HB-0004REFERENCE 5041 STATE OF NORTH CAROLINA

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

#### **CONTENTS**

SHEEL NO.	<u>DESCRIPTION</u>
I	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-19	BORE LOGS, CORE REPORTS, & CORE PHOTOGRAPHS
20	LAB TEST RESULTS
21	SITE PHOTOGRAPHS

DESCRIPTION

## **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY <u>HAYWOO</u> PROJECT DESCRIPT I-40	E BRIDGE	243 ON	_
SITE DESCRIPTION. OVER NC 215		)	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HB-0004	1	21

#### **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 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 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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

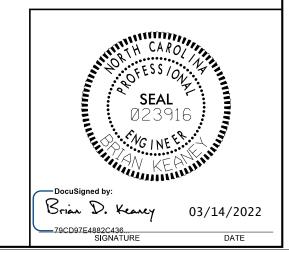
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRAYT OR CUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE TO MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- TES:
  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.
  BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS
  FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE
  CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL P. GRAINGER N. YACOBI B. KEANEY K. WALKER M. MOSELEY C. BOWEN INVESTIGATED BY \_P. GRAINGER DRAWN BY \_P. GRAINGER

DATE <u>3/4/2022</u>

CHECKED BY K. BUSSEY SUBMITTED BY HDR



PROJECT REPERENCE NO. SHEET NO. HB=0004

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

## SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

COLL DESCRIPTION	CDADATION	DOON DECEDIATION	TERMS AND DESINITIONS
SOIL DESCRIPTION  SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN	GRADATION  WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS  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.  GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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; CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	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.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	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 A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) (> 36% PASSING *200) (> 36% PASSING *200) (> 36% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.  ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD FIELD SPI REPOSAL IF TESTED, ROCK TIPE INCLUDES GRANTE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-0 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLO SPI REFUSAL IF TESTED,	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.  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
7. PASSING SILT-	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK 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 GRANULAR CLAY PEAT ** SOILS SOILS SOILS	PERCENTAGE OF MATERIAL  GRANULAR SILT - CLAY	WEATHERING	<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
20 U 3 K C XM CI X M C XM C XM C XM C XM C XM C	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
MATERIAL PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 40 MX 41 MN   40 MX   41 MN   40 MX   41 MN   40 MX   41 MN   LITTLE OR HIGHLY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           HIGHLY ORGANIC         > 10%         > 20%         HIGHLY         35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOILS	GROUND WATER	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
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.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.  FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND MATERIALS 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 COOD FAIR TO POOR POOR UNSUITABLE	<u> </u>	(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 SUBGRADE	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.  FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	TT areas	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,  IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  ROADWAY EMBANKMENT (RE)  DIP & DIP DIRECTION  OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL  SPT DET MIT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED 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.
LOOSE	I M	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) DENSE 30 TO 50  VERY DENSE > 50	THAN ROADWAY EMBANKMENT AUGER BORING CONE PENE TRUMETER  AUGER BORING  CONE PENE TRUMETER  TEST	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. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF	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	INFERRED ROCK LINE MW MONITORING WELL TEST BORING	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 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	WITH CORE  TTTTT ALLUVIAL SOIL BOUNDARY  PIEZOMETER  PIEZOMETER  SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (ROD) - 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
HARD > 30 > 4	INSTALLATION	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.  SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS    XX   INDEPCHT	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	UNSUITABLE WASTE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.  HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNDE	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.  SLICKENSIDE - 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 0.005 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS.  MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB, HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY $\gamma$ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR EIELD MOISTURE DESCRIPTION	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 <sub>d</sub> - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GOIDE FOR FIELD MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
LL LIQUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID: REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES  TCR - TRICONE REFUSAL  FRAGS FRAGMENTS  FRAGS FRAGMENTS  FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: CP #1- #5 Rebar w/ Plastic Blue Cap 2,666.17
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	CP #2 -#5 Rebar w/ Plastic Blue Cap 2,671.53
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT  DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: SEE ABOVE FEET
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	BORING COORDINATES OBTAINED FROM COLE SURVEYING & DESIGN, PA
PLASTICITY	CME-55	INDURATION	BORING COORDINATES OBTAINED FROM COLE SURVEYING & DESIGN, PA FROM SURVEY DATED 2/21/2022 AND TRIMBLE RIZ GNSS, RECEIVER CERTIFIED WITH FCC PART 15 (CLASS B DEVICE), 24, 32; RCM; PTCRB; BT SIG
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS X-N Q2	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	FIAD - FILLED IMMEDIATELY AFTER DRILLING
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST TUNGCARBIDE INSERTS HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH  COLOR	PORTABLE HOIST TRICONE 'STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
CULUR	X TRICONE 2 15/16 TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE: 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.	X CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS,	DATE: 8-15-1

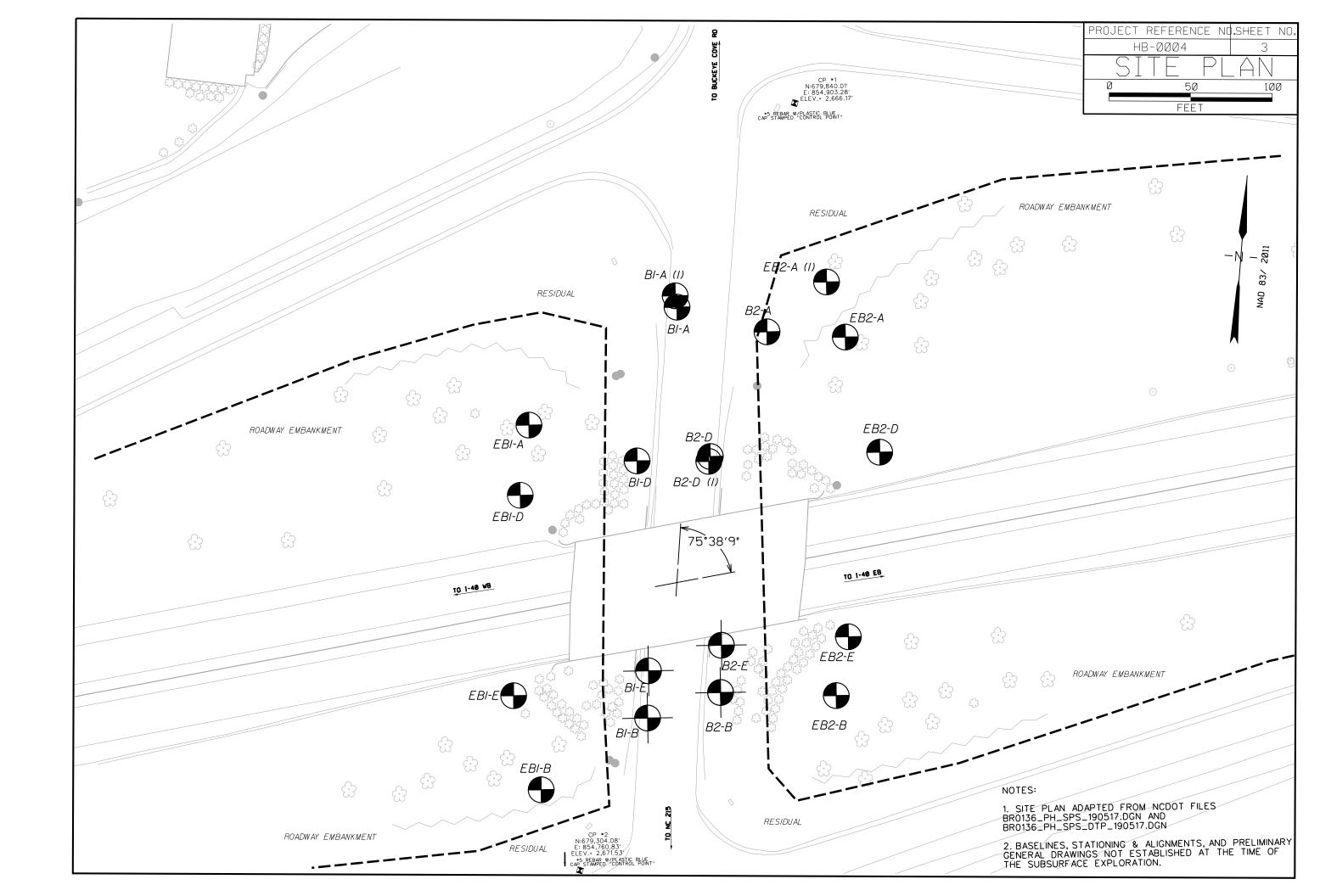
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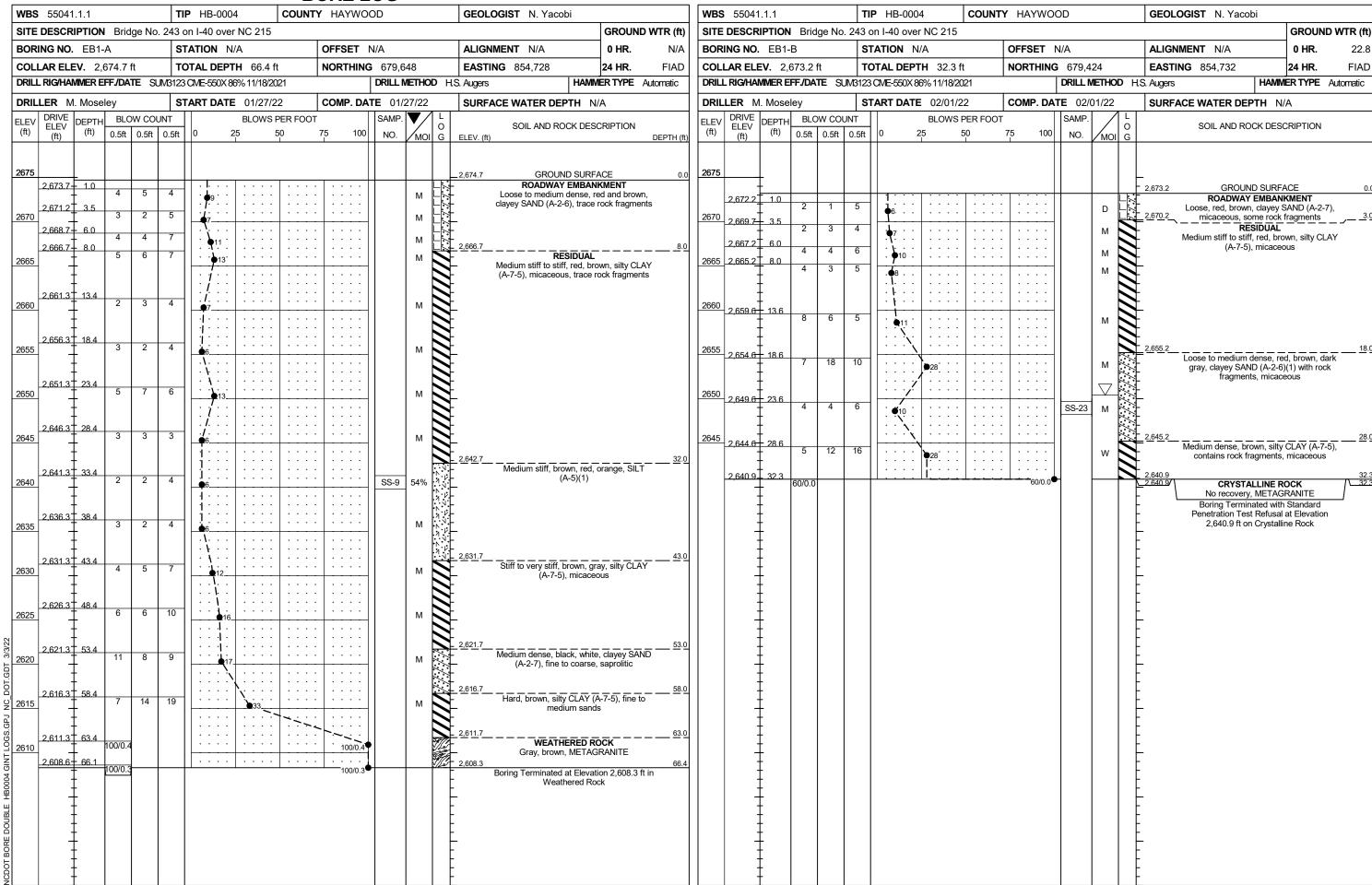
#### NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

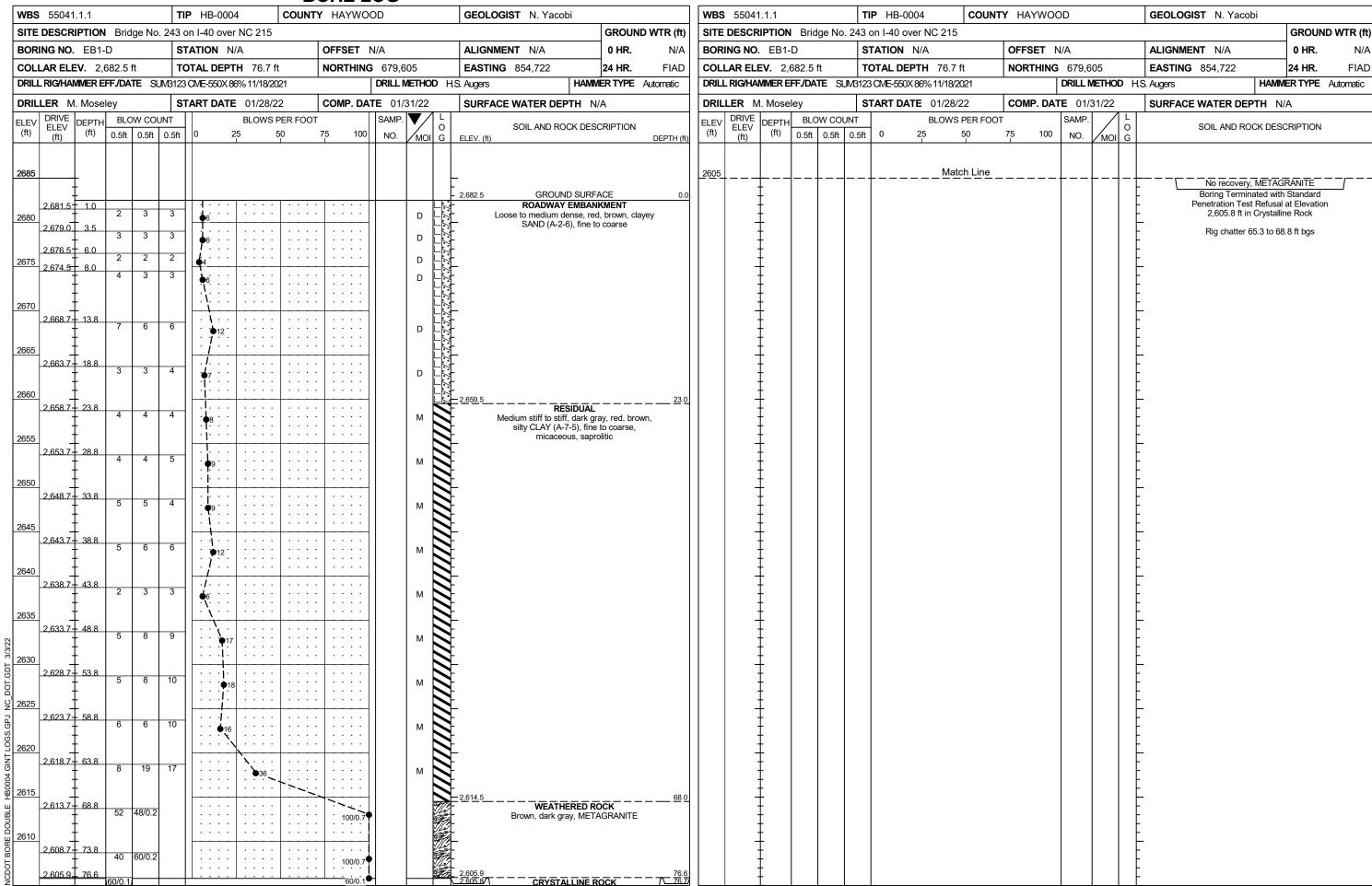
## SUBSURFACE INVESTIGATION

## SUPPLEMENTAL LEGEND GEOLOGICAL STRENGTH INDEX (GSI) TARLES

		SUPPLEME. FRO	NTAL LI DM AAS	EGEND, GI HTO LRF	EOLOGIC FD BRID	AL STRENGTH INDEX (GSI) TABLES GE DESIGN SPECIFICATIONS
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Join	ted Rock Ma	ass (Marinos and Hoek, 2	000)			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 Marınos, 2000)		ν Θ Ο Φ		a C e s	S O C O S	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.	URF4	Very rough, fresh unweathered surfa	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surf with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surf with soft clay coatings or fillings	Execution of the lithology, structure and surface conditions (barticularly of the pedding planes), choose a pox in the chart Tocate the bosition in the pox that corresponds to the condition of the discontinuities and estimate the average value of QSI from the contours. Do not attembt to be too precise. Quoting a range from 33 to 32 is more realistic than discontinuities are besent; these will dominate the personal planes of surfaces with cooning with a slight shift to the right in the columns for the 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 fail, and conditions. Were the columns of the 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 fail, and conditions. We conditions of this planes of the role of
STRUCTURE		DECREASING SU	JRFACE QU		<b>⇒</b>	COMPOSITION AND STRUCTURE
INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities  BLOCKY - well interlocked un-	PIECES 90	80		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.
disturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets  VERY BLOCKY - interlocked,	OF ROCK	70 60				B. Sand- stone with stone and stone and stone and stone and stone with stone or silty shale with sand- layers of siltstone amounts  B. Sand- Stone with stone and siltstone or clayey stone layers of siltstone amounts
partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets	OCKING	5	o´ / /			stristorie (m. amouris ) and layers 40
BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity	DECREASING INTERL		40	30		C.D.E. and G - 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 F and H.  F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed almost chaotic structure
DISINTEGRATED - poorly inter- locked, heavily broken rock mass with mixture of angular and rounded rock pieces	DECRE			20		G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers  H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock overes
LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes	V   N	N/A N/A			10	Into small rock pieces.   → Means deformation after tectonic disturbance  DATE: 8-19-







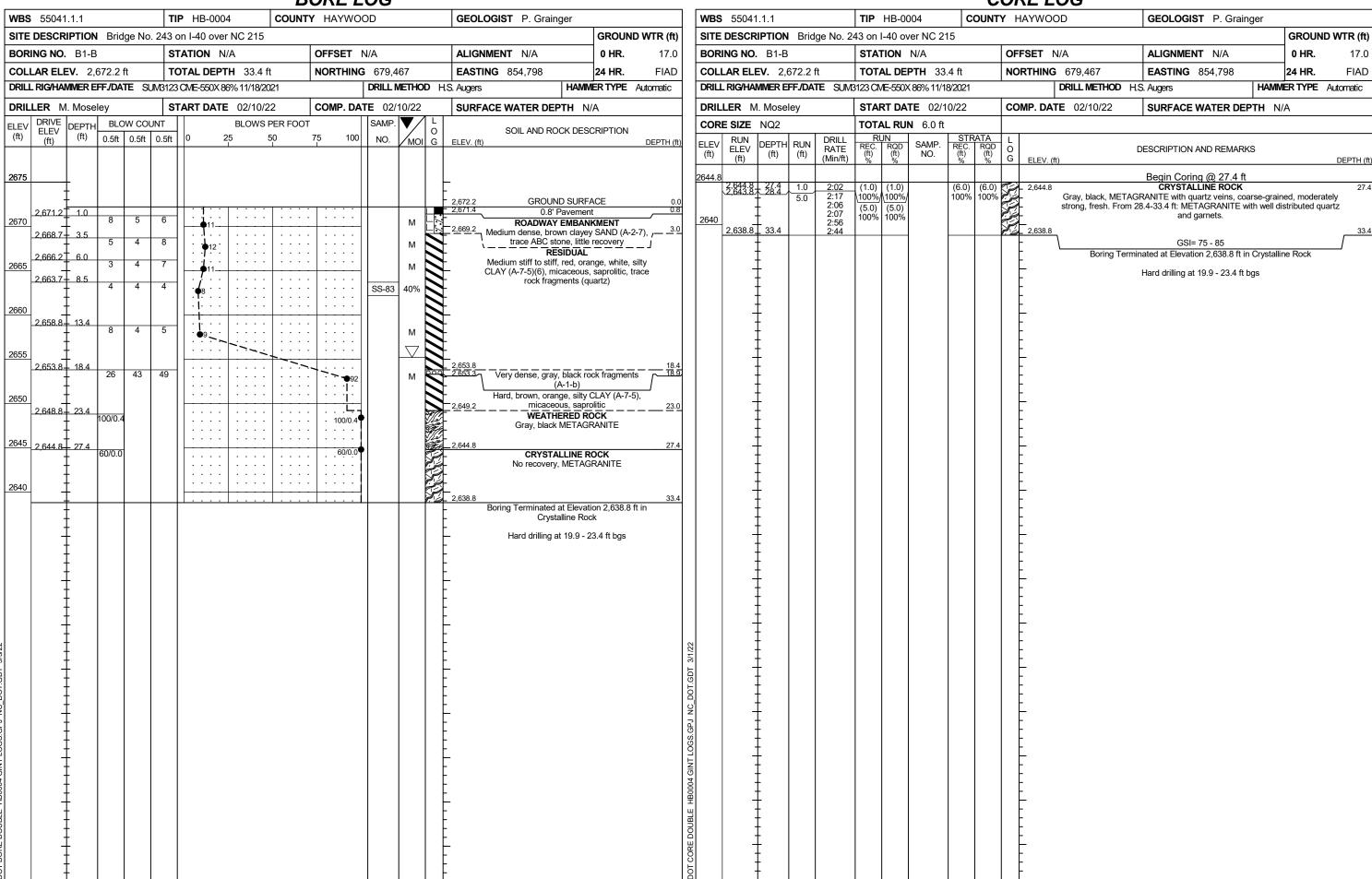
							D	UKE L	UG					
WBS	55041.1.1			TI	<b>P</b> HB-000	4	COUNT	r HAYWO	OD			GEOLOGIST N. Yacobi		
SITE	DESCRIPTION	<b>I</b> Brid	dge No.	243	on I-40 ove	NC 215							GROUND WTR	(ft)
BOR	ING NO. EB1	-E		S	<b>FATION</b> N	/A		OFFSET	N/A			ALIGNMENT N/A	0 HR.	N/A
COL	LAR ELEV. 2,	686.7	ft	т	OTAL DEPT	<b>H</b> 57.7 ft		NORTHING	679,4	82		<b>EASTING</b> 854,716	<b>24 HR.</b> FI.	IAD
DRILI	_ RIG/HAMMER E	FF./DA	TE SU	JM3123	CME-550X 8	6% 11/18/202	21		DRILL N	/IETHO	D H.	l.S. Augers	AMMER TYPE Automat	atic
DRIL	LER M. Mose	eley		S	TART DATE	02/01/22	2	COMP. DA	TE 02/	01/22		SURFACE WATER DEPTH	I N/A	
ELEV	DRIVE DEDT		DW COL			BLOWS P			SAMP.	<b>V</b> /	1 L	1		
(ft)	ELEV (ft)		0.5ft	0.5ft	0 2	25 5	0	75 100	NO.	МОІ	O G	SOIL AND ROCK ELEV. (ft)	DESCRIPTION DEPT	TH (ft
2690												_		
	‡											-		
0005	2,685.7 + 1.0				1							_ 2,686.7 GROUND S - ROADWAY EM		0.0
2685	+	3	3	2	<b>4</b> 5			<del>   </del>		D		Loose, red, brown, cla	ayey SAND (A-2-6)	
	2,683.2 7 3.5	3	4	3	7					М		<u>-</u> -		
2680	2,680.7 6.0	2	1	2	$  f^{\cdot}  $					١		-		
	2,678.7 8.0	2	2	4	<b>4</b> 3					M		<del>-</del> - 2,678.2		8.5
	‡			4	6					W		Medium stiff, red, s	andy SILT (A-5)	
2675	‡				.1							- -		
	2,672.8 13.9	<u> </u>			:   :   :							2,673.7 Loose, red, brown, cla	ayey SAND (A-2-6)	13.0
2670	‡	4	3	6	9					M		<del>-</del> -		
2670	† †				<del>                                    </del>			1				 _ 2,668.7		18.0
	2,667.8 18.9	3	4	7						М		- RESID - Medium stiff to very s		. — -
2665	<u> </u>				. 1'.' .					'''		- CLAY (A-7-5),		
	2.662.8 - 23.9											-		
	7,002.0 = 23.3	4	5	6	. • 11 .					М		-		
2660	‡				<del>                                   </del>							- -		
	2,657.8 28.9	3	4	3								<del>-</del>		
2655	‡	3	4	3	. 7					M		<del>-</del> -		
2000	†				· \			1				<del>-</del> -		
	2,652.8 33.9	5	6	7						М		- -		
2650	<u> </u>				¶.'ĕ.							<u>-</u> 		
	2.647.8 - 38.9				.							<u>-</u> -		
	İ	4	7	8	•15					М		<u>-</u>		
2645	+				<del> /</del>							 - 2,643.7		43.0
	2,642.8 43.9	2	4	4	$   \cdot \tilde{j} \cdot \cdot  $					М		- Medium stiff, dark gra	y, sandy SILT (A-5)	
2640	Ŧ	-	'							l IVI		• •		
	1,,,,,				- 1						11	 _ 2,638.7		48.0
	2,637.8 48.9	8	7	7						М		Medium dense, brown (A-2-7), micace		
2635	‡				\ .							- <del>-</del>		
	2,632.8 + 53.9				/							<u>-</u> -		
0000	‡	7	9	14		23				W		- -		
2630	2,629.0 57.7							20/0.0				2,629.0		57.7
	<u> </u>	60/0.0						60/0.0				CRYSTALLI No recovery, ME		
	1 1											- Boring Terminated - Penetration Test Re		
	1 1											- 2,629.0 ft on Cr		
	<del> </del>										F	<u>-</u>		
	‡											- -		
	‡											<del>-</del> -		
	‡											- -		
	‡											<del>_</del> -		
	‡											- -		
											F	-		

SHEET 6

									<u>URE L</u>	UG							
WBS	55041.	1.1			TIF	P HB-000	4	COUNT	Y HAYWO	OD			GEOLOGI	ST P. Grain	ger		
SITE	DESCRI	PTION	Brid	lge No.	243 o	n I-40 ove	r NC 215									GROUNI	WTR (ft)
BOR	ING NO.	B1-A	ı.		ST	ATION N	l/A		OFFSET 1	N/A			ALIGNME	NT N/A		0 HR.	14.9
COL	LAR ELE	<b>V.</b> 2,	669.1	ft	то	TAL DEP	<b>FH</b> 63.1 f	t	NORTHING	679,7	719		EASTING	854,820		24 HR.	FIAD
DRILL	L RIG/HAN	IMER E	FF./DA	TE SU	JM3123	CME-550X 8	6% 11/18/20	)21		DRILL I	METHO	D H.	S. Augers		HAMM	ER TYPE	Automatic
DRII	LER M.	Mose	lev		ST	ART DATI	<b>E</b> 02/07/2	2	COMP. DA	TF 02/	07/22		SURFACE	WATER DEI	PTH N/	Δ	
ELEV		DEPTH	_	OW COL				PER FOOT	l	SAMP.		1 🗆 T	TOOK! AGE	WAILKEL	111 14/		
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	0		50	75 100	NO.	МОІ	O G	ELEV. (ft)	SOIL AND RO	OCK DESC	CRIPTION	DEPTH (ft
2670		-											<b>-</b> 2,669.1	GROUN	ID SURFA	ACE	0.0
	2,668.1	1.0	9	7	4	1111		: : : :					2,668.4	0.7' P	AVEMEN	T	0.7
0005	2,665.4	. 37	"	'	7	. 11 .					M		2,666.1 Me	ROADWAY edium dense, re	d, brown,	clayey SAN	ID ,— 3.0
2665	2,005.4	- J./ -	6	5	5	. •10		<del> </del>	+		М		- \	(A-2-7)	, micaced	us	_ Ĺ
	2,662.9	6.2	4	3	8	: 1:::					М			edium dense, re	d, brown,	clayey SAN	
2660	2,660.4	8.7				: / <b>!</b> !! :					"			-2-7), micaceou ledium stiff to v			
	1 7		2	2	3	<b>\$</b> 5					М		C	LAY (A-7-5), mi fragments (	caceous,	contains roo	k
	1					: : :								iraginents (	quaitz), s	аргопис	
2655	2,656.0	13.1	2	2	3	5							<del>-</del>				
	‡					: : :											
	2,651.0	18.1				: : :											
2650	ł ´ +	-	3	2	3	5	<del> </del>	<del> </del>			М		_				
						: '\'. :		: : : :									
2645	2,646.0	23.1	2	7	15	: : \											
2043	1 1	<u>-</u>	^	'	15	/:	22	l			М		<del>-</del>				
	1 ±					1 : 1/:											
2640	2,641.0	28.1	2	3	5	: //: :					М		•				
	1 ‡		-			8					IVI		<del>-</del>				
	‡					. 7											
2635	2,636.0	33.1	4	5	8	/					l w						
	1 7	-									''						
	0.004.0	. 38.1				: ; : :											
2630	2,631.0	_38.1_	2	3	5						w		<del>-</del>				
	‡					· • · ·											
	2,626.0	43.1				. ',											
2625	- <del></del>	-	3	6	7	13-		ļ · · · ·	+		W		<del>-</del>				
	‡					: :  : :											
0000	2,621.0	48.1				: : !: :											
2620	1 1	<u>-</u>	3	5	9	14-		<u> </u>	+		W		<del>-</del>				
												1					
2615	2,616.0	53.1	3	4	8	- 1					l w	N					
	1 7	-			-	12					"		<del>-</del> ·				
						: : : :	: : : ` : ` :	†÷÷_;				N T					
2610	2,611.0	_58.1 -	5	30	70				100/4 0			347	2,610.5	WEATH	ERED RO	OCK	58.6
									100/1.0					Brown, gray			
	2.606.8 2.606.3	62.3 62.8 63.1	90	10/0.0			<u>_</u>	<u>_</u>	400/0.5		L		2,606.0				63.1
	2,606.0	63.1	100/0.3						100/0.5 100/0.3 60/0.0	7		F	_	Boring Termir Penetration Tes			
	‡		60/0.0						00/0.0					2,606.0 ft or			
														Hard drilling a			
	1	<u>-</u>										<u> </u>	– Grin	ding at 62.1 ft b			62.3
		•										F			290		
													•				
		-											<del>-</del>				
												<u> </u>					
	<del> </del>											1 F					

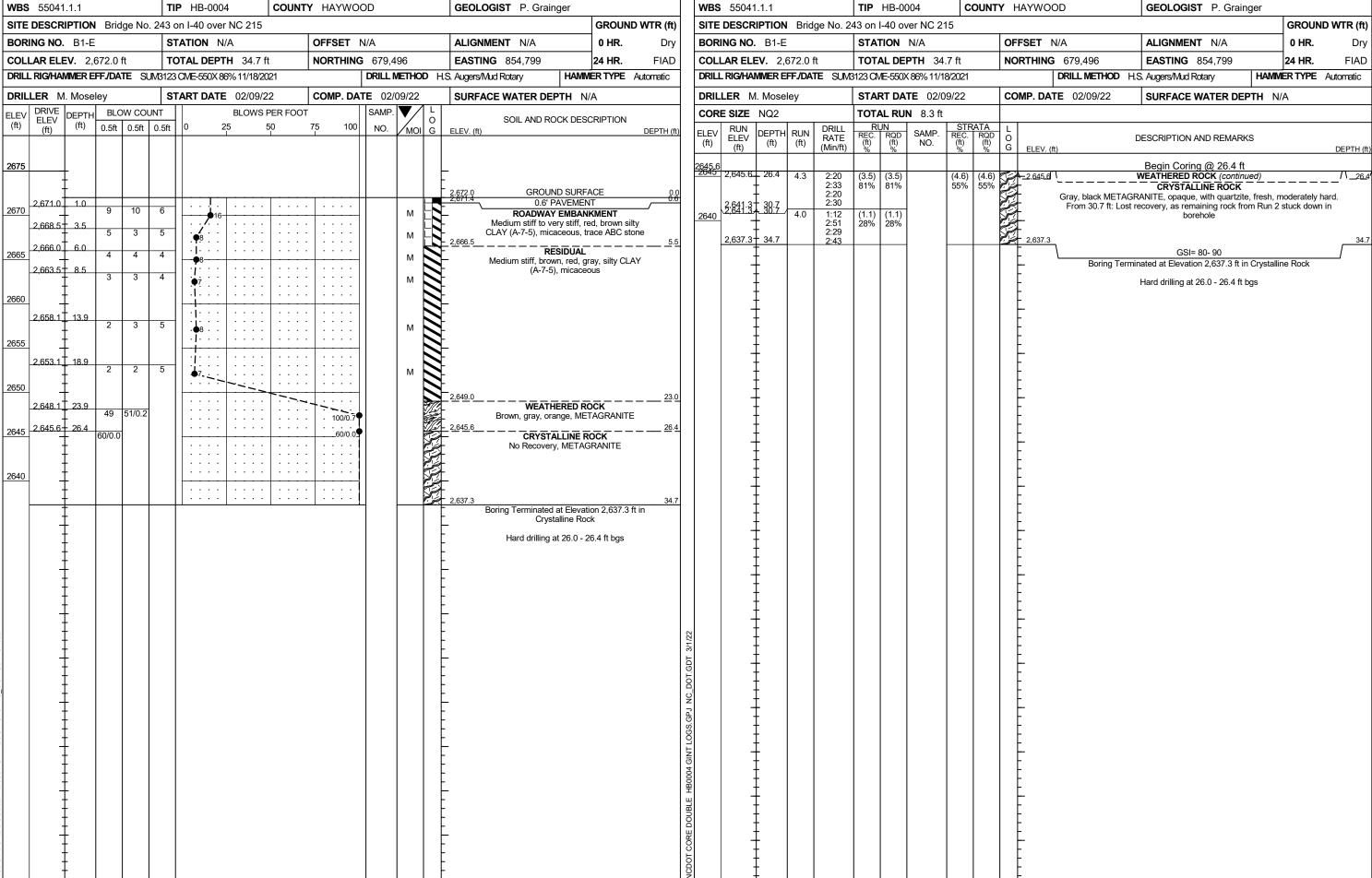
SHEET 7

<b>WBS</b> 55041.1.1		NTY HAYWOOD	GEOLOGIST P. Grainger	<b>WBS</b> 55041.1.1	TIP HB-0004 COUN	TY HAYWOOD	GEOLOGIST P. Grainger
SITE DESCRIPTION Bridge No.			GROUND WTR (ft)	SITE DESCRIPTION Bridge No. 2			GROUND WTR (ft)
BORING NO. B1-A (1)	STATION N/A	OFFSET N/A	ALIGNMENT N/A 0 HR. Dry	BORING NO. B1-A (1)	STATION N/A	OFFSET N/A	ALIGNMENT N/A 0 HR. Dry
<b>COLLAR ELEV.</b> 2,669.0 ft	TOTAL DEPTH 95.3 ft	<b>NORTHING</b> 679,726	<b>EASTING</b> 854,819 <b>24 HR</b> . FIAD	<b>COLLAR ELEV.</b> 2,669.0 ft	TOTAL DEPTH 95.3 ft	<b>NORTHING</b> 679,726	<b>EASTING</b> 854,819 <b>24 HR</b> . FIAD
DRILL RIG/HAMMER EFF./DATE SU	JM3123 CME-550X 86% 11/18/2021	DRILL METHOD H	S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF/DATE SUN	VB123 CME-550X 86% 11/18/2021	DRILL METHOD H	I.S. Augers HAMMER TYPE Automatic
DRILLER M. Moseley	<b>START DATE</b> 02/08/22	COMP. DATE 02/08/22	SURFACE WATER DEPTH N/A	DRILLER M. Moseley	<b>START DATE</b> 02/08/22	COMP. DATE 02/08/22	SURFACE WATER DEPTH N/A
ELEV		OOT   SAMP.   L O   NO.   MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV (ft) DRIVE DEPTH BLOW COUNTY (ft) 0.5ft 0.5ft 0		OT SAMP. L O NO. MOI G	SOIL AND ROCK DESCRIPTION
(-7)		, , , , , , , , , , , ,	ELLY. (II)	(1)		, , , , , , , , , , , , , , , , , , , ,	
2670			2,669.0 GROUND SURFACE 0.0	2590	Match Line  24		RESIDUAL
			Offset 10' north of B1-A, augering to 73.8 ft bgs.				Hard, gray, orange, white, silty CLAY (A-7-5), micaceous, trace rock fragments (continued)
2665			-	2585 2,585.2 83.8 7 14	24		
							-
2660				2580 2,580.2 88.8			
				13 17	23	: ::::     w	_
2655				2575 2 575 2 02 0		: ::::     🔀	<u>-</u> -
2655			-	2575 2,575.2 93.8 12 41	48	•89. W	
			:				<ul> <li>Boring Terminated at Elevation 2,573.7 ft in</li> <li>Silty Clay (A-7-5)</li> </ul>
2650		<del>  </del>	-				- <del>-</del>
2645							
2640			-				
							-
2635							<u>-</u>
							-
2630		<del>    </del>	-				 -
							- -
2625		<del>  </del>	-				- <del>-</del>
2620							
			-				_
2615 2610 2610 2610 2600 2600 2600 2600 2600							
2615			_				
9.100							
2610			<u>.                                    </u>				<u></u>
							_
00 000r +							-
<u>  2005                                  </u>		<del>    </del>	-				 -
904 6			:				<u>-</u> -
<u> </u>		<del>  </del>	·				- -
0     1       1     2595       2.595.2     73.8			. 2,596.0				-
2000 2,000 17 17 17 M	23		Hard, gray, orange, white, slity CLAY (A-7-5),				_
			. micaceous, trace rock fragments .				
2590 2,590.2 78.8			•				



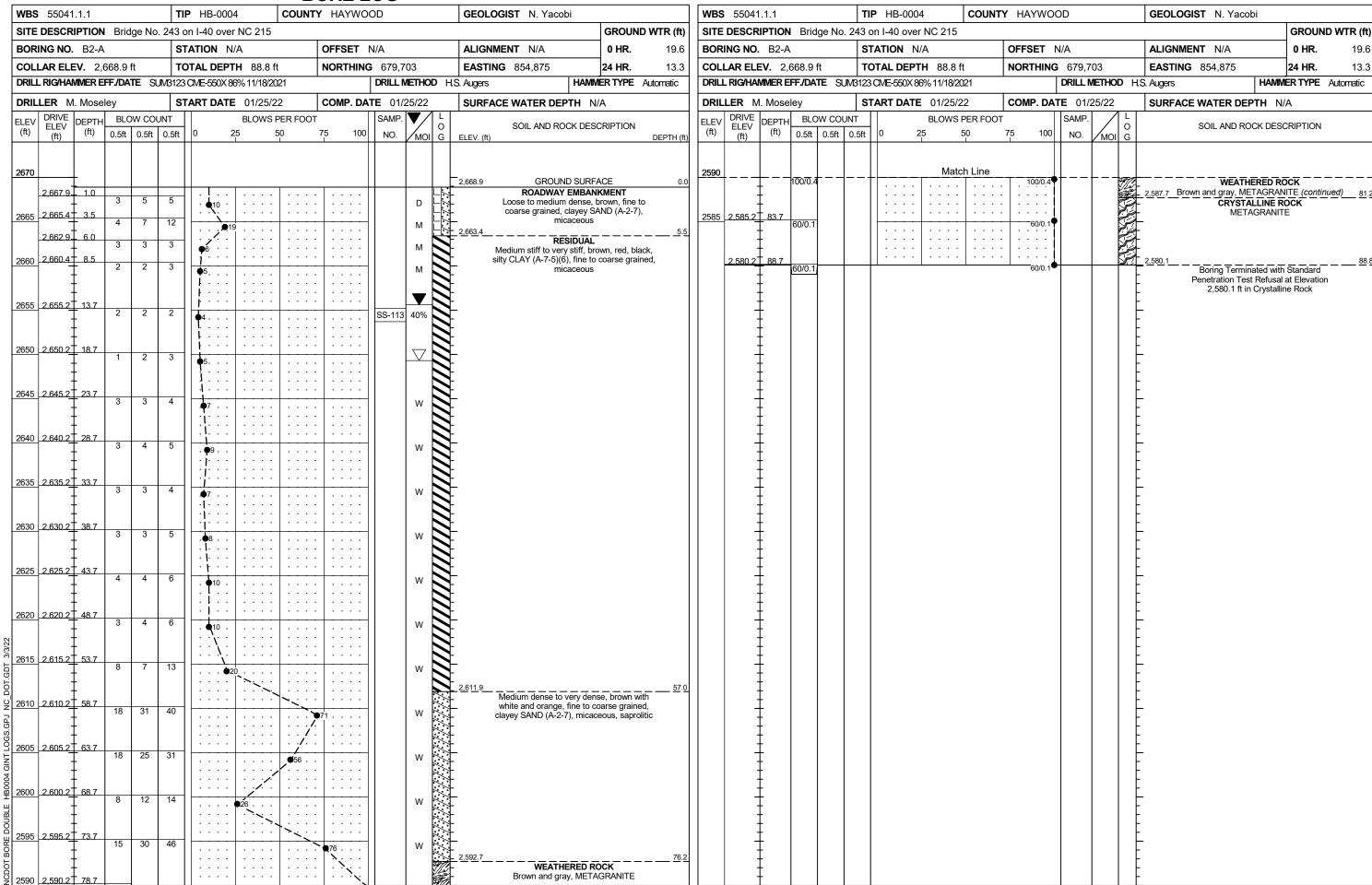
									UKE L						
WBS	55041	.1.1			Т	<b>IP</b> HB-000	4	COUNT	Y HAYWO	OD			GEOLOGIST N. Yacobi		
SITE	DESCR	IPTION	l Bric	dge No.	243	on I-40 ove	r NC 215							GROUN	ND WTR (ft)
BOR	ING NO.	B1-D	)		S	TATION N	/A		OFFSET	N/A			ALIGNMENT N/A	0 HR.	Dry
COLI	LAR ELE	<b>V.</b> 2,	669.9	ft	T	OTAL DEPT	<b>TH</b> 53.9 ft		NORTHING	679,6	25		<b>EASTING</b> 854,794	24 HR.	FIAD
DRILL	RIG/HAI	VIMER E	FF./DA	TE SU	M3123	3 CME-550X 8	6% 11/18/202	21		DRILL N	VIETHO	D H.S	S. Augers HAN	MER TYPE	Automatic
DRIL	LER M	. Mose	ley		S	TART DATE	01/25/22	2	COMP. DA	TE 01/2	27/22		SURFACE WATER DEPTH	N/A	
ELEV (ft)	DD1) /E	DEPTH (ft)	Ė	0.5ft	NT 0.5ft	0 2	BLOWS P		75 100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DE	SCRIPTION	DEPTH (ft)
2670	2,668.9	_ 1.0	2	3	4								2,669.9 GROUND SUF	NKMENT	0.0
2665	2,666.4 2,663.9		2	3	3	↑7 · · · · · · · · · · · · · · · · · · ·					D M		Loose, brown, red, clayey to medium grained,		
2660	2,661.4 	- - 8.5 -	2	2	3	•6···· •5					M M		2,662.9  RESIDUA  Medium stiff to stiff, darl brown, silty CLAY (A-7-5 sands, micao	red, dark gr ), trace medi	
2655	_2,656.1_ 	- 13.8	5	6	6	12-					М				
2650	_2,651.1_	18.8	5	3	5						М				
2645	2,646.1 	- 23.8 -	3	3	3	- <b>1</b> · · · · · · · · · · · · · · · · · · ·					w				
2640		- - 28.8 - -	3	3	5						w				
2635		- 33.8 -	4	5	9	14_	,,,,				w				
2630	2,631.1 -	- 38.8 -	21	79/0.3					100/0.8				. WEATHERED White, brown, C		<u>38.0</u>
2625	2,626.1 -	- 43.8 -	100/0.4	4					100/0.4						
2620		- - 48.8 - -	62	48/0.1					100/0.6						
	2,616.1	53.8	100/0.1						100/0.1				2,616.0	l' 0.010.0	53.9
													Boring Terminated at Elev Weathered Rock  .		



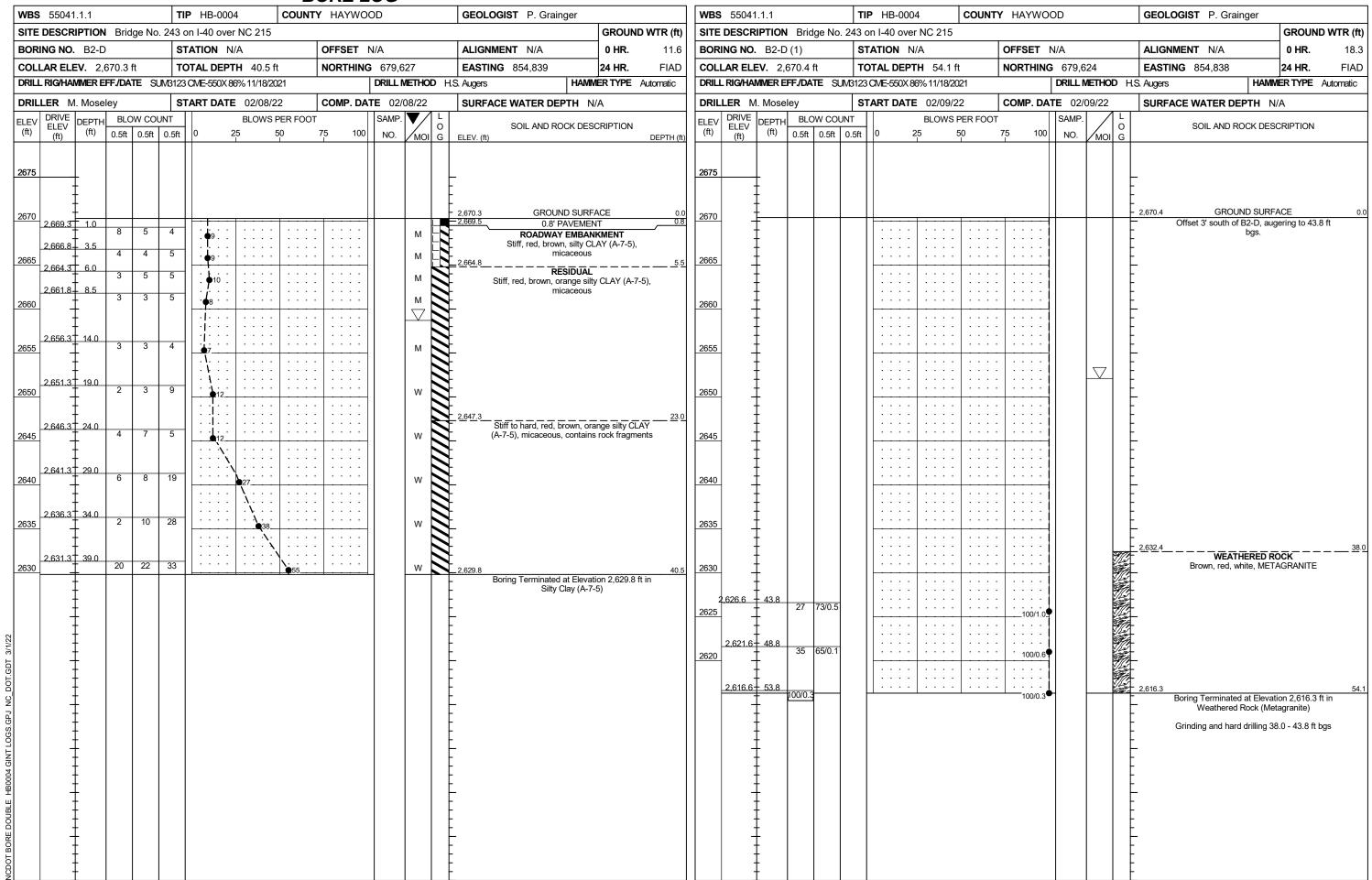


19.6

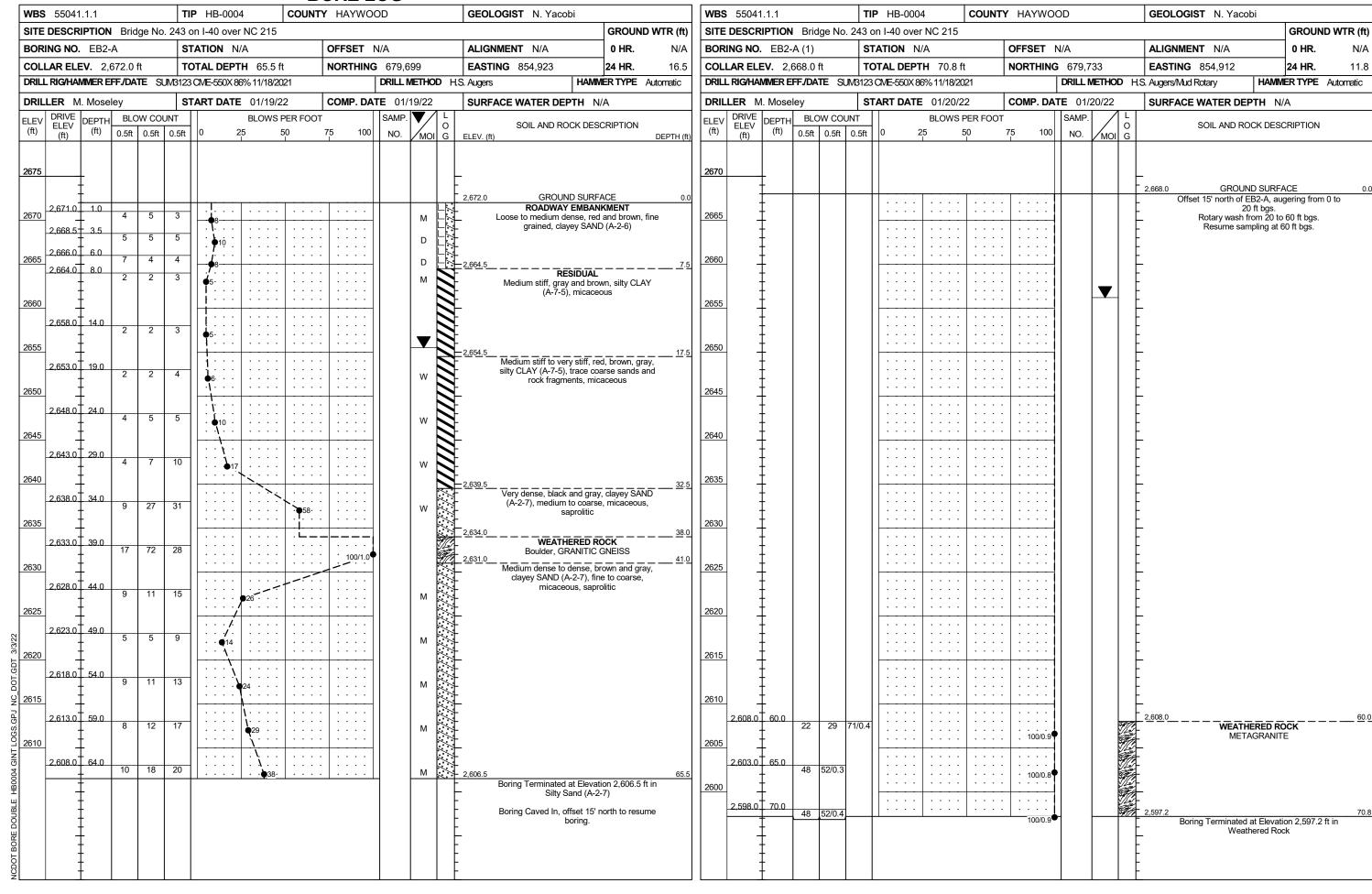
13.3

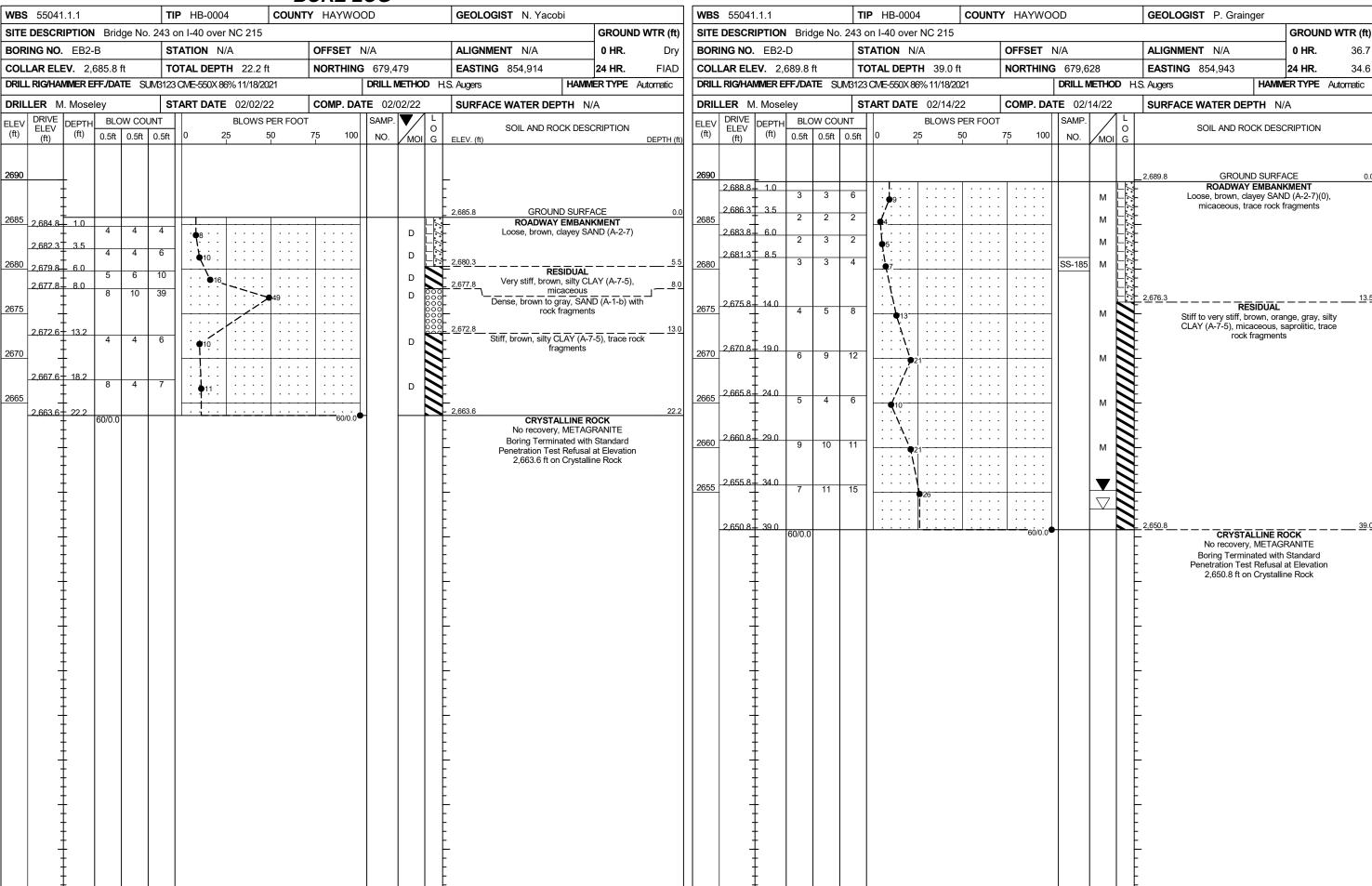


	<i>E</i>	BORE LOG				CORE LOG		
<b>WBS</b> 55041.1.1	TIP HB-0004 COUN	ITY HAYWOOD	GEOLOGIST N. Yacobi	<b>WBS</b> 55041.1.1	TIP HB-0004 COUN	ITY HAYWOOD	GEOLOGIST N. Yacobi	
SITE DESCRIPTION Bridge No. 2	1		GROUND WTR (I	SITE DESCRIPTION Bridge No.	243 on I-40 over NC 215			GROUND WTR (1
BORING NO. B2-B	STATION N/A	OFFSET N/A	ALIGNMENT N/A 0 HR. N/	BORING NO. B2-B	STATION N/A	OFFSET N/A	ALIGNMENT N/A	<b>0 HR.</b> N/
COLLAR ELEV. 2,670.2 ft	TOTAL DEPTH 31.6 ft	<b>NORTHING</b> 679,482	<b>EASTING</b> 854,843 <b>24 HR.</b> FIA		TOTAL DEPTH 31.6 ft	<b>NORTHING</b> 679,482	<b>EASTING</b> 854,843	<b>24 HR</b> . FIA
DRILL RIG/HAMMER EFF./DATE SUIV	/B123 CME-550X 86% 11/18/2021	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE SUN	/B123 CME-550X 86% 11/18/2021	DRILL METHOD	D H.S. Augers F	HAMMER TYPE Automatic
DRILLER M. Moseley	<b>START DATE</b> 02/02/22	COMP. DATE 02/03/22	SURFACE WATER DEPTH N/A	DRILLER M. Moseley	<b>START DATE</b> 02/02/22	COMP. DATE 02/03/22	SURFACE WATER DEPTH	l N/A
ELEV CFT DRIVE COUNTY CFT		400	SOIL AND ROCK DESCRIPTION	CORE SIZE NQ2	TOTAL RUN 10.0 ft	1.1		
(ft) (ft) 0.5ft 0.5ft 0	J.5π   0 25 50	75 100 NO. MOI G	ELEV. (ft) DEPTH	(ft) ELEV RUN ELEV (ft) DEPTH RUN (ft) DRILL RATE (Min/ft)	RUN   STRATA   REC.   RQD   (ft) (ft) (ft)   NO.   (ft) (ft) (ft)	D O G ELEV. (ft)	DESCRIPTION AND REMARKS	DEPTI
2675			_	2648.6			Begin Coring @ 21.6 ft	
				2,648.6 21.6 3.0 2:16 2:08	(2.5) (2.5) (8.8) (8.8) 83% 83% 88% 88%	2,648.6 Gray to dark of	CRYSTALLINE ROCK gray METAGRANITE, with large white q red to fresh, hard, no fractures, garnets	uartz bands, slightly
2670			L T 2,670.2 GROUND SURFACE	2.08 2.645 24.6 2.05 2.05 2.05 2.15 2.19 2.03	(4.3) (4.3) 86% 86%			
2,669.2 1.0	3 1			2.19	86% 86%	From 24.6 to 3 <sup>2</sup>	1.6 ft: Large quartz bands, abundant 2m	nm to 15 mm garnets.
2,667.2 3.0 4 4	4		2,667.2 RESIDUAL	2640 2,640.6 29.6 1:59 2,640.6 29.6 2:11 2,638.6 31.6 2.0 2:28 2,638.6 31.6 2.41	(20) (20)			
2,664.7 5.5 4 4	5		Medium stiff to very stiff, brown, orange, black, silty CLAY (A-7-5)	2,638.6 31.6 2:41	(2.0) (2.0) 100% 100%	2,638.6 Boring	GSI= 95-100 Terminated at Elevation 2,638.6 ft in Cr	vstalline Rock
2,662.2 8.0	. 🕶						Torrimated at Elovation 2,000.0 it in or	ystalline rook
2660	6   . • 11 .					<del> </del>		
<del></del>								
2,657.1 13.1 4 4	10	.				<u> </u>		
2655	14							
2.652.1 18.1								
2650	13 26	:   : : : :     M				-		
2,648.6 21.6 60/0.0		60/0.0	2,648.6 2 CRYSTALLINE ROCK	.6.				
		.	No recovery, METAGRANITE					
2645								
2640								
			2,638.6 3  Boring Terminated at Elevation 2,638.6 ft in	.6				
			- Crystalline Rock					
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CDOT BORE DOUBLE HB0004 GINT LOGS.GPJ NC_DOT.GDT 3/7/22			<del> -</del>  -	SORE   T		E		
			<u>-</u> -					
<u> </u>			-					



		BORE LOG					CORE LOG	
<b>WBS</b> 55041.1.1	TIP HB-0004 COUN	TY HAYWOOD	GEOLOGIST N. Yacobi		<b>WBS</b> 55041.1.1	TIP HB-0004 COUN	TY HAYWOOD	GEOLOGIST N. Yacobi
SITE DESCRIPTION Bridge No.	243 on I-40 over NC 215			GROUND WTR (ft)	SITE DESCRIPTION Bridge No. :	243 on I-40 over NC 215		GROUND WTR (
BORING NO. B2-E	STATION N/A	OFFSET N/A	ALIGNMENT N/A	<b>0 HR.</b> Dry	BORING NO. B2-E	STATION N/A	OFFSET N/A	ALIGNMENT N/A 0 HR. D
<b>COLLAR ELEV.</b> 2,670.8 ft	TOTAL DEPTH 34.4 ft	<b>NORTHING</b> 679,511	<b>EASTING</b> 854,844	24 HR. FIAD	<b>COLLAR ELEV.</b> 2,670.8 ft	TOTAL DEPTH 34.4 ft	<b>NORTHING</b> 679,511	<b>EASTING</b> 854,844 <b>24 HR</b> . FIA
DRILL RIG/HAMMER EFF./DATE SU	M3123 CME-550X 86% 11/18/2021	DRILL METHOD	I.S. Augers HAMME	R TYPE Automatic	DRILL RIG/HAMMER EFF./DATE SUN	VB123 CME-550X 86% 11/18/2021	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic
DRILLER M. Moseley	<b>START DATE</b> 02/02/22	COMP. DATE 02/02/22	SURFACE WATER DEPTH N/A	A	DRILLER M. Moseley	<b>START DATE</b> 02/02/22	<b>COMP. DATE</b> 02/02/22	SURFACE WATER DEPTH N/A
ELEV DRIVE DEPTH BLOW COU	BLOWS PER FO		SOIL AND ROCK DESCF	RIPTION	CORE SIZE NQ2	TOTAL RUN 5.1 ft		
(ft) (ft) (ft) 0.5ft 0.5ft	0.5ft 0 25 50		ELEV. (ft)	DEPTH (ft)	ELEV RUN DEPTH RUN DRILL RATE	RUN   STRATA   REC.   RQI   REC.   RQI   NO.   (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)	L 0	DESCRIPTION AND REMARKS
					(ft) ELEV (ft) (ft) RATE (Min/ft)	(ft) (ft) NO. (ft) (ft) (ft) %	G ELEV. (ft)	DEPTH
2675			_		2641.5	(0.5) (0.0) (1.6) (0.8	26415	Begin Coring @ 29.3 ft CRYSTALLINE ROCK
			<u>-</u>		2640 2,641.5 29.3 1.0 1.55 2,640.5 30.3 4.1 3:50 2.00 1.33 2,636.4 34.4 2:54	(0.5) (0.0) (1.6) (0.8 50% 0% 31% 16%	2,641.5 Dark gray to gray	/ METAGRANITE, slightly weathered to fresh, moderately
2670			2,670.8 GROUND SURFAC	CE 0.0	2,636.4 + 34.4   2.54	(1.1) (0.8) 27% 20%	2,636.4	hard, close fracture spacing
2670 2,669.8 1.0 5 5	7 . •12		RESIDUAL  Medium stiff to very stiff, browr CLAY (A-7-5), micace	n, orange, silty	2,030.4 34.4 2.34		2,030.4	3
2,667.3 3.5 3 3	$\frac{}{3} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{vmatrix} = \frac{1}{2} \begin{vmatrix} 1$		L CLAY (A-7-5), micace	eous			Boring Te	GSI= 75 - 80 rminated at Elevation 2,636.4 ft in Crystalline Rock
2665 2,664.8 6.0	<b>T</b> 6		<u>-</u>					·
2.662.3 7 8.5	5	1 1 1	<u>-</u>		+		-	
2660	7   . •11 .	:   : : : :     M	-					
	1		<del>-</del> -					
2,657.2 13.6 9 12	10	.	-					
2655			- -					
2,652.2 18.6	:::/: :::: :::		<del>-</del> -				-	
2650	6 . •12		-					
+	· · · · · · · · · · · · · · · · · · ·			22.0			<u> </u>	
2,647.2 23.6 100/0.4		100/0.4	Dark brown, METAGRA					
2645			<del>-</del>					
2 642 2 7 28 6			-				-	
2,642.2		1 100/0.2	CRYSTALLINE RO	29.3 PCK				
			METAGRANITE				<u> </u>	
1   1			2,636.4	34.4				
			Boring Terminated at Elevation Crystalline Rock	n 2,636.4 ft in				
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WBS	55041.1.1			TI	<b>IP</b> HB-0004	COUNT	Y HAYWO	DD			GEOLOGIST N. Yacobi			
SITE	DESCRIPTION	l Brid	lge No	243	on I-40 over NC 21	5						GROUN	D WTR (ft)	
BORING NO. EB2-E					TATION N/A	OFFSET 1	N/A			ALIGNMENT N/A	0 HR.	Dry		
<b>COLLAR ELEV.</b> 2,690.4 ft					OTAL DEPTH 36.4	NORTHING	679,5	15		<b>EASTING</b> 854,922	24 HR.	FIAD		
DRILL RIG/HAMMER EFF/DATE SUM				JM3123	3 CME-550X 86% 11/18		DRILL IV	<b>IETHO</b>	D H.S	S. Augers HAI	/IMER TYPE	MER TYPE Automatic		
DRIL	LER M. Mose	lev		S	TART DATE 02/01	/22	COMP. DA	Γ <b>E</b> 02/0	)1/22		SURFACE WATER DEPTH	N/A		
ELEV (ft)	DRIVE ELEV (ft) DEPTH (ft)	BLC	0.5ft	!		S PER FOOT		SAMP.	MOI	L O G	SOIL AND ROCK DE		DEPTH (ft)	
2695										  -  -  -	- 2,690.4 GROUND SUF	PEACE	0.0	
2690	2,689.4 1.0	3	4	4	•8				М		ROADWAY EMBA Loose, red, brown, claye	NKMENT y SAND (A-2-		
2685	2,686.9 3.5 2,684.4 6.0	2	4	3	7				М		Loose, brown, black, orar (A-2-7), mica	ige, clayey SA	/	
	2,681.9 8.5	3	3	5	7				M					
2680	1 1			Ü	\				М		-		42.0	
2675	2,676.9 13.5	6	7	10	· · · · · · · · · · · · · · · · · · ·				D		2,677.4 RESIDUA Stiff to hard, brown, silt			
	2,671.9 18.5	6	6	7					Б.					
2670	1 1			,	13.				D		-			
2665	2,666.9 23.5	16	21	27		48			D		-			
	2,661.9 28.5	5	9	10										
2660	†		9	10	19				М		-			
2655	2,656.9 33.5	66	34/0.1				100/0.6				2,657.4 WEATHERED Gray, METAGE		33.0	
	2.654.1 36.3	60/0.1	$\vdash$				60/0.1	1		V/)-/	2,654.1 2,654.0 CRYSTALLINE		36.3 \36.4	
	† † † †									-	No recovery, MET. Boring Terminated v Penetration Test Refu: 2,654.0 ft in Cryst	ith Standard al at Elevation		
	Ī									-				
	1 1										-			
	‡									-				
										-	-			
	<u> </u>									<u> </u>	-			
											-			
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	‡													

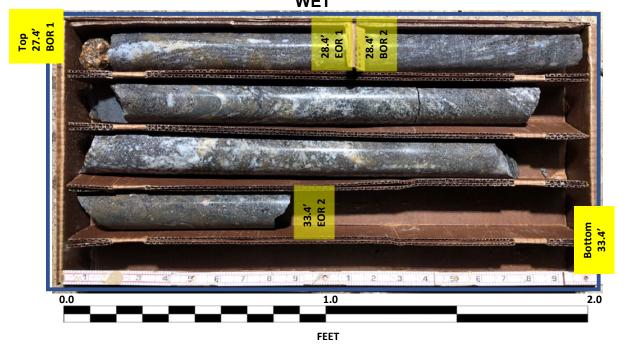
SHEET 18

#### CORE PHOTOGRAPHIC RECORD

#### 55041.1.1 (HB-0004)

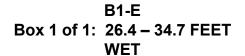
#### Bridge No. 243 on I-40 over NC 215 (Champion Road)

B1-B Box 1 of 1: 27.4 – 33.4 FEET WET



B-2B Box 1 of 1: 21.6 – 31.6 FEET WET







B-2E Box 1 of 1: 29.3 – 34.4 FEET WET



PROJECT REFERENCE NO. SHEET NO. HB-0004

SOIL TEST RESULTS



HDR Engineering, Inc. of the Carolinas 555 Fayetteville St, Suite 900 Raleigh, N.C. 27601 N.C.B.E.L.S. License Number: F-0116

SOIL TEST RESULTS																
BORING	SAMPLE	OFFSET	STATION	DEPTH	AASHTO	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	NO.	OFFSEI		INTERVAL	CLASS.			C. SAND	F. SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
EB1- A	SS- 9	N/A	N/A	33. 4′ - 34. 9′	A- 5( 1)	46	3	23. 4	29.4	34.0	13. 2	97.1	84.4	51.4	54	-
EB1- B	SS- 23	N/A	N/A	23. 6′ - 25. 1′	A- 2-6(1)	39	16	34.4	22. 1	<i>32.</i> 6	10.9	52. 1	38.7	24.7	N/A	-
B1- B	SS-83	N/A	N/A	8.5′ - 10.0′	A-7-5(6)	56	12	23. 3	26.3	31.1	19. 3	98. 1	83. 1	54.6	40	-
B2- A	SS- 113	N/A	N/A	13. 7′ - 15. 2′	A-7-5(6)	44	12	18.7	21.3	37.9	22. 1	91.5	77.6	58.3	40	-
EB2- D	SS- 185	N/A	N/A	8. 5' - 10. 0'	A- 2-7(0)	43	12	38.5	28.7	20. 1	12.7	85. 1	63.4	29.7	N/A	-

## Site Photographs



Photo 1: Looking South towards End Bent 1 and Bent 1



Photo 3: Looking East towards End Bent 2 and Bent 2 under Bridge 243



Photo 2: Looking North towards End Bent 2 and Bent 2



Photo 4: Looking southwest towards End Bent 1 and Bent 1 under Bridge 243