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### STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM

PROJECT DESCRIPTION BRIDGE 131 ON US 220 BYPASS OVER NORFOLK SOUTHERN RAILROAD

STATE	STATE PROJECT REFERENCE NO.	SHEET NQ.	TOTAL SHEETS
N.C.	B-5352	1	18

### CAUTION NOTICE

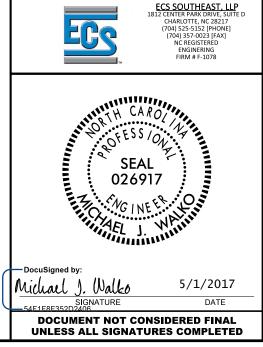
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1991 707-680. 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 BORNICS 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 DECREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOLL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOLL 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 NON CLIMATOR THEORY AND FRELIMINARY 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 OPHIONO OF THE DEPARTMENT AS TO THE TYPE AND TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE REVIENT OF THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONTENS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. 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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# 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				
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.				
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	UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.				
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.				
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING				
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.				
	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - 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				
GENERAL         GRANULAR MATERIALS         SILT-CLAY MATERIALS         ORGANIC MATERIALS           CLASS.         ( ≤ 35%, PASSING *200)         ( > 35%, PASSING *200)         ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.				
CROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	EINE TO COADE CRAIN METAMORPHIC AND NON-COASTAL DIAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.				
CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	POCK (NCP)	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM				
SYMBOL COCCORCOOC	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED				
X PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SANDSTONE, CEMENTED SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.				
*10 50 MX *40 30 MX 50 MX 51 MN GRANULAR CLAY MUCK, SOILS COULC PEAT	PERCENTAGE OF MATERIAL	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT				
*200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN	ORGANIC MATERIAL CRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE				
MATERIAL	TRACE OF ORGANIC MATTER         2         -         3/.         3         -         5/.         TRACE         1         -         10%.           LITTLE ORGANIC MATTER         3         -         5/.         5         -         12%.         LITTLE         10         -         20%.	HAMMER IF CRYSTALLINE.	HORIZONTAL.				
PASSING *40	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE				
PI 6 MX NP 10 MX 11 MN 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE CONCLUSION	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.				
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.				
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI,) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.				
OF MAJOR GRAVEL, AND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM				
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABL	$\nabla PW$ PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD,) 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	PARENT MATERIAL.				
AS SUBURAUE POUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.				
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.				
	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.				
PRIMARY SOIL TYPE COMPACINESS UR PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO				
		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL, IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.				
GENERALLY VERY LOOSE < 4 CRANNER LOOSE 4 TO 10	SOIL SYMBOL OF THAT TEST BORING SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.				
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50	ARTIFICIAL FILL (AF) OTHER HUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.				
(NON-COHESIVE) VERY DENSE > 50		VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE				
VERY SOFT < 2 < 0.25	□ INFERRED SOIL BOUNDARY CORE BORING ● SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.				
GENERALLY         SOFT         2 TO 4         0.25 TO 0.5           SILT-CLAY         MEDIUM STIFF         4 TO 8         0.5 TO 1.0		COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.				
MATERIAL STIFF 8 TO 15 1 TO 2		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - 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				
(COHESIVE)         VERY STIFF         15 TO 30         2 TO 4           HARD         > 30         > 4	TTTTTT ALLUVIAL SOIL BOUNDARY A FIELOWETER OF SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.				
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.				
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION -	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND				
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053		HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.				
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT				
(BLDR,) (COB,) (GR,) (CSE, SD,) (F SD,) (SL,) (CL,)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.				
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF				
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	A 140 LB.HAMMER FALLING 30 INCHES REOUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL				
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.				
SOIL MOISTURE SCALE FIELD MOISTURE (ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN BE GROVED 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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.				
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK DUALITY DESIGNATION (SROD) - A MEASURE OF ROCK DUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY				
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	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.				
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.				
RANGE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: "GPS" B462I-2				
	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	N: 981065.925 E: 1726273.168				
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT           DRILL UNITS:         ADVANCING TOOLS:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 711.94 FEET				
SL SHRINKAGE LIMIT		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	NOTES:				
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	NORTHINGS AND EASTINGS OBTAINED USING AVAILABLE PLANS AND				
	↓         CME-55         ↓         B CONTINUOUS FLIGHT HOUGH         CORE SIZE:           ↓         B* HOLLOW AUGERS         □         B         □         H	THINLY LAMINATED < 0.008 FEET	THE EXISTING BRIDGE FOR REFERENCE.				
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.					
PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         0-5         VERY LOW	CME-550 HARD FACED FINGER BITS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;					
SLIGHTLY PLASTIC 6-15 SLIGHT		GENILE BLOW BY HAMMER DISINIEGRAIES SAMPLE.					
MODERATELY PLASTIC         16-25         MEDIUM           HIGHLY PLASTIC         26 OR MORE         HIGH		MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: BREAKS EASILY WHEN HIT WITH HAMMER.					
COLOR		CRAINS ARE DISCIPLET TO SERADATE WITH STEEL PROPE.					
		INDURATED DIFFICULT TO BREAK WITH HAMMER.					
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.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE;					
		SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14				

# PROJECT REPERENCE NO.



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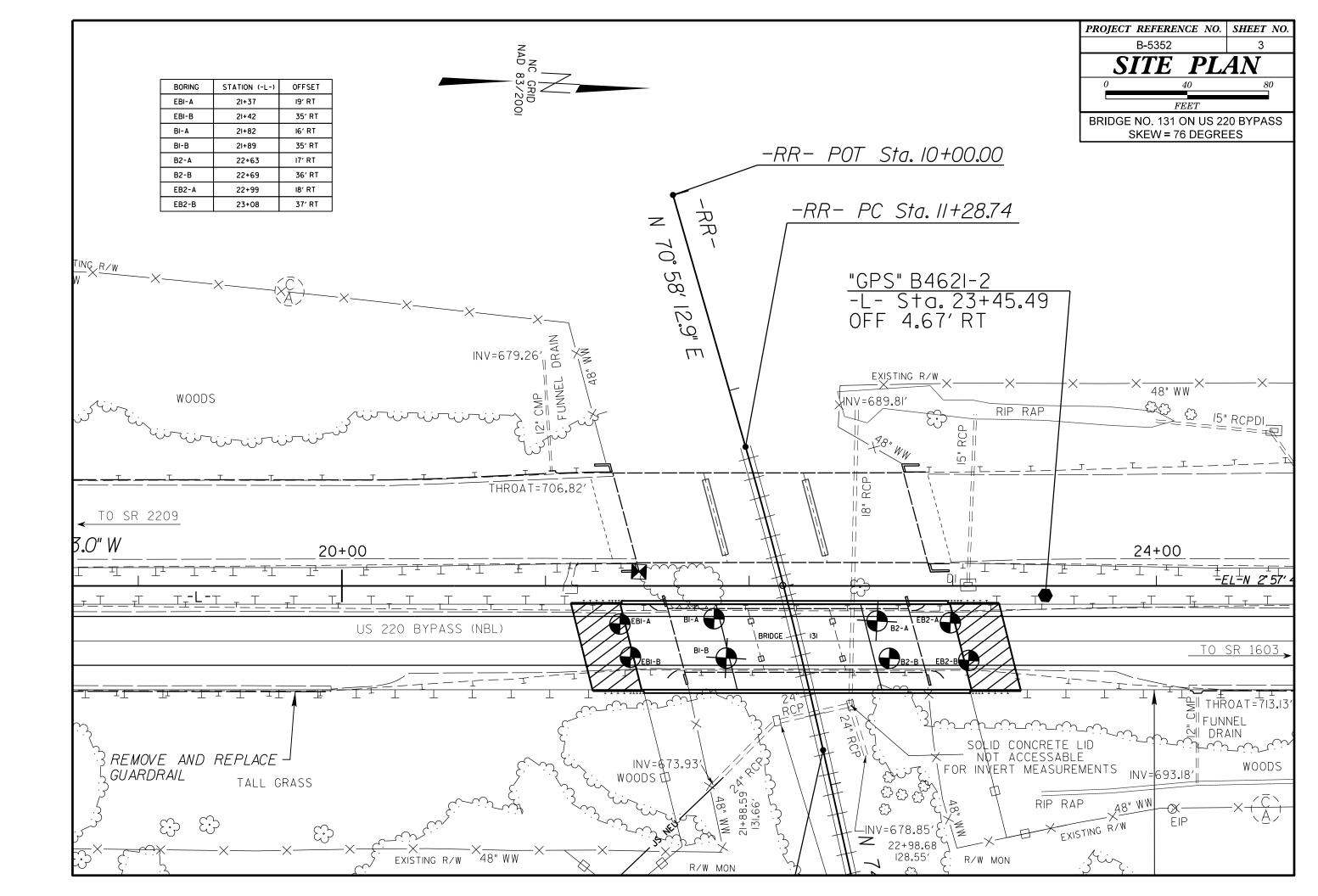
## NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

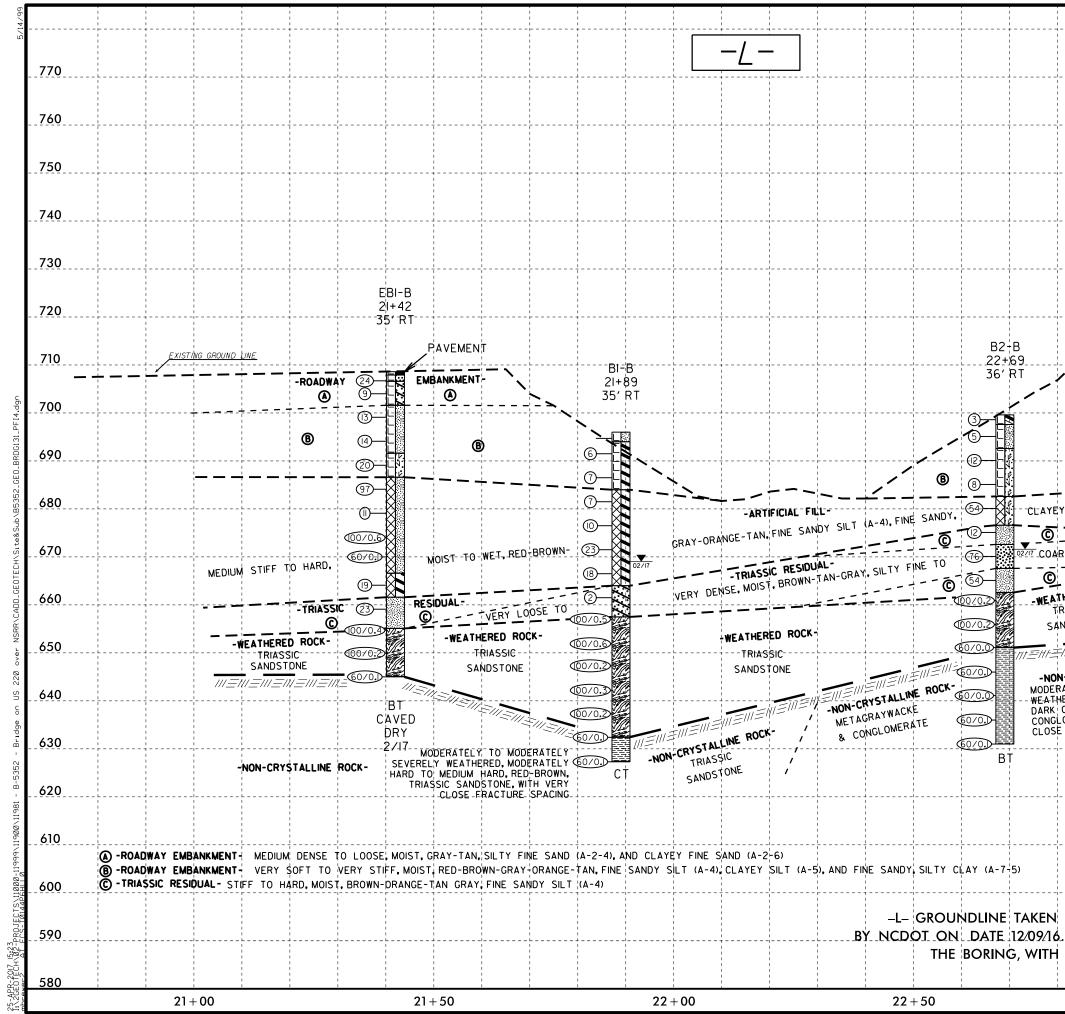
SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4–1 — Determination of GSI for Jointed	Rock Mass (Marı	nos and Hoek, 2000)			AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tector
GEOLOGICAL STRENGTH INDEX (GSI)FOR JOINTED ROCKS (Hoek and Marinos,2000)	ଓ ଅ ଅ	р е	N G Q	0 0 0 0	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 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.	0D igh, fresh unweathered surf	s s der a	ed surfaces	<b>VERY POOR</b> Slickensided, highly weathered surfa with soft clay coatings or fillings	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.
STRUCTURE	DEC	REASING SURFACE	E 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.
BLOCKY - well interlocked un- disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets		70 60			B. Sand- stone with thin inter-
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		50			layers of sultstone
formed by many intersecting		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> .
discontinuity sets. Persistence of bedding planes or schistosity 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
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	N/A	N/A		10	Mains deformation after tectonic disturbance

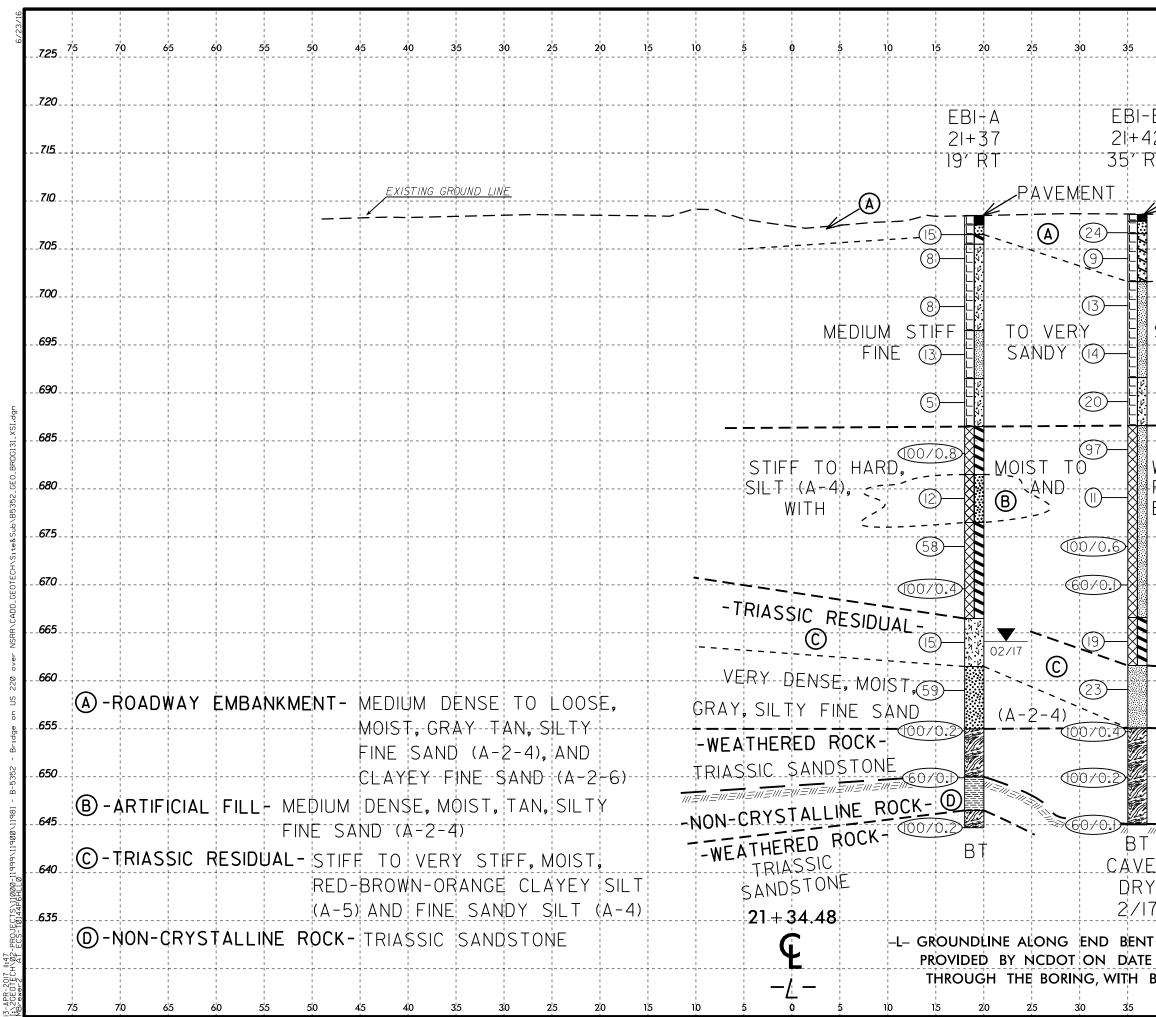
SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)	onically Defo
VERY GOOD - Vern Rouch fresh	ormed
unweathered surfaces	Heterog
6000 - Rough, slightly weathered	B
surfaces	B-5
EATD - Smooth moders =+0]:	35
weathered and altered surfaces	2
	nos ar
slickensided surtaces with compact coatings or fillings with angular fragments	
<b>VERY POOR -</b> Very smooth, slicken-	3HEET 7
sıded or hıghly weathered surfaces wıth soft clay coatıngs or fillıngs	4
	-

7Ò 60 E. Weak siltstone or clayey shale with 50 С /в /E sandstone 40 layers formed, 30 Vfaulted, ale or siltstone leformed forming an oc ture 20 formed silty orming a with pockets ers of 10 nsformed eces.

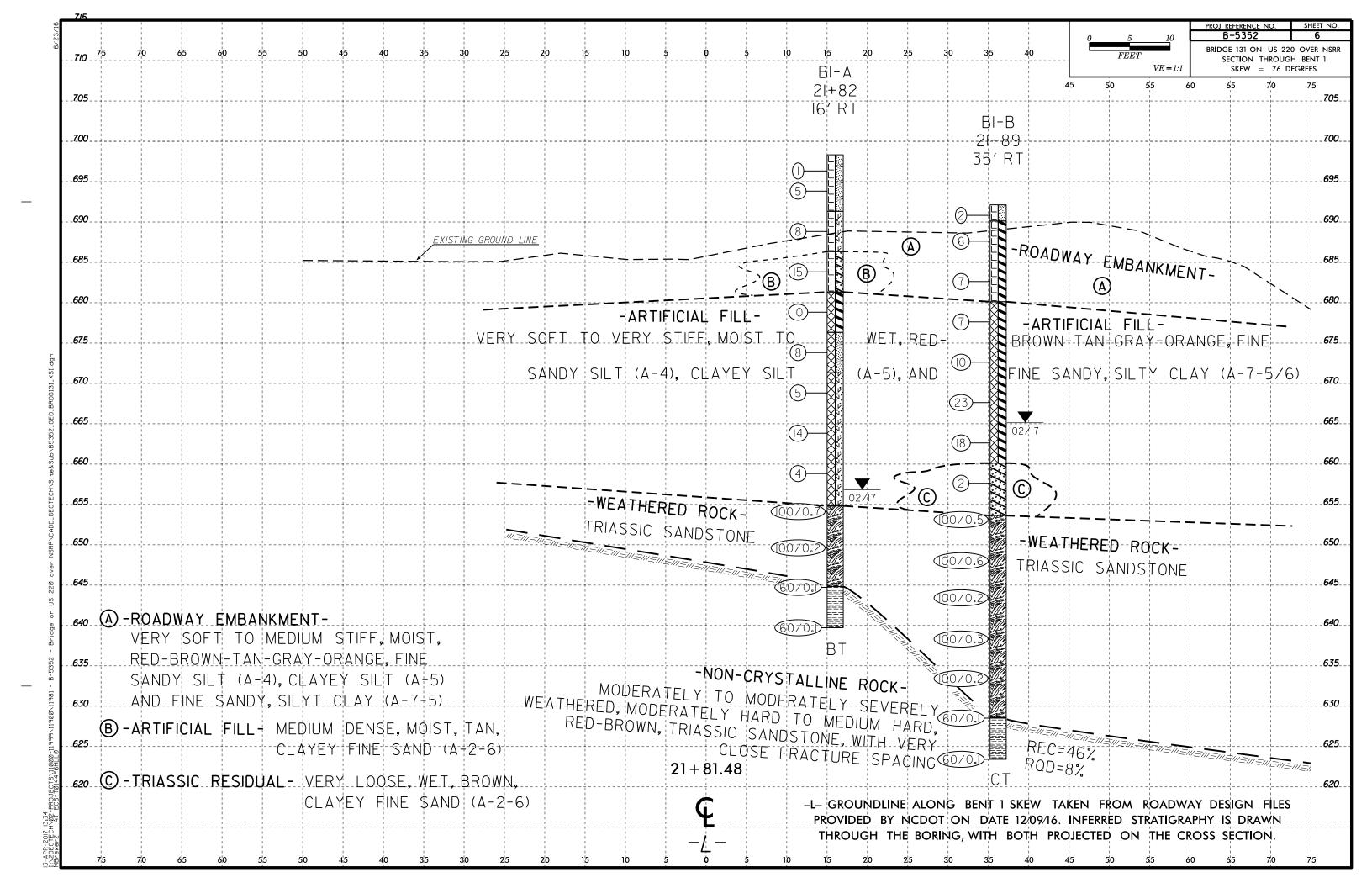


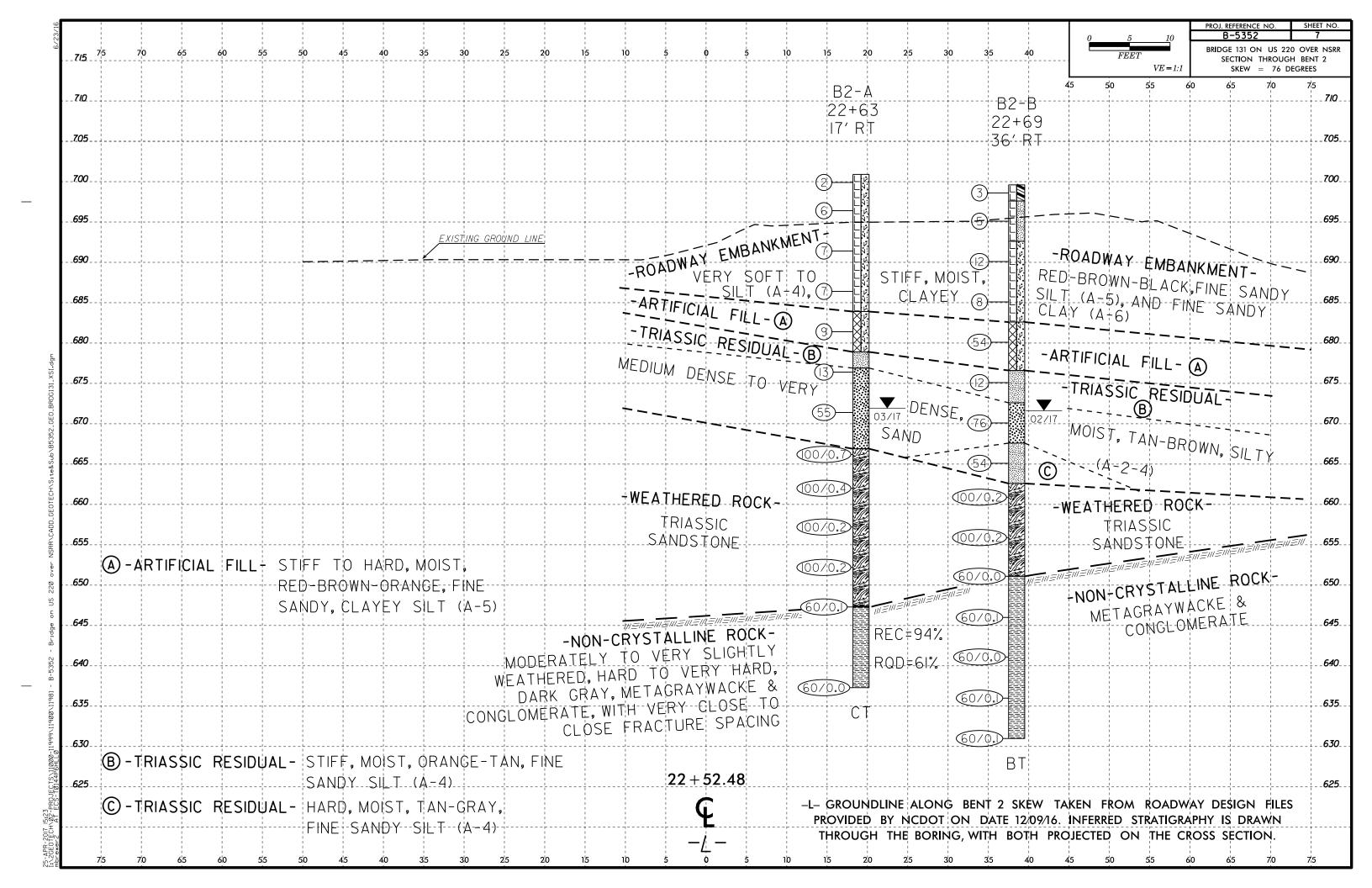


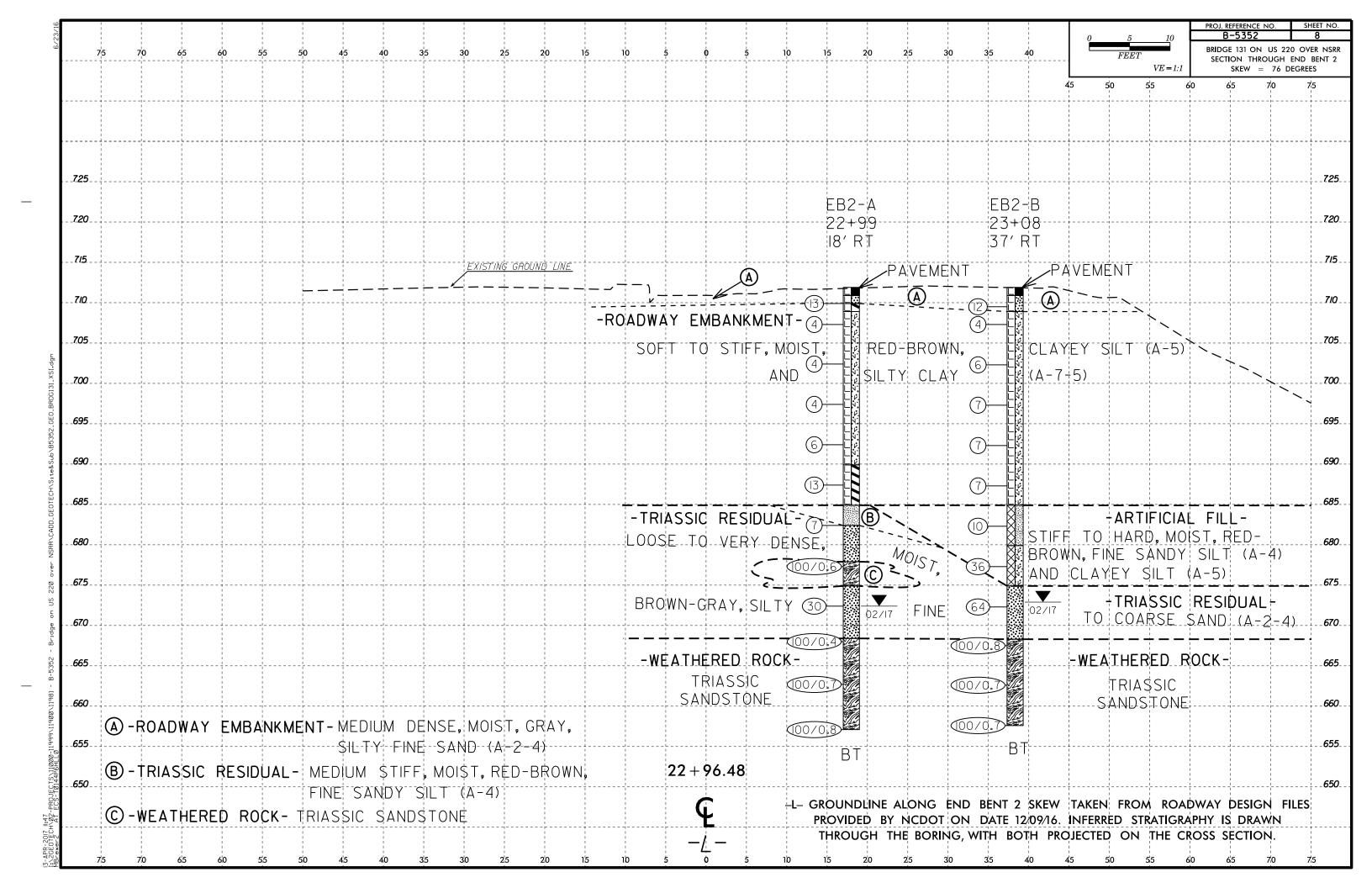
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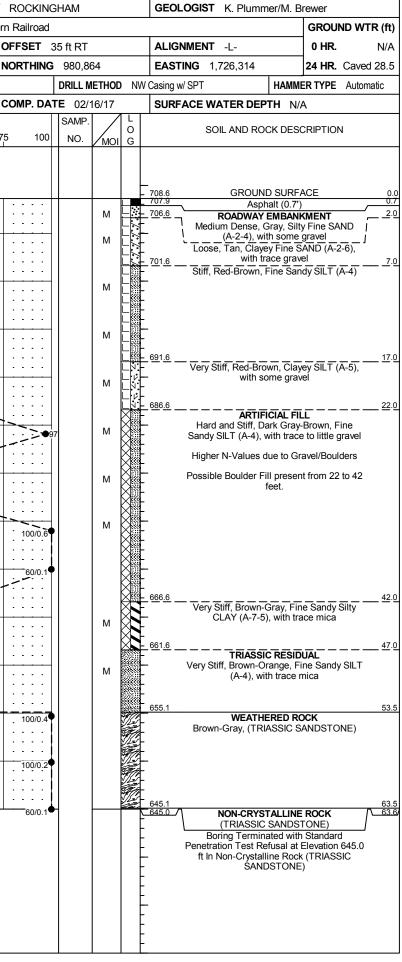
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SITE DESCRIPTION       Bridge 131 on US 220 Bypass over Norfolk Southern Rainced       GROUND WTR (th)       SITE DESCRIPTION       Bridge 131 on US 220 Bypass over Norfolk Southern         BORING NO.       EEL-A       STATION 21+37       OFFSET 19 ft RT       ALIGNMENT -L.       0 HR.       4.06         COLLAR ELEV. 708 5 ft       TOTAL DEPTH 63.8 ft       NORTHING 980,853       EASTING 1.725.283       24 HR.       4.44         DRILL ROHAMMER EFF.DATE       F362445 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F362445 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)         DRILL ROHAMER EFF.DATE F362445 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)         DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)         DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)         DRILL ROHAMER EFF.DATE F36245 CME5 80% (2/H2016)       BRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)         TOTO TA DEPTH BL       0/200 TME F362 80% (2/H2016)       BRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)       DRILL ROHAMER EFF.DATE F36245 CME55 80% (2/H2016)									1							1									
DOUBLINE CD1-A         DATION 21-07         OFFSET 1918 ET         ALLONMENT 4.         PMR. 40.2         EXTMON 21-02												GEOLOGIST K. Plummer													
DOLLAGELEV. 70:5.1         TOTAL DEPTH. 15:6.1         NOTHING: 50:0.51         DOLLAGELEV. 70:6.1         TOTAL DEPTH. 15:6.1         NOTHING: 50:0.55           DBLLBAMMERGE FLAND         DBMLBER D. TOPIC         DBMLBER					ge 131				folk South	1									-	e 131				folk South	-
DBL         DBL <thdl< th=""> <thdbl< th=""> <thdbl< th=""></thdbl<></thdbl<></thdl<>	BOR	NG NO.	. EB1-/	A		S	TATION 2	21+37		OFFSET	19 ft RT			ALIGNMENT -L-	<b>0 HR.</b> 40.6	BOR	ring no.	EB1-	В		ST	TATION 2	1+42		0
DBALLER         DUPOR         START DATE         DO2007         DUPOR DATE         DUPOR         COUNT         DUPOR         DUPOR <th>COLI</th> <th>LAR EL</th> <th><b>EV.</b> 70</th> <th>)8.5 ft</th> <th></th> <th>T (</th> <th>OTAL DEP</th> <th><b>TH</b> 63.8 f</th> <th>ť</th> <th>NORTHING</th> <th><b>3</b> 980,8</th> <th>58</th> <th></th> <th>EASTING 1,726,298</th> <th colspan="2"><b>24 HR.</b> 44.4</th> <th colspan="4">COLLAR ELEV. 708.6 ft</th> <th>т</th> <th colspan="3">TOTAL DEPTH 63.6 ft</th> <th>N</th>	COLI	LAR EL	<b>EV.</b> 70	)8.5 ft		T (	OTAL DEP	<b>TH</b> 63.8 f	ť	NORTHING	<b>3</b> 980,8	58		EASTING 1,726,298	<b>24 HR.</b> 44.4		COLLAR ELEV. 708.6 ft				т	TOTAL DEPTH 63.6 ft			N
Line         Party         BLOW COUNT         BLOWS FREE FOOT         SMP         Value         Value         SM	DRILL	RIG/HAN	MMER EF	F./DATI	E F&F	3495 (	CME-55 80%	02/16/2016		DRILL METHOD N			) NW	Casing w/ SPT HAI	IMER TYPE Automatic						R3495 C	495 CME-55 80% 02/16/2016			
Im         Im         Im         Date         Case         Case <thcase< th="">         Case         Case<!--</th--><th>DRIL</th><th>LER D</th><th>). Tignor</th><th></th><th></th><th>S</th><th>TART DAT</th><th>E 02/23/1</th><th>17</th><th colspan="3"></th><th></th><th>SURFACE WATER DEPTH</th><th>N/A</th><th colspan="5"></th><th>ST</th><th colspan="4">START DATE 02/15/17</th></thcase<>	DRIL	LER D	). Tignor			S	TART DAT	E 02/23/1	17					SURFACE WATER DEPTH	N/A						ST	START DATE 02/15/17			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ELEV	DRIVE	DEPTH	BLC	W CO	UNT		BLOWS	PER FOO	T	SAMP		L			ELEV	/ DRIVE	DEPTH	BLO	W CO	UNT		BLOWS	PER FOO	T
The S         GROUND SURFACE         OF           705         700         <	(ft)		(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	мо				(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
The S         GROUND SURFACE         OF           705         700         <																									
The S         GROUND SURFACE         OF           705         700         <	710															710									
20       1/2       3       20       1/2       3       20       1/2			ŧ											708.5 GROUND SU	RFACE 0.0	110		ŧ							
705       706       7	1	707.5	1.0	20	12	3						м					707.7	0.9	29	18	6				:
4       4       4       5       4       5       4       5       4         200       700       45       2       3       6       7<	705	705.0	3.5				<b>1</b> 5							Medium Dense, Gray,	Silty Fine Sand $\int -\frac{3.0}{2}$	1	705.0	3.6							•
700       700       65       2       3       5       70			Ŧ	4	4	4	. • 8 • •					м	LŀF					ł	4	5	4	· 🏟 - ·			•
0.00       0.00			Ŧ				: : : :							Medium stiff, Gray-Red-E	rown, Clayey SILT			Ŧ							:
698       696       696       697       697       698       697       698       6	700	700.0	8.5	2	2	5	- I   <del>I</del>				41			(A-5), with trace wo	od fragments	700	700.1	8.5	7	6	7				
995       600.0       13.5       -			t	2	3	5	- <b>•</b> 8			·   · · · · ·		M						t	( <sup>'</sup>	U	'	· ·••13·			:
0.00       0.00       13.3       3       6       7       0.00			ł				:\::						<u>Lit</u>	696.5				ŧ				· · · · ·			:
690       600.0       115.5       2       3       2       1 <td< td=""><td>695</td><td>695.0</td><td>13.5</td><td>3</td><td>6</td><td>7</td><td></td><td></td><td></td><td></td><td></td><td>м</td><td>L -</td><td>Suil, Red-brown, Filles</td><td>Sanuy SILT (A-4)</td><td>695</td><td>695.1</td><td>13.5</td><td>4</td><td>5</td><td>9</td><td></td><td></td><td></td><td></td></td<>	695	695.0	13.5	3	6	7						м	L -	Suil, Red-brown, Filles	Sanuy SILT (A-4)	695	695.1	13.5	4	5	9				
680       680       7 <td></td> <td></td> <td>Ŧ</td> <td></td> <td>ŧ</td> <td></td> <td></td> <td></td> <td><math>1 \cdot \cdot \bullet^{14}</math></td> <td></td> <td></td> <td>:  </td>			Ŧ															ŧ				$1 \cdot \cdot \bullet^{14}$			:
000       0011       10.5       2       3       2         685       685.0       22.5       5       7       930.3       10002         680       680.0       22.5       7       930.3       10002       10002         680       680.0       22.5       7       930.3       10002       10002         680       680.0       22.5       10002       10002       10002       10002         680       680.0       22.5       10002       10002       10002       10002         675       675.0       33.5       8       22       38       10002       10002         670       670.0       33.5       8       22       38       10002       10002         685       685.0       43.5       4       7       8       10002       10002       10002       10002         685       685.0       43.5       4       7       8       10002       10002       10002       10002         685       685.0       53.5       00002       10002       10002       10002       10002       10002       10002         685       685.0       53.5       00002       1000	<u></u>		‡				:/:::							691.5 Medium Stiff. Brown, C	avev SILT (A-5).			‡							:
695       695       695       7       930.3       10075         690       690.0       22.5       7       930.3       10075         690       690.0       22.5       20       8       4       10075         690       690.0       22.5       20       8       4       10075         675       675.0       33.5       8       22       36       36.5       9       2         670       670.0       33.5       8       22       36       100000       100000       100000       10	690	690.0	$\frac{18.5}{4}$	2	3	2	5				11	м				690	690.1	$\frac{18.5}{1}$	4	5	15		20 • • • •		-
685       686.0       22.5       7       7 390.3			ł				. :							696 F	22.0			ł					<b>````</b> `		-
65       7       930.3	685	685.0	T 23 5						+						FILL	685	685 1	T 23.5						[	
680       680.0       28.5       28.4 <ul> <li></li></ul>		000.0	+ 20.0	5	7	93/0.3						м		Hard, Tan, Silty CLAY ( aravel	A-7-6), with little			<u></u>	21	52	45				-
680       680       78.5       20       8       4       62       60.1       22.5       9       2       61.1       62       61.1       22.5       9       2       61.1       62       61.1       22.5       9       2       61.1       22.5       9       2       61.1       62       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       9       2       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5       61.1       22.5			‡							·	T I				Crovel/Pouldore 27.0			‡							÷+`
675       675.0       33.5       8       22       36         676       670.0       33.5       8       22       36         670       670.0       38.5       10000.4       1000.4       1000.4         665       665.0       43.5       7       8       15       1000.4         665       665.0       43.5       6       9       10         666       660.0       48.5       8       9       50         665       655.0       5.3.5       1000.2       10       665       665.1       43.5       6       9       10         665       665.0       43.5       600.1       665       665.1       43.5       9       10	680	680.0	28.5										X E	Medium Dense, Tan,	Silty Fine Sand		680.1	28.5						<b>-:</b>	-
675       675       675       675       675       675       675       675       1       33.5       9       74       26/0.7       20.0       24.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       33.5       9       74       26/0.7       36.5       60/0.7       655       655.1       63.5       60/0.7       655       655.1       63.5       60/0.7       655       655.1       63.5       60/0.7       655       655.1       655.1       655.1			+	20	8	4	· •12			.		м	8-	(A-2-4), with so	ne gravel			+	6	9	2	• <b>●</b> 11	$\begin{bmatrix} \cdots \end{bmatrix}$		•
675       675.0       33.5       8       22       36         670       670.0       38.5       9       74       280.1         670       670.0       38.5       9       74       280.1         670       670.0       38.5       9       74       280.1         670       670.0       38.5       9       74       280.1         670       670.0       38.5       9       74       280.1         680       660.0       43.5       9       74       280.1         680       660.0       48.5       9       10       665       665.1       43.5       9       10         680       660.0       48.5       9       50       53.5       600.1       48.5       9       10         680       660.1       48.5       9       50       53.5       665.1       53.5       660.1       48.5       9       10         685       655.0       53.5       100/0.2       100/0.2       100/0.2       655       655.1       53.5       100/0.2         645       645.1       63.5       100/0.2       650.1       53.5       100/0.2       100/0.2       10			Ŧ										X E					Ŧ							:
670       6	675	675.0	33.5		22	26		_ · · ```			41			Hard, Gray, Silty CLAY	(A-7-5), with high	675	675.1	33.5	- a	74	26/0.1			· · · · ·	<u>:</u> +:
670       670       <	1		t	°	22	30						W						t		/-	20/0.1				:
670       670.0       38.5       100/0.4         665       665.0       43.5			ł											Possible Boulder Fil	present from			ŧ							:
665       665.0       43.5       4       7       8       9       50       51       <	670	670.0	38.5	100/0.4				<u> </u>			•	w	87-	30.5-42.	0	670	670.1	38.5	60/0.1				<u> </u>	+	+
665       665.0       43.5			Ŧ															Ŧ						· · · ·	+
003       005       0435       4       7       8         660       660.0       48.5       6       9       10         660       660.0       48.5       6       9       10         655       655.0       53.5       100/0.2             655       655.0       53.5       100/0.2               660       660.0       58.5       60/0.1	CCE		‡				::;; <del>:</del>	•+====		┊┥÷÷┾	٩l				SIDUAL 42.0	1	005.4	‡							:
660       660.0       48.5       8       9       50       53.5       661.5       Very Dense, Gray, Silfy Fine SAND (A-2.4), with trace mica       660       660.1       48.5       4       5       18         655       655.0       53.5       100/0.2       100/0.2       100/0.2       100/0.2       655.0       53.5       655.0       655.0       53.5       655.0       53.5       655.0       53.5       100/0.4       4       5       18       100/0.4       100/0.2       100/0.4       100	000	665.0	$\frac{143.5}{1}$	4	7	8					11					600	665.1	43.5	6	9	10	· · • •			+
660       660.0       48.5			ł									M	N V	664 F	47.0			ł				· · · · ·			-
655       655.0       53.5       100/0.2       100/0.2       100/0.2       100/0.2         650       650.0       58.5       60/0.1       655.0       58.5       655.0       655.0       58.5       100/0.2       100	660	660.0	T 185											Very Dense, Gray, Silty F	ine SAND (A-2-4),		660.1	T 48.5							:
655       655.0       53.5       100/0.2         650       650.0       58.5       60/0.1         650       650.0       58.5       60/0.1         645       644.9       63.6       63.6         100/0.2       100/0.2       100/0.2         645       644.9       63.6         100/0.2       100/0.2         100/0.2       100/0.2         100/0.2       100/0.2         100/0.2       100/0.2         100/0.2       100/0.2         100/0.2       100/0.2         100/0.2       100/0.2			+ +0.0	8	9	50			●59			м	F	with trace r	nica			Ŧ	4	5	18		23		
655       655.0       53.5       00/0.2         650       650.0       58.5         650       650.0       58.5         650       660.0         645       644.9         645       644.9         645       644.7         100/0.2       100/0.2         646.5       WEATHERED ROCK         644.7       (TRIASSIC SANDSTONE)         645       645.1       63.5         60/0.1       00/0.2			‡							·   · · · · ·								‡							:
650       650.0       58.5         650       60/0.1         645       644.9       63.6         100/0.2       100/0.2	655	655.0	53.5										-	655.0	53.5	655	655.1	53.5	100/0 4			· · · ·	I · · · ·	<u> </u>	<u>.</u>
650       650.0       58.5       60/0.1			t	100/0.2	1					•   • • • •	T I							t	100/0.4						:
650       650.0       58.5       650.0       58.5       650.0       58.5         645       644.9       63.6       644.7       (TRIASSIC SANDSTONE)       645       645.1       63.8         100/0.2       100/0.2       100/0.2       100/0.2       100/0.2       645       644.7       (TRIASSIC SANDSTONE)       645       645.1       63.8			ł								!		4		,			ł							
645     644.9     63.6       100/0.2     100/0.2         100/0.2	650	650.0	58.5	60/0 1	-			+ • • • •			<b>↓</b>		974			650	650.1	58.5	100/0.2				+ • • • •		
645     644.9     63.6     WEATHERED ROCK       100/0.2     100/0.2     100/0.2         645     644.7     (TRIASSIC SANDSTONE)     63.8       Boring Terminated at Elevation 644.7 ft In Weathered Rock (TRIASSIC)     645     645.1     63.5			‡								!							‡							:
644.9         63.6         644.7         (TRIASSIC SANDSTONE)         63.8           100/0.2         100/0.2         100/0.2         100/0.2         644.7         (TRIASSIC SANDSTONE)         63.8           Weathered Rock (TRIASSIC         Weathered Rock (TRIASSIC         100/0.2         100/0.2         100/0.2	o		‡										977		<u>воск</u> <u>62.0</u>			‡							:
T       T Weathered Rock (TRIASSIC     T       T	645	644.9-	63.6	100/0.2	-					100/0.2	<b>∳</b>			644.7 (TRIASSIC SAN	DSTONE) <u>63.8</u>	645	645.1	63.5	60/0.1						
SANDSTONE)			Ŧ		1								-	Weathered Rock	(TRIASSIC			Ŧ							
			Ŧ										F	SANDSTC	NE)			Ŧ							
		-	Ŧ														-	Ŧ							
			‡															‡							
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			<u>t</u>															t							



WBS	46066	5.1.1			Т	ΊP	B-5352		
			Bride	ie 131			220 Bypas	s over Nor	
			Dridg				ATION 2'		
	ING NO.				_				
-	LAR ELE	-	-				TAL DEPT		t
				E F&R	3495	CI	ME-55 80% (	02/16/2016	
DRIL	LER D	. Tignor				T.		02/24/1	7
	DRIVE ELEV	DEPTH	·	W COL		_			PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	+	0 2	25	50
705		Ļ							
	-	ŧ							
	701.2	1.0	WOH	WOH	1	-			
700	698.7 -	- 3.5		WOII			N		<u> </u>
			1	2	3		<b>b</b> 5 <sup></sup>		
95	-	Ŧ							
	693.7 -	8.5		_			.1		
	-	‡	2	4	4				
690	-	‡					<u>  · ∖ · ·</u>		
	688.7 -	- 13.5	8	8	7	-			
	-	ł							
685		F					<i> </i>		+ • • • •
	683.7 -	- 18.5 -	3	3	7		· · · ·		
680	-	+					- F		
000	678.7 -	- 23.5					<u>.</u>		
			2	3	5		• <u>8</u> · ·		
75	-	ł					.		
	673.7 -	28.5	1	2	3		1		
	-	‡	'	2	3		<b>9</b> 5		
70	-	‡					<u>``</u>		
	668.7 -	- 33.5	4	6	8	-	· · · ·	· · · ·	
-	-	ŧ					<b>1</b> 4		
665	663.7 -	- 38.5							
		- 50.5	2	1	3	1	<b>•</b> 4		
660	-	Ŧ							
	658.7 -	- - 43.5		70 /2 2				<u> </u>	
	-	‡	30	70/0.2					
655		‡					· · · ·		· · · ·
	653.7 -	48.5	100/0.2						
	-	Ł							
650		F					L	+ • • • •	+ • • • •
	648.7 -	- 53.5	60/0.1						
645	-	‡							
040	643.7 -	- 58.5					<u> </u>	<u>.</u>	<u> </u>
	-	t.	60/0.1				-	-	
	-	Ł							
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		<u> </u>							

#### **TY** ROCKINGHAM GEOLOGIST K. Plummer hern Railroad GROUND WTR (ft) ALIGNMENT -L-OFFSET 16 ft RT 0 HR. 57.5 **NORTHING** 980,904 **EASTING** 1,726,293 24 HR. 41.5 DRILL METHOD H.S. Augers HAMMER TYPE Automatic COMP. DATE 02/27/17 SURFACE WATER DEPTH N/A SAMP. т MOI G SOIL AND ROCK DESCRIPTION 75 100 NO. ELEV. (ft) DEPTH (ft) GROUND SURFACE ROADWAY EMBANKMENT 702.2 0.0 . . . . Very Soft to Medium Stiff, Red-Brown, Fine Μ Sandy SILT (A-4), with trace mica and . . . . some gravel Μ . . . . . . . . . . . 695.2 \_\_\_\_\_\_\_ Medium Stiff, Red-Brown, Clayey SILT \_\_\_\_\_7.0 . . . . (A-5), with trace mica . . . . Μ . . . . . . . . 101 690.2 \_\_\_\_\_ Medium Dense, Tan, Clayey Fine SAND 12.0 . . . . (A-2-6) Μ . . . . . . . . . . . . ARTIFICIAL FILL \_\_\_\_\_ 17.0 Stiff, Gray, Silty CLAY (A-7-6), with trace root fragments 685.2 . . . . Μ . . . . . . . . . . . . 680.2 Medium Stiff, Red-Brown, Fine Sandy SILT \_\_\_\_ 22.0 . . . . (A-4), with trace mica Μ . . . . . . . . Medium Stiff, Stiff and Soft, Red-Brown, \_\_\_\_\_27.0 . . . . . . . . Clayey SILT (A-5), with trace mica Μ . Μ . . . . . . . . Μ . . . . . . . . ▼ . . . . 648.7 43.5 <u>. . . .</u> . WEATHERED ROCK 100/0.7 Red-Brown, (TRIASSIC SANDSTONE) . . . 100/0.2 . . . . . . 53.5 NON-CRYSTALLINE ROCK Brown, (TRIASSIC SANDSTONE) . . . . . . . 60/0.1 - 643.6 58.6 Boring Terminated with Standard Penetration Test Refusal at Elevation 643.6 ft In Non-Crystalline Rock (TRIASSIC SANDSTONE)

### GEOTECHNICAL BORING REPORT BORE LOG & CORE LOG

										KING								46066.1.1	
SITE	DESCRI	PTION	Bridg	e 131	on US	220 Bypas	s over Nor	olk South	ern Rail	road					GROUND	NTR (ft)	SITE	DESCRIPTION	N E
BORII	NG NO.	B1-B			S	TATION 2	1+89		OFFSE	<b>ET</b> 3	5 ft RT			ALIGNMENT -L-	0 HR.	N/A	BORI	NG NO. B1-E	3
COLL	AR ELE	<b>V</b> . 69	6.0 ft		т	OTAL DEP	<b>TH</b> 68.7 f	:	NORT	HING	980,91	11		EASTING 1,726,312	24 HR.	27.0	COLL	AR ELEV. 6	96.0
ORILL	RIG/HAM	MER EF	F./DATE	F&R	3495 C	ME-55 80%	02/16/2016		•		DRILL M	ethod	D NW	Casing W/SPT & Core HAMME	R TYPE Au	tomatic	DRILL	RIG/HAMMER E	FF./C
RILI	ER D.	Tignor			S		E 02/16/1	7	COMP	. DAT	E 02/2	22/17		SURFACE WATER DEPTH N/A	۸		DRILI	LER D. Tigno	or
LEV	DRIVE ELEV	DEPTH	BLO	W COL	JNT		BLOWS	PER FOO	Г		SAMP.	▼/	L	SOIL AND ROCK DESC			CORE	SIZE NQ2	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	моі	G	ELEV. (ft)		DEPTH (ft)	ELEV (ft)	RUN ELEV (ft)	
700		_															632.4	632.4 - 63.6	5
	605 7	-												696.0 GROUND SURFA		0.0	630	+	
95	695.7 -	-	WOH	1	1	<b>Q</b> 2						М		ROADWAY EMBANK	v SILT (A-4)	2.0		627.4 + 68.6	—
ļ	692.5	3.5	2	2	4							.,	LN	with trace mica and litt Medium Stiff, Brown-Gray-	le gravel	i l		4	
690	_	-		2	4	•6	<u> </u>					М	ĿŊ	Fine Sandy, Silty CLA				‡	
		-											LN					‡	
ŀ	687.5	8.5	2	3	4	↓ ↓7						М	LS					+	
85	4	-					+						LN	684.0		12.0		‡	
ļ	682.5	13.5	3	3	4							.,		ARTIFICIAL FIL Medium Stiff to Very				‡	
80	1	-		3	4	<b>•</b> 7	_ · · · ·					М		Tan-Orange-Brown, Fine Sar (A-7-5), with trace mica and	ndy, Silty CLA	Y		‡	
		-													a autor gravor			‡	
ŀ	677.5	- 18.5	3	4	6	• • • • • •						м						+	
75	-	-				\ <u>_</u> -	+ • • • •											‡	
ļ	672.5	- 23.5			10	· · · ```												‡	
70	1	-	5	10	13		23					M						‡	
		-				$  \cdot \cdot \cdot  $												ŧ	
ŀ	667.5	- 28.5	4	8	10		8			•••		М						+	
65	4	-							·   · ·					664.0		32.0		ŧ	
	662.5	- - 33.5			_	./				•••				TRIASSIC RESIDI				‡	
60	4	-	1	1	1	<b>•</b> 2						W	/./	SAND (A-2-6), with tra				ţ	
	+	-																ţ	
╞	657.5	38.5	100/0.5			╘╘╧╧		╞═╤╤	1 10	0/0.5				657.5 WEATHERED RC	CK	38.5		+	
655	4	-												Gray-Red-Brown, (TR SANDSTONE)	IASSIC			ţ	
	652.5	- - 43.5		10.15										,				1	
50	4	-	60	40/0.1					10	0/0.6								ţ	
	+	-																ţ	
ŀ	647.5	48.5	100/0.2						10									+	
645	4	-																ţ	
	642.5	- 53.5																1	
640	4	-	100/0.3						10	0/0.3								ţ	
	+	-																ţ	
╞	637.5	58.5	100/0.2						- 10									+	
635	4	-																ţ	
	632.5	- - 63.5												632.5		63.5		1	
630	4	-	60/0.1											632.4 NON-CRYSTALLINE Red-Brown, (TRIASSIC SA		63.6		ţ	
	+	-													,			ţ	
┝	627.4	68.6	60/0.1					•••		0/0.1			E.	627.4 627.3 Boring Terminated with	Standard	68.6 68.7		+	
	4	-												Penetration Test Refusal at E ft In Non-Crystalline Rock	Elevation 627	.3		ţ	
	4	-												SANDSTONE				1	
		-											1 F					+	

WBS	46066	.1.1			TIP	B-535	2	C	OUNT	1
SITE	DESCR	PTION	Bridg	je 131 on	US 22	0 Bypa	ass over N	lorfolk	South	3
BORI	NG NO.	B1-B			STAT	ΓΙΟΝ	21+89			
COLL	AR ELE	<b>V.</b> 69	6.0 ft		тоти	AL DE	<b>PTH</b> 68.	7 ft		
DRILL	RIG/HAM	MER EF	F./DATE	F&R349	5 CME	-55 809	% 02/16/20	16		
DRIL	LER D.	Tignor			STAF	RT DA	<b>TE</b> 02/1	6/17		
COR	E SIZE	NQ2					<b>N</b> 5.0 ft			
ELEV	RUN ELEV		RUN	DRILL RATE	REC.	RQD	SAMP.	REC.	ATA RQD	
(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	
32.4	632.4 -	- 63.6	5.0	1:45	(2.3)	(0.4)		(2.3)	(0.4)	ŀ
630	-	-	0.0	1:00 2:00	46%	8%		46%	8%	Ē
	- 627.4 -	- 68.6		1:30 1:45						Ē
		-		N=60/0.1						ſ
	-	-								
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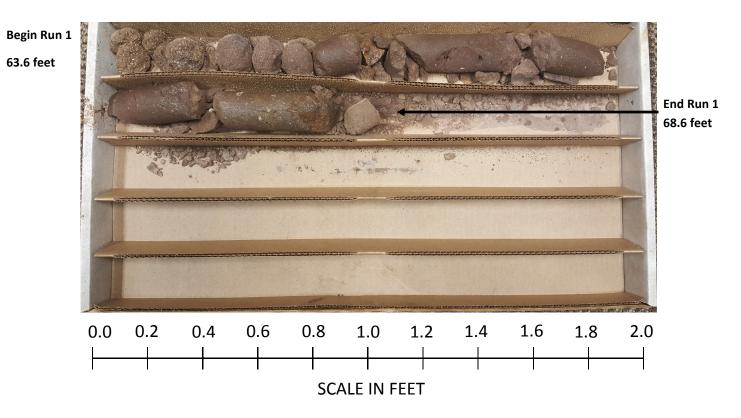
ΓY	ROCKING	GHAM		GEOLOGI	ST K. Plu	immer/M. B	rewer							
hern	Railroad						GROUN	ND WTR (ft)						
0	FFSET :	35 ft RT		ALIGNME	NT -L-		0 HR.	N/A						
N	ORTHING	980,911		EASTING	1,726,31	2	24 HR.	27.0						
1.1		DRILL MET	HOD NW	Casing W/SPT			ER TYPE	Automatic						
		TE 02/22/		-		DEPTH N/		Automatic						
	OWF. DA		17	SURFACE	WATERL		4							
	0 DESCRIPTION AND REMARKS													
G	ELEV. (	ft)						DEPTH (ft)						
		Madaw		Begin Cori	ng @ 63.6	ft	hali i landi	ha 00.0						
	632.4	Medium I	Hard, Red-	derately Sever Brown, (TRIA	SSIC SANE	STONE), wi	th Very C	to 63.6 lose						
				Fractu	re Spacing									
	627.4 627.3	Boring Te	rminated	with Standard	Penetratio	n Test Refus	al at Eleva	68.6 68.7						
	Ł	627	7.3 ft In No	n-Crystalline F	Rock (TRIA	SSIC SANDS	STONE)							
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Bridge No. 131 on -L- over NSRR

# WBS - 46066.1.1 TIP No. - B-5352

ECS Southeast Project No. 08: 11981

Rock Core Photographs: Boring - B1-B — Station: 21+89 Offset: 35' RT





### GEOTECHNICAL BORING REPORT BORE LOG & CORE LOG

	46066		Rrid	ne 12		IP B-5352	es over M		Y ROCKIN				GEOLO	GIST K. Plun	nmer	GPOLIN	D WTR (ft)		46066		Brid	12			
SITE DESCRIPTION         Bridge 131 on US 220 Bypass over Norfolk Sou           BORING NO.         B2-A         STATION         22+63							OFFSET					ENT -L-													
COLLAR ELEV. 700.9 ft TOTAL DEPTH 63.6							•	NORTHING					<b>G</b> 1,726,290		0 HR. 24 HR.	N/A 29.0									
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 80% 02/16/2016								1		DD N	N Casing W/S														
DRIL	LER D	. Tigno	r		s	TART DATE	02/27/1	7	COMP. DA				-	E WATER DE		ER TYPE		DRILL RIG/HAMMER EFF./DATE F8							
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		BLOWS F	PER FOOT	-	SAMP.				SOIL AND R				CORE SIZE NQ2							
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	5 5	50	75 100	NO.	Имо		ELEV. (ft)				DEPTH (ft	1 1	RUN ELEV	DEPTH		DRIL RAT			
																		(ft)	(ft)	(ft)	(ft)	(Min/			
05		F											_					647.3	647.3	- 53.6	2.0	2:15/			
	-	F																645	645.3	- 55.6	3.0	2:30/2			
00	700.9	0.0	1	1	1						м		700.9		ND SURFA		0.0		642.3 ·	- - 58.6		2:00/			
	-					$\left \begin{array}{cccc} \mathbf{V}_{1}^{2} & \dots & \dots \\ \mathbf{V}_{n} & \dots & \dots \end{array}\right $						L L	Ve	ery Soft to Mediu Clayey SILT (	ım Stiff, Re	d-Brown-B	ack,	640		+	5.0	2:00/2			
	697.4	3.5	1	3	3						м	LV LV	- -		,					ŧ		2:30/ 1:45/			
95	-	F						 				L.V.	-						637.3	<u>+ 63.6</u> +		2:40/ N=60/			
	692.4	8.5	2	3	4			 				LV							-	Ŧ					
90	-	ŧ				•••	 	· · · ·	· · · · ·		M	L.V.	_							Ŧ					
	- 687.4	-					· · · · ·	· · · · ·				L.⊻ L.⊻								Ŧ					
85		- 10.0	1	3	4	<b>1</b>   : <b>∳</b> 7 : :	· · · · ·	· · · · ·			м									Ŧ					
55	-	F											683.9				17.0			ŧ					
	682.4	18.5	3	3	6		· · · · ·	· · · · ·			м	β.	. Si	tiff, Red-Brown-C	FICIAL FIL Drange, Cla		A-5)		-	ŧ					
30	_	+				· • • · ·			· · · · ·			8°	678.9				22.0			ŧ					
	677.4	23.5				] :;;::	· · · · ·												-	+					
'5	-	+	3	6	7		· · · · ·				M				ome mica					+					
0	-	F												ledium Dense to Silty Fine SAND						‡					
	672.4	28.5	6	21	34			• • • • • •55				_							-	‡					
0	_	F						↓ 55	· · · · · ·		M		_						·	‡					
	667.4	33.5		05	75/0 (								666.9				34.0		-	+					
55	-	F	5	25	75/0.2				100/0.7					WEAT Tan-Gray, (TR	HERED RC			1		‡					
	-												- - -	· · · · · · · · · · · · · · · · · · ·			/			ŧ					
	662.4 -	38.5	100/0.4				· · · ·	 	100/0.4										-	Ŧ					
60	-	F						 					-							Ŧ					
	657.4	43.5	100/0.2						100/0.2										-	Ŧ					
5	-	Ļ											_							Ŧ					
	- 652.4	48.5					· · · · ·	· · · · ·												Ŧ					
50	-		100/0.2				 	· · · · ·	100/0.2	<b>[</b> ]										‡					
, <u>,</u>	-	ŧ							· · · · ·	1			-							‡					
	647.4 -	53.5	60/0.1				· · · ·		• • 60/0.1				647.4 647.3	NON-CRY	STALLINE	ROCK	<u>53.5</u> 53.6		-	ŧ					
5	_	F							· · · · ·				_	Dark Gray, (M CONG	IETAGRAY SLOMERAT	′WACKE & TE)			·	‡					
	-	F																	-	+					
40	-	E																		‡					
		[ 											-							ŧ					
	637.3	63.6	60/0.0						60/0.0	┝┤			637.3	Boring Term			63.6		-	Ŧ					
	-	F											_		-Crystalline	Rock				Ŧ					
	-	ł											. (N	IETAGRAYWAC	NE & CON	NGLUIVIER/	(IE)		-	Ŧ					
	-	ŧ											-							ŧ					
	-	ŧ																	.	ŧ					
	-	ŧ																		ŧ					
		L	I	I	1	1				1	1								1	1					

131 on US 220 Bypass over Norfolk So **STATION** 22+63 TOTAL DEPTH 63.6 ft F&R3495 CME-55 80% 02/16/2016 START DATE 02/27/17 TOTAL RUN 10.0 ft RUN REC. RQD (ft) (ft) % % RILL ATE /lin/ft) STRATA REC. RQD (ft) (ft) % % SAMP. NO. 
 15/1.0
 (2.0)
 (1.8)

 30/1.0
 100%
 90%

 10/1.0
 (3.0)
 (1.7)

 00/1.0
 100%
 57%

 00/1.0
 00/1.0
 52%

 30/1.0
 48%
 52%

 45/1.0
 66/0.0
 66/0.0
 (9.4) (6.1) 94% 61%

**TIP** B-5352

С	COUNTY ROCKINGHAM GEOLOGIST K. Plummer																		
orf	olk So	uthe	rn Railro	bad							GROUN	ID WTR (ft	)						
		OF	FSET	17 fl	t RT		ALIGNM				0 HR.	N/A	`						
t		NO	RTHING		80,984		EASTIN				24 HR.	29.0	)						
5					RILL METHOD	NW	Casing W/S					Automatic							
7		со	MP. DA	TE	02/28/17		SURFAC	EW/	ATER DEF	PTH N/	A								
	ATA																		
EC. t)	RQD (ft) %	L O				D	DESCRIPTION AND REMARKS												
6	%	G	ELEV. (1	<u>t)</u>			DEPTH (ft												
.4)	(6.1)		647.3	M	oderately Wea	thered	Begin Coring @ 53.6 ft at to Very Slightly Weathered, Hard to Very Hard, Dark 53 ACKE & CONGLOMERATE), with Very Close to Close												
1%	61%		-	Gr	ay, (METAGR	AYWA	ACKE & CONGLOMERATE), with Very Close to Close Fracture Spacing												
		Ē	-				GSI = 40 to 55												
			-																
			- 637.3									63.	_						
			-	62	Boring Termin 7.3 ft In Non-C	ated v	vith Standa	d Per	netration Te	est Refusa	l at Elevat	on	-						
			-	03	7.5 IL IN NON-C	rystai	Ine Rock (i	/IE I AU	JRATWACI	KE & CUP	NGLUIVIER	ATE)							
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# Bridge No. 131 on -L- over NSRR

# WBS - 46066.1.1 TIP No. - B-5352

## ECS Southeast Project No. 08: 11981

Rock Core Photographs: Boring - B2-A — Station: 22+63 Offset: 17' RT





								<u>URE L</u>	<u> </u>			
WBS	46066	5.1.1			Т	<b>IP</b> B-5352	COUNT	Y ROCKIN	GHAM		GEOLOGIST K. Plummer	
SITE	DESCR	IPTION	l Bric	dge 13	1 on l	JS 220 Bypass over I	Norfolk So	uthern Railro	bad			GROUND WTR (ff
BORI	NG NO.	B2-B	;		S	<b>TATION</b> 22+69		OFFSET 3	36 ft RT		ALIGNMENT -L-	0 HR. N/A
COLL	AR ELE	<b>EV</b> . 69	9.6 ft		т	OTAL DEPTH 68.6	ft	NORTHING	980,9	91	EASTING 1,726,308	<b>24 HR.</b> 28.0
DRILL	RIG/HAI	MMER E	FF./DA	TE F	R3495	5 CME-55 80% 02/16/201	6				W Casing w/ SPT HAMM	IER TYPE Automatic
DRILI	LER D	. Tiano	r		s	TART DATE 02/14/	17	COMP. DA	<b>TE</b> 02/			
ELEV	DRIVE	DEPTH		OW CO		11	PER FOOT		SAMP.			
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	MOI G	SOIL AND ROCK DES	CRIPTION DEPTH (
	. ,						•					
700											699.6 GROUND SURF	
	699.6	- 0.0 -	1	1	2					мЦ	- ROADWAY EMBAN	IKMENT
	- 696.1	3.5									697.6 Soft, Red-Brown, Fine Sar Medium Stiff, Red-Brown, F	
695		- 0.0	2	2	3					м	(A-4), with trace	mica
	-	-									692.6	7
690	691.1	8.5	4	6	6						- Stiff to Medium Stiff, Red- SILT (A-5)	Brown, Clayey
000	-	-									} 	
	- - 686.1	13.5							1			
685		- 13.5	2	4	4	-    · /· · ·   · · · · · · · · · · · · ·	· · · ·	· · · ·		ML	⊬ ,—	
	-	F				· · <b>` · </b>					_ 682.6	17
~~~	681.1	18.5	18	33	21						ARTIFICIAL F Hard, Red-Brown, Fine Sar	LL
680	-	-	10	33	21		<b>1</b> 54				(A-5)	-,,, -, -,
	-										- 676.6	23
675	676.1	23.5	3	4	8		<u> </u>			м	TRIASSIC RESI	
	-										- 672.6	2
	671.1	28.5					+++++				- Very Dense, Tan, Silty Fine (A-2-4), with little	to Coarse SAND
670	-		25	43	33			<b>9</b> 76		м	(A-2-4), With Indie	mica
	-	F									– <u>667.6</u> – Hard, Tan-Gray, Fine Sandy	<u>SILT (A.4) with</u> <u>32</u>
665	666.1	33.5	10	20	34					м	trace mica	SIET (A-4), WIIT
	-	F					<b>1</b> 34				- 662.6	37.
	- 661.1	38.5						┥÷÷∹┤			- WEATHERED R	OCK
660	-	_	100/0.2	2				100/0.2	"		- Tan-Gray to Black, (1	
	-	-										
655	656.1	43.5	100/0.2	2				100/0.2	,			
	-	F									-	
	- 651.1	48.5									651.1	48
650			60/0.0	7			+ • • • •	• • 60/0.0	'		NON-CRYSTALLIN Black-Tan, (METAGRA	E ROCK
	-	F									CONGLOMERA	
645	646.1	53.5	60/0.1	-				· · · 60/0.1	,			
	-	F						· · · ·	1		-	
	- 641.1	58.5							1			
640		- 36.5	60/0.0	1			· · · ·	• • 60/0.0	1		₽ ₽-	
	-	t -									<del>}</del>	
625	636.1	63.5	60/0.1	-				· · · · · · · · · · · · · · · · · · ·	,		<u>}</u>	
635	-	F	00/0.1				+				<u>-</u> -	
	-	-							1			
ŀ	631.1	68.5	60/0.1			+		60/0.1	Ч		631.0 Boring Terminated wit	
	-	F							1		Penetration Test Refusal at ft In Non-Crystallin	e Rock
	-	F							1		(METAGRAYWACKE & CO	
	-	F									  -	
	-	Ł							1		F	
	-	F									+	

								<b>_</b>		_00															
WBS 46066.1.1 SITE DESCRIPTION Bridge 131 or			Т	IP B-5352	2	COUNT	Y ROCKINGHAM				GEO	DLOGIST K. Plummer	-	WE	<b>8S</b> 4606	6.1.1			ד	IP B-5352	COUNT	YF			
			on US	6 220 Bypa	ss over No	rfolk South							GROUND WTR (ft	) SIT	E DESCR	RIPTION	Brido	ge 131	on US	6 220 Bypas	folk South	iern I			
BORING NO. EB2-A			s	TATION :	22+99		OFFSET	18 ft RT			ALIC	GNMENT -L-	0 HR. 50.2	2 <b>BO</b>	ring no	. EB2-	·B		S	TATION 2	3+08		OF		
COLLAR ELEV. 711.9 ft			Т		<b>PTH</b> 54.8	ft	NORTHING 981,020				EAS	EASTING 1,726,289 24 HR. 39.5			COLLAR ELEV. 711.9 ft TOTAL DEPTH							54.3 ft N			
DRILL RIG/HAMMER EFF./DATE F&R34				CME-55 80%	6 02/16/2016		DRILL METHOD H.S.			DH.	S. Augers				DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 80% 02/16/2016										
DRILLER D. Tignor					E 02/23/		COMP. D	COMP. DATE 02/23/17				FACE WATER DEPTH N		_	DRILLER         D. Tignor         START DATE         02/13/17								cc		
		DEPTH		DW CC				PER FOO		SAMP.		/ L				ELE		DEPTH		w co				PER FOO	
(ft)	ELEV (ft)	(ft)	0.5ft	1	0.5ft	0	25	50	75 100		Мо	O I G	ELEV.	SOIL AND ROCK DES	SCRIPTION DEPTH (	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	1	0		50	75
	()												LLLV.	(it)	DEFIN		(1)								
715		$\pm$											-			715	5	$\pm$							
		Ŧ											711.9	GROUND SURF	ACE 0	.0		Ŧ							
710	710.9	1.0	18	10	3								710.9	ASPHALT (1.	0')1	0 710	710.5	- 1.4				· · · ·	· · · ·		
110	708.3	+ 36				13				11	M		708.9	ROADWAY EMBAN Medium Dense, Gray, Si	Ity Fine SAND $-\frac{3}{-3}$		<u> </u>	+ - <u>3.6</u>	21	9	3	. •12	· · · · ·		
Γ	100.0	1	WOH	2	2	<b>↓</b>	·   · · · ·				м	L L V	È	(A-2-4), with trace to Soft, Red-Brown, Silty CL			700.0	‡	1	2	2	<b>↓</b>			.   .
705		ŧ										L <sub>V</sub> .	Ŀ	trace grave		705	5	ŧ					· · · ·		· _ ·
	703.4	8.5	2									L <sup>i</sup>	Ł	Soft to Medium Stiff, Red- SILT (A-5)			703.3	8.6							
		ł		2	2	♠4					M		-	. ,				+	2	3	3	<b>♦</b> 6			.   .
700	-	Ŧ											-			700		Ŧ					+	+ • • •	
F	698.4	† 13.5 †	2	2	2				·   · · · · ·		м		F				698.3	13.6	1	3	4				
695		‡							:   : : : :				-			695	-	‡							.   .
095	- 693.4	+ + 18.5										LV LV	-			090		+ 18.6					+····		
Ē	095.4	1 10.5	2	2	4		.				м	LV LV					693.3	18.6	1	3	4				.   .
690		ł				.\							689.9		2	.0 690	)	Ŧ							
	688.4	23.5												Stiff, Red-Brown, Silty C	CLAY (A-7-5)	1		T 23.6							
		Ŧ	4	5	8	13			.		M							Ŧ	5	3	4	• • • • • • • • • • • • • • • • • • •			.   .
685		‡											<u>684.9</u>		<u> </u>	0 685	5	‡					+		·   ·
-	683.4	28.5	2	3	4		·   · · · ·		·   · · · · ·		м		- 682.4	TRIASSIC RESI Medium Stiff, Red-Brown, I	Fine Sandy SILT 29	5	683.3	28.6	3	4	6	. <b>\</b>    . <b>\</b>			·   ·
	•	ŧ	-			. <b>♥</b> 7-■     . <b> </b>			:   : : : :					(A-4), with trace Loose, Brown, Silty Fine	mica /			ŧ	ľ						.   -
680	-	±				<del>   </del>							-	with trace mi		680		±					<u> </u>	+	+
ŀ	6/8.4	<u>+ 33.5</u> 	15	55	45/0.1	.!			100/0.6			977	677.9	WEATHERED R	34 ROCK	.0	678.3	<del> </del> 33.6 	9	9	27		36		• •
675		Ŧ								Ϋ́Ι			674.9	Tan, (TRIASSIC SAN		.0 675	5	Ŧ							.   .
	673.4	38.5								-			-	TRIASSIC RESI Medium Dense, Brown, S	DUAL			- 38.6							
	•	‡	10	12	18						M	-	F	(A-2-4), with trac	e clay			Ŧ	10	20	44			· · • • • • • • • • • • • • • • • • • •	i i
670	-	‡					·   i · · ·						-			670	) .	‡						· · ŀ	·   ·
ŀ	668.4	43.5	100/0.4	4			:   <b>!</b>	+				M	668.4	WEATHERED R	43 43	5	668.3	43.6	25	75/0.3				:: <u></u>	:- -:
		t		]					100/0.4				L	Tan, (TRIASSIC SAN	DSTONE)			ŧ	20	10/0.0					.   .
665	-	±					+ • • •						F			665	-	ŧ					+	<u> </u>	
F	663.4	<u>+ 48.5</u> 	40	60/0.2	2				100/0 7	•							663.3	<u>† 48.6</u> †	30	70/0.2					
660		Ŧ											F			660		Ŧ							
	658.4	53.5								1			-				-	53.6							
ļ		<b>‡</b>	20	43	57/0.3			•••	100/0.8				657.1	Boring Terminated at Elev	54	.8		+	55	45/0.2		<u>  · · · ·</u>			<u>·</u>
	_	‡											<u> </u>	Weathered Rock (T	RIASSIC			‡							
		t											L	SANDSTON	E)			t							
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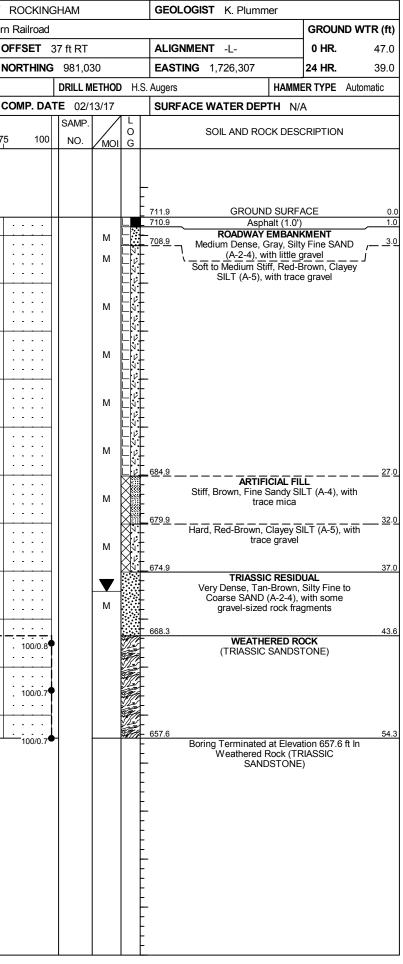




Photo No.1: View at End Bent 2 looking south (downstation) on -L- (US 220 Bypass)



Photo No. 2: View at End Bent I looking north (upstation) on -L- (US 220 Bypass) over the Norfolk Southern Rail Way



Photo No. 3: View at End Bent 2 looking south (downstation) on -L- (US 220 Bypass) over the Norfolk Southern RailWay

