

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. 126 OVER  
TOMS CREEK ON US 52 SB

**CONTENTS**

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
2A	SUPPLEMENTAL LEGEND (GSI)
3	SITE PLAN
4-7	CROSS SECTION(S)
8-17	BORE LOGS, CORE LOGS, CORE PHOTOS
18	ROCK TEST RESULTS

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

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT 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 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.

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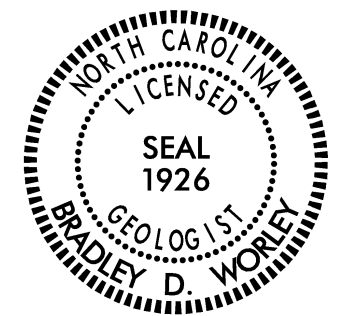
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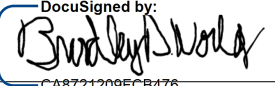
SUBMITTED BY B. WORLEY, PG

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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										TERMS AND DEFINITIONS																													
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAV. SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>										<p>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.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SRQD)</b> - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																													
<b>SOIL CLASSIFICATION</b>										<b>ANGULARITY OF GRAINS</b>										<b>WEATHERED ROCK (WR)</b>										<b>CRISTALLINE ROCK (CR)</b>																													
<p>GENERAL CLASS. GRANULAR MATERIALS (&lt;= 35% PASSING #200) SILT-CLAY MATERIALS (&gt; 35% PASSING #200) ORGANIC MATERIALS</p>										<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES &gt; 100 BLOWS PER FOOT IF TESTED.</p>										<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>																													
<b>MINERALOGICAL COMPOSITION</b>										<b>COMPRESSIONIBILITY</b>										<b>NON-CRYSTALLINE ROCK (NCR)</b>										<b>COASTAL PLAIN SEDIMENTARY ROCK (CP)</b>																													
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>										<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																													
<b>PERCENTAGE OF MATERIAL</b>										<b>GROUND WATER</b>										<b>WEATHERING</b>										<b>SEDIMENTARY ROCK (SR)</b>																													
<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC &gt; 10% &gt; 20% HIGHLY 35% AND ABOVE</p>										<p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>										<p>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS MUCK, FEAT</p>																													
<b>CONSISTENCY OR DENSENESS</b>										<b>MISCELLANEOUS SYMBOLS</b>										<b>ROCK HARDNESS</b>										<b>RECOMMENDATION SYMBOLS</b>																													
<p>PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p>										<p>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>										<p>UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>																													
<p>GENERALY GRANULAR MATERIAL (NON-COHESIVE) GENERALY SILT-CLAY MATERIAL (COHESIVE)</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p>										<p>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>										<p>UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>																													
<b>TEXTURE OR GRAIN SIZE</b>										<b>ABBREVIATIONS</b>										<b>FRACURE SPACING</b>										<b>BEDDING</b>																													
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053</p>										<p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE. - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY</p>										<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</p>										<p>TERM SPACING THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED &lt; 0.008 FEET</p>																													
<p>GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3</p>										<p>MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT v - VERY</p>										<p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>										<p>BENCH MARK: B-5527-2 N 966405 E 1560952 ELEVATION: 958.96 FEET</p>																													
<b>SOIL MOISTURE - CORRELATION OF TERMS</b>										<b>EQUIPMENT USED ON SUBJECT PROJECT</b>										<b>INDURATION</b>										<b>NOTES</b>																													
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p>										<p>DRILL UNITS: CME-45C CME-55 CME-550X VANE SHEAR TEST PORTABLE HOIST</p>										<p>ADVANCING TOOLS: CLAY BITS 6' CONTINUOUS FLIGHT AUGER 3 1/4" HOLLOW STEM AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING w/ ADVANCER TRICONE * STEEL TEETH TRICONE * TUNG-CARB. CORE BIT</p>										<p>HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: -B -H -N Q HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>LIQUID LIMIT (LL) - SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PLASTIC LIMIT (PL) - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OPTIMUM MOISTURE SHRINKAGE LIMIT (OM) - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>									
<b>PLASTICITY</b>										<b>INDURATION</b>										<b>NOTES</b>										<b>NOTES</b>																													
<p>NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>FIAD = Filled Immediately After Drilling MnO = Manganese Oxide Elevations for North Bound Interior Bent Borings obtained using the TIN file (B5527_Ls.tin.tin)</p>										<p>FIAD = Filled Immediately After Drilling MnO = Manganese Oxide Elevations for North Bound Interior Bent Borings obtained using the TIN file (B5527_Ls.tin.tin)</p>																													
<b>COLOR</b>										<b>INDURATION</b>										<b>NOTES</b>										<b>NOTES</b>																													
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>										<p>FIAD = Filled Immediately After Drilling MnO = Manganese Oxide Elevations for North Bound Interior Bent Borings obtained using the TIN file (B5527_Ls.tin.tin)</p>										<p>FIAD = Filled Immediately After Drilling MnO = Manganese Oxide Elevations for North Bound Interior Bent Borings obtained using the TIN file (B5527_Ls.tin.tin)</p>																													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

**SUBSURFACE INVESTIGATION**

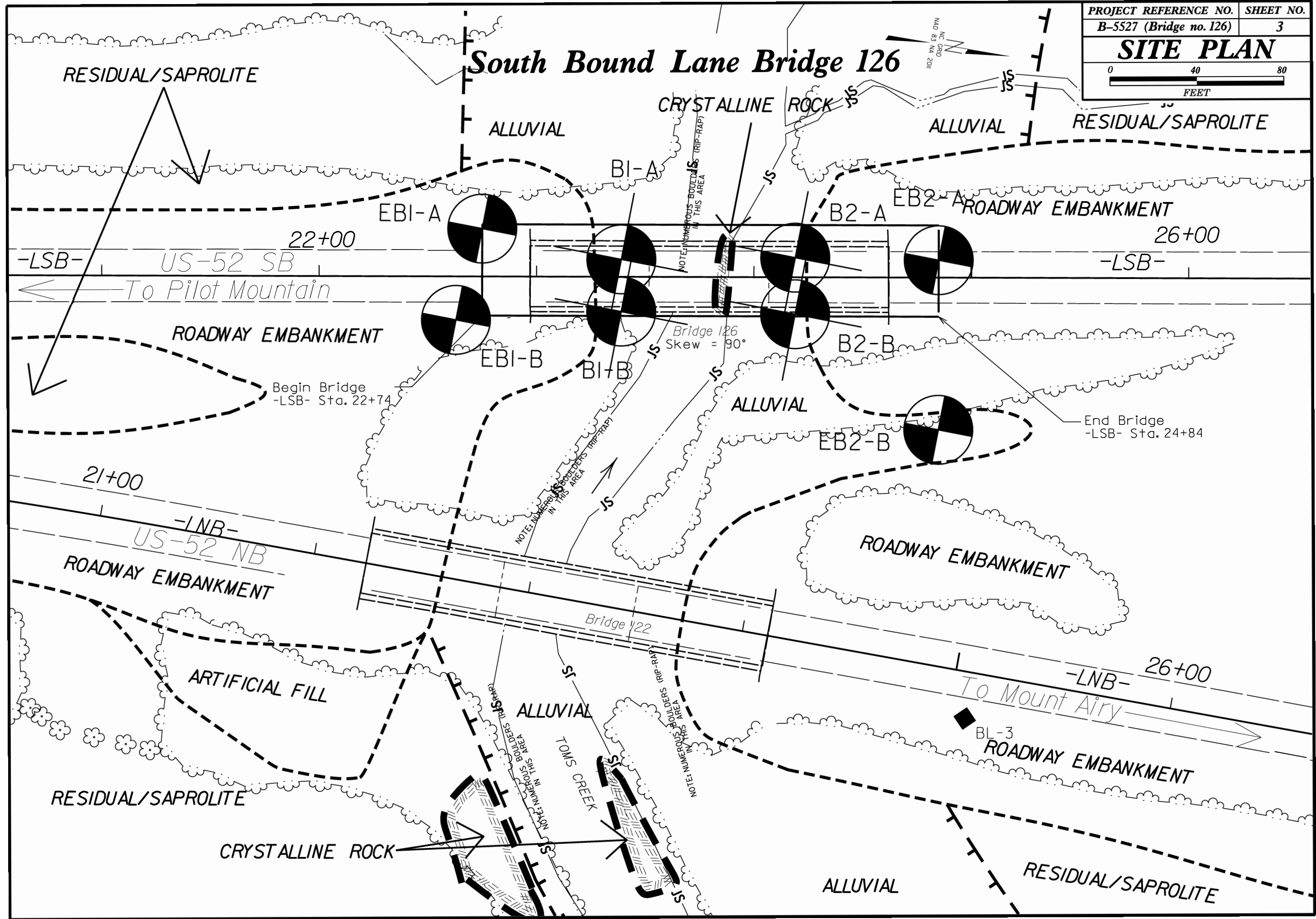
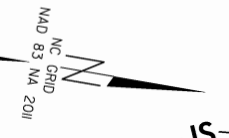
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES  
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

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

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

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

# South Bound Lane Bridge 126

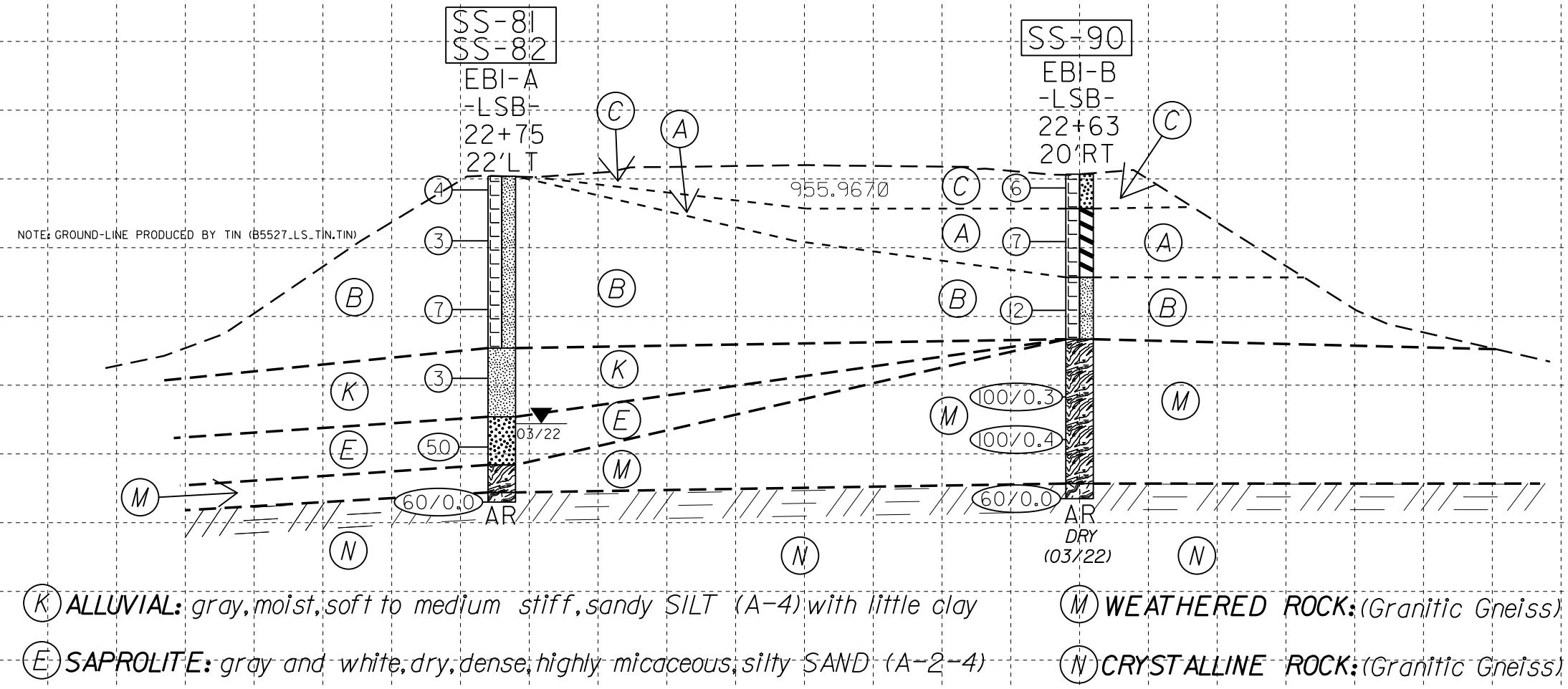




23-FEB-2023 12:22 K:\Geotechnical\2022 Projects\B-5527 Bridges 122 & 126 for GEU\B5527\_BRDG\B5527\_GEO\_BRDG0122\_BRDG0126\_Inventory\_Summit\_REV2\CADD\_GEOTECH\esc BRDG\B5527\_BRDG\_SBL\_xst\_REV.dgn

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C-SAND	F-SAND	SILT	CLAY	10	40	200		
SS-81	22'LT	22+75	3.7' - 5.2'	A-4(0)	39	5	15.4	47.9	26.1	10.6	90	88	45	NA	NA
SS-82	22'LT	22+75	13.7' - 15.2'	A-4(0)	32	4	32.1	31.9	19.8	16.2	96	73	43	NA	NA
SS-90	20'RT	22+63	3.9' - 5.4'	A-7-5(11)	51	18	17.7	22.6	10.9	48.8	95	84	62	NA	NA

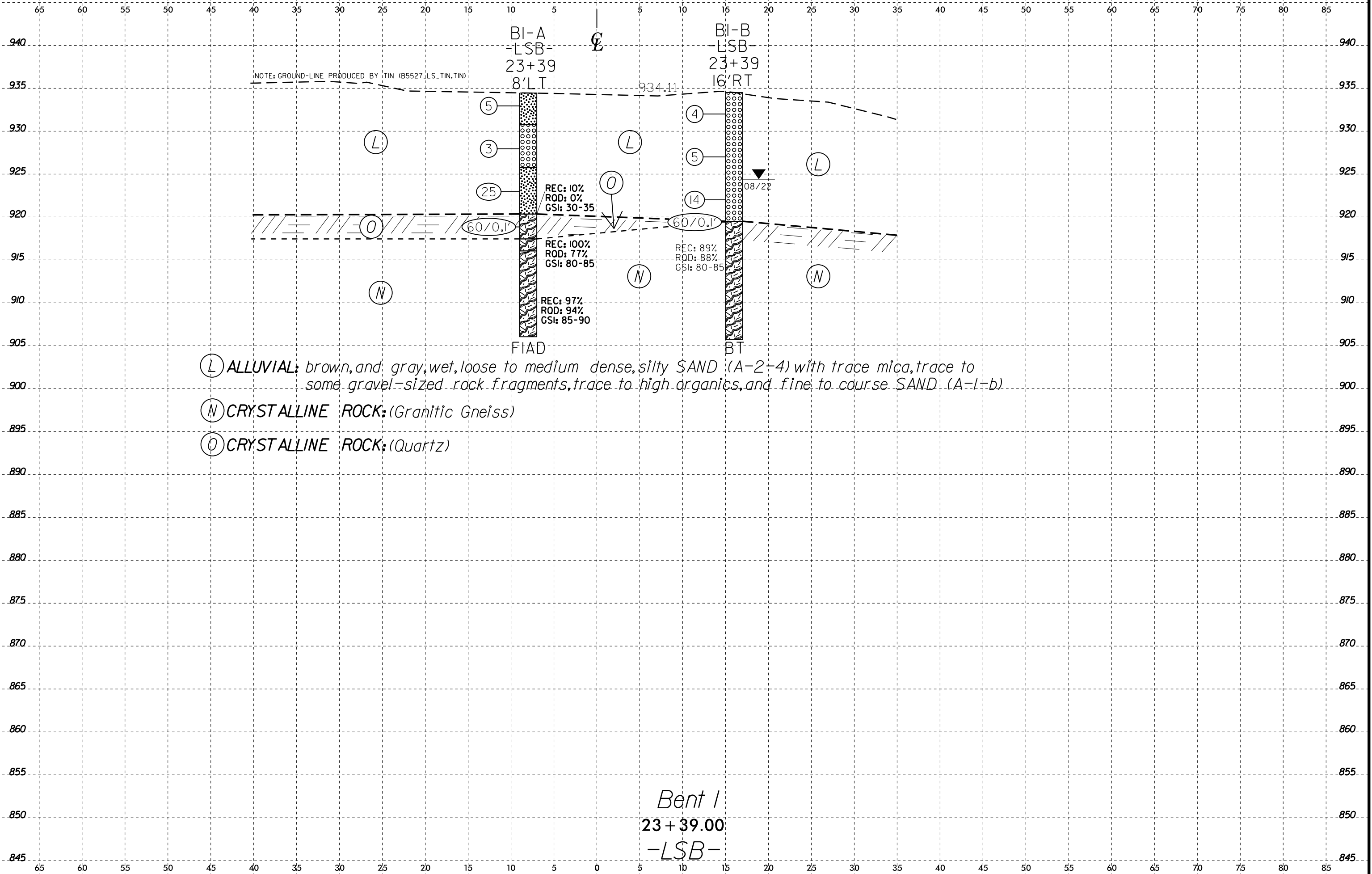
- (A) ROADWAY EMBANKMENT: red, dry, medium stiff, moderately plastic, highly sandy, silty CLAY (A-7-5) with trace mica
- (B) ROADWAY EMBANKMENT: red-brown, gray and white, dry to moist, soft to stiff, sandy SILT (A-4) with little clay and trace to some mica
- (C) ROADWAY EMBANKMENT: red-tan, dry, loose, silty SAND (A-2-4) with trace mica



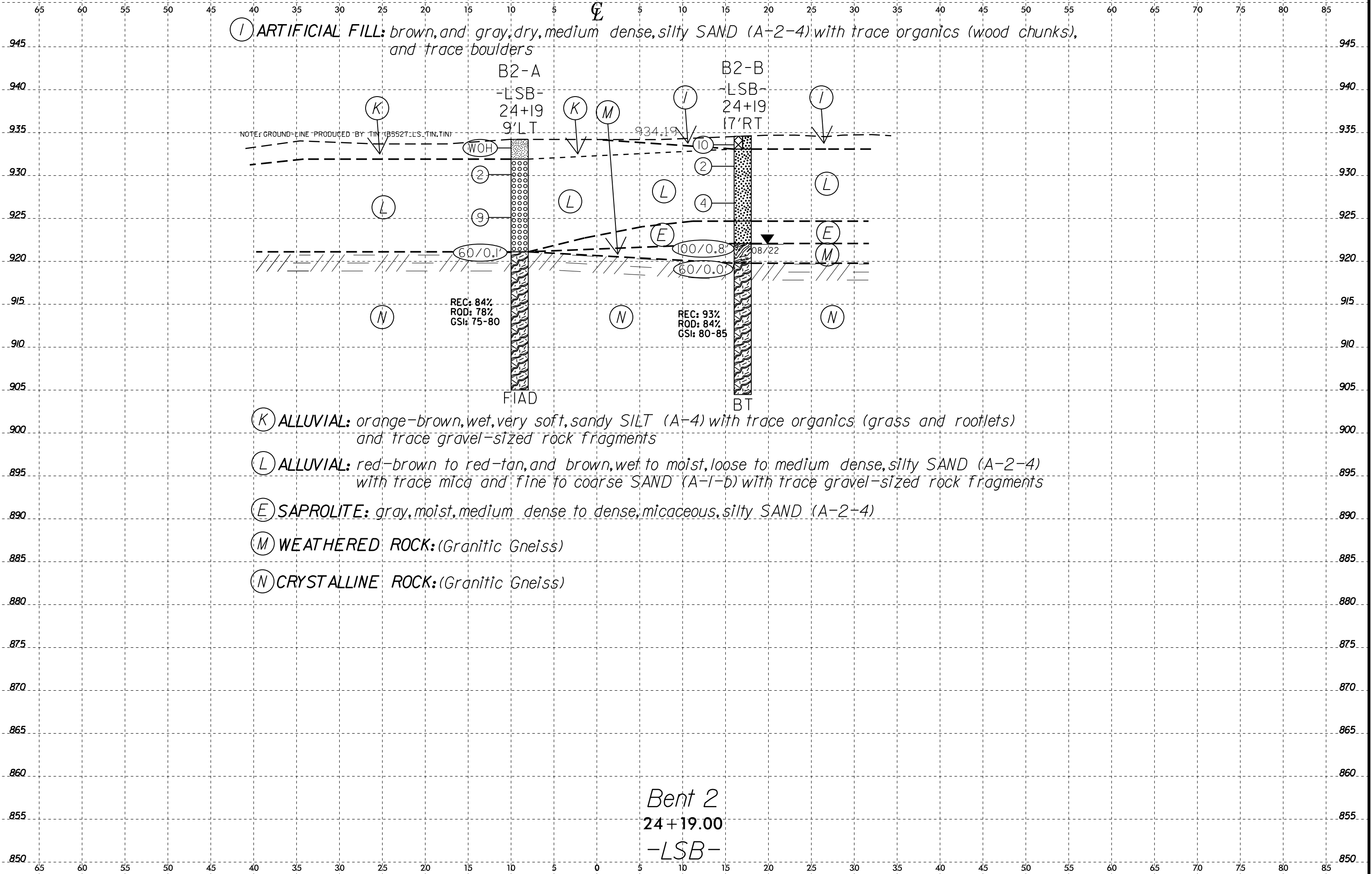
- (K) ALLUVIAL: gray, moist, soft to medium stiff, sandy SILT (A-4) with little clay
- (E) SAPROLITE: gray and white, dry, dense, highly micaceous, silty SAND (A-2-4)
- (M) WEATHERED ROCK: (Granitic Gneiss)
- (N) CRYSTALLINE ROCK: (Granitic Gneiss)

End Bent 1  
22+74.01  
-LSB-

6/23/16  
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6/23/16  
23-FEB-2023 12:25  
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(I) ARTIFICIAL FILL: brown, and gray, dry, medium dense, silty SAND (A-2-4) with trace organics (wood chunks), and trace boulders

B2-A

B2-B

-LSB-  
24+19  
9'LT

-LSB-  
24+19  
17'RT

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

REC: 84%  
ROD: 78%  
GSI: 75-80

REC: 93%  
ROD: 84%  
GSI: 80-85

(K) ALLUVIAL: orange-brown, wet, very soft, sandy SILT (A-4) with trace organics (grass and rootlets) and trace gravel-sized rock fragments

(L) ALLUVIAL: red-brown to red-tan, and brown, wet to moist, loose to medium dense, silty SAND (A-2-4) with trace mica and fine to coarse SAND (A-1-b) with trace gravel-sized rock fragments

(E) SAPROLITE: gray, moist, medium dense to dense, micaceous, silty SAND (A-2-4)

(M) WEATHERED ROCK: (Granitic Gneiss)

(N) CRYSTALLINE ROCK: (Granitic Gneiss)

Bent 2  
24+19.00  
-LSB-

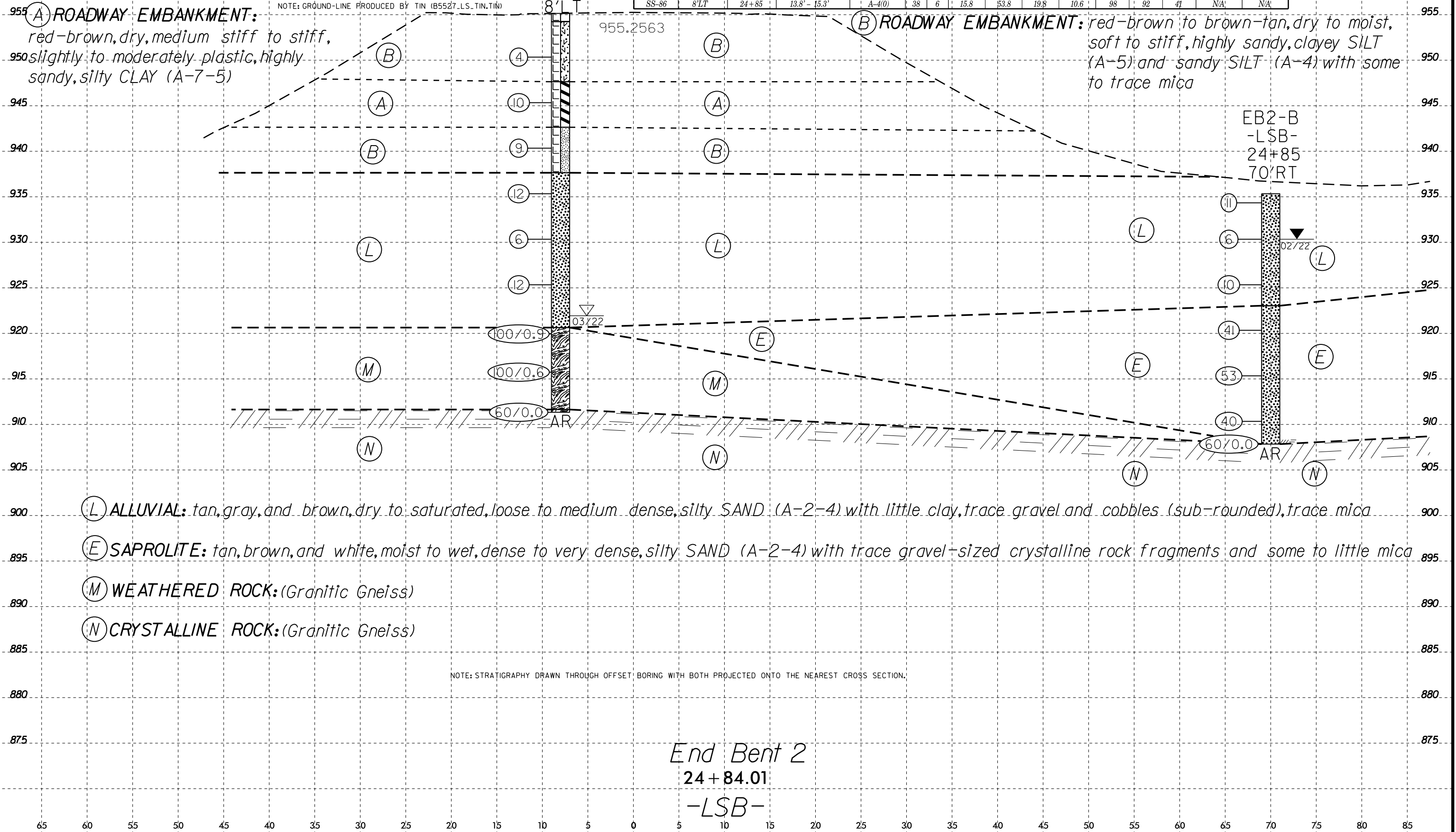
SS-84  
SS-85  
SS-86

CE

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C-SAND	F-SAND	SILT	CLAY	10	40	200		
SS-84	8'LT	24+85	3.8' - 5.3'	A-5(2)	41	8	20.0	35.6	14.1	30.3	96	84	51	NA	NA
SS-85	8'LT	24+85	8.8' - 10.3'	A-7-5(5)	46	11	15.3	36.6	4.0	44.1	99	92	55	NA	NA
SS-86	8'LT	24+85	13.8' - 15.3'	A-4(0)	38	6	15.8	53.8	19.8	10.6	98	92	41	NA	NA

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

**(B) ROADWAY EMBANKMENT:** red-brown to brown-tan, dry to moist, soft to stiff, highly sandy, clayey SILT (A-5) and sandy SILT (A-4) with some to trace mica



**(L) ALLUVIAL:** tan, gray, and brown, dry to saturated, loose to medium dense, silty SAND (A-2-4) with little clay, trace gravel and cobbles (sub-rounded), trace mica

**(E) SAPROLITE:** tan, brown, and white, moist to wet, dense to very dense, silty SAND (A-2-4) with trace gravel-sized crystalline rock fragments and some to little mica

**(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+84.01  
-LSB-

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## 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. 126 OVER TOMS CREEK ON US 52 SB							<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> LSB_EB1A		<b>STATION</b> 22+75		<b>OFFSET</b> 22 ft LT		<b>ALIGNMENT</b> -LSB-	
<b>COLLAR ELEV.</b> 955.3 ft		<b>TOTAL DEPTH</b> 23.7 ft		<b>NORTHING</b> 966,715		<b>EASTING</b> 1,560,837	
<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> 03/01/22		<b>COMP. DATE</b> 03/01/22		<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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
960															
955	955.3	0.0	3	2	2									955.3	0.0
950	951.6	3.7	2	2	1									953.1	2.5
945	946.6	8.7	3	4	3									948.1	7.5
940	941.6	13.7	3	2	1									943.6	12.0
935	936.6	18.7	7	18	32									937.8	17.5
	931.6	23.7												934.3	21.0
														932.3	23.0
														931.6	23.7
			60/0.0												

<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. 126 OVER TOMS CREEK ON US 52 SB							<b>GROUND WTR (ft)</b>
<b>BORING NO.</b> LSB_EB1B		<b>STATION</b> 22+63		<b>OFFSET</b> 20 ft RT		<b>ALIGNMENT</b> -LSB-	
<b>COLLAR ELEV.</b> 955.6 ft		<b>TOTAL DEPTH</b> 23.6 ft		<b>NORTHING</b> 966,711		<b>EASTING</b> 1,560,881	
<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> 03/03/22		<b>COMP. DATE</b> 03/03/22		<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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
960															
955	955.6	0.0	3	3	3									955.6	0.0
950	951.7	3.9	2	3	4									953.1	2.5
945	946.7	8.9	5	7	5									948.1	7.5
940	940.7	14.9	4	8	100/0.3									943.6	12.0
935	936.7	18.9	12	100/0.4										937.8	17.5
	932.0	23.6												934.3	21.0
														932.3	23.0
			60/0.0											931.6	23.7

NCDOT BORE DOUBLE B5527\_GEO\_BRDG\_LSB.GPJ NC\_DOT.GDT 8/18/22



# GEOTECHNICAL BORING REPORT BORE LOG

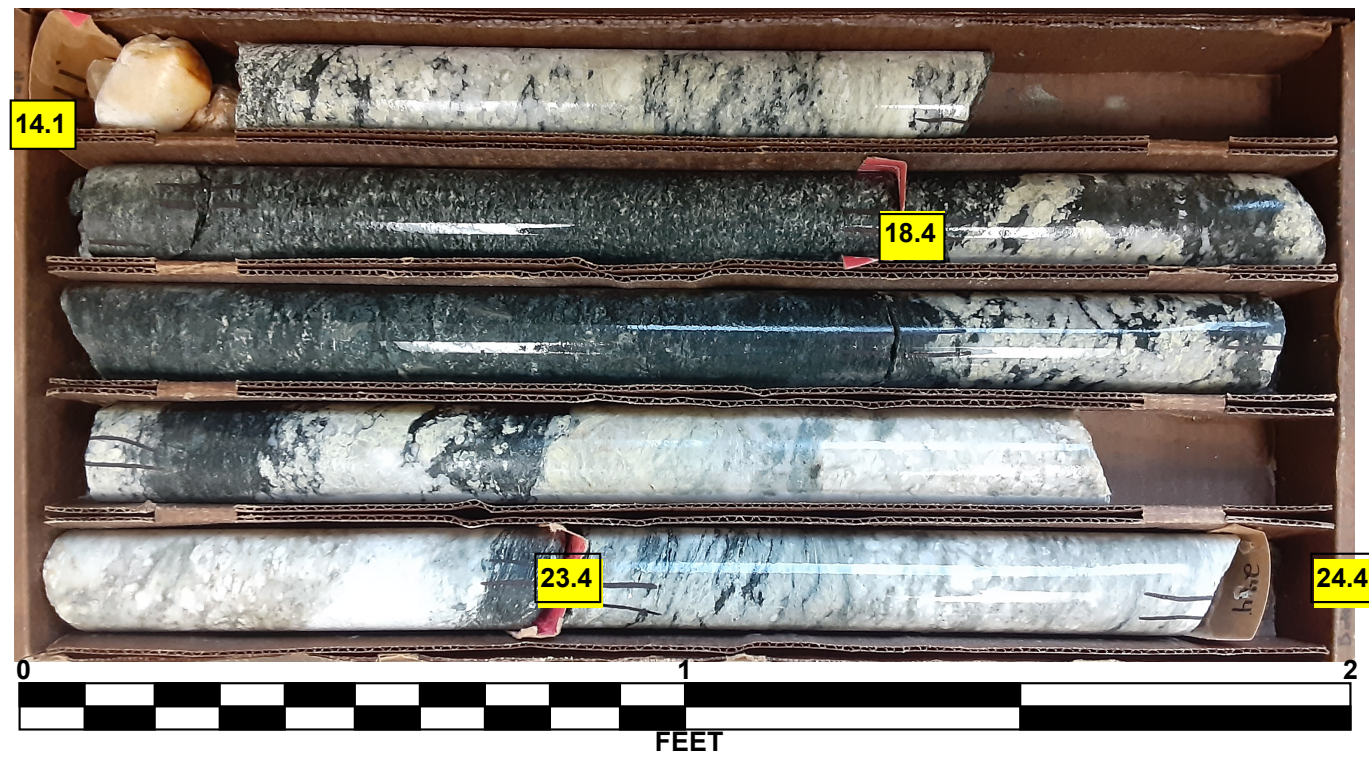
# GEOTECHNICAL BORING REPORT CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.							
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)						
BORING NO. LSB_B1A		STATION 23+39		OFFSET 8 ft LT		ALIGNMENT -LSB-							
COLLAR ELEV. 933.7 ft		TOTAL DEPTH 28.4 ft		NORTHING 966,780		EASTING 1,560,839							
DRILL RIGHAMMER EFF/DATE SUM3123 CME-550X 86% 11/2/2021		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic									
DRILLER Moseley, M.B.		START DATE 07/27/22		COMP. DATE 07/27/22		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				
935												GROUND SURFACE	0.0
	933.2	0.5	2	2	3							ALLUVIAL	
												brown, silty SAND (A-2-4) with some gravel-sized rock fragments	
930												(boulders from 0.1'-2.4')	
	928.2	5.5	2	2	1							brown, fine to coarse SAND (A-1-b) with trace mica and organics	
925												gray, silty SAND (A-2-4) with trace mica and high organics	
	923.2	10.5	16	7	18							(0.8 ft section of wood in spoon)	
920												CRYSTALLINE ROCK	
	918.2	15.5	60/0.1'									(Begin Core at 14.1 Feet)	
915												(Quartz)	
												REC: 10% RQD: 0% GSI: 30-35 (Granitic Gneiss)	
												REC: 100% RQD: 77% GSI: 80-85 (Granitic Gneiss)	
												REC: 97% RQD: 94% GSI: 85-90	
910												Boring Terminated at Elevation 905.3 ft in Crystalline Rock (Granitic Gneiss)	
												- Drilled Through Existing Bridge Deck	

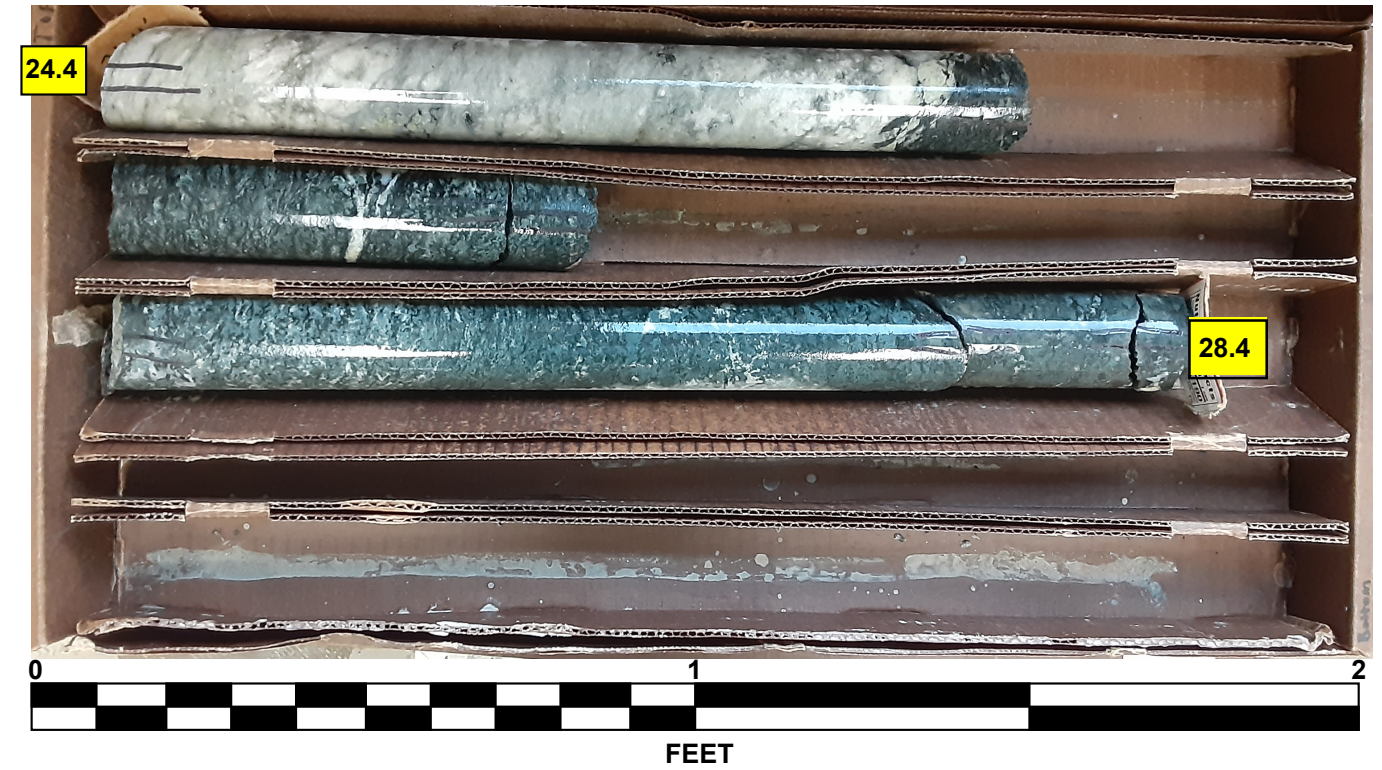
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M.						
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)					
BORING NO. LSB_B1A		STATION 23+39		OFFSET 8 ft LT		ALIGNMENT -LSB-						
COLLAR ELEV. 933.7 ft		TOTAL DEPTH 28.4 ft		NORTHING 966,780		EASTING 1,560,839						
DRILL RIGHAMMER EFF/DATE SUM3123 CME-550X 86% 11/2/2021		DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic								
DRILLER Moseley, M.B.		START DATE 07/27/22		COMP. DATE 07/27/22		SURFACE WATER DEPTH N/A						
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 (%)			
919.6											Begin Coring @ 14.1 ft	
	919.6	14.1	4.3	2:06/1.0 3:37/1.0 N=60/0.1' 5:01/1.0 3:14/1.0 0:41/0.3'	(2.7) 63%	(2.3) 53%					CRYSTALLINE ROCK	14.1
											white, moderately severe weathering, hard, very close to close fracture spacing, QUARTZ	
915											GSI: 30-35	
	915.3	18.4	5.0	4:34/1.0 4:42/1.0 2:55/1.0 2:49/1.0 4:04/1.0	(4.8) 96%	(4.8) 96%					dark gray and white, very slight to fresh weathering, moderately hard to hard, moderately close to close fracture spacing, GRANITIC GNEISS	17.0 18.4
910											GSI: 80-85	
											dark gray to gray-green and white, very slight to fresh weathering, moderately hard to hard, moderately close to close fracture spacing, GRANITIC GNEISS	
	905.3	28.4		5:14/1.0 6:18/1.0 4:13/1.0 2:07/1.0 2:43/1.0	(4.9) 98%	(4.6) 92%					GSI: 85-90	28.4
											Boring Terminated at Elevation 905.3 ft in Crystalline Rock (Granitic Gneiss)	
											- Drilled Through Existing Bridge Deck	

# CORE PHOTOGRAPHS

**LSB\_B1A**  
BOX 1: 14.1 - 24.4 FEET



**LSB\_B1A**  
BOX 2: 24.4 - 28.4 FEET

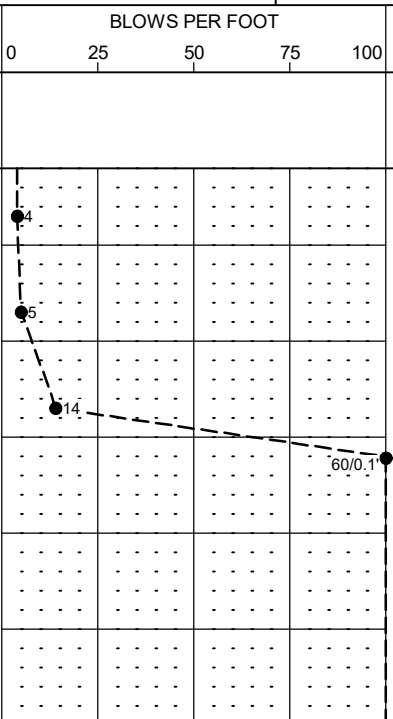
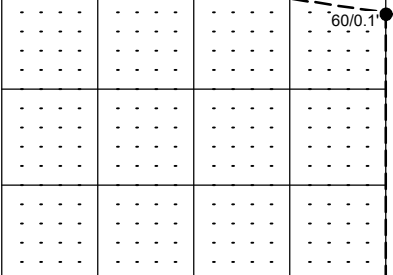


# GEOTECHNICAL BORING REPORT


## BORE LOG

# GEOTECHNICAL BORING REPORT

## CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M. & Gross, A.													
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)												
BORING NO. LSB_B1B		STATION 23+39		OFFSET 16 ft RT		ALIGNMENT -LSB-													
COLLAR ELEV. 934.0 ft		TOTAL DEPTH 28.8 ft		NORTHING 966,785		EASTING 1,560,862													
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 08/03/22		COMP. DATE 08/03/22		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				ELEV. (ft)	DEPTH (ft)				
935																934.0	GROUND SURFACE	0.0	
930	932.5	1.5	2	1	3	·	·	·	·	·			W	·		<b>ALLUVIAL</b> brown to gray, fine to coarse SAND (A-1-b) with trace organics (wood) and trace gravel-sized rock fragments  (no sample recovered at 6.5 ft run)			
925	927.5	6.5	2	3	2	·	·	·	·	·									
920	922.5	11.5	3	6	8	·	·	·	·	·									
915	919.0	15.0																	
910													W		<b>CRYSTALLINE ROCK</b> (Begin Core at 15.1 Feet)  (Granitic Gneiss)  REC: 89% RQD: 88% GSI: 80-85	15.0			
																905.2	Boring Terminated at Elevation 905.2 ft in Crystalline Rock (Granitic Gneiss)  - Drilled Through Existing Bridge Deck	28.8	

NCDOT BORE SINGLE B5527\_GEO\_BRDG\_LSB\_REV.GPJ NC\_DOT.GDT 3/15/23

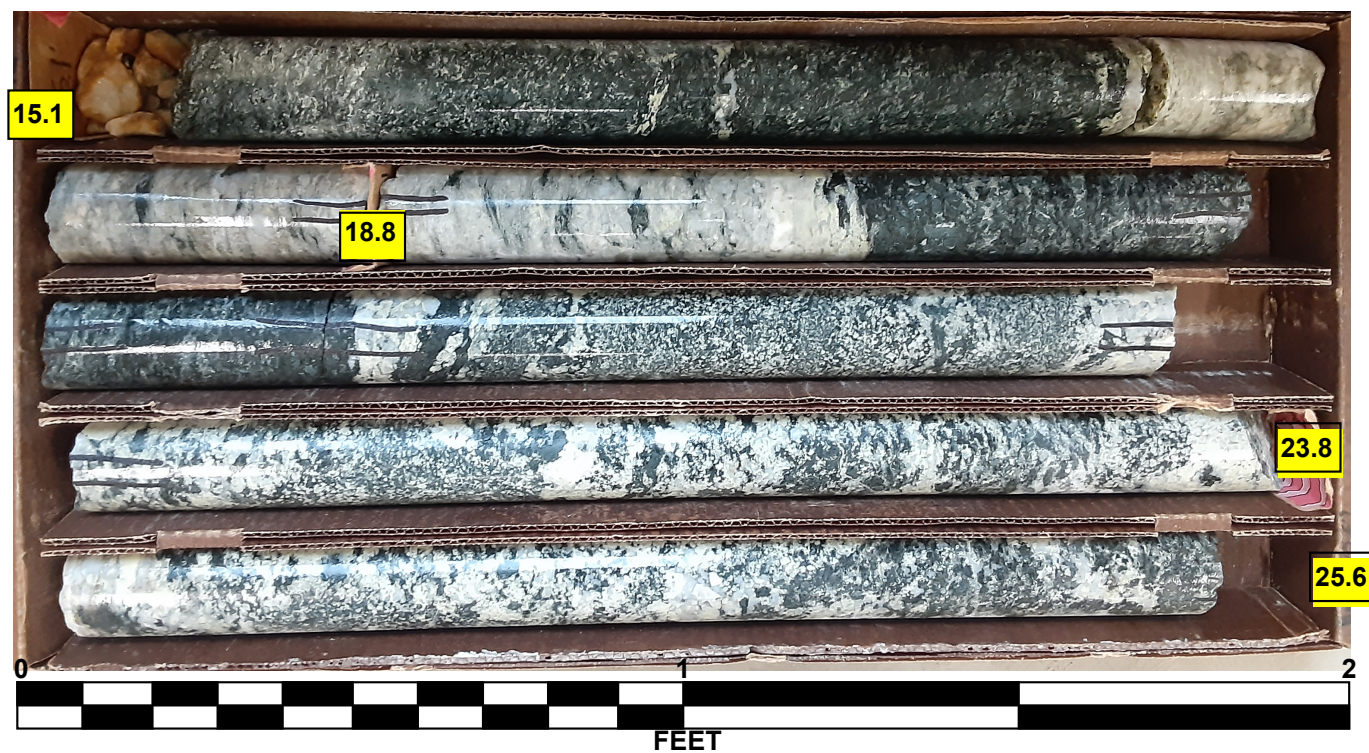
WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Shipman, M. & Gross, A.		
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)	
BORING NO. LSB_B1B		STATION 23+39		OFFSET 16 ft RT		ALIGNMENT -LSB-		
COLLAR ELEV. 934.0 ft		TOTAL DEPTH 28.8 ft		NORTHING 966,785		EASTING 1,560,862		
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 08/03/22		COMP. DATE 08/03/22		SURFACE WATER DEPTH N/A		
CORE SIZE NQ2		TOTAL RUN 13.7 ft		STRATA		LOG	DESCRIPTION AND REMARKS	
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %			RQD (ft) %
918.9	918.9	15.1	3.7	2:31/1.0 4:42/1.0 3:48/1.0 2:20/0.7	(2.4) 65%	(2.0) 54%		Begin Coring @ 15.1 ft <b>CRYSTALLINE ROCK</b> green-gray, white and black, slight to fresh weathering, hard to very hard, moderately close to wide fracture spacing, GRANITIC GNEISS  GSI: 80-85 <i>(continued)</i>
915	915.2	18.8	5.0	3:27/1.0 3:28/1.0 3:38/1.0 3:01/1.0 2:23/1.0	(5.0) 100%	(5.0) 100%		
910	910.2	23.8	5.0	8:06/1.0 3:05/1.0 3:55/1.0 4:17/1.0 2:20/1.0	(4.8) 96%	(4.8) 96%		
	905.2	28.8						

NCDOT CORE SINGLE B5527\_GEO\_BRDG\_LSB\_REV.GPJ NC\_DOT.GDT 3/15/23

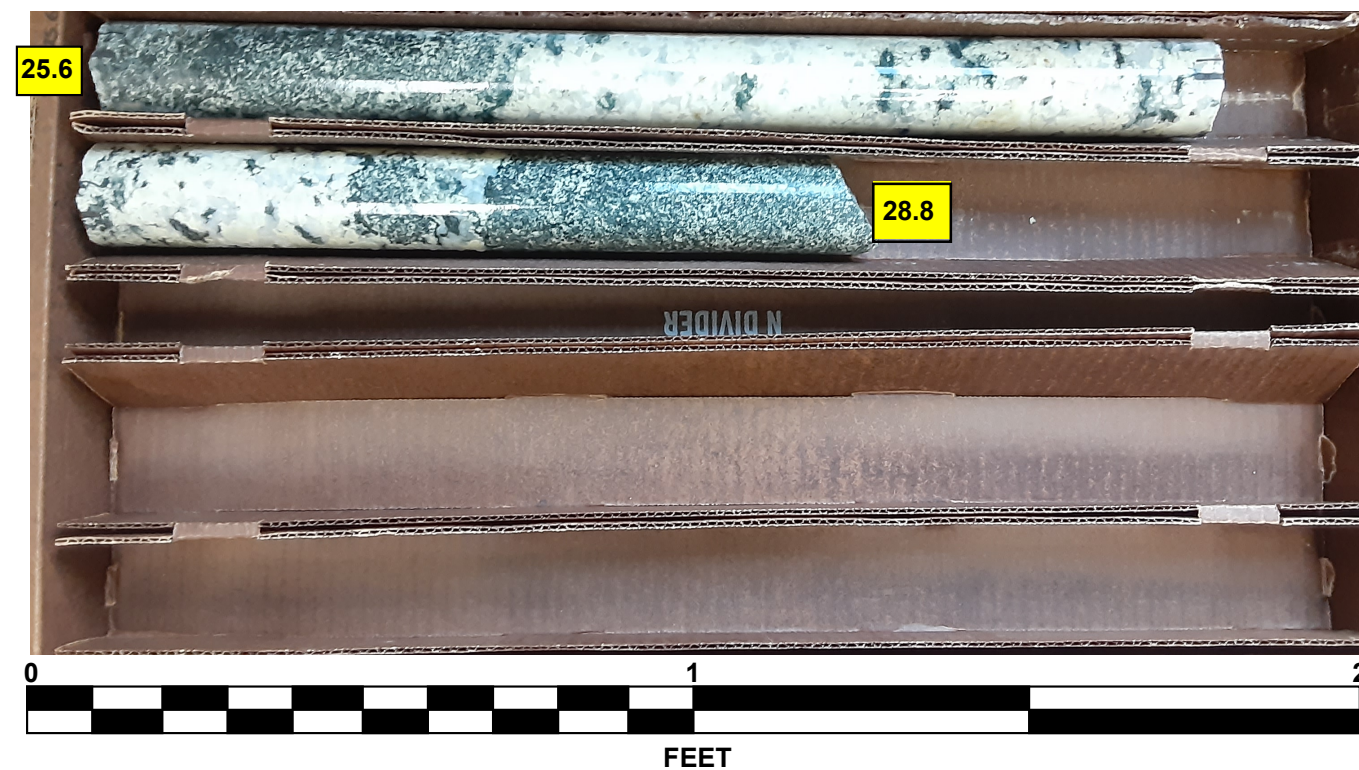


# CORE PHOTOGRAPHS

**LSB\_B1B**  
BOX 1: 15.1 - 25.6 FEET



**LSB\_B1B**  
BOX 2: 25.6 - 28.8 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. 126 OVER TOMS CREEK ON US 52 SB						GROUND WTR (ft)							
BORING NO. LSB_B2A		STATION 24+19		OFFSET 9 ft LT		ALIGNMENT -LSB-							
COLLAR ELEV. 934.0 ft		TOTAL DEPTH 29.3 ft		NORTHING 966,859		EASTING 1,560,823							
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 07/25/22		COMP. DATE 07/26/22		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
935	934.0	0.0	WOH	WOH	WOH						W	934.0 GROUND SURFACE	0.0
930	930.9	3.1	1	1	1						W	931.7 ALLUVIAL orange-brown, sandy SILT (A-4) with trace organics (grass and rootlets) and trace gravel-sized rock fragments (bridge abutment between 1.0'-1.4') brown, fine to coarse SAND (A-1-b) with trace mica and trace gravel-sized rock fragments	2.3
925	925.9	8.1	1	1	8						W		
920	920.9	13.1	60/0.1									920.9 CRYSTALLINE ROCK (Begin Core at 13.1 Feet)	13.1
915												(Granitic Gneiss)	
910											RS-2		
905													
Boring Terminated at Elevation 904.7 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. 126 OVER TOMS CREEK ON US 52 SB						GROUND WTR (ft)				
BORING NO. LSB_B2A		STATION 24+19		OFFSET 9 ft LT		ALIGNMENT -LSB-				
COLLAR ELEV. 934.0 ft		TOTAL DEPTH 29.3 ft		NORTHING 966,859		EASTING 1,560,823				
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 07/25/22		COMP. DATE 07/26/22		SURFACE WATER DEPTH N/A				
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 16.1 ft		STRATA	LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %				
920.8	920.8	13.2	1.1	2:21/1.0	(1.1)	(1.1)			Begin Coring @ 13.2 ft	
920	919.7	14.3	5.0	0:26/0.1	100%	100%			CRYSTALLINE ROCK	
				2:18/1.0	(4.0)	(3.6)			green-gray and white, slight to fresh weathering, moderately hard to hard, moderately close to close fracture spacing, GRANITIC GNEISS	
915	914.7	19.3	5.0	2:41/1.0	80%	72%			GSI: 75-80 (continued)	
				2:43/1.0						
				2:07/1.0						
				1:38/1.0						
910	909.7	24.3	5.0	1:43/1.0	(3.5)	(2.8)			RS-2	
				2:57/1.0	70%	56%				
				3:45/1.0						
				3:05/1.0						
				2:55/1.0						
905	904.7	29.3	5.0	2:41/1.0	(5.0)	(4.5)				
				2:32/1.0	100%	90%				
				2:50/1.0						
				2:16/1.0						
				3:01/1.0						
Boring Terminated at Elevation 904.7 ft in Crystalline Rock (Granitic Gneiss)										29.3
- Drilled Through Existing Bridge Deck										

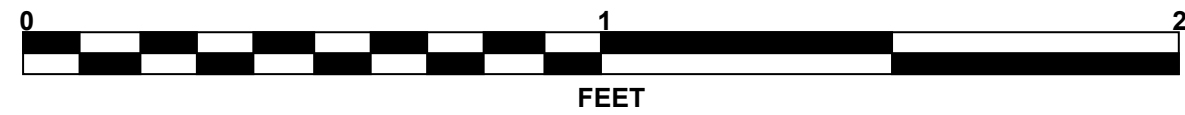
NCDOT BORE SINGLE B5527\_GEO\_BRDG\_LSB\_REV.GPJ NC\_DOT.GDT 3/15/23

NCDOT BORE SINGLE B5527\_GEO\_BRDG\_LSB\_REV.GPJ NC\_DOT.GDT 3/15/23



# CORE PHOTOGRAPHS

**LSB-B2A**  
BOX 1: 13.1 - 23.0 FEET



**LSB\_B2A**  
BOX 2: 23.0 - 29.2 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

# GEOTECHNICAL BORING REPORT

## CORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Gross, A.										
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)									
BORING NO. LSB_B2B		STATION 24+19		OFFSET 17 ft RT		ALIGNMENT -LSB-										
COLLAR ELEV. 934.4 ft		TOTAL DEPTH 30.1 ft		NORTHING 966,864		EASTING 1,560,848										
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X86%11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic										
DRILLER Moseley, M.B.		START DATE 08/03/22		COMP. DATE 08/04/22		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						
935	934.4	0.0	76	3	7									934.4	0.0	GROUND SURFACE
	931.9	2.5	1	1	1									932.9	1.5	ARTIFICIAL FILL brown and gray, silty SAND (A-2-4) with trace organics (wood chunks) and trace boulders
930	927.6	6.8	2	2	2									924.5	9.9	ALLUVIAL red-brown to red-tan, silty SAND (A-2-4) with trace mica
925	922.6	11.8	21	47	53/0.3'									921.9	12.5	SAPROLITE gray, micaceous silty SAND (A-2-4)
920	919.6	14.8	60/0.0'											919.6	14.8	WEATHERED ROCK (Granitic Gneiss)
915														904.3	30.1	CRYSTALLINE ROCK (Begin Core at 15.3 Feet)  (Granitic Gneiss)  REC: 93% RQD: 84% GSI: 80-85
910																Boring Terminated at Elevation 904.3 ft in Crystalline Rock (Granitic Gneiss)  - Drilled Through Existing Bridge Deck
905																

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Gross, A.						
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)					
BORING NO. LSB_B2B		STATION 24+19		OFFSET 17 ft RT		ALIGNMENT -LSB-						
COLLAR ELEV. 934.4 ft		TOTAL DEPTH 30.1 ft		NORTHING 966,864		EASTING 1,560,848						
DRILL RIG/HAMMER EFF./DATE SUM3123 CME-550X86%11/2/2021				DRILL METHOD SPT Core Boring		HAMMER TYPE Automatic						
DRILLER Moseley, M.B.		START DATE 08/03/22		COMP. DATE 08/04/22		SURFACE WATER DEPTH N/A						
CORE SIZE NQ2		TOTAL RUN 14.8 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	ROD (%)		REC. (%)	ROD (%)			
919.1	919.1	15.3	4.8	2:52/1.0 2:58/1.0 2:35/1.0 3:12/1.0 4:35/0.8	(4.2) 88%	(3.4) 71%					Begin Coring @ 15.3 ft	
915	914.3	20.1	5.0	3:30/1.0 2:55/1.0 2:55/1.0 2:51/1.0 3:18/1.0	(4.8) 96%	(4.4) 88%					CRYSTALLINE ROCK gray to gray-green and white, very slight to fresh weathered, hard to very hard, moderately close to wide fracture spacing, GRANITIC GNEISS  (Biotite-rich lense at 24.1'-25.1')  GSI: 80-85 (continued)	
910	909.3	25.1	5.0	2:45/1.0 2:36/1.0 2:55/1.0 2:37/1.0 2:14/1.0	(4.8) 96%	(4.8) 96%						
905	904.3	30.1									Boring Terminated at Elevation 904.3 ft in Crystalline Rock (Granitic Gneiss)  - Drilled Through Existing Bridge Deck	30.1

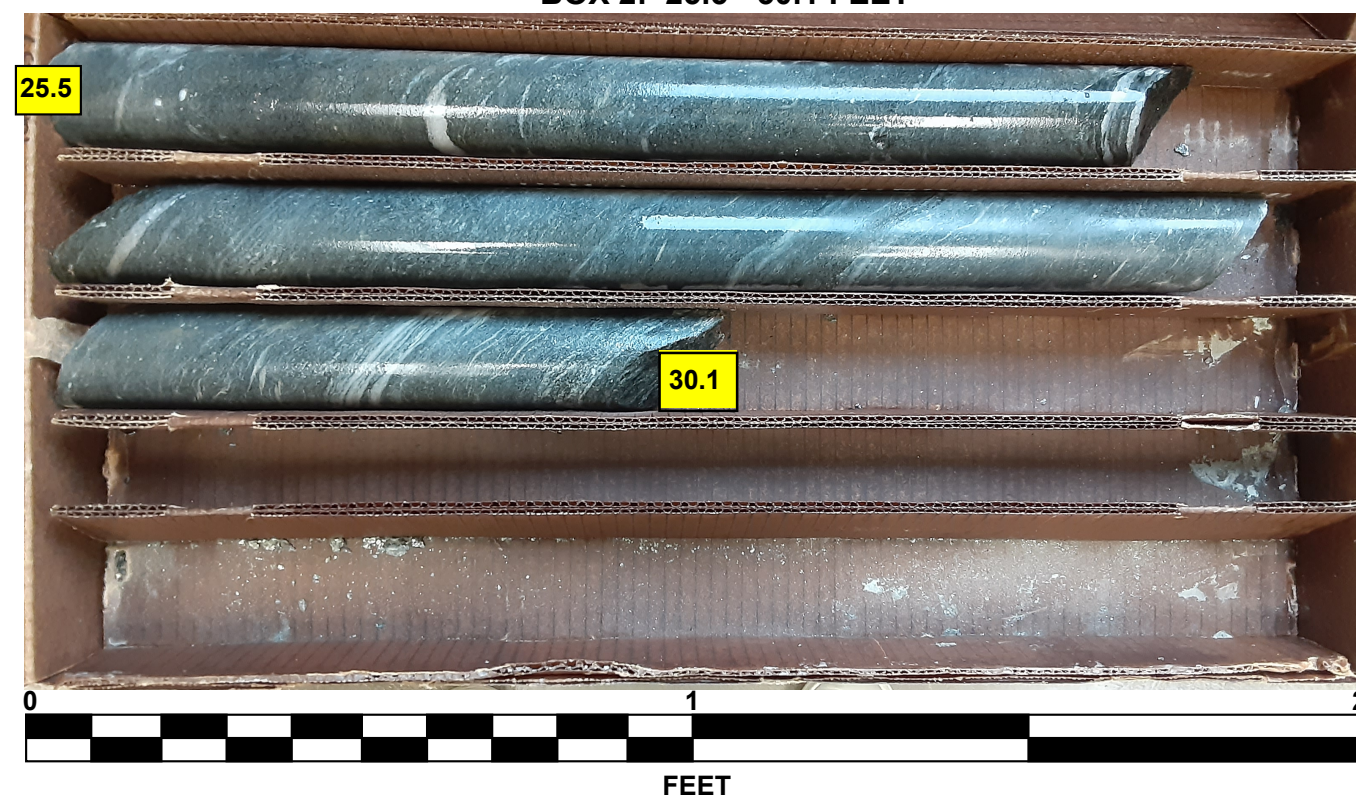


# CORE PHOTOGRAPHS

**LSB\_B2B**  
BOX 1: 15.3 - 25.5 FEET



**LSB\_B2B**  
BOX 2: 25.5 - 30.1 FEET



# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Gross, A.											
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)										
BORING NO. LSB_EB2A		STATION 24+85		OFFSET 8 ft LT		ALIGNMENT -LSB-											
COLLAR ELEV. 955.1 ft		TOTAL DEPTH 43.8 ft		NORTHING 966,924		EASTING 1,560,812											
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 03/02/22		COMP. DATE 03/02/22		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
960																	
955															955.1	GROUND SURFACE	
															954.2	ROADWAY EMBANKMENT ASPHALT & CONCRETE	
950	951.3	3.8	2	2	2							SS-84	M			red-brown, highly micaceous, highly sandy, clayey SILT (A-5)	
945	946.3	8.8	4	4	6							SS-85	D		947.6	red-brown, highly micaceous, slightly plastic, highly sandy, silty CLAY (A-7-5)	
940	941.3	13.8	3	4	5							SS-86	D		942.6	brown-tan, sandy SILT (A-4) with little clay and trace mica	
935	936.3	18.8	8	7	5								D		937.6	ALLUVIAL gray and brown, silty SAND (A-2-4) with little clay, trace gravel and cobbles (sub-rounded)	
930	931.3	23.8	3	3	3								D				
925	926.3	28.8	3	2	10								Sat.				
920	921.3	33.8	16	30	70/0.4										100/0.9	WEATHERED ROCK (Granitic Gneiss)	
915	916.3	38.8	50	50/0.1											100/0.6		
	911.3	43.8	60/0.0												60/0.0	911.6	CRYSTALLINE ROCK (Granitic Gneiss)
															911.3		Boring Terminated with Standard Penetration Test Refusal at Elevation 911.3 ft in Crystalline Rock (Granitic Gneiss)
																	- Topsoil Thickness = N/A
																	- Boring drilled through the existing roadway

NCDOT CORE DOUBLE B5527\_GEO\_BRDG\_LSB.GPJ NC\_DOT.GDT 8/18/22

WBS 55027.1.FS1		TIP B-5527		COUNTY SURRY		GEOLOGIST Fischer, H.											
SITE DESCRIPTION BRIDGE NO. 126 OVER TOMS CREEK ON US 52 SB							GROUND WTR (ft)										
BORING NO. LSB_EB2B		STATION 24+85		OFFSET 70 ft RT		ALIGNMENT -LSB-											
COLLAR ELEV. 936.7 ft		TOTAL DEPTH 27.5 ft		NORTHING 966,939		EASTING 1,560,888											
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 02/22/22		COMP. DATE 02/22/22		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
940																	
															936.7	GROUND SURFACE	
935	936.7	0.0	2	4	7											ALLUVIAL tan, silty SAND (A-2-4) with trace mica	
930	932.7	4.0	2	3	3												
925	927.7	9.0	2	3	7												
920	922.7	14.0	23	23	18											924.4	SAPROLITE tan, brown, and white, silty SAND (A-2-4) with trace gravel-sized crystalline rock fragments and some to little mica
915	917.7	19.0	10	14	39												
910	912.7	24.0	22	20	20												
	909.2	27.5	60/0.0													60/0.0	CRYSTALLINE ROCK (Granitic Gneiss)
																	Boring Terminated with Standard Penetration Test Refusal at Elevation 909.2 ft on Crystalline Rock (Granitic Gneiss)
																	- Topsoil Thickness = 0.0 Feet
																	- Boring offset from originally proposed location due to boulders.

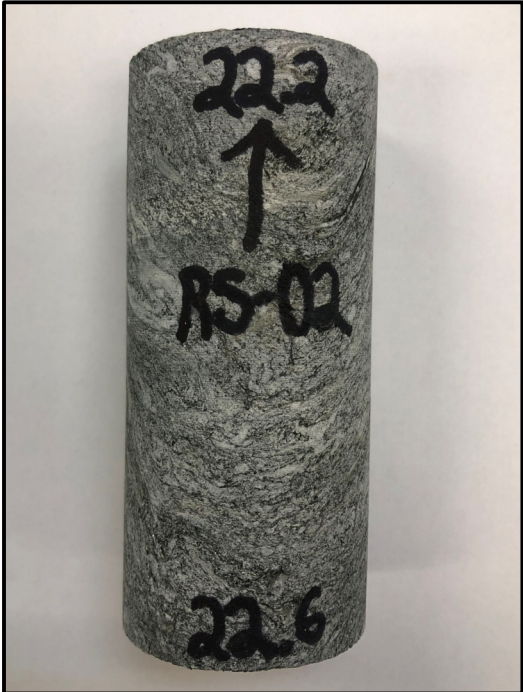


<b>Project No.:</b> 55027	<b>Tested By:</b> C. Sullivan	<b>Test Date:</b> 2022-15-09
<b>Project Name:</b> B-5527		
<b>Boring ID:</b> LSB_B2A	<b>Sample ID:</b> RS-02	<b>Sample Depth:</b> 22.2-22.6 ft
<b>Sample Description:</b> Gray Schist		

<u>Initial Specimen Measurements</u>	
Diameter: 1.980 in	L/D: 2.24
Area: 3.079 in <sup>2</sup>	
Length: 4.43 in	
Weight: 604.1 g	
Unit Weight: 168.7 pcf	

**LOAD TEST DATA**

Deflection Reading (in)	Load Reading (lb)	Strain (%)	Stress (psi)
0.000	0	0.000	0
0.005	1510	0.113	490
0.010	2940	0.226	950
0.015	6070	0.339	1970
0.020	10800	0.451	3510
0.023	14810	0.519	4810



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.