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#### 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

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#### **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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (199) 707-6800. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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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 PERFORM INDEPINDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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 SIDER FIRM FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

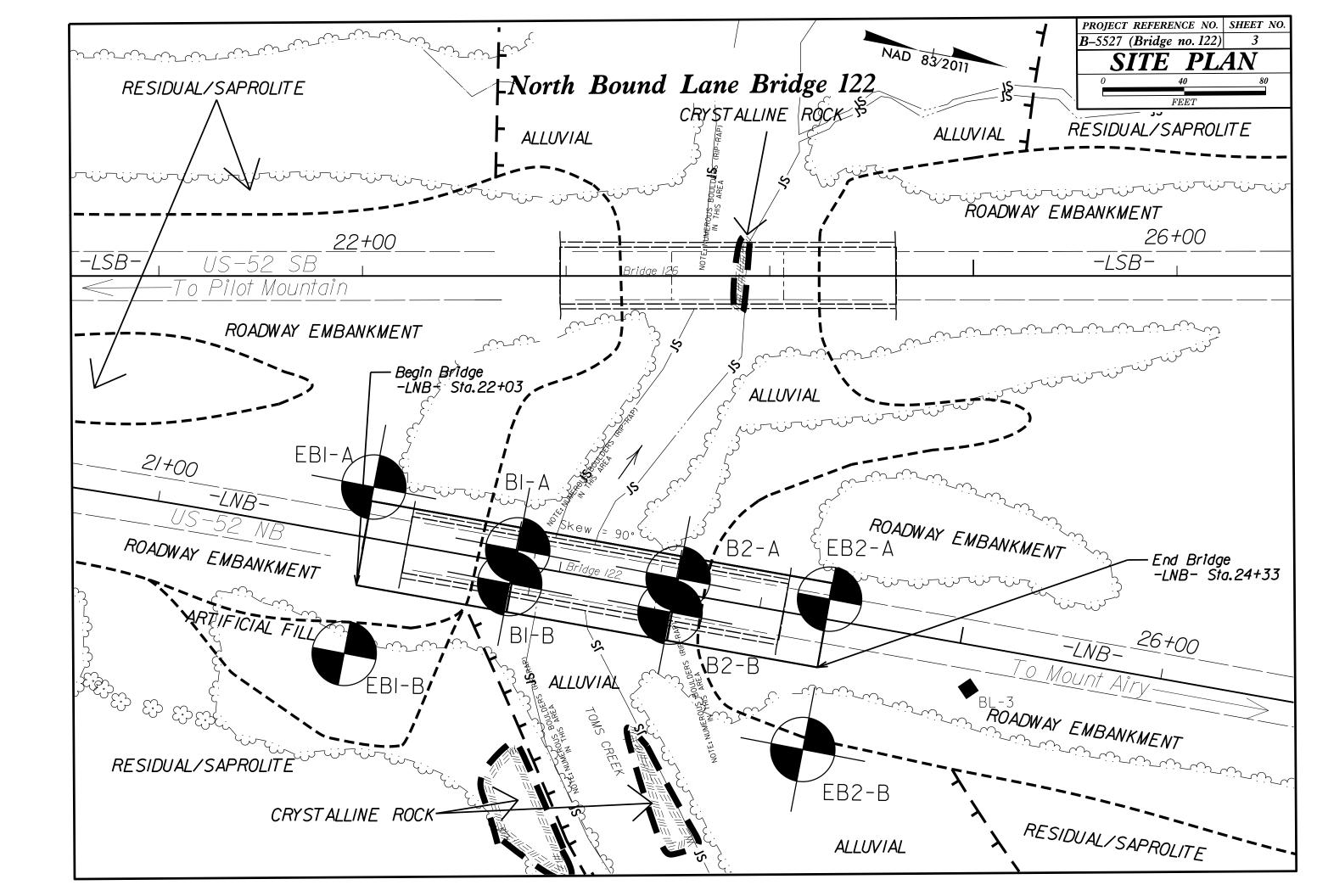
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK 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 206, ASTM DI586, SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUBE THE FOLLOWING; CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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 CRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TES ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIEL SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN ( BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULARI IT OR ROUNDNESS OF SUIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SI
GENERAL GRANILLAR MATERIALS SILT-CLAY MATERIALS	MINERALOGICAL COMPOSITION	EINE TO COARSE CRAIN ICNEOUS AND METAMORPHIC
CLASS. (≤ 35% PASSING ■200) (> 35% PASSING ■200) URGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE I
		NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COAS
SYMBOL BOOGGOOCO	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, E
2 PASSING	HIGHLY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SAND
*10 50 MX GRANULAR CLAY PEAT	PERCENTAGE OF MATERIAL	WEATHERING
■200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN		FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 50ILS WITH LL - 6 MX NP 10 MX 10 MX 11 NN 11 NN 10 MX 10 MX 11 MN 11 MN UMOREDATE HIGHL'	IRACE         0+ ORGANIC         MATTER         2 - 3%         3 - 5%         IRACE         1 - 10%           LITTLE         ORGANIC         MATTER         3 - 5%         5 - 12%         LITTLE         10 - 20%           MODERATELY         ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY         ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY         ORGANIC         > 10%         > 20%         HIGHLY         35% AND ABOVE	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF URGAN	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO F
GEN. RATING EVELLENT TO COOD FAIR TO POOR FAIR TO POOR INSULTAN	E	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGT
		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL
	MISCELLANEOUS SYMBOLS	
PRIMARY SOIL TYPE COMPARINESS OF PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND
GRANILAR LOOSE 4 TO 10		
MATERIAL DENSE 30 TO 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS #
VERY SOFT < 2 < 0.25	Ý	
MATERIAL         STIFF         8 TO 15         1 TO 2           (COHESIVE)         VERY STIFF         15 TO 30         2 TO 4		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGE
		- ROCK HARDNESS
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ACCEPTABLE, BUT NOT TO BE	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE
	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRAT
PLASTIC BANGE SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM
UM + UPTIMUM MUISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED
REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, H
NON PLASTIC 0-5 VERY LOW		PURRING WITH ETNICED EDEES NUMEDOUS CRAINS.
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER	GRAINS CAN BE SEPARATED FROM SAMPLE WITH S
		BREAKS EASILY WHEN HIT WITH HAMMER.
		DIFFICULT TO BREAK WITH HAMMER.
		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPL SAMPLE BREAKS ACROSS GRAINS.

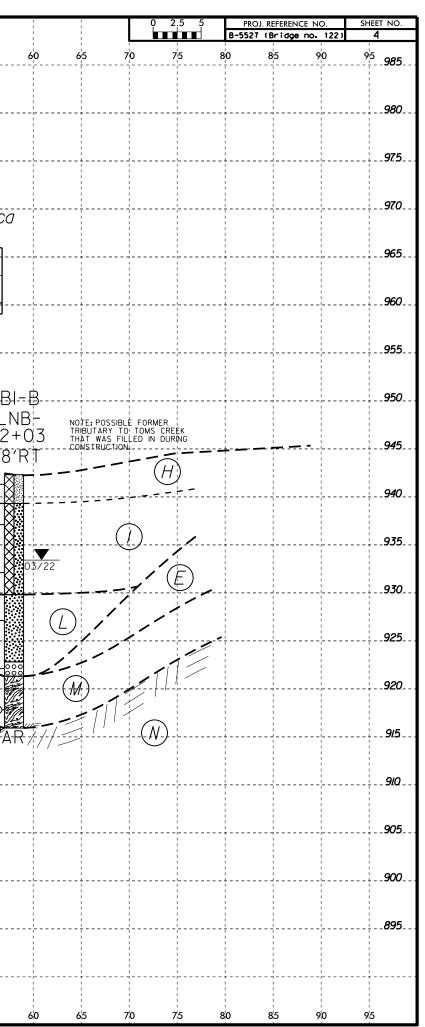
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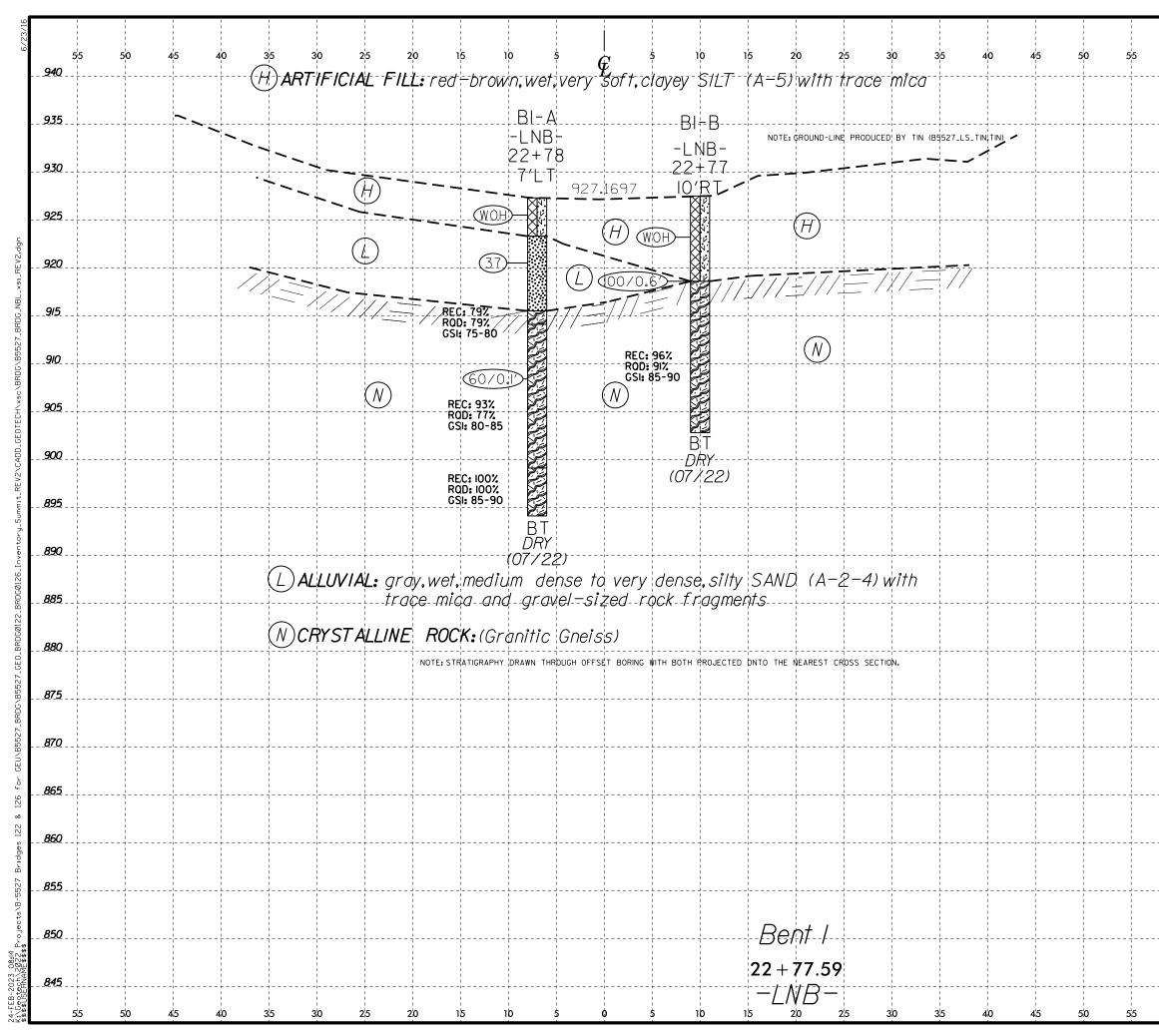
	TERMS AND DEFINITIONS
TED. AN INFERRED D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
0.1 FOOT PER 60	ADUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
PT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <u>ARTESIAN</u> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
ROCK THAT INCLUDES GRANITE,	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
TAL PLAIN . IF TESTED. TC.	<u>CALCAREOUS (CALC.)</u> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <u>COLLUVIUM</u> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
T MAY NOT YIELD DSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
	$\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
CRINGS UNDER	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
COATINGS IF OPEN, HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
ROCK UP TO IAL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
ER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
TS. IN AY. ROCK HAS	<u>FLOAT</u> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIG1NAL POSITION AND DISLODGED FROM PARENT MATERIAL.
TH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
55.000.000	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
FELDSPARS DULL LOSS OF STRENGTH	FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
AT ONLY MINOR VALUES < 100 BPF	OF AN INTERVENING IMPERVIOUS STRATUM.
IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
RS. SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SECMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTACE.
NS REQUIRES	$\underline{SAPROLITE}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
DEEP CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. D BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPT) - NUMBER OF BLOWS (N OR BPF)OF A 140 LB.HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
N FRAGMENTS INT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
<. PIECES 1 INCH CHED READILY BY	STRATA ROCK DUALITY DESIGNATION (SROD) - A MEASUME OF ROCK DUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	BENCH MARK: B-5527-2
	N 966405 E 1560952
4 FEET 1.5 - 4 FEET	ELEVATION: 958.96 FEET
0.16 - 1.5 FEET .03 - 0.16 FEET	NOTES:
008 - 0.03 FEET	FIAD = Filled Immediately After Drilling
< 0.008 FEET	
	Mn0 = Manganese Oxide
EAT, PRESSURE, ETC.	Elevations for North Bound Interior Bent Borings optained
	using the TIN file (B5527_Ls_tin.tin)
STEEL PROBE:	
PROBE:	
LE;	DATE: 8-15-14

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	SUI	BSURFA		INVESTIGATION			
	SUPPLEME FR	ENTAL LEGEND, GI OM AASHTO LRI	EOLOGIC FD BRID	CAL STRENGTH INDEX (GSI) TABLES OGE DESIGN SPECIFICATIONS			
AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed Re	lock Mass (Marinos and Hoek, 2	2000)	<u> </u>	AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deforme	ed Heterogeneous Rock M	lasses (Marinos and Hoek	., 2000)
GEOLOGICAL STRENGTH INDEX (GSI)FOR JOINTED ROCKS (Hoek and Marinos,2000)	s p U e U e	e s C e s	s O C	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos.P and Hoek E.,2000)			
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	surf	and surfa	ed surfac fillings	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the $\hat{v}_{0}$ position in the box that corresponds to the condition $\hat{v}_{0}$	esh hered	aces aces aces compact gular	slicken- surfaces fillings
apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation	e ather d, Ir	weathered and weathered sur ugs or fillings ts	reather ngs or	of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too d precise. Quoting a range from 33 to 37 is more d on the state the discrete the d	ery Rough, fresh urfaces slightly weather	ch, moderately nd altered surfaces smooth, occasionally surfaces with angular fillings with angular	J smooth, sli leathered su vatings or f
	fresh unwed tly weather	tely ses 1ghly soatir	highly J coati	Hoek-Brown criterion does not apply to structurally or p controlled failures. Where unfavourably oriented of continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass.		h, moder id alter smooth, surface fillings	Very sm Jy weat y coatu
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.	GOOD rough, fres , slightly v	FAIR Smooth, modera altered surfac POOR Slickensided, h with compact c or angular fra	<b>POOR</b> ensided, soft clau	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	VERY GOOD - V unweathered si GOOD - Rough, surfaces		POOR - Very s J or highly wea soft clay coai
Water pressure is dealt with by effective	VERY G Very ro GOOD Rough, s surtace	FAIR Smoot alteré POOR Slické with c or an	<b>VERY</b>   Slicke with s	not change the value of GSI and it is dealt with by	VERY Unwea GOOD surfac	FAIR - Smo weathered POOR - Ver slickenside coatings o fragments	<b>VERY</b>   sided with s
STRUCTURE				COMPOSITION AND STRUCTURE			
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90	N/A	N/A	A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally			
discontinuities BLOCKY - well interlocked un- disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets				L/     controlled instability.	60		
	60		$\left( - \right)$	B. Sand- stone with thin inter- layers of C. Sand- stone and siltstone in similar by the siltstone siltstone in similar by the siltstone stone layers by the siltstone stone layers stone layerstone stone stone layers stone layerstone stone stone s	50 B	C D E	
VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets BLOCKY/DISTURBED/SEAMY - folded with angular blocks	5	50		siltstone amounts sandstone layers	40		
1 Charles tormed by many intersection		40 30		<b>C. D. E.</b> and <b>G</b> - 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 <b>F</b> and <b>H</b> .		30 F 20	
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces		20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers		¢ H	10 H
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A N/A		10	Means deformation after tectonic disturbance	/		DATE: 8-19-16

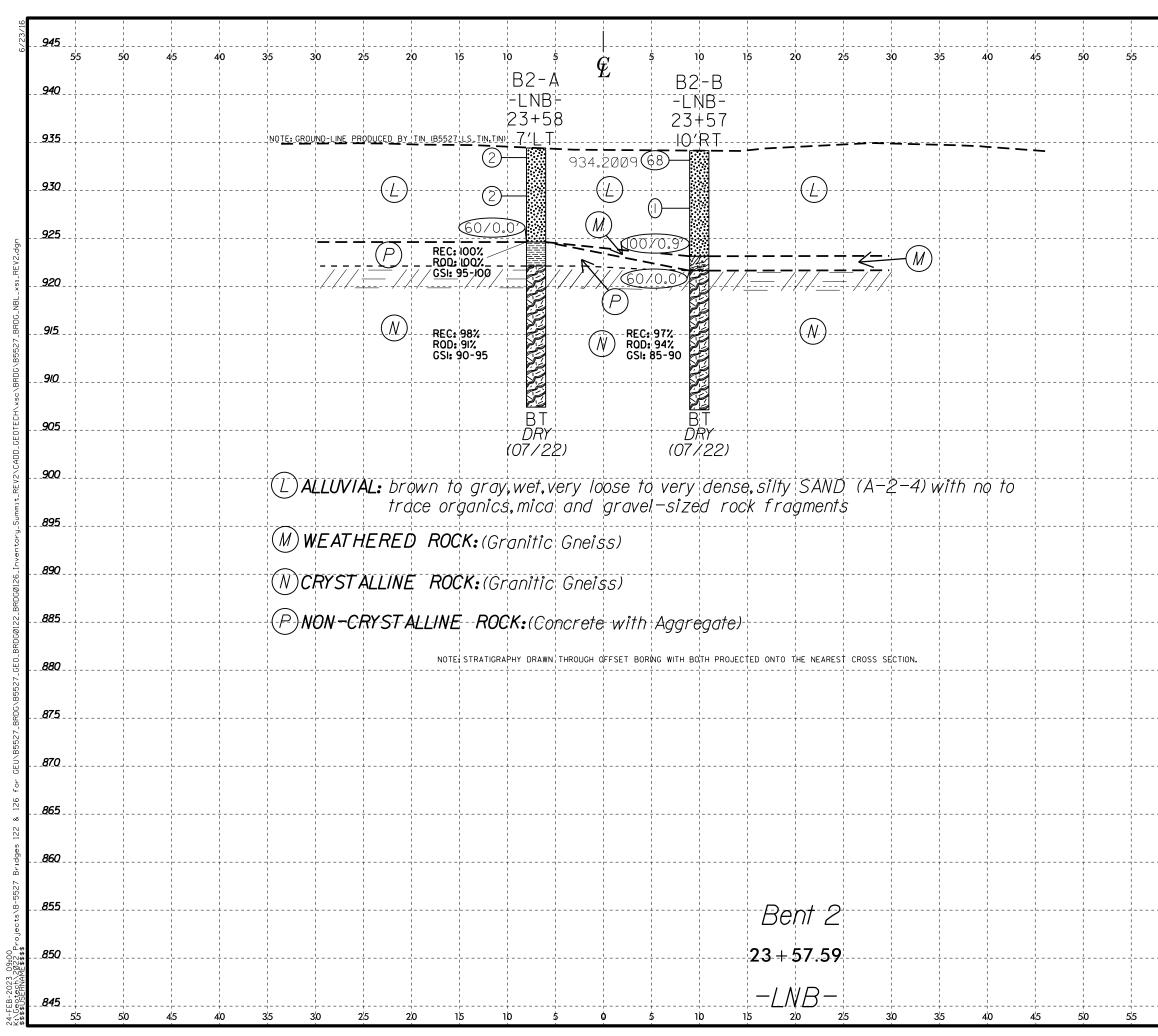


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ω <b>.985</b>	55 5 	0	45 	40 	35	5 3	0 2	25 2	0	15	10	5 (	$\dot{E}^{1}$		10 1 	5	20	25	3 <mark>0 :</mark>	3 <sup>5</sup>	40 45	50 	5 <sup>5</sup>
		(B)	ROAL	OW AY	ЕМ	(BAN)	KMEN	t: brow	vn,ta	n'n, and	white	, moist	t, stiff,	sandy	SILT	(A-4	4) wit	h trace	ė clay	and g	gravel		
980	+	$\widehat{(C)}$	ROAL	DW AY	EM	1 BANI	KMEN	T: bro	wn.m	oist.m	edium	dens	se, silty	SAN/	ייייי ל (A-,	2-4)	with .	little a	r <sub>avel</sub>	+	 	· · · · · · · · · · · · · · · · · · ·	
975			, , , ,	, , , ,			: : : !	, , , ,	, , , ,		, , , ,					   	· · · · · · · · · · · · · · · · · · ·						
		(H)	ARTI	FICIA	VL F	- <i>ILL:</i> [	brown	, moist	,soft	, sandy	SILT	(A-4	1) with	trace	mica								
970		-(-7-)-	ARTI	FICIA	VL F		5 5 5 r 0 w n	moist	โดดรเ	e to m	edium	dens	se. siltv	SAN	ה (A-	2-4)	with	some t	, b trac	e bou	lders ar	nd trace	mic
5							·	5-57						0, 1, 1									
<b>.965</b>							j <b>L</b>	3I-A	<b>!</b>		-+				-i	TES	$T^{-}RI$	ESULTS		+		·	
960				+			- L	NB-	; ; 	SAMPLE NO. SS-57	OFFSET	STATION	N DEPT INTERV	VAL	AASHTO CLASS.	L.L. P.I.	C. SAND	% BY WEIGH F. SAND SI - 33.1	LT CLAY	10	SING (SIEVE\$) 40 200 -66 - 44	MOISTURE ORG	% ANIC
				Œ	3)		1	+03 5′LT	- - - -	1			JCED BY TIN	ľ		20 4	955.32			1 10			
. <b> 955</b>							8)			(B	<u>+                                    </u>	+ 			+ 		<b>~</b>	- +0 					
							/0.4		= = :							(	$\widehat{B}$	<b>``</b> ,					
950					$\widehat{M}$					<u>``</u>	+~_									+			⊦_∃ 
945					·					(M)		<u>}</u>		5)		·	(H)	·			- <u>-</u>		22
					/	 Rec:										``			- - - -		(H)		
940						ROD: GŠI:	17% 55-60	§	; ;			 X <b></b>			<u>```</u>		·+		·			(4)	);
935				(	$\mathbb{N}$	REC:	91%	03/22	1 1 1 1				~~~				-	(E)		     	$\bigcirc$	6	)
900						ROD: GSI:	75-80							~>.		·/							 \}
									; ; ; , , , , , , , , , , , , , , , , ,			$\mathbb{N}$				2			<u>                                     </u>				); 
								5	     						     							<b>`</b> (4	)
			  -     		·		  -   	 	, ,	<mark> </mark>	- +					 				÷	(M)		
920							1 1 1 1	     	       							     						45	
				+			       	+	4 ! ! !		- +	       			       		· +		(N	)		>100/	0:3
915	<u>-</u>			ALU	VIA	L:-gr		,red,a	indи	/hite,-s	aturat	ed,100	se-to-é	dense.	; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ; ;	SAND		2-4)-a	hd-GF	AVE-L	-(-A	<u>, 60/0</u>	
										ub rou						     					I I I I I I I I I I		
910			$\overline{(E)}$	SAPF	ROLI	TE: t	; brown,	gray,	and i	white, c	iry to	moist	, mediu	m de	ense to	very	dens	se, silty	SANL	) (A-2	2-4) wii	'h	
905						č	ome t	to little	ę mic	ca,trac	e MnC	)											
n			(M)	WEA	THE	RED	ROC	<b>.</b> <b>K:</b> (Gr	anitic	Gneis	, s's)	       			       		+       		-	+		·	
900					J _				; ; J			, , , , ,			     	' ' '				         	                             		
			$(\mathbf{N})$	CHIS	I AL	LINE	RUC	. <b>K:</b> (Gr			i.		OFFSET BORIN	IC WITH PO					FCTION				
<b>.895</b>					·				     						<b></b>	nd				     			
MEss							       		       						1	22 +	1	1					     
USERNA				+			       	+	 ! ! !		- <del>-</del>					·	VB−			T			
\$ <del>\$</del>	55 5	0	45	40	35	5 3	0	25 2	0	15	່າກ	5	<b>0</b> 5		່ທ່າ	15 <b>—</b> 1	20	25	30	35	40 45	50	55

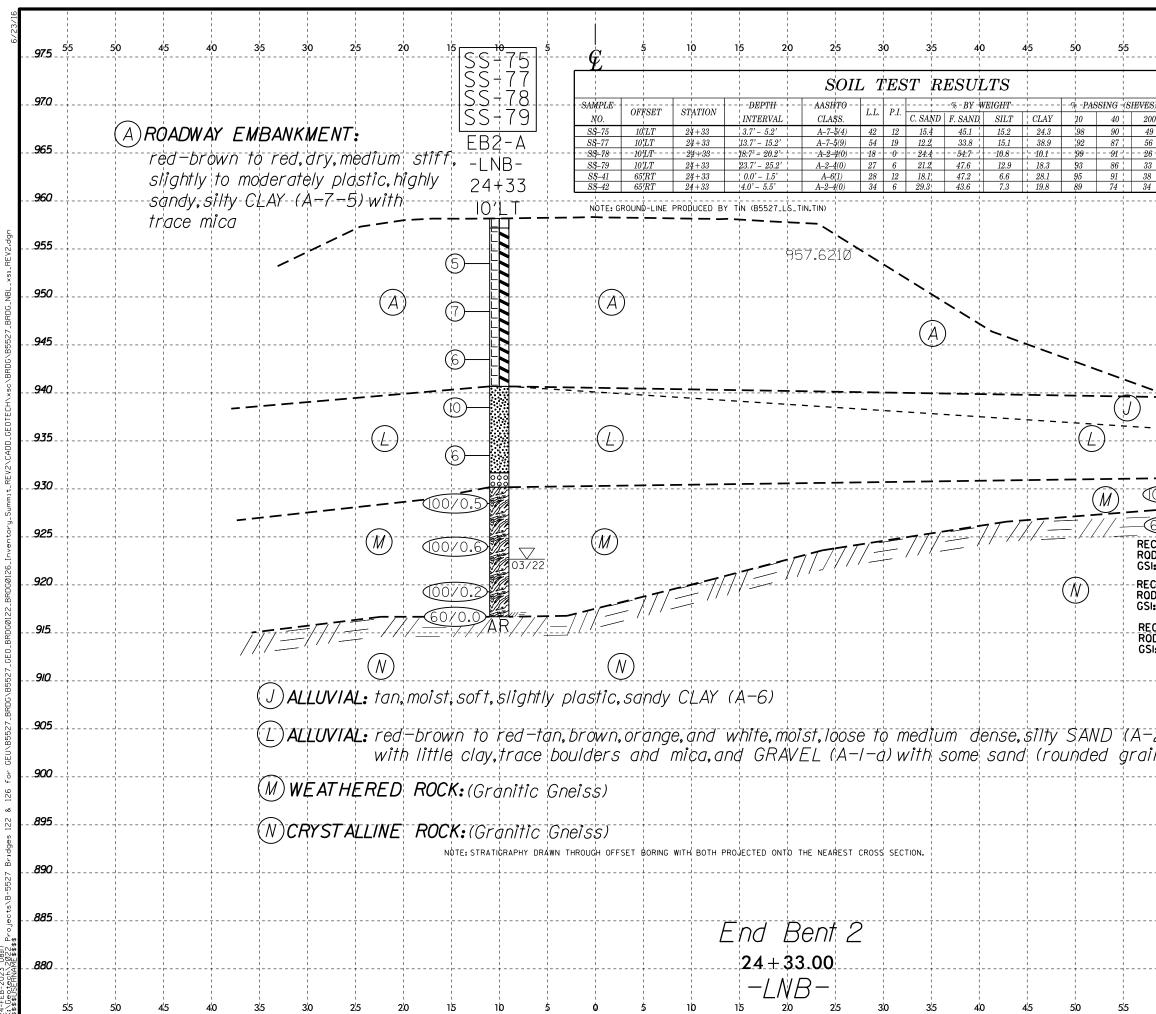




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			02	.5 5	PROJ. RI 8-5527 (8	FERENCE NO	D. SHEE	T NO.
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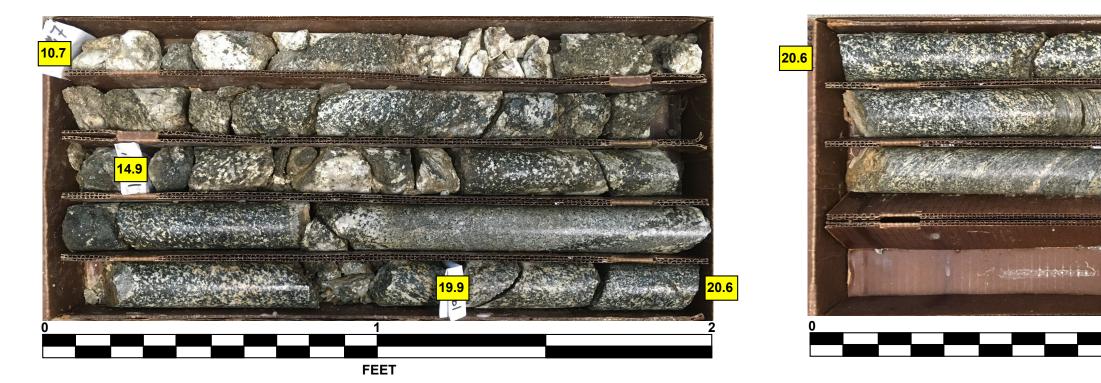


		0 2.5 5		OJ. REFEREN 7 (Bridge	CE NO. no. 122)	sheet no. <b>7</b>
60 65	70	75	80	85 	90	9 <sup>5</sup> <b>975</b>
	% PRGANIC					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<u>N/A</u> <u>N/A</u> <u>N/A</u> <u>N/A</u> N/A		 - - - - - -			<b>965</b>
8   N/A   4   N/A   			               	               	             	<b>960</b>
SS+ SS+	41			               		955
EB2	-B					950
-LNI 24+ 65'F	33					945
		D			•	
(9) 	(	L) 	<b></b>			930
60/0.0 S	///		• 			
DD: 64% SI: 60-65 C: 44% DD: 0% SI: 25-30	(	N)		J		<b>920</b>
51: 25-30 EC: 98% DD: 96% S1: 85-90						<i>91</i> 5
B CAV (037	ED 22)		             	             	             	<i>910</i>
-2-4) ins)	                 		               	               		
				  		<b>900</b>
60 65	7/0	75	80	85	90	<b>880</b> 95

			SORE LOG										JURE					
<b>WBS</b> 55027.1	.FS1	TIP B-5527 COUN	TY SURRY	GEOLOGIST Fischer	r, H. & Gross, A.	WBS	<b>S</b> 55027.1.FS1	1		TIP B-5	527	COUN	TY SURR	Y	GEOLOGIS	<b>T</b> Fischer, H. &	Gross, A.	
SITE DESCRIP	TION BRIDGE NO	D. 122 OVER TOMS CREEK ON	US 52 NB		GROUND WTR (ft)	SITE	E DESCRIPTION	N BRID	GE NO.	122 OVE	R TOMS C	REEK ON					GROUN	D WTR (ft
BORING NO.	LNB_EB1A	STATION 22+03	OFFSET 25 ft LT	ALIGNMENT -LNB-	0 HR. N/A	BOR	ring no. LNB	EB1A	;	STATION	<b>N</b> 22+03		OFFSET	25 ft LT	ALIGNMEN	<b>T</b> -LNB-	0 HR.	N/A
COLLAR ELEV	. 955.4 ft	TOTAL DEPTH 24.9 ft	<b>NORTHING</b> 966,670	EASTING 1,560,974	<b>24 HR.</b> 18.5	COL	LAR ELEV. 9	55.4 ft	· ·	TOTAL D	<b>DEPTH</b> 24.	9 ft	NORTH	<b>NG</b> 966,670	EASTING	1,560,974	24 HR.	18.5
DRILL RIG/HAMM	IER EFF./DATE SUM	3123 CME-550X 86% 11/2/2021	DRILL METHOD	SPT Core Boring	HAMMER TYPE Automatic	DRIL	L RIG/HAMMER E	FF./DATE	E SUM312	23 CME-55	60X 86% 11/2/2	2021		DRILL METHOD	SPT Core Boring	HAN	IMER TYPE	Automatic
DRILLER Mos	seley, M.B.	START DATE 02/24/22	COMP. DATE 03/03/22	SURFACE WATER DE	PTH N/A	DRII	LLER Moseley	/, M.B.	:	START D	DATE 02/24	4/22	COMP. I	DATE 03/03/22	SURFACE V	VATER DEPTH	N/A	
ELEV DRIVE (ff) ELEV DE	EPTH BLOW COUN	IT BLOWS PER FOC	DT SAMP.		OCK DESCRIPTION	COF	RE SIZE NQ2		-	TOTAL R	<b>RUN</b> 14.2 ft	t			I			
(ft) ELEV (ft)	(ft) 0.5ft 0.5ft 0	.5ft 0 25 50	75 100 NO. MOI	O SOIL AND RO G ELEV. (ft)	DEPTH (ft)	ELEV		RUN	DRILL	RUN REC. RQI	D SAMP.	STRATA	L		DECODIDITION			
						(ft)	(ft)	(41)	RATE (Min/ft)	(ft) (ft) % %	) NO.	STRATA REC. RQD (ft) (ft) % %	G ELE	V. (ft)	DESCRIPTION A	ND REMARKS		DEPTH (f
960						944.74	4								Begin Coring	g @ 10.7 ft		
<b>—</b>				F			944.7 10.7	4.2 M	V=60/0.0 0:51/1.2	(4.0) (0.6	6)	(5.8) (1.0) 97% 17%	944.	7 white dark are	CRYSTALL	INE ROCK wn, moderate to mo	oderate sever	10. <sup>-</sup>
							944.7 10.7 940.5 14.9		0:47/1.0	5070 147	/0	57.0 17.0	FT-1	weathering, me	dium hard to mode GRANITIC	rately hard, close fr	racture spacin	g,
955 955.4	0.0 2 3	5	SS-57 M	ARTI	ND SURFACE 0.0 FICIAL FILL	940		5.0	0:51/1.0	(4.4) (2.7 88% 54%	7)		938.	7				16.
				brown, tan, and brown, tan, and with trace	white, sandy SILT (A-4) e clay and gravel <u>2.7</u>		Ŧ	·	1:03/1.0	88% 54%	%	(7.5) (5.9) 91% 72%		white, gray, dark	GSI: green, and black, s	slight to very slight	weathering, ha	
951.5 <del>-</del>	<u>3.9</u> 100/0.4		· · · · · · · · · · · · · · · · · · ·	WEATH	HERED ROCK	935	935.5 - 19.9	•	1:04/1.0 <u>1:08/1.0</u>	(1.0)		91% /2%	B.	to very ha	ard, close fracture s	spacing, GRANITIC	GNEISS	
				WEATH (Grai	nitic Gneiss)		1 1	5.0 (	0:56/1.0 0:52/1.0	(4.8) (3.6 96% 72%	6) %		930.		GSI:	75-80		
946.5 -	89								0:55/1.0				R#					
945 944.7 1	100/0.3		100/0.3	944.7	10.7		930.5 - 24.9	+ +	1:06/1.0		-		930.		ated at Elevation 93	80.5 ft in Crystalline	Rock (Graniti	24. ic
	60/0.0			CRYST.	ALLINE ROCK pre at 10.7 Feet)		‡							<u> </u>	Gne	eiss)	(	
Ŧ					,		1								- Topsoil Thick	ness = 0.3 Feet		
940				(Grai REC: 97% R	nitic Gneiss) QD: 17%  GSI: 55-60 16.7		+							- Boring	deepened on 3/3/2	2 to confirm in-situ	bedrock.	
‡			·   · · · ·     • • •		10.7								I E					
935			·   · · · ·	(Grai	nitic Gneiss)		<del> </del>						F					
				REC: 91% R	QD: 72% GSI: 75-80								F					
			· · · · · · · · · · · · · · · · · · ·				1											
			·   · · · ·	930.5 Boring Terminate	d at Elevation 930.5 ft in		1 1											
±					ock (Granitic Gneiss)		‡											
				- Topsoil Th	ickness = 0.3 Feet		‡											
∓					ed on 3/3/22 to confirm		+											
‡					tu bedrock.													
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#### GEOTECHNICAL BORING REPORT CORE LOG

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



FEET

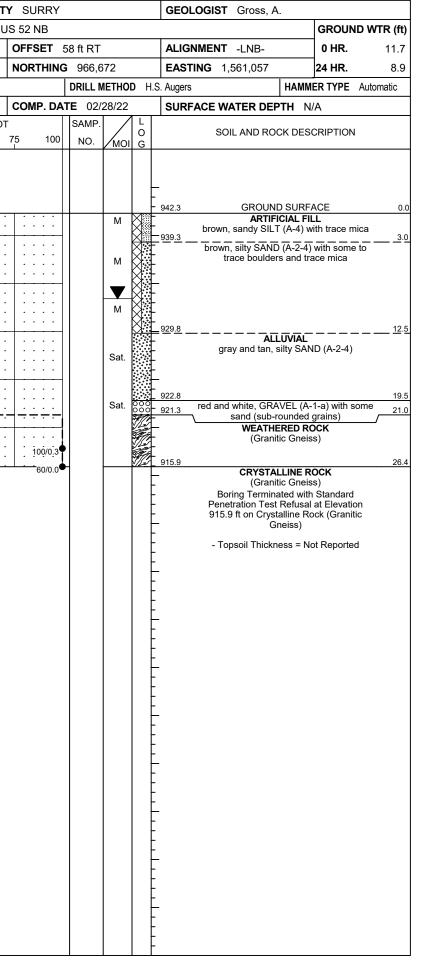
SHEET 9 55027.1.FS1 (B-5527)

LNB\_EB1A BOX 2: 20.6 - 24.9 FEET



														E
WBS	55027	7.1.FS1			TI	P	B-5	5527	,			С	OI	JNT
SITE	DESCR		BRI	DGE I	NO. 12	22 (	OVE	ER T	ON	IS (		EF	< C	N U
BOR	ING NO.	LNB	_EB1E	3	S	TAT		N 2	22+(	03				
COL	LAR ELE	<b>EV.</b> 94	12.3 ft		<b>T</b>	ОΤΑ		DEP	тн	20	5.4 <sup>-</sup>	ft		
DRILL	RIG/HA	MMER E	FF./DA	re sl	JM3123	СМ	E-55	50X 8	6%	11/2	/202	1		
DRIL		loseley	-			TAF	RT I	DAT	E	02/	28/2	22		
ELEV (ft)	DRIVE ELEV	DEPTH (ft)		W CO		_0				BLO	WS		R F	001
(11)	(ft)	(11)	0.5ft	0.5ft	0.5ft				25			50 		
945		F												
	942.3	0.0	1	2	2	Ц.			<b>—</b>			_	<del></del>	
940		Ļ		2	2		4.	• •	·		• •			•
	938.1	4.2	13	4	2		1:	 			· ·		· ·	· ·
935	-	+		-	2		<b>€</b> 6 • <b>\</b> •	· · · ·			· · · ·		· ·	•••
333	933.1	9.2						<u>.</u>	1					
	-	- <u>9.</u> 2	7	9	8	11	· · · ·		7		· · · ·		· ·	•••
930		t t						/				_		
	928.1	14.2	1	2	2		1				• •			
925	-	Ľ						• •						• •
	923.1	19.2	_	- 00	- 00		· ·	 					· ·	•••
000	-	Ļ	7	22	23		 	· · ·	<b>T</b> :		•	45 <del> </del> -	 <del>.</del> <del>.</del>	- : :
920	918.1	24.2							1			+		
	915.9	24.2	100/0.3				· ·	· · · ·			· · · ·		· ·	•••
	915.9	- 20.4	60/0.0				•••	•••			•••			•••
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JOT BORE DOUBLE B5527\_GEO\_BRDG\_LNB\_REV2UPDATED.GPJ\_NC\_DOT.GDT\_2/23



					WBS 55027.1.FS1			CEOLOCIET Chimmen M
WBS 5502			ITY SURRY	GEOLOGIST Shipman, M.			TY SURRY	GEOLOGIST Shipman, M. GROUND WTR (ft)
		. 122 OVER TOMS CREEK ON U	-	GROUND WTR (ft)	SITE DESCRIPTION BRIDGE NO			
	<b>D.</b> LNB_B1A	STATION 22+78	OFFSET 7 ft LT	ALIGNMENT -LNB- 0 HR. N/A	BORING NO. LNB_B1A	STATION 22+78	OFFSET 7 ft LT	ALIGNMENT -LNB- 0 HR. N/A
	LEV. 927.3 ft	TOTAL DEPTH 33.3 ft	<b>NORTHING</b> 966,746	EASTING         1,560,990         24 HR.         Dry	COLLAR ELEV. 927.3 ft	TOTAL DEPTH 33.3 ft	<b>NORTHING</b> 966,746	EASTING 1,560,990 24 HR. Dry
DRILL RIG/H/	AMMER EFF./DATE SUMB	123 CME-550X 86% 11/2/2021	DRILL METHOD SP	T Core Boring HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE SUM3	3123 OVE-550X 86% 11/2/2021	DRILL METHOD SF	PT Core Boring HAMMER TYPE Automatic
DRILLER	Moseley, M.B.	START DATE 07/22/22	COMP. DATE 07/22/22	SURFACE WATER DEPTH N/A	DRILLER Moseley, M.B.	<b>START DATE</b> 07/22/22	COMP. DATE 07/22/22	SURFACE WATER DEPTH N/A
			OT SAMP.	SOIL AND ROCK DESCRIPTION	CORE SIZE NQ2	TOTAL RUN 21.4 ft		
(ft) ELEV (ft)	(ft) 0.5ft 0.5ft	0.5ft 0 25 50	75 100 NO. MOI G		ELEV RUN DEPTH RUN DRILL (ff) CELEV (ff) (ff) RATE	RUN         SAMP.           REC.         RQD           (ft)         (ft)           (ft)         (ft)		DESCRIPTION AND REMARKS
					(ft) ELEV (ft) (ft) (Min/ft)	(ft) (ft) NO. (ft) (ft)	G ELEV. (ft)	DESCRIPTION AND REMARKS
930					9154			Begin Coring @ 11.9 ft
				-		0 (1.1) (1.1)	914.1 white and gray, sli	CRYSTALLINE ROCK 13.2 ght to moderate weathering, moderately hard to hard.
926.5	5 - 0.8			927.3 GROUND SURFACE 0.0		$\begin{array}{c c} \hline & 19\% & 18\% \\ \hline 0 & (4.3) & (3.7) \\ \hline 0 & 86\% & 74\% \\ \hline 0 & 0 \\ \hline 0 & (5.0) & (3.9) \\ \hline 0 & 100\% & 78\% \\ \hline \end{array}$	clos	ght to moderate weathering, moderately hard to hard, e fracture spacing, GRANITIC GNEISS
925			·· · · · · · ·       w 🕅	red-brown, clayey SILT (A-5)	910 - 2:23/1.0 2:22/1.0	0 80% 74%		GSI: 75-80 (continued)
	±				909.0 18.3 2:12/1.0	0 (5.0) (3.9)	white and gray to hard to hard. clo	dark gray, very slight to slight weathering, moderately se to moderately close fracture spacing. GRANITIC
	5 - 5.8	33	· ·   · · · ·	gray, silty SAND (A-2-4) with trace				se to moderately close fracture spacing, GRANITIC GNEISS
920	$\pm$ $ $ $ $ $ $			gravel-sized rock fragments and trace mica	905 904.0 23.3 2:06/1.0			GSI: 80-85
	<u>+</u>							
915 915.5	5 + 11.8 60/0.1			915.5 11.8	900		white and gray, sin clos white and gray to hard to hard, clo	
				-914.1 CRYSTALLINE ROCK 13.2 (Begin Core at 11.8 Feet)	899.0 28.3 1:57/1.0 5.0 2:08/1.0	0 (4.7) (3.9) 0 94% 78% 0 0 0 (5.0) (5.0) 0 (5.0) (5.0)		ite, very slight to fresh weathering, hard, moderately
	Ŧ			(Granitic Gneiss)			clos	e fracture spacing, GRANITIC GNEISS
910	<b>+</b>				895         2:41/1.0           895         2:14/1.0           894.0         33.3           2:51/1.0		dark gray and wh clos	GSI: 85-90
	‡				894.0 33.3 2:51/1.0		Boring Terminat	ed at Elevation 894.0 ft in Crystalline Rock (Granitic
005				REC: 93% RQD: 77% GSI: 80-85				Gneiss)
905	$\pm$			-				Drilled Through Existing Bridge Deck
900	+							
	Ŧ							
	$\frac{1}{4}$			REC: 100% RQD: 100% GSI: 85-90				
895	$\downarrow$							
	+ + +			Boring Terminated at Elevation 894.0 ft in Crystalline Rock (Granitic Gneiss)				
	‡							
	<u>+</u>			- Drilled Through Existing Bridge Deck				
15/23	±			_				
л 3/	$\overline{+}$			-				
T.GD	Ŧ							
	$\frac{1}{4}$			-				
	‡							
D.GP	‡							
REV2UPDATED.GPJ	<u>+</u>			-				
	±						-	
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EN I	+ $ $ $ $ $ $						-	
	Ŧ							
BRL	<b>†</b>			-				
GEO	‡							
527_0	<u>+      </u>							
B56	$\pm$			-			-	
IGLE	$\pm$							
NIN III	Ŧ							
30Rt	<b>†</b>			-	Kol         I			
TOC	‡							
NC	<u>t      </u>							

#### ICAL BORING REPORT CORE LOG

## LNB\_B1A BOXES 1 & 2: 11.9 - 30.3 FEET





#### SHEET 12 55027.1.FS1 (B-5527)

# LNB\_B1A BOX 3: 30.3 - 33.3 FEET

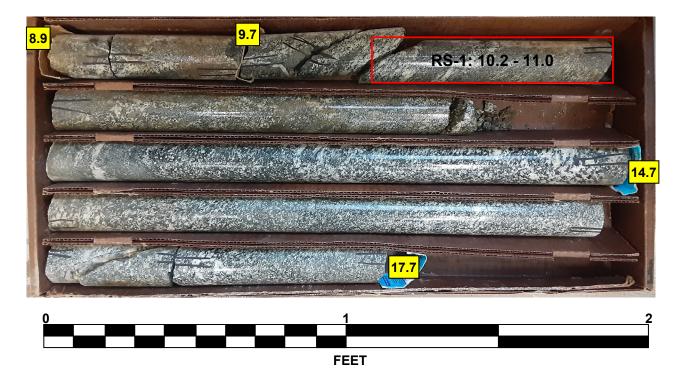
		4 504				<b>D</b> D 5507					LOC	3			CT Obierra M			I		
	55027					P B-5527				Λľ				GEOLOGI	<b>ST</b> Shipman, M.					55027
				JGE N						<del>_</del>	10 (1 57			AL 10111-		GROUND				DESCR
	NG NO.					TATION 22					10 ft RT					0 HR.	N/A			NG NO.
									NORTH	IING	966,74				1,561,008	24 HR.	Dry			LAR EL
				E 501		CME-550X 86%							J 5P	T Core Boring		MERTYPE AU	Iomatic			. RIG/HA
RIL	LER M									DA	TE 07/	19/22	1.1	SURFACE	WATER DEPTH	N/A			DRIL	LER N
_EV (ft) 030	DRIVE ELEV (ft)	DEPTI (ft)	H BLC 0.5ft	0.5ft		0 2		PER FOOT		100	SAMP. NO.	мо	C C G		SOIL AND ROCK DE	SCRIPTION	DEPTH (ft)		CORE ELEV (ft) 918.6	RUN ELEV (ft)
925	924.2	3.3	WOH	woн	WOH		· · · · ·	· · · · ·						- 927.5 - re-	GROUND SUR ARTIFICIAL I d-brown, clayey SILT mica	FILL	0.0		915	918.6 917.8 917.8 912.8
20	919.2	- - 8.3		91/0.1	WOIT				100/	-		W	Z L Z L Z	- - - - 918.6			8.9		910	907.8
915	-	- - -								-	RS-1			- - - - -	CRYSTALLINE (Begin Core at 8 (Granitic Gne	.9 Feet) eiss)			905	902.8
10	-	-					· · · · ·							- -	REC: 96% RQD: 91%	o GSI: 85-90				
005	- - -	- - -												- - - - 902.8	ing Terminated at Ele	untion 002 8 ft i	24.7			
														-	Crystalline Rock (Gra Drilled Through Existir	nitic Gneiss)				
		+ - - - - - - - - - - - - -												- 				DOT.GDT 3/15/23		
																		NCDOT CORE SINGLE B5527_GEO_BRDG_LNB_REV2UPDATED.GPJ_NC_DOT.GDT_3/15/23		
														- - - -				7_GEO_BRDG_LNB		
														- 				RE SINGLE B552		
	-	-												- - - -				NCDOT CO		

									C	O	RE L	.0	G												
WBS	55027.	1.FS1			TIP	B-552	7	C	OUNT	Y S	URRY					GEOL	OGIS	ST	Shipn	nan,	M.				
SITE	DESCRIF	PTION	BRID	GE NO.	122 0	VER T	OMS CRI	EEK O	NUS	52 N	В											GROL	JND \	WTR (f	it)
BORI	NG NO.	LNB_	B1B		STA	ΓΙΟΝ	22+77			OF	FSET 1	10 ft	RT			ALIG	NMEN	T	-LNB	-		0 HR	•	N/.	Ά
	AR ELE						<b>PTH</b> 24.			NO	RTHING					EAST		1,5	561,00	)8		24 HR		Dr	-
				E SUMB1	23 CME	-550X 8	36%11/2/20	)21				DR	ILL ME	THOD	SPT	Core Bo	oring				HAMIN	AER TYPE	E Au	tomatic	
	LER Mo		M.B.		-		<b>TE</b> 07/1			co	MP. DAT	TE	07/19	)/22		SURF	ACE	WA	TER I	DEP	TH N	/A			
						AL RUI JN	N 15.8 f	t STR	ΔΤΔ																_
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %		SAMP. NO.	REC. (ft) %	RQD (ft) %	L O G	ELEV. (f	ft)			DI	ESCRIP	TION	ANI	D REM	IARKS	S			DEPTH	(ft)
918.6	918.6 917.8 T	8.9	0.8	1:12/0.8	(0.6)	(0.4)					- 918.6								@ 8.9 IE ROC						8.9
915	+	•	5.0	2:06/1.0 1:36/1.0 1:45/1.0 2:22/1.0 1:46/1.0	75% (4.7) 94%	<u>50%</u> (4.3) 86%	RS-1			XXX	-	gr	ay and	white,	, slight	to fresh	n weat	heri IC (	ng, clo GNEIS	se to	wide fr	acture sp	bacing		5.5
910	907.8	19.7	5.0	1:34/1.0 2:08/1.0 1:21/1.0 2:10/1.0 1:43/1.0	(5.0) 100%	(4.6) 92%																			
905	+	24.7	5.0	2:00/1.0 2:00/1.0 2:14/1.0 1:56/1.0 2:48/1.0	(5.0) 100%	(5.0) 100%					- - - - 902.8													24	4.7
		21.7		2.40/1.0									Boring	Term	inated	at Elev		902. neis		Crysta	alline R	lock (Gra	nitic	2	<u>+.</u>
	Ŧ										-				- Dri	lled Thi				ridae	Deck				
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#### **GEOTECHNICAL BORING REPORT** CORFIOG

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

## LNB\_B1B





SHEET 14 55027.1.FS1 (B-5527)

BOX 2: 17.7 - 24.7 FEET

FEET

										.00								
WBS	55027	. <b>1.FS</b> 1	1		T	<b>P</b> B-55	27	COUNT	Y SURRY				GEOLOGIST Shipman, M.		V	VBS	55027	.1.FS1
SITE	DESCR	IPTIO	N BR	IDGE	NO. 12	22 OVER	R TOMS C	REEK ON U	JS 52 NB					GROUND WTR (f	t) S	SITE I	DESCR	IPTION
BOR	ING NO.	LNB	B2A		S	TATION	23+58		OFFSET	7 ft LT			ALIGNMENT -LNB-	0 HR. N//	4 E	BORI	ig no.	LNB
COL	LAR ELE	<b>EV.</b> 9	34.4 ft		Т	OTAL DE	<b>PTH</b> 27	.0 ft	NORTHIN	<b>G</b> 966,	826		EASTING 1,560,989	24 HR. Dr	y C	OLL	AR ELE	<b>EV.</b> 93
DRILL	RIG/HAN	MER E	FF./DA	TE SI	JM3123	CME-550)	K 86% 11/2/2	2021	1	DRILL	METHO	D SF	PT Core Boring HAMM	ER TYPE Automatic		RILL	rig/hav	<b>IMER E</b>
DRIL	LER M	oselev	/. M.B.		S		<b>TE</b> 07/2	21/22	COMP. DA	TE 07	/21/22		SURFACE WATER DEPTH N			RILL	ER M	loseley
ELEV	DRIVE	DEPTH	1	ow co				VS PER FOO		SAMP		1 L					SIZE	
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	о	25	50	75 100		мо	0   G	SOIL AND ROCK DES	CRIPTION DEPTH		LEV	DUN	DEPTI
	()													DEITH		(ft)	ELEV (ft)	(ft)
																24.0	(,	
935	934.4	0.0	6	1	1								-934.4 GROUND SURF/	ACE (	0.0	24.6		9.8
	-	-		'	'	<b>•</b> <sup>2</sup> · ·			• • • • • •		W		ALLUVIAL brown to gray, silty SAND	(A-2-4) with		╞	922.4 -	+ 12.0 +
930	930.4	4.0										F	trace organics and trace gra fragments	avel-sized rock	g	920	-	ŧ.
		-	1	1	1	•2				1		-	(no sample recovered in	4.0 ft drive)			- 917.4 -	+ + 17.0
		-							·   · · · · ·					,		ŀ		- 17.0
925	924.6	- 98				• • •							(very hard drilling throug 924.6 boulders and cobbles fro		.8	915	-	F
1		-	60/0.0							<b>[</b>			NON-CRYSTALLINE	ROCK			- 912.4 -	22.0
1	]	L										đ		· · · · · · · · · · · · · · · · · · ·		910	-	‡
920	-	-											Concrete with Aggr REC: 100% RQD: 100%	GSI: 95-100		010	-	ŧ
		-											CRYSTALLINE R (Granitic Gneis			ŀ	907.4 -	27.0
915	1	F							·   · · · · ·			Ø	REC: 98% RQD: 91%				-	ŧ
315		-											REC. 90% RQD. 91%	631. 90-95			-	F
		-							.   .								-	F
910		-											_				_	ŧ
	-	-										R.					-	ŧ
		-								<u>.</u>			· 907.4 Boring Terminated at Eleva	27 tion 907.4 ft in	.0		-	ŧ
	-	-											Crystalline Rock (Granit	tic Gneiss)			-	ŧ
		-											- Drilled Through Existing	Bridge Deck			-	ł
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	1	-													NCDOT CORE SINGLE_B5527_GEO_BRDG_LNB_REV2UPDATED.GPJ_NC_DOT.GDT_3/15/23		-	ŧ
L			1							1	1	1 1						/

LNB

CORE LOG **TIP** B-5527 N BRIDGE NO. 122 OVER TOMS CREEK ON US 52 NB **STATION** 23+58 B\_B2A 934.4 ft TOTAL DEPTH 27.0 ft EFF/DATE SUM3123 CME-550X 86% 11/2/2021 **START DATE** 07/21/22 ey, M.B. TOTAL RUN 17.2 ft STRATA REC. RQD (ft) (ft) % % DRILL RATE (Min/ft) H RUN SAMP. REC. (ft) % RQD (ft) % (ft) NO. 
 2.2
 N=60/0.0'
 (2.2)
 (2.2)

 2:51/1.0
 100%
 100%

 3:15/1.0
 100%
 100%

 5.0
 0:54/0.2
 (4.9)
 (4.4)

 2:39/1.0
 98%
 88%
 2:27/1.0

 2:23/1.0
 92:23/1.0
 98%
 88%
 2:34/1.0 2:05/1.0 5.0 2:25/1.0 2:42/1.0 2:59/1.0 2:59/1.0 2:17/1.0 
 2:10/1.0

 2:28/1.0

 5.0
 2:16/1.0

 2:04/1.0
 100%

 90%
 2:01/1.0 1:39/1.0 1:56/1.0

#### GEOTECHNICAL BORING REPORT

#### COUNTY SURRY GEOLOGIST Shipman, M. GROUND WTR (ft) OFFSET 7 ft LT ALIGNMENT -LNB-0 HR. N/A **NORTHING** 966,826 EASTING 1,560,989 24 HR. Dry DRILL METHOD SPT Core Boring HAMMER TYPE Automatic **COMP. DATE** 07/21/22 SURFACE WATER DEPTH N/A DESCRIPTION AND REMARKS ELEV. (ft) DEPTH (ft) G Begin Coring @ 9.8 ft NON-CRYSTALLINE ROCK CONCRETE WITH AGGREGATE 924.6 9.8 922.1 12.3 GSI: 95-100 CRYSTALLINE ROCK green-gray and white, fresh to moderate weathering, moderately hard to hard, close to moderately close fracture spacing, GRANITIC GNEISS GSI: 90-95 907.4 27.0 Boring Terminated at Elevation 907.4 ft in Crystalline Rock (Granitic Gneiss) - Drilled Through Existing Bridge Deck

## LNB\_B2A

BOX 1: 9.8 - 19.3 FEET 9.8

FEET



SHEET 16 55027.1.FS1 (B-5527)

#### LNB\_B2A BOX 2: 19.3 - 27.0 FEET

FEET

GEOTECHNIC

										00					ı r						1.				
	55027					IP B-5527			Y SURRY				GEOLOGIST Shipman, M.	1	4 1		55027					B-552			OUNT
SITE	DESCR	IPTION	N BR	IDGE		22 OVER T		EK ON L						GROUND WTR (ft)	1 1					DGE NO.	1		OMS CR	EEK C	NUS
BOR	NG NO.	LNB	B2B		S	TATION 2	3+57		OFFSET	10 ft RT	-		ALIGNMENT -LNB-	0 HR. N/A		BORI	NG NO.	LNB_	B2B		STA	TION	23+57		
COLI	AR ELE	<b>EV.</b> 93	34.1 ft		Т	OTAL DEP	<b>TH</b> 27.0 f	t	NORTHIN	<b>G</b> 966,	825		EASTING 1,561,007	24 HR. Dry		COLI	AR ELE	<b>EV.</b> 93	34.1 ft		тот	AL DE	<b>PTH</b> 27	.0 ft	
DRILL	RIG/HA	MMER E	FF./DA	TE SI	JM3123	CME-550X 8	6% 11/2/2021			DRILL	METHO	DD S	SPT Core Boring HAMM	MER TYPE Automatic		DRILL	. RIG/HAN	<b>IMER EF</b>	F./DAT	E SUMB	123 CM	-550X 8	36%11/2/2	021	
DRIL	LER M	loseley	, M.B.		S	TART DATI	E 07/20/2	2	COMP. DA	TE 07	/20/22	2	SURFACE WATER DEPTH	N/A	1 [	DRIL	LER M	loseley,	M.B.		STA	RT DA	<b>TE</b> 07/2	20/22	
LEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS F	PER FOO	Г	SAMP	. /		SOIL AND ROCK DES			COR	E SIZE	NQ2			тот	AL RUI	<b>N</b> 14.5 f	ťt	
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	0 :	25 5	50	75 100	NO.	мо	O I G		SCRIPTION		ELEV	RUN ELEV	DEPTH		DRILL RATE	REC.	UN I ROD	SAMP.	STF REC.	RATA
																(ft)	elev (ft)	(ft)	(ft)	(Min/ft)	(ft) %	RQD (ft) %	NO.	(ft) %	RQD (ft) %
935																921.6									
	934.1	0.0	3	64	4	++ • • • •		···· •			w		934.1 GROUND SURF			920	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 1:56/1.0 2:52/1.0 2:52/1.0 2:40/1.0	0' (4.5) 100%	(4.3) 96%			
	-	-											brown to gray, silty SAND to trace organics, mica, a	(A-2-4) with no			-	+ 17.0		1:51/1.0   1:46/1.0   1:43/1 0					
930	- 929.1	- 5.0											rock fragmer	nts			917.1	17.0	5.0	0:36/0.5	(5.0) 100%	(4.7)			
	- 323.1	- 0.0	2	1	0		· · · · ·				w		(layer of boulders/cobbles	s from 0.8'-1.0')		915	-	Ł		2:52/1.0	100%	94%			
925	-	È.											5 q 0 − 0 −				912.1	22.0		3:10/1.0				1	
<u>720</u>	924.1	10.0	-	3	97/0.4											910	-	F	5.0	1:55/1.0	(4.7) 94%	(4.4) 88%		1	
	- 921.6 -	- 125	3		97/0.4				100/.9			<u>M</u>	923.1 921.6 WEATHERED R		1			Ŧ		2:12/1.0	1			1	
920	- 0.1 20		60/0.0	r			· · · ·		00/0.01			P	Granitic Gnei	iss)	1		907.1	27.0		1:40/1.0	<u> </u>			-	+
	-	Ł											(Begin Core at 12.				-	ŧ						1	
	-	F										P	(Granitic Gnei	iss)			-	ŧ							
915	-	-											REC: 97% RQD: 94%	GSI: 85-90			-	ŧ							
	-	-															-	ŧ							
910	-	-					· · · · ·										-	Ł							
910	-	-											_				-	Ŧ							
								•••					907.1	27.0			-	Ŧ							
	-	-											Boring Terminated at Elev Crystalline Rock (Grar				-	ŧ							
	-												- Drilled Through Existing	a Bridae Deck			-	‡							
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		ORING RI LOG	EPORT	SHE	EET 17
	JRE TY SURI		GEOLOGIST Shipmar	 h. M.	
	52 NB			GROUND	WTR (ft
	OFFSE	<b>T</b> 10 ft RT	ALIGNMENT -LNB-	0 HR.	N/A
	NORTH	HING 966,825	EASTING 1,561,007	24 HR.	Dry
	-	DRILL METHOD	SPT Core Boring	HAMMER TYPE A	Automatic
	COMP	<b>DATE</b> 07/20/22	SURFACE WATER DE	PTH N/A	
(ft) %		_EV. (ft)	DESCRIPTION AND REMAR		DEPTH (
			Begin Coring @ 12.5 ft		
	92	1.6 gray to blue-gra	CRYSTALLINE ROCK ay and white, slight to fresh weather lose to wide fracture spacing, GR	ering, moderately hard	12 d to
		nard, c		ANTIC GNEISS	
			GSI: 85-90		
	90	07.1			27
	F	Boring Term	inated at Elevation 907.1 ft in Crys Gneiss)	stalline Rock (Granitic	;
	-		- Drilled Through Existing Bridg	le Deck	
				e Deck	
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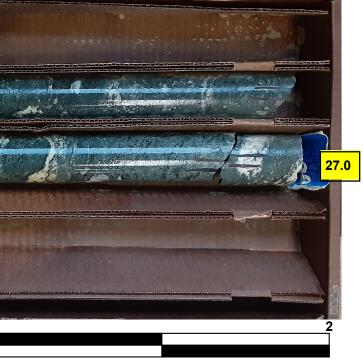
# LNB\_B2B BOX 1: 12.5 - 22.0 FEET

12.5 FEET

FEET

SHEET 18 55027.1.FS1 (B-5527)

# LNB\_B2B BOX 2: 22.0 - 27.0 FEET



															D
WBS	55027	7.1.FS1			Т	ΊP	B-	552	27				СС	U	NT
SITE	DESCR		I BRI	DGE I	NO. 1	22	2 0 V	'ER	тс	OMS	S CF	REI	ΕK	10	۱L
BOR	ING NO	. LNB	EB2A	4	s	T/		N	24	+33	3				
COLI	AR ELI					0	TAL	DF	рт	н	41.	5 ft			
	. RIG/HAI		-	<b>TE</b> 01	JM3123	-						-			
DRIL		loseley					ART	DA	IE						
	DRIVE ELEV	DEPTH		W CO							OW			FC	100
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft		0		2	5		5	0		
960															
	-	F													
	-	-						· ·	•		•••	:			
955	- 954.5	3.7					L		•	•	• •	·	•	·	• •
	904.0	/ 	2	2	3				•	-	• •	•	.	•	
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950	- 949.5-	8.7					ļį	 	·	·	· ·	:	<u> </u>	•	
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945	- 944.5	- - 13.7					ļļ	· ·	•	•	· ·	•	·	•	
		10.7	3	3	3	1		: :	•	:	•••	:	:	:	
	-	F					i.	•••	•	•	• •	•		•	
940	- 939.5-	18.7					·		•	•			•	: 	
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	-	ł							•	•	•••	·	•	•	• •
930	929.5-	28.7						_	-					_	_
	-	ŧ	70	30/0.0				· ·	•		· ·	:		:	
	-	Ł						•••	•	•	•••	•		÷	•••
925	924.5	33.7							-			-	-	-	
	-	ŧ	12	75	25/0.′				•	:	•••	:		:	
	-	t						· ·	:	•	· ·	:		:	· ·
920	919.5	38.7	100/0 0				<u> </u>		-						
	-	Ŧ	100/0.2	1				· ·	:	•	· ·	:		:	
	916.7 -	41.5	60/0.0			+	·			•		•	•		
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#### SHEET 19

Y SURRY				GEOLOGIST Gross	Α.		
IS 52 NB						GROUN	ID WTR (ft)
OFFSET 1	I0 ft LT			ALIGNMENT -LNB-		0 HR.	35.5
NORTHING	966,9	01		EASTING 1,560,986	i	24 HR.	FIAD
	DRILL N	IETHO	р н.:	S. Augers	HAMM	ER TYPE	Automatic
COMP. DAT	<b>TE</b> 03/	01/22		SURFACE WATER D	EPTH N	/A	
-	SAMP.	▼/	L	SOIL AND F			
75 100	NO.	моі	O G	ELEV. (ft)	OCK DES	CRIFTION	DEPTH (ft)
			F	- 958.2 GROL	IND SURF.	ACE	0.0
					Y EMBAN		1.0
			ŀN	red-brown to re	d, slightly t	o moderat	ely
	SS-75	D		plastic, highly s wit	andy, siity n trace mic	CLAY (A-7 a	-5)
		D		-			
				<del>_</del>			
	SS-77	D					
				940.7			17.5
+ · · · · ·	00.70			red-brown to re	LLUVIAL	SAND (A-2	
	SS-78	М			th little clay		- '/
	SS-79	м					
			000	931.7 red-brown to red-	ton CRAV		26.5
+				some san	d (rounded	l grains)	28.0
100/0.5					HERED RO		
· 100/0.6		$\overline{\nabla}$		-			
				_			
• 100/0.2							
60/0.0					ALLINE R		41.5
				– (Gra Boring Term	initic Gneis		
				Penetration Te 916.7 ft on Cr			
				-	Gneiss)		
				- Topsoi	Thickness	s = N/A	
				- Boring drilled t	hrough exis	sting roadv	vay.
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GE	EO	T	EC	H	Ν

				BORE LOG		1						ı	CORE LOG		
	55027.1.FS1			ITY SURRY		GEOLOGIST Fischer, H. & Gr		<b>WBS</b> 5502			<b>TIP</b> B-552		COUNTY SURRY	GEOLOGIST Fischer, H.	
SITE	DESCRIPTION B	BRIDGE NO.	122 OVER TOMS CREEK ON	US 52 NB			GROUND WTR (ft)	SITE DESC	RIPTION BE		D. 122 OVER	TOMS CREE	K ON US 52 NB		
BORI	NG NO. LNB_EB	32B	<b>STATION</b> 24+33	OFFSET 65 ft RT		ALIGNMENT -LNB-	<b>0 HR.</b> N/A	BORING N	<b>O</b> . LNB_EB2	2B	STATION	24+33	OFFSET 65 ft RT	ALIGNMENT -LNB-	0 HR.
COLL	<b>AR ELEV.</b> 939.2	ft	TOTAL DEPTH 26.0 ft	<b>NORTHING</b> 966,902		EASTING 1,561,061	24 HR. Caved	COLLAR E	LEV. 939.21	it	TOTAL DE	<b>PTH</b> 26.0 ft	<b>NORTHING</b> 966,902	EASTING 1,561,061	24 HR. Ca
DRILL	RIG/HAMMER EFF./D	DATE SUM3	123 CME-550X 86% 11/2/2021	DRILL MET	HOD SI	PT Core Boring HAMM	ER TYPE Automatic	DRILL RIG/H	AMMER EFF./D	ATE SUM	3123 CME-550X	86% 11/2/2021	DRILL METHOD	SPT Core Boring H	AMMER TYPE Automa
DRILL	ER Moseley, M.	В.	<b>START DATE</b> 02/23/22	COMP. DATE 03/02/	22	SURFACE WATER DEPTH N/	Ά	DRILLER	Moseley, M.E	3.	START DA	TE 02/23/22	COMP. DATE 03/02/22	SURFACE WATER DEPTH	I N/A
ELEV	DRIVE DEPTH BI	BLOW COUNT	BLOWS PER FO	OT SAMP.	L	SOIL AND ROCK DESC		CORE SIZE	NQ2		TOTAL RU				
(ft)	(ft) (ft) 0.5	5ft 0.5ft 0.5	5ft 0 25 50	75 100 NO. N	101 G			ELEV RUN	, DEPTH RUN	DRILL RATE	RUN REC. RQD	SAMP. ST	RATA L . RQD O (ff) G	DESCRIPTION AND REMARKS	
								(ft) (ft)	(ft) (ft)	(Min/ft)		NO. (ft)	(ft) G		
940	939.2 0.0					-939.2 GROUND SURFA	ACE 0.0	928.23	11.0 5.0	N=00/0				Begin Coring @ 11.0 ft CRYSTALLINE ROCK	
i F	- 2	2 1 1				ALLUVIAL				N=60/0.0 0:46/1.0 2:02/1.0 3:27/1.0 2:15/1.0 2:05/1.0	$\begin{array}{c c} 0 & (4.4) & (3.2) \\ 88\% & 64\% \end{array}$	(4.4 88%	) (3.2) 928.2 64% white, gray, bla	k, and brown, very slight to moderate weathering 12.1' - 12.7'), medium ha	e severe weathering
035	935.2 4.0					brown, tan, orange, and whi	ite. silty SAND	925	+ 16.0	3:27/1.0				fracture spacing, GRANITIC GNES	ard to hard, close SS
900		36			1	– (A-2-4) with little clay a	nd gravel	923.2	5.0	0:40/1.0	) (1.9) (0.0) ) 38% 0%	(2.2)		GSI: 60-65	Γ
	‡		.	· · · · · · · · · · · · · · · · · · ·		931.9 WEATHERED RC	7.3	920	±	0:54/1.0		42%	dark gray and b	rown, moderate to moderate severe v ely hard, close to very close fracture	weathering, medium spacing, GRANITIC
930	930.2 9.0 30	0 70/0.3				_ WEATHERED RC _ (Granitic Gneiss		918.2	2 21.0	0:52/1.0	)		917.9	GNEISS	
-	928.2 + 11.0 60/0					928.2 CRYSTALLINE RO	11.0	045	5.0	2:47/1.0	) (4.9) (4.5) 98% 90%	(4.6) 98%	) (4.5)	GSI: 25-30 black, fresh to very slight weathering	a hard to yory hard
925	‡					(Begin Core at 11.0 (Granitic Gneise	Feet)	915	2 + 26.0	1:21/1.0			modera	tely close fracture spacing, GRANIT	IC GNEISS
525	+			· · · · ·			GSI: 60-65 16.0	313.2		1.30/1.0	,			GSI: 85-90	
	‡					- (Granitic Gneis:	s)		±				Boring Termi	nated at Elevation 913.2 ft in Crystalli Gneiss)	ne Rock (Granitic
920	<b></b>					REC: 44% RQD: 0% C	GSI: 25-30		‡					- Topsoil Thickness = 0.0 Feet	
	‡			·   · · · · <b>!</b>		917.9	21.3		‡				Borin	g deepened on 3/2/22 to confirm in-si	itu bedrock.
915	‡					- Granitic Gneis: – REC: 98% RQD: 96% (	s)		±						
010	<b>†</b>					– REC: 98% RQD: 96% ( 913.2	GSI: 85-90 26.0		‡						
Γ	-					Boring Terminated at Eleval Crystalline Rock (Granit			‡						
	<b>+</b>					Topsoil Thickness =	,		‡						
	÷ I					- Boring deepened on 3/2/2			‡						
	Ŧ					in-situ bedrock	ζ.		<b>†</b>						
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#### NICAL BORING REPORT CORE LOG

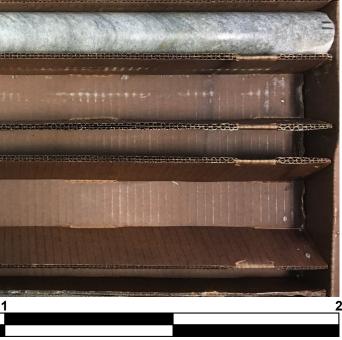
#### LNB\_EB2B BOX 1: 11.0 - 23.3 FEET

# FEET

<mark>26.0</mark>

SHEET 21 55027.1.FS1 (B-5527)

LNB\_EB2B BOX 2: 23.3 - 26.0 FEET



FEET



Project No.: 55027	Tested By:	C. Sullivan	Test Date: 2022-15-09
Project Name: B-5527			
Boring ID: LNB_B1B	Sample ID:	RS-01	Sample Depth: 10.3-10.7
Sample Description: Gray Schist			
Initial Specimen Measurements		7	
Initial Specimen Measurements Diameter: 1.950 in L/D: 2.27		]	
Diameter: 1.950 in L/D: 2.27 Area: 2.986 in <sup>2</sup>			103
Diameter:         1.950 in         L/D:         2.27           Area:         2.986 in <sup>2</sup> Length:         4.43 in			103
Diameter: 1.950 in L/D: 2.27 Area: 2.986 in <sup>2</sup>			103

#### LOAD TEST DATA

	Deflection Reading (in)	Load Reading (Ib)	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			
3DT 9/16/22							
ALCON_FORMAT.	Strain Rate: Failure Mode:	train Rate: %/min ailure Mode: <u>emarks:</u> te: Uniaxial compressive strength was determined in general accordance h ASTM D7012-14 Method C. Deflection, Strain, and Young's modulus (E) data					
I RESULTS G19008.00.GPJ FA	<u>Remarks:</u>						
ROCK CO	ASTM D7012-14 M accordance with th	pressive strength was Method C. Deflection rence only and is not ethod D as deflecti nat procedure. Young' cant modulus at each	on and strain is i s Modulus is calculat	not measured in ted using this data			

SHEET 22 55027.1.FS1 (B-5527)

#### **UNCONFINED COMPRESSIVE STRENGTH OF ROCK**

ASTM D7012

