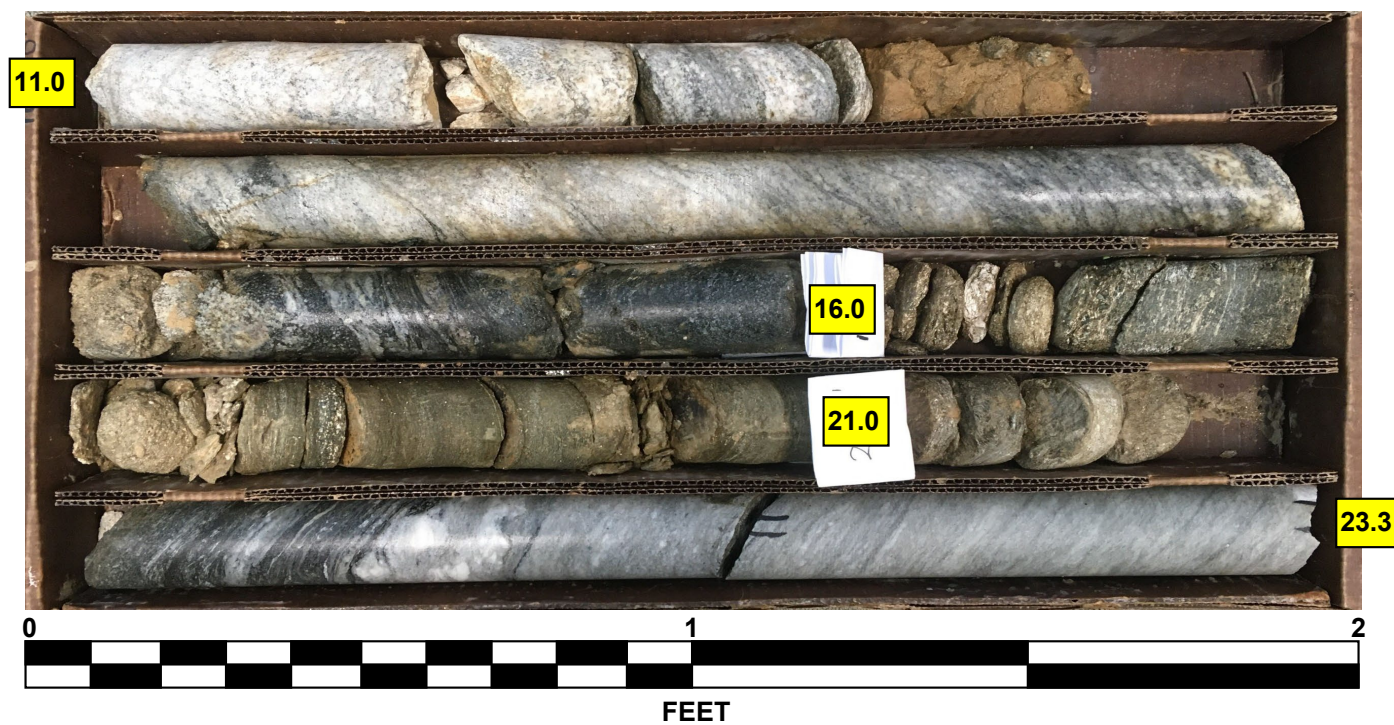
## GEOTECHNICAL BORING REPORT CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Fischer, H. & Gross, A.									
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)								
BORING NO. LNB_EB2B		STATION 24+33		OFFSET 65 ft RT		ALIGNMENT -LNB-									
COLLAR ELEV. 939.2 ft		TOTAL DEPTH 26.0 ft		NORTHING 966,902		EASTING 1,561,061									
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic									
DRILLER Moseley, M.B.		START DATE 02/23/22		COMP. DATE 03/02/22		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	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
940	939.2	0.0													939.2 GROUND SURFACE 0.0
			2	1	1										936.7 tan, slightly plastic, sandy CLAY (A-6) 2.5
935	935.2	4.0	6	3	6										931.9 brown, tan, orange, and white, silty SAND (A-2-4) with little clay and gravel 7.3
															928.2 WEATHERED ROCK (Granitic Gneiss) 11.0
930	930.2	9.0	30	70/0.3											928.2 CRYSTALLINE ROCK (Begin Core at 11.0 Feet) (Granitic Gneiss) 11.0
	928.2	11.0	60/0.0							100/0.8					923.2 REC: 88% RQD: 64% GSI: 60-65 16.0
925										60/0.0					923.2 (Granitic Gneiss) REC: 44% RQD: 0% GSI: 25-30 16.0
920															917.9 (Granitic Gneiss) REC: 98% RQD: 96% GSI: 85-90 21.3
915															913.2 Boring Terminated at Elevation 913.2 ft in Crystalline Rock (Granitic Gneiss) 26.0
															- Topsoil Thickness = 0.0 Feet
															- Boring deepened on 3/2/22 to confirm in-situ bedrock.

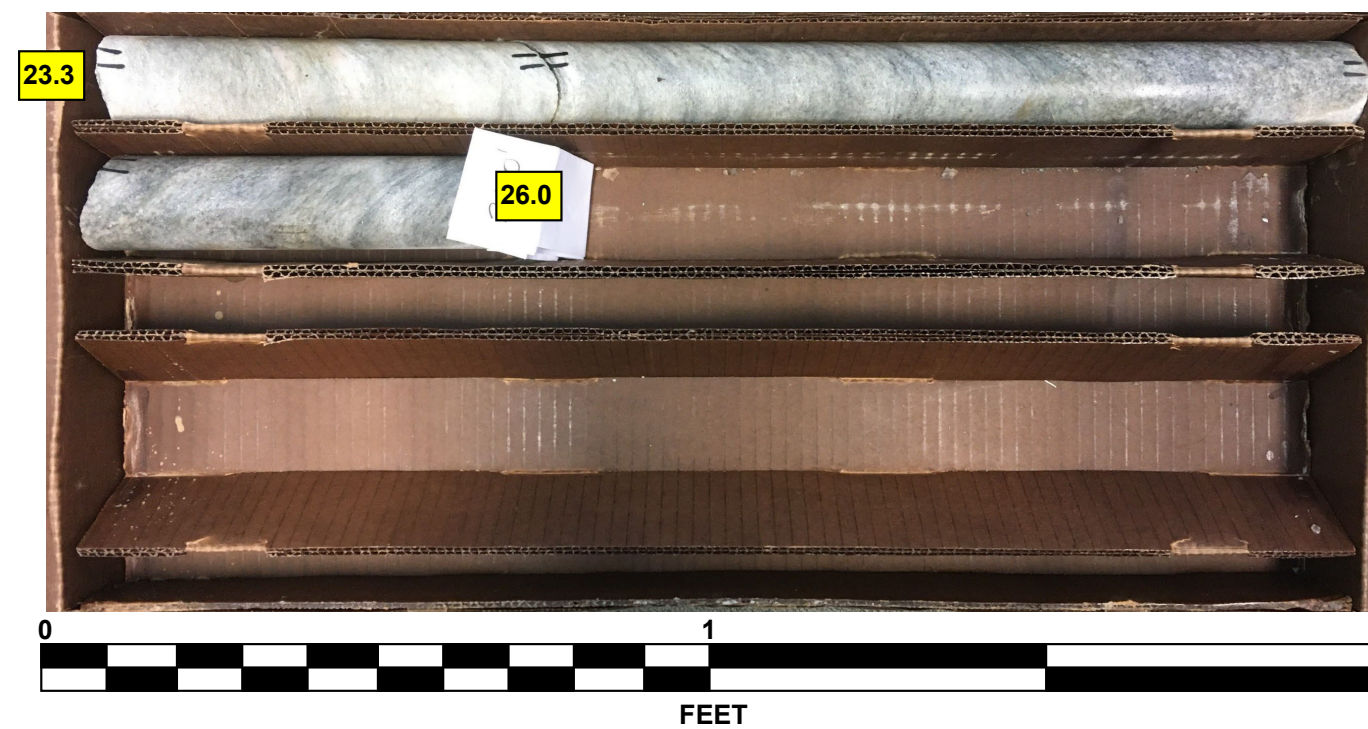
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Fischer, H. & Gross, A.					
SITE DESCRIPTION BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB							GROUND WTR (ft)				
BORING NO. LNB_EB2B		STATION 24+33		OFFSET 65 ft RT		ALIGNMENT -LNB-					
COLLAR ELEV. 939.2 ft		TOTAL DEPTH 26.0 ft		NORTHING 966,902		EASTING 1,561,061					
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X 86% 11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic					
DRILLER Moseley, M.B.		START DATE 02/23/22		COMP. DATE 03/02/22		SURFACE WATER DEPTH N/A					
CORE SIZE NQ2		TOTAL RUN 15.0 ft		DESCRIPTION AND REMARKS							
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	RQD (ft) %	LOG	
928.23	928.2	11.0	5.0	N=60/0.0 0.46/1.0 2.02/1.0 3.27/1.0 2.15/1.0 2.05/1.0	(4.4) 88%	(3.2) 64%		(4.4) 88%	(3.2) 64%		928.2 Begin Coring @ 11.0 ft 11.0
925											928.2 CRYSTALLINE ROCK white, gray, black, and brown, very slight to moderate severe weathering (very severe weathering 12.1' - 12.7'), medium hard to hard, close fracture spacing, GRANITIC GNEISS 11.0
	923.2	16.0									923.2 GSI: 60-65 16.0
920			5.0	0.40/1.0 0.43/1.0 0.54/1.0 0.52/1.0 0.57/1.0	(1.9) 38%	(0.0) 0%		(2.2) 42%	(0.0) 0%		923.2 dark gray and brown, moderate to moderate severe weathering, medium hard to moderately hard, close to very close fracture spacing, GRANITIC GNEISS 16.0
	918.2	21.0									917.9 GSI: 25-30 21.3
915			5.0	1.22/1.0 2.47/1.0 1.56/1.0 1.21/1.0 1.30/1.0	(4.9) 98%	(4.5) 90%		(4.6) 98%	(4.5) 96%		917.9 white, gray, and black, fresh to very slight weathering, hard to very hard, moderately close fracture spacing, GRANITIC GNEISS 21.3
	913.2	26.0									913.2 GSI: 85-90 26.0
											Boring Terminated at Elevation 913.2 ft in Crystalline Rock (Granitic Gneiss)
											- Topsoil Thickness = 0.0 Feet
											- Boring deepened on 3/2/22 to confirm in-situ bedrock.

# CORE PHOTOGRAPHS

**LNB\_EB2B**  
BOX 1: 11.0 - 23.3 FEET



**LNB\_EB2B**  
BOX 2: 23.3 - 26.0 FEET





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**UNCONFINED COMPRESSIVE STRENGTH OF ROCK**

ASTM D7012

<b>Project No.:</b> 55027	<b>Tested By:</b> C. Sullivan	<b>Test Date:</b> 2022-15-09
<b>Project Name:</b> B-5527		
<b>Boring ID:</b> LNB_B1B	<b>Sample ID:</b> RS-01	<b>Sample Depth:</b> 10.3-10.7 ft
<b>Sample Description:</b> Gray Schist		

<u>Initial Specimen Measurements</u>	
Diameter: 1.950 in	L/D: 2.27
Area: 2.986 in <sup>2</sup>	
Length: 4.43 in	
Weight: 619.4 g	
Unit Weight: 178.4 pcf	

**LOAD TEST DATA**

Deflection Reading (in)	Load Reading (lb)	Strain (%)	Stress (psi)
0.000	0	0.000	0
0.005	1040	0.113	350
0.010	2500	0.226	840
0.015	6700	0.339	2240
0.020	17500	0.451	5860
0.025	31200	0.564	10450
0.029	40780	0.655	13650

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Strain Rate: %/min

Failure Mode:

Remarks:

**Note:** Uniaxial compressive strength was determined in general accordance with ASTM D7012-14 Method C. Deflection, Strain, and Young's modulus (E) data is provided for reference only and is not intended to be in accordance with ASTM D7012-14 Method D as deflection and strain is not measured in accordance with that procedure. Young's Modulus is calculated using this data to determine the secant modulus at each data interval per Figure 2 (C) in ASTM D 7012-14.



10 ROCK COMPRESSION RESULTS G19008.00.GPJ FALCON\_FORMAT.GDT 9/16/22