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REFERENCE: B-5810

PROJECT: 45764

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY CABARRUS
 SITE DESCRIPTION BRIDGE NO. 22 ON NC 24/27 EBL
OVER ROCKY RIVER

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5810	1	33

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 (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

PERSONNEL

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DATE JULY 2019



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957A789AED704CB
7/30/2019

SIGNATURE DATE

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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 BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: WEATHERED ROCK (WR) CRYSTALLINE ROCK (CR) NON-CRYSTALLINE ROCK (NCR) COASTAL PLAIN SEDIMENTARY ROCK (CP)										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. 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 SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. 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 FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. 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 THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. 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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																			
MINERALOGICAL COMPOSITION										COMPRESSION										WEATHERING																			
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.																			
PERCENTAGE OF MATERIAL										GROUND WATER										PERCENTAGE OF MATERIAL																			
ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL										WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP										TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE																			
CONSISTENCY OR DENSENESS										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																			
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DPT DMT VST TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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 PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ROCK HARDNESS																			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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 PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.																			
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HL - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLL. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED % - UNIT WEIGHT % - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS SS - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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 PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.																			
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										ROCK HARDNESS																			
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH										DRILL UNITS: CME-45C, CME-55, CME-550, VANE SHEAR TEST, PORTABLE HOIST, CME-550X ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG.-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE * STEEL TEETH, TRICONE * TUNG.-CARB., CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, H, N HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. 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 PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.																			
COLOR										FRACTURE SPACING										ROCK HARDNESS																			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.15 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET																			
INDURATION										FRACTURE SPACING										ROCK HARDNESS																			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																													
NOTES:										FRACTURE SPACING										ROCK HARDNESS																			
NM= NOT MEASURED										BENCH MARK: BL -6; -BL - 19+41.82; N: 551070.2340, E: 1559978.6410 B-5810-3; -BL - 24+90.80; N:550880.752, E: 1560493.888 BL-6 ELEVATION: 504.22 FEET B-5810-3 ELEVATION: 505.48 FEET																													

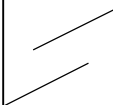
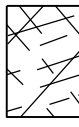
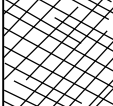
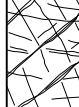



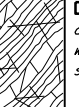

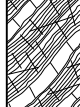


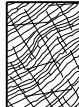

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT**

SUBSURFACE INVESTIGATION

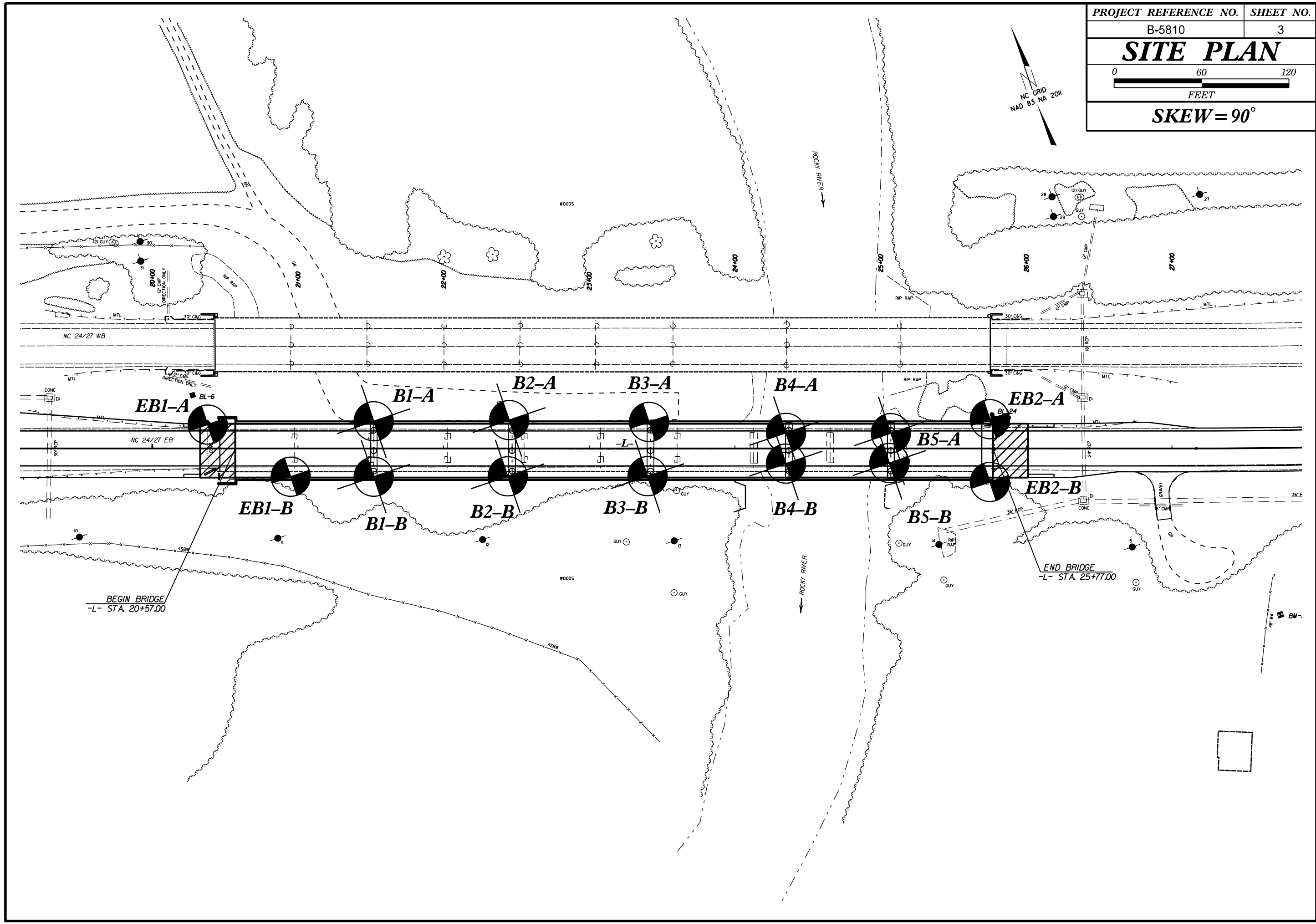
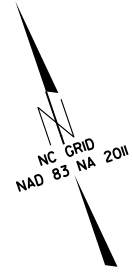
**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

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

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

	SURFACE CONDITIONS						SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)					
GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)	VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)	VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings	
STRUCTURE	DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE						
 <p>INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities</p>	90			N/A	N/A	 <p>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.</p>	70					
 <p>BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets</p>	80	70				 <p>B. Sandstone with thin inter-layers of siltstone</p>	60	50	40	30	20	
 <p>VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets</p>		60	50			 <p>C. Sandstone and siltstone in similar amounts</p>		40	30	20	10	
 <p>BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity</p>			40	30		 <p>D. Siltstone or silty shale with sandstone layers</p>			30	20	10	
 <p>DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces</p>				20		 <p>E. Weak siltstone or clayey shale with sandstone layers</p>				20	10	
 <p>LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes</p>	N/A	N/A			10	 <p>F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure</p>				10		
						 <p>G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers</p>					10	
						 <p>H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.</p>					10	
						→ Means deformation after tectonic disturbance						

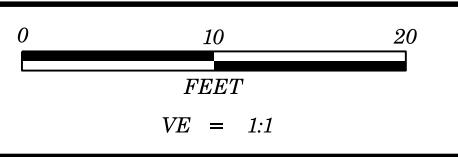
PROJECT REFERENCE NO.	SHEET NO.
B-5810	3
SITE PLAN	
FEET	
SKEW = 90°	



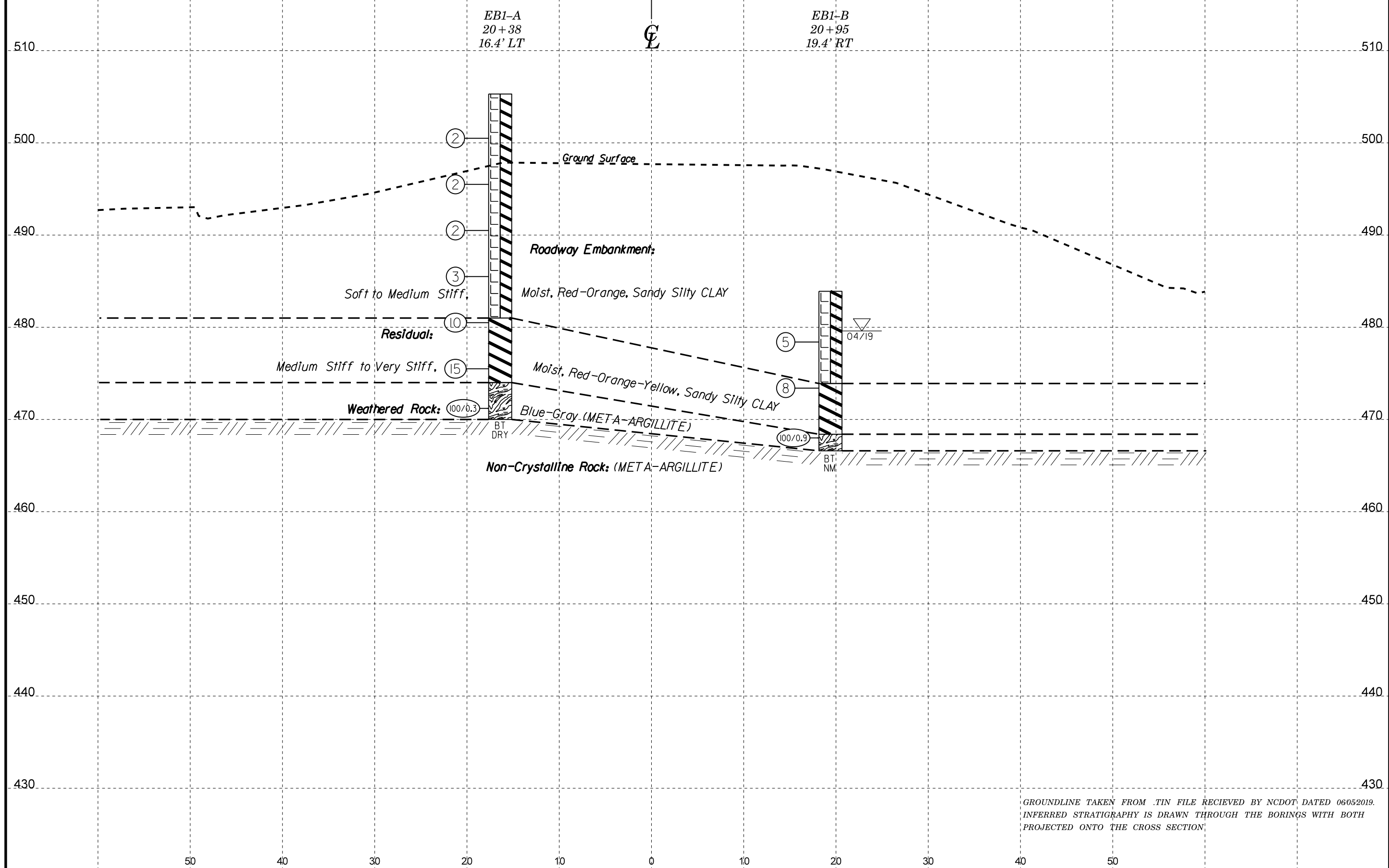
BEGIN BRIDGE
-L- STA. 20+57.00

END BRIDGE
-L- STA. 25+77.00

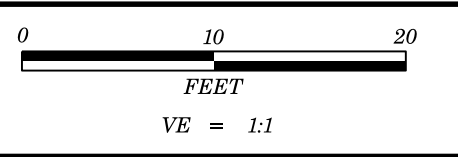
BM-



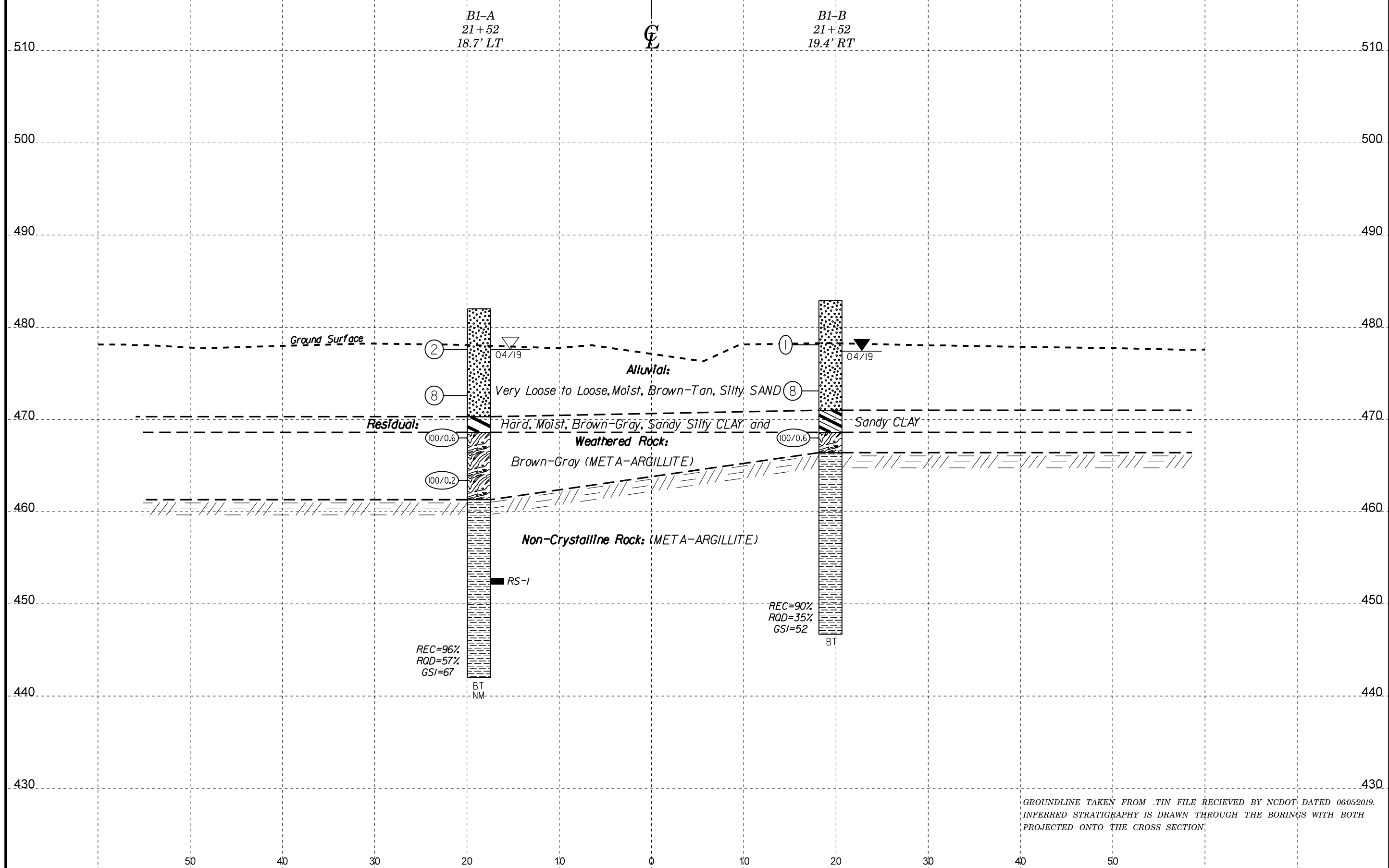
PROJECT REFERENCE NO.	SHEET NO.
B-5810	4
CROSS SECTION THROUGH END BENT 1	
AT -L- STATION 20+57	
SKEW=90°	



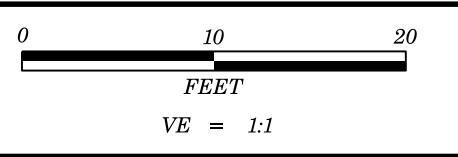
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 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION



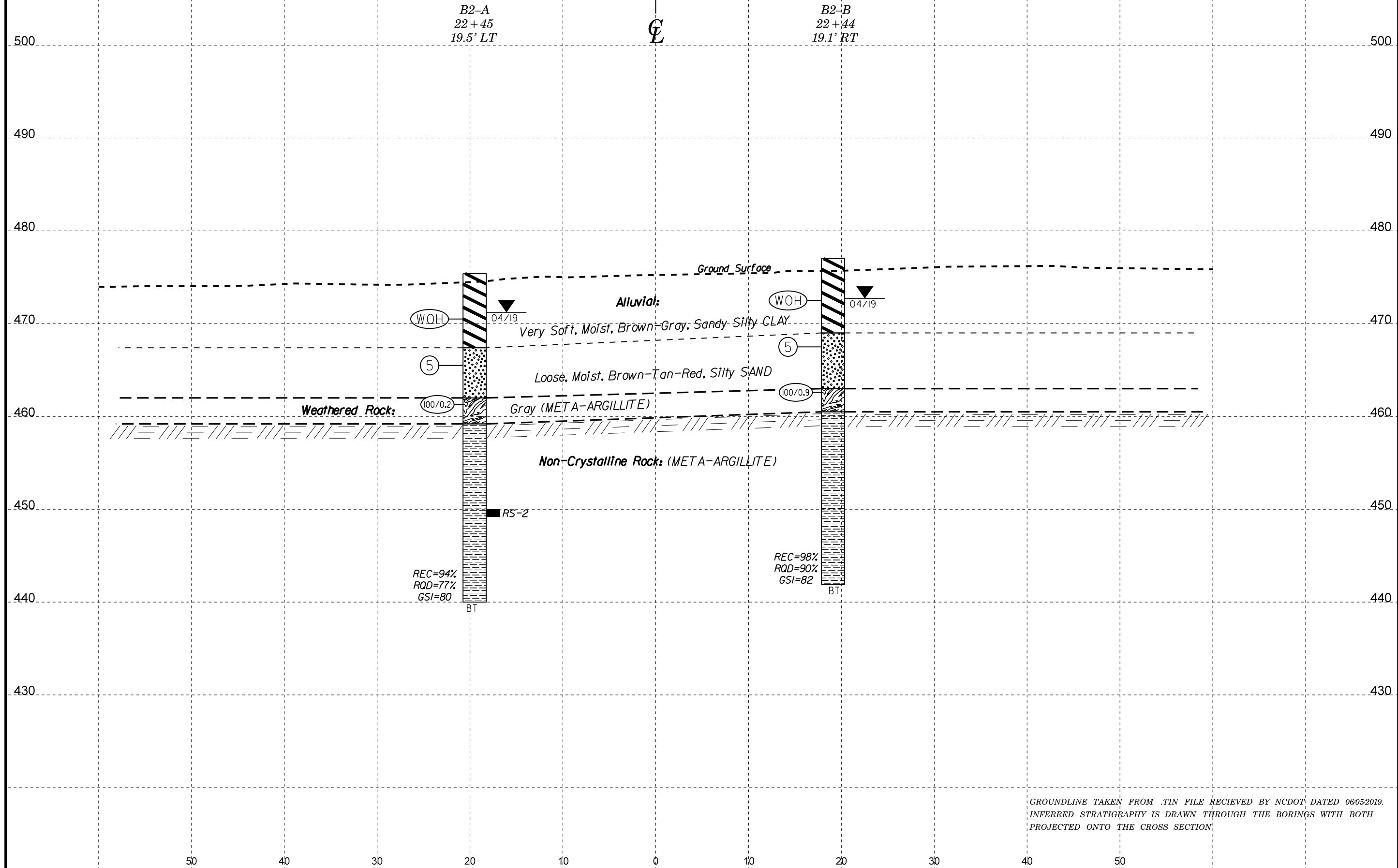
PROJECT REFERENCE NO.	SHEET NO.
B-5810	5
CROSS SECTION THROUGH BENT 1	
AT -L- STATION 21+52	
SKEW=90°	



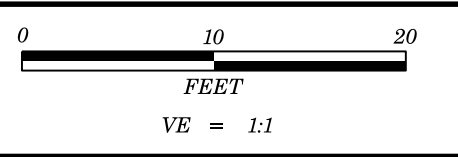
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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



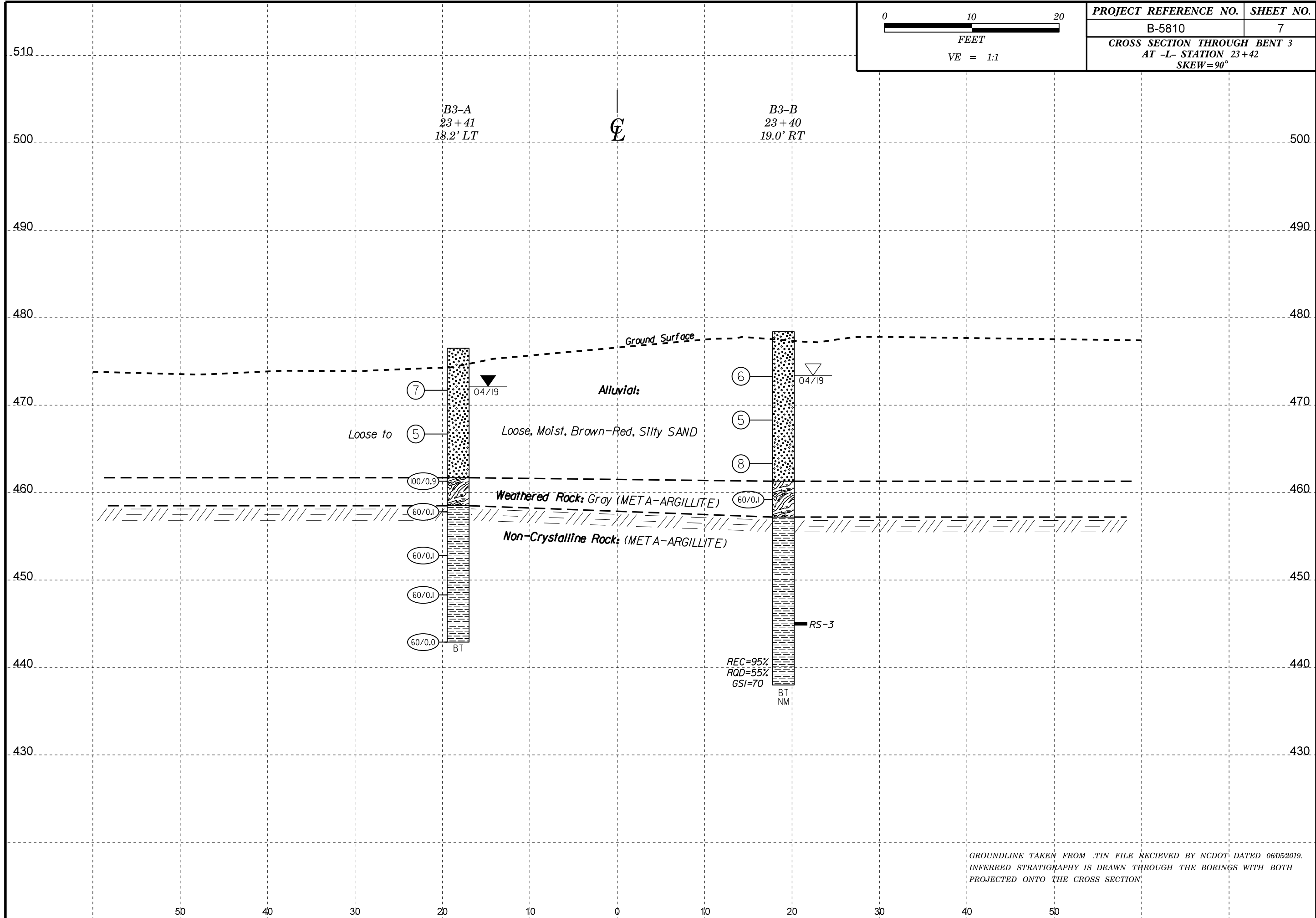
PROJECT REFERENCE NO.	SHEET NO.
B-5810	6
CROSS SECTION THROUGH BENT 2	
AT -L- STATION 22+47	
SKEW=90°	



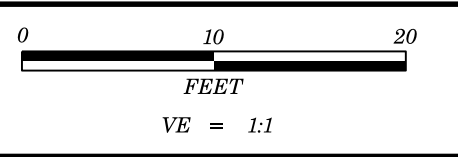
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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



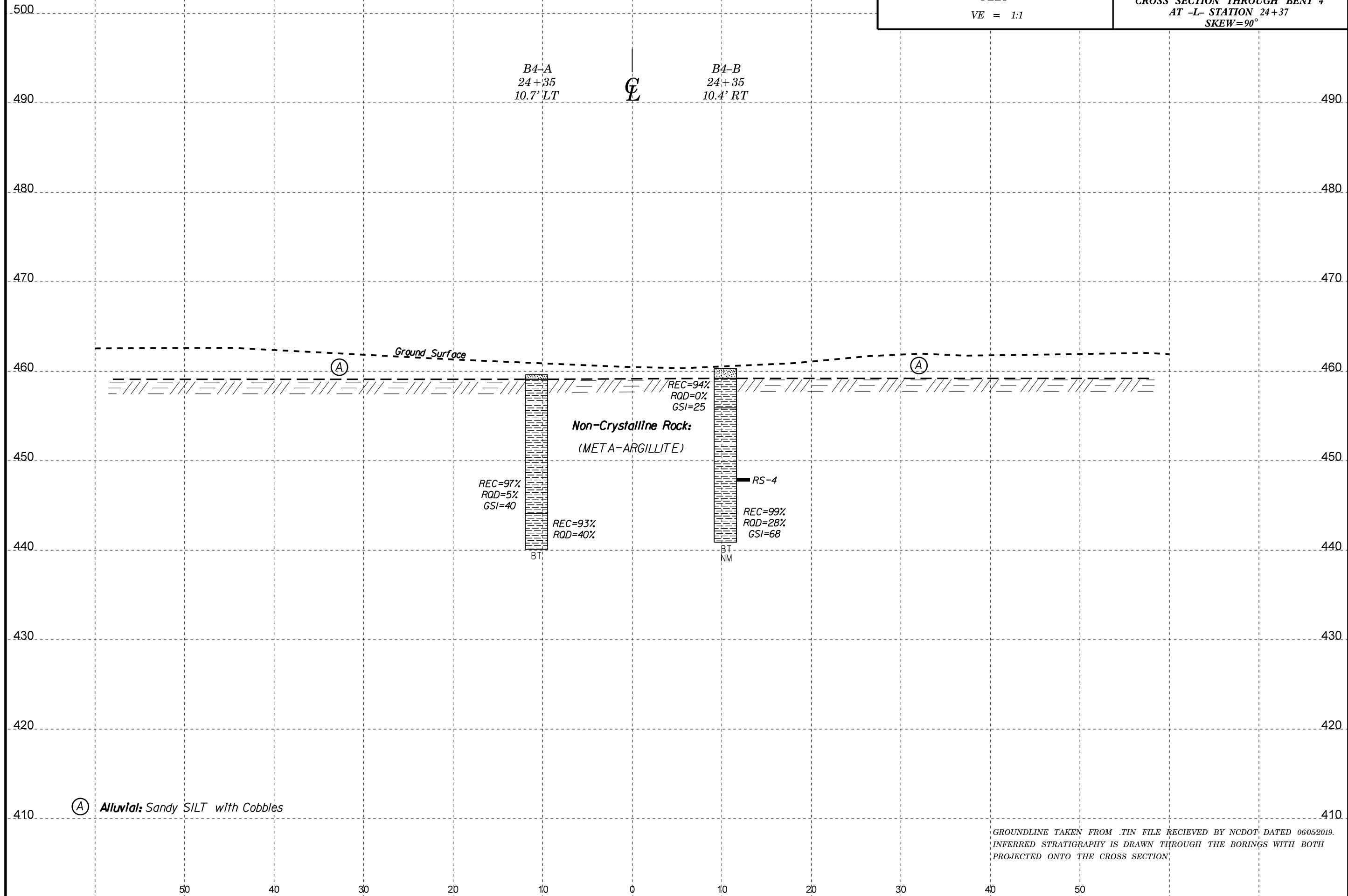
PROJECT REFERENCE NO.	SHEET NO.
B-5810	7
CROSS SECTION THROUGH BENT 3 AT -L- STATION 23+42 SKEW=90°	



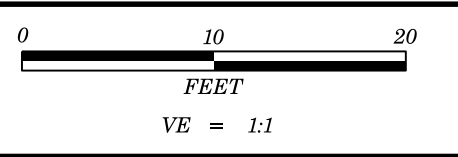
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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



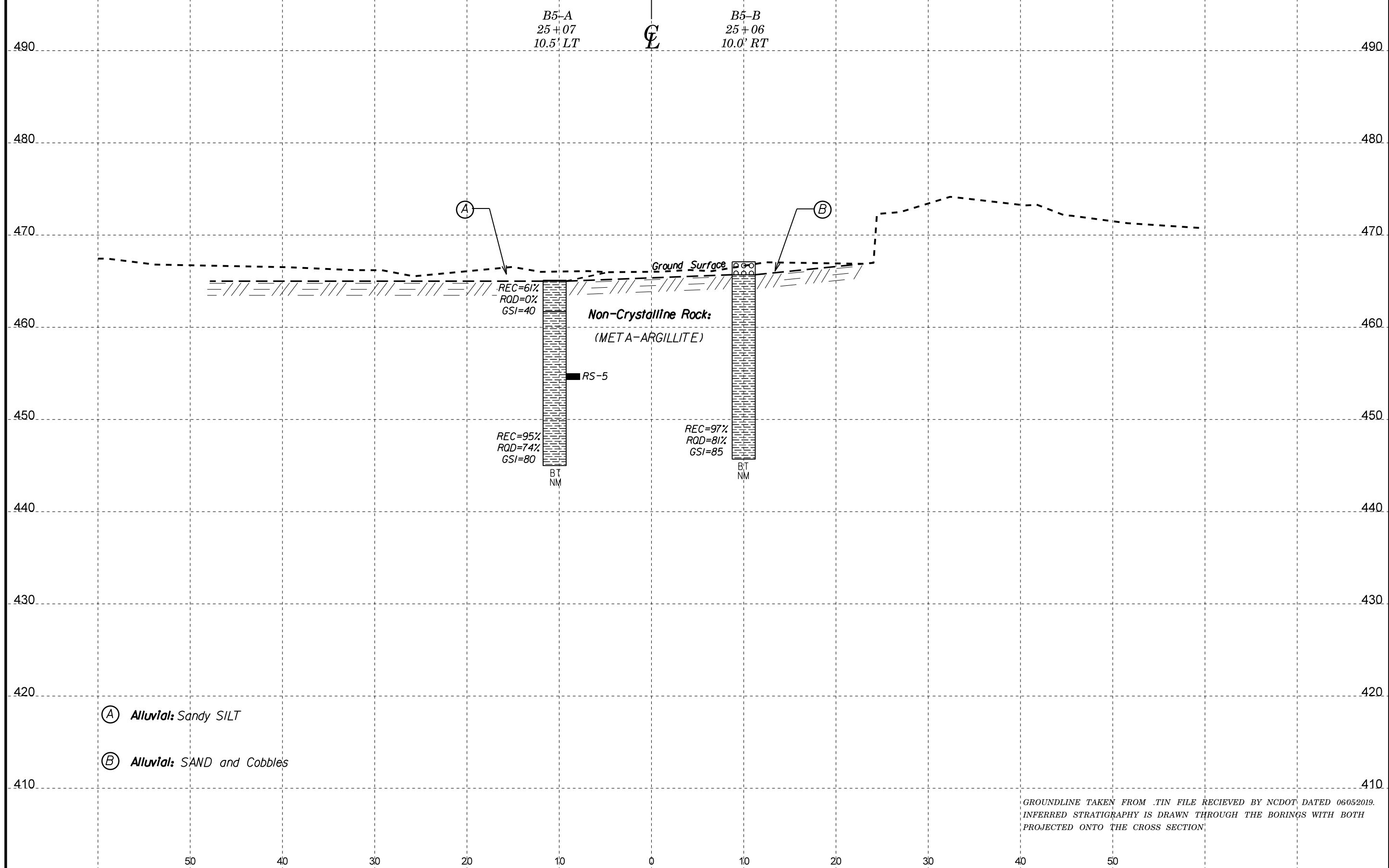
PROJECT REFERENCE NO.	SHEET NO.
B-5810	8
CROSS SECTION THROUGH BENT 4	
AT -L- STATION 24+37	
SKEW=90°	



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 06/05/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



PROJECT REFERENCE NO.	SHEET NO.
B-5810	9
CROSS SECTION THROUGH BENT 5	
AT -L- STATION 25+07	
SKEW=90°	



B5-A
25+07
10.5' LT

B5-B
25+06
10.0' RT

REC=61%
RQD=0%
GSI=40

REC=97%
RQD=81%
GSI=85

REC=95%
RQD=74%
GSI=80

Non-Crystalline Rock:
(META-ARGILLITE)

BT
NM

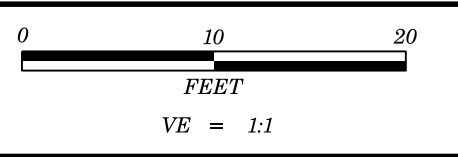
BT
NM

RS-5

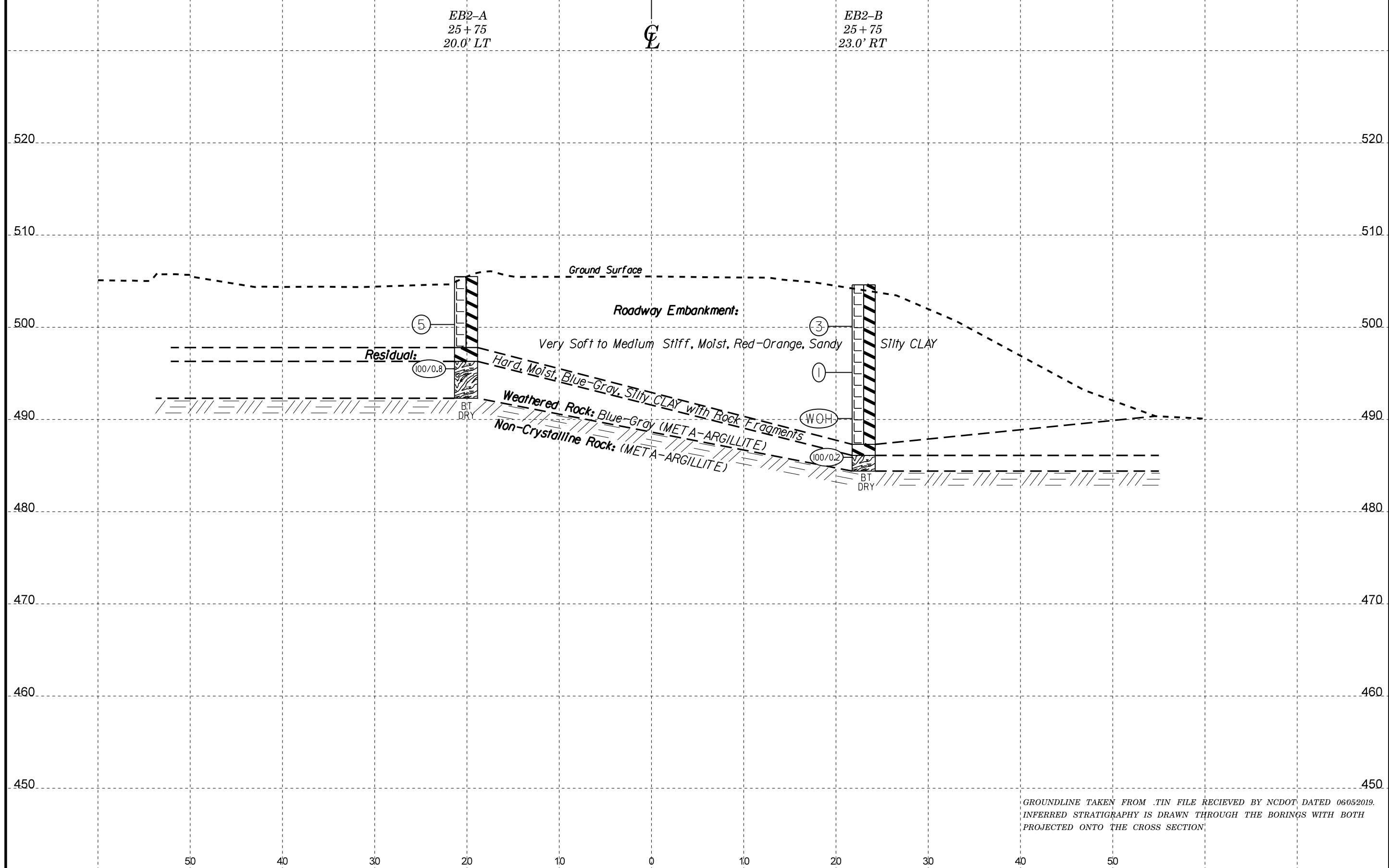
(A) Alluvial: Sandy SILT

(B) Alluvial: SAND and Cobbles

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 06/05/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



PROJECT REFERENCE NO.	SHEET NO.
B-5810	10
CROSS SECTION THROUGH END BENT 2	
AT -L- STATION 25+77	
SKEW=90°	



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 06/05/2019.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT

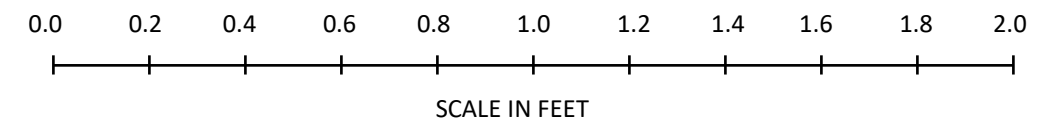
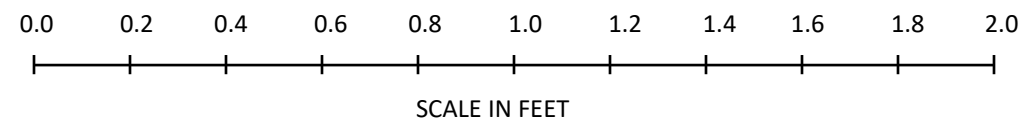
BORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. EB1-A		STATION 20+38		OFFSET 16 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 505.3 ft		TOTAL DEPTH 35.3 ft		NORTHING 551,048		EASTING 1,559,982									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/07/19		COMP. DATE 04/07/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
510															
505														505.3	0.0
500	501.5	3.8	WOH	WOH	2							M			
495	496.5	8.8	WOH	1	1							M			
490	491.5	13.8	WOH	1	1							M			
485	486.5	18.8	3	1	2							M			
480	481.5	23.8	3	5	5							M		481.0	24.3
475	476.5	28.8	9	4	11							M		474.0	31.3
470	471.5	33.8	100/0.3											470.0	35.3

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. EB1-B		STATION 20+95		OFFSET 19 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 483.9 ft		TOTAL DEPTH 17.3 ft		NORTHING 550,996		EASTING 1,560,024									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/07/19		COMP. DATE 04/07/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
485															
480	479.4	4.5	1	2	3							M		483.9	0.0
475	474.4	9.5	1	3	5							M		473.9	10.0
470	469.4	14.5	18	15	85/0.4									468.4	15.5
														466.6	17.3

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B1-A 21+52, 18.7' LT



GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

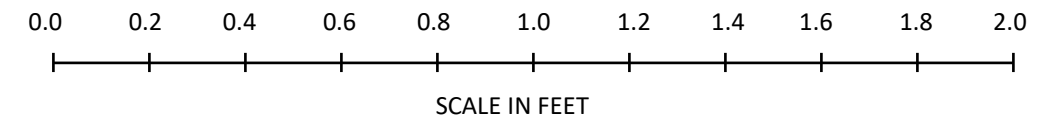
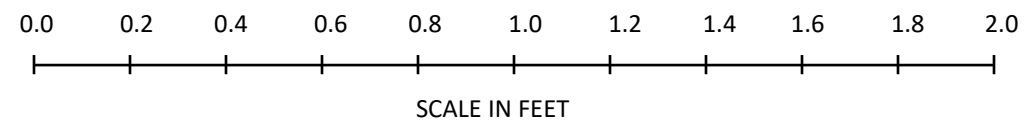
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.										
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)									
BORING NO. B1-B		STATION 21+52		OFFSET 19 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 482.9 ft		TOTAL DEPTH 36.2 ft		NORTHING 550,977		EASTING 1,560,078										
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic										
DRILLER Smith, C. L.		START DATE 04/05/19		COMP. DATE 04/05/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
485														482.9	GROUND SURFACE	0.0
480	479.1	3.8	1	0	1										ALLUVIAL Brown-Tan, Silty SAND	
475	474.1	8.8	2	4	4											
470	469.1	13.8	12	41	59/0.1									471.0	RESIDUAL Brown-Gray, Sandy CLAY	11.9
465														468.6	WEATHERED ROCK Brown-Gray (META-ARGILLITE)	14.3
460														466.4	NON-CRYSTALLINE ROCK (META-ARGILLITE)	16.5
455																
450																
														446.7	Boring Terminated at Elevation 446.7 ft in Non-Crystalline Rock (META-ARGILLITE)	36.2

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)				
BORING NO. B1-B		STATION 21+52		OFFSET 19 ft RT		ALIGNMENT -L-					
COLLAR ELEV. 482.9 ft		TOTAL DEPTH 36.2 ft		NORTHING 550,977		EASTING 1,560,078					
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic					
DRILLER Smith, C. L.		START DATE 04/05/19		COMP. DATE 04/05/19		SURFACE WATER DEPTH N/A					
CORE SIZE NX			TOTAL RUN 19.7 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
466.4	466.4	16.5	4.7	0:44/1.0 0:41/1.0 0:52/1.0 0:47/1.0 0:00/0.7	(3.1) 66%	(2.1) 45%		(17.8) 90%	(6.8) 35%		Begin Coring @ 16.5 ft
465	461.7	21.2	5.0	0:46/1.0 0:39/1.0 0:44/1.0 0:50/1.0 0:37/1.0	(5.0) 100%	(1.6) 32%					NON-CRYSTALLINE ROCK Gray to Brown, Moderately Severly Weathered to Fresh, Moderately Hard to Hard, META-ARGILLITE with Very Close to Moderately Close Fracture Spacing GSI=52
460	456.7	26.2	5.0	0:39/1.0 0:41/1.0 0:47/1.0 0:40/1.0 0:42/1.0	(4.7) 94%	(0.0) 0%					
455	451.7	31.2	5.0	0:48/1.0 0:41/1.0 0:53/1.0 0:44/1.0 0:49/1.0	(5.0) 100%	(3.1) 62%					
450	446.7	36.2									Boring Terminated at Elevation 446.7 ft in Non-Crystalline Rock (META-ARGILLITE)

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B1-B 21+52, 19.4' RT



GEOTECHNICAL BORING REPORT BORE LOG

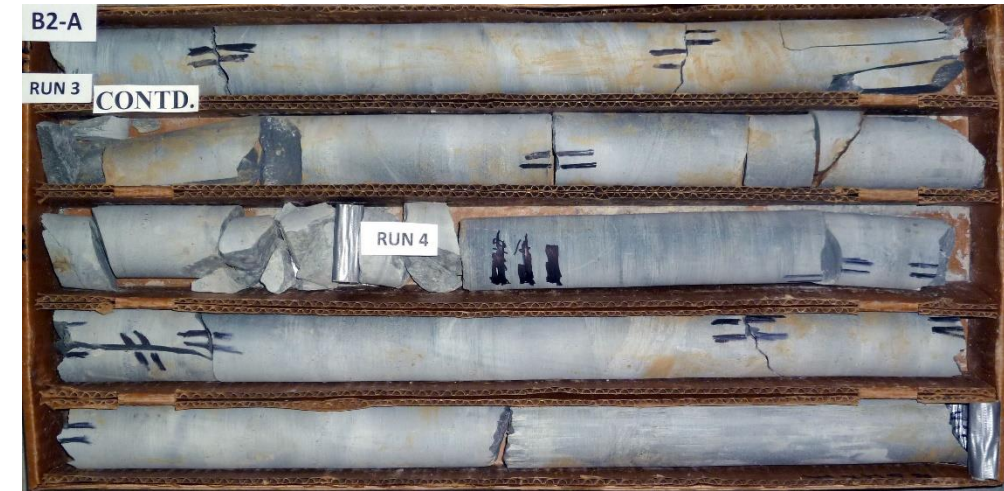
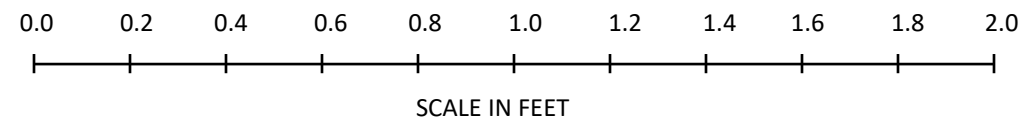
GEOTECHNICAL BORING REPORT CORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. B2-A		STATION 22+45		OFFSET 20 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 475.4 ft		TOTAL DEPTH 35.4 ft		NORTHING 550,984		EASTING 1,560,179									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/30/19		COMP. DATE 04/30/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
480															
475														475.4	GROUND SURFACE
470	471.5	3.9	WOH	WOH	WOH										ALLUVIAL Brown-Gray, Sandy Silty CLAY
465	466.5	8.9	1	2	3									467.4	Brown-Tan-Red, Silty SAND
460	461.5	13.9	100/0.2											462.0	WEATHERED ROCK Gray (META-ARGILLITE)
455														459.2	NON-CRYSTALLINE ROCK (META-ARGILLITE)
450															
445															
440														440.0	Boring Terminated at Elevation 440.0 ft in Non-Crystalline Rock (META-ARGILLITE)

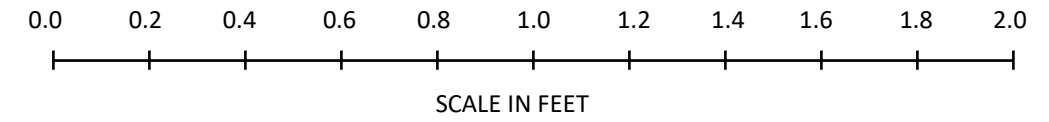
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)					
BORING NO. B2-A		STATION 22+45		OFFSET 20 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 475.4 ft		TOTAL DEPTH 35.4 ft		NORTHING 550,984		EASTING 1,560,179						
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 04/30/19		COMP. DATE 04/30/19		SURFACE WATER DEPTH N/A						
CORE SIZE NX			TOTAL RUN 19.2 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
459.2	459.2	16.2	4.2	0:59/1.0 1:07/1.0 1:15/1.0 1:20/1.0 1:18/0.2	(3.5) 83%	(3.0) 71%		(18.0) 94%	(14.8) 77%		Begin Coring @ 16.2 ft NON-CRYSTALLINE ROCK Gray, Very Slightly Weathered to Fresh, Hard, META-ARGILLITE with Close to Wide Fracture Spacing GSI=80	16.2
455	455.0	20.4	5.0	1:21/1.0 1:23/1.0 1:20/1.0 1:24/1.0 1:25/1.0	(4.5) 90%	(4.0) 80%						
450	450.0	25.4	5.0	1:31/1.0 1:21/1.0 1:24/1.0 1:27/1.0 1:30/1.0	(5.0) 100%	(3.1) 62%	RS-2					
445	445.0	30.4	5.0	1:27/1.0 1:19/1.0 1:22/1.0 1:27/1.0 1:30/1.0	(5.0) 100%	(4.7) 94%						
440	440.0	35.4										440.0
Boring Terminated at Elevation 440.0 ft in Non-Crystalline Rock (META-ARGILLITE)												

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B2-A 22+45, 19.5' LT

Begin
16.2 feet



End
35.4 feet



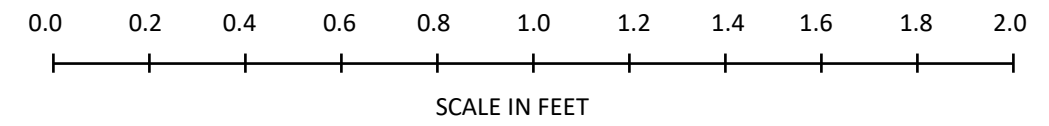
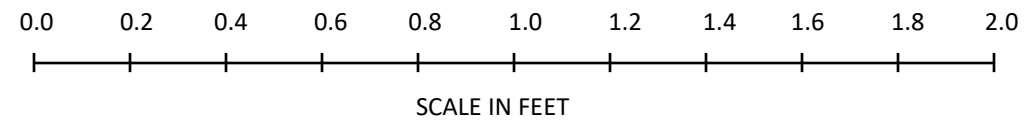
GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.										
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River								GROUND WTR (ft)								
BORING NO. B2-B		STATION 22+44		OFFSET 19 ft RT		ALIGNMENT -L-		0 HR.	4.6							
COLLAR ELEV. 477.0 ft		TOTAL DEPTH 35.1 ft		NORTHING 550,948		EASTING 1,560,165		24 HR.	4.3							
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic										
DRILLER Smith, C. L.		START DATE 04/01/19		COMP. DATE 04/01/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
480																
475																
470																
465																
460																
455																
450																
445																

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River								GROUND WTR (ft)				
BORING NO. B2-B		STATION 22+44		OFFSET 19 ft RT		ALIGNMENT -L-		0 HR.	4.6			
COLLAR ELEV. 477.0 ft		TOTAL DEPTH 35.1 ft		NORTHING 550,948		EASTING 1,560,165		24 HR.	4.3			
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 04/01/19		COMP. DATE 04/01/19		SURFACE WATER DEPTH N/A						
CORE SIZE NX			TOTAL RUN 18.6 ft							LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN (ft)		STRATA		ELEV. (ft)			
460.5	460.5	16.5	3.6	0:51/1.0 0:44/1.0 0:43/1.0 0:00/0.6	(3.6)	(3.2)	(18.3)	(16.8)		460.5		
455	456.9	20.1	5.0	0:45/1.0 0:40/1.0 0:38/1.0 0:42/1.0 0:46/1.0	(5.0)	(4.9)						
450	451.9	25.1	5.0	0:39/1.0 0:44/1.0 0:42/1.0 0:46/1.0 0:40/1.0	(4.9)	(4.1)						
445	446.9	30.1	5.0	0:48/1.0 0:52/1.0 0:54/1.0 0:55/1.0 0:53/1.0	(4.8)	(4.6)						
	441.9	35.1								441.9	35.1	

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B2-B 22+44, 19.1' RT



GEOTECHNICAL BORING REPORT BORE LOG

WBS 45764.1.1	TIP B-5810	COUNTY CABARRUS	GEOLOGIST Stickney, J. K.
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River			GROUND WTR (ft)
BORING NO. B3-A	STATION 23+41	OFFSET 18 ft LT	ALIGNMENT -L-
COLLAR ELEV. 476.5 ft	TOTAL DEPTH 33.6 ft	NORTHING 550,952	EASTING 1,560,269
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Smith, C. L.	START DATE 04/29/19	COMP. DATE 04/29/19	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
480																
475														476.5	GROUND SURFACE	0.0
470	472.7	3.8	5	4	3								M	ALLUVIAL Brown-Red, Silty SAND		
465	467.7	8.8	1	2	3								M			
460	462.7	13.8	3	22	78/0.4									461.7	WEATHERED ROCK Gray (META-ARGILLITE)	14.8
455	457.9	18.6	60/0.1											458.5	NON-CRYSTALLINE ROCK (META-ARGILLITE)	18.0
450	452.9	23.6	60/0.1													
445	448.4	28.1	60/0.1													
	442.9	33.6	60/0.0											442.9	Boring Terminated at Elevation 442.9 ft in Non-Crystalline Rock (META-ARGILLITE)	33.6

NCDOT BORE DOUBLE B6810_GEO_BH_BRDG0022.GPJ NC DOT.GDT 7/24/19

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.										
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)									
BORING NO. B3-B		STATION 23+40		OFFSET 19 ft RT		ALIGNMENT -L-	0 HR. 4.0									
COLLAR ELEV. 478.4 ft		TOTAL DEPTH 40.4 ft		NORTHING 550,917		EASTING 1,560,256	24 HR. NM									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic										
DRILLER Smith, C. L.		START DATE 04/30/19		COMP. DATE 04/30/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
480														478.4	GROUND SURFACE	0.0
															ALLUVIAL Red-Brown, Silty SAND	
475	474.3	4.1	1	3	3							M				
470	469.3	9.1	2	2	3							M				
465	464.3	14.1	3	4	4							M				
460	459.3	19.1	60/0.1											461.3	WEATHERED ROCK Gray (META-ARGILLITE)	17.1
455														457.2	NON-CRYSTALLINE ROCK (META-ARGILLITE)	21.2
450																
445												RS-3				
440																
														438.0	Boring Terminated at Elevation 438.0 ft in Non-Crystalline Rock (META-ARGILLITE)	40.4

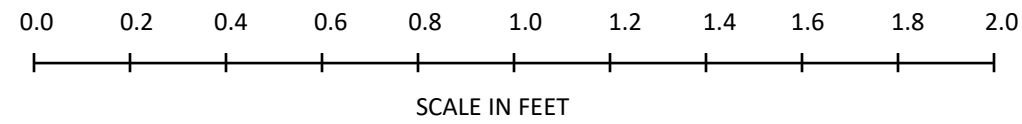
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)				
BORING NO. B3-B		STATION 23+40		OFFSET 19 ft RT		ALIGNMENT -L-	0 HR. 4.0				
COLLAR ELEV. 478.4 ft		TOTAL DEPTH 40.4 ft		NORTHING 550,917		EASTING 1,560,256	24 HR. NM				
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing WSPT & Core		HAMMER TYPE Automatic					
DRILLER Smith, C. L.		START DATE 04/30/19		COMP. DATE 04/30/19		SURFACE WATER DEPTH N/A					
CORE SIZE NX			TOTAL RUN 19.2 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		STRATA		LOG	DESCRIPTION AND REMARKS	
					REC. (ft)	RQD (ft)	REC. (ft)	RQD (ft)		ELEV. (ft)	DEPTH (ft)
457.2	457.2	21.2	4.2	0:54/1.0 0:48/1.0 0:59/1.0 0:58/1.0 0:00/0.2	(3.5)	(1.3)	(18.2)	(10.6)		457.2	Begin Coring @ 21.2 ft NON-CRYSTALLINE ROCK Gray, Very Slightly Weathered to Fresh, Hard, META-ARGILLITE with Close to Moderately Close Fracture Spacing GSI=70
455											
	453.0	25.4	5.0	1:15/1.0 1:18/1.0 1:20/1.0 1:14/1.0 1:16/1.0	(5.0)	(2.4)					
450											
	448.0	30.4	5.0	1:21/1.0 1:27/1.0 1:15/1.0 1:20/1.0 1:24/1.0	(5.0)	(4.6)					
445											
	443.0	35.4	5.0	1:23/1.0 1:27/1.0 1:25/1.0 1:11/1.0 1:07/1.0	(4.7)	(2.3)					
440											
	438.0	40.4									Boring Terminated at Elevation 438.0 ft in Non-Crystalline Rock (META-ARGILLITE)

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

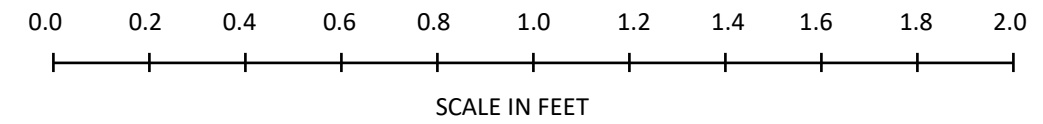
NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B3-B 23+40, 19.0' RT

Begin
21.2 feet



End
40.4 feet



**GEOTECHNICAL BORING REPORT
BORE LOG**

**GEOTECHNICAL BORING REPORT
CORE LOG**

WBS 45764.1.1				TIP B-5810				COUNTY CABARRUS				GEOLOGIST Stickney, J. K.				
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River												GROUND WTR (ft)				
BORING NO. B4-A				STATION 24+35				OFFSET 11 ft LT				ALIGNMENT -L-				
COLLAR ELEV. 459.6 ft				TOTAL DEPTH 19.5 ft				NORTHING 550,915				EASTING 1,560,356				
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018						DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic						
DRILLER Smith, C. L.				START DATE 04/10/19				COMP. DATE 04/10/19				SURFACE WATER DEPTH 4.6ft				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
460															459.6	GROUND SURFACE
															459.1	ALLUVIAL Sandy SILT with Cobbles
455																NON-CRYSTALLINE ROCK (META-ARGILLITE)
450																
445															444.1	
															440.1	Boring Terminated at Elevation 440.1 ft in Non-Crystalline Rock (META-ARGILLITE)

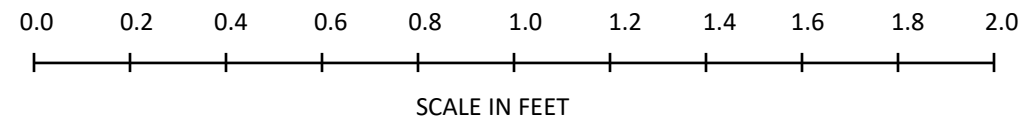
NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

WBS 45764.1.1				TIP B-5810				COUNTY CABARRUS				GEOLOGIST Stickney, J. K.					
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River												GROUND WTR (ft)					
BORING NO. B4-A				STATION 24+35				OFFSET 11 ft LT				ALIGNMENT -L-					
COLLAR ELEV. 459.6 ft				TOTAL DEPTH 19.5 ft				NORTHING 550,915				EASTING 1,560,356					
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018						DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic							
DRILLER Smith, C. L.				START DATE 04/10/19				COMP. DATE 04/10/19				SURFACE WATER DEPTH 4.6ft					
CORE SIZE NX						TOTAL RUN 19.0 ft											
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS						
					REC. (%)	RQD (ft)		REC. (%)	RQD (ft)		ELEV. (ft)	DEPTH (ft)					
459.1	459.1	0.5	3.0	0:00/1.0	(3.0)	(0.0)		(14.6)	(0.8)		459.1	Begin Coring @ 0.5 ft					
	456.1	3.5		0:00/1.0	100%	0%		97%	5%			NON-CRYSTALLINE ROCK					
455			5.0	0:00/1.0								Brown and Gray, Severly Weathered to Slightly Weathered, Medium Hard to Moderately Hard META-ARGILLITE with Very Close to Close Fracture Spacing GSI=40					
	451.1	8.5		1:24/1.0	(5.0)	(0.4)											
			5.0	1:33/1.0	100%	8%											
450				1:35/1.0													
	446.1	13.5		1:51/1.0	(4.6)	(0.4)											
			5.0	1:34/1.0	92%	8%											
445				1:41/1.0	(4.6)	(1.6)											
	441.1	18.5		1:36/1.0	92%	32%		(3.7)	(1.6)		444.1						
			1.0	1:39/1.0				93%	40%								
	440.1	19.5	1.0	1:41/1.0	(1.0)	(0.0)		100%	0%		440.1	Boring Terminated at Elevation 440.1 ft in Non-Crystalline Rock (META-ARGILLITE)					
				1:44/1.0													

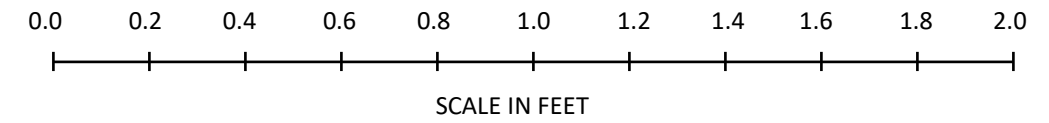
NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B4-A 23+35, 10.7' LT

Begin
0.5 feet



End
19.5 feet



GEOTECHNICAL BORING REPORT BORE LOG

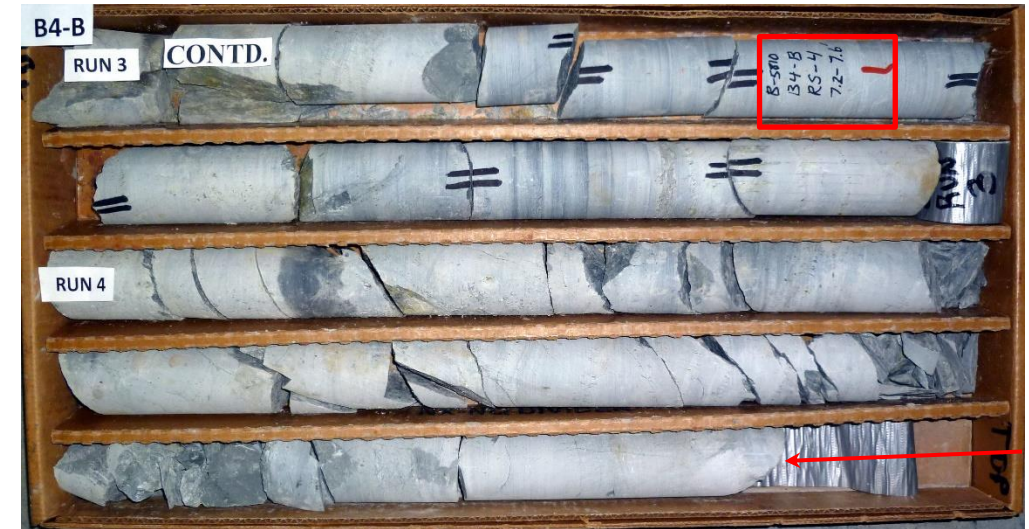
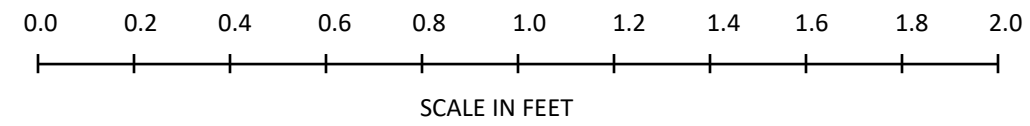
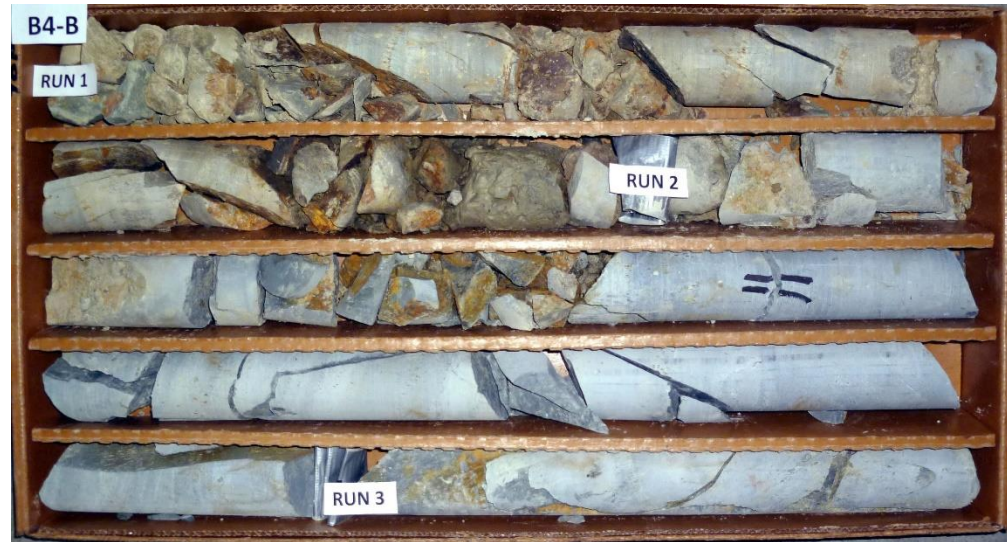
GEOTECHNICAL BORING REPORT CORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)					
BORING NO. B4-B		STATION 24+35		OFFSET 10 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 460.3 ft		TOTAL DEPTH 19.4 ft		NORTHING 550,895		EASTING 1,560,349						
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing WSPT & Core			HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 04/15/19		COMP. DATE 04/15/19		SURFACE WATER DEPTH 5.5ft						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT		SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		
465												
460											460.3	GROUND SURFACE
											459.2	ALLUVIAL Sandy SILT with Cobbles
											455.9	NON-CRYSTALLINE ROCK (META-ARGILLITE)
455												
450												
445												
											440.9	Boring Terminated at Elevation 440.9 ft in Non-Crystalline Rock (META-ARGILLITE)

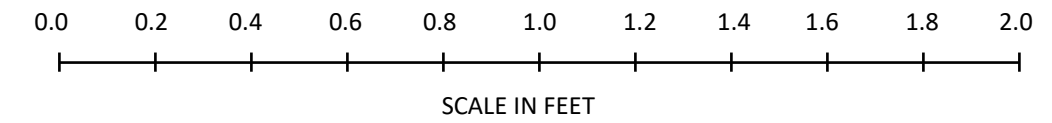
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)					
BORING NO. B4-B		STATION 24+35		OFFSET 10 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 460.3 ft		TOTAL DEPTH 19.4 ft		NORTHING 550,895		EASTING 1,560,349						
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing WSPT & Core			HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 04/15/19		COMP. DATE 04/15/19		SURFACE WATER DEPTH 5.5ft						
CORE SIZE NX			TOTAL RUN 18.3 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	ROD (ft) %	SAMP. NO.	STRATA REC. (ft) %	ROD (ft) %	LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
459.2	459.2	1.1	3.3	0:00/1.0	(3.1) 94%	(0.0) 0%		(3.1) 94%	(0.0) 0%		459.2	Begin Coring @ 1.1 ft
	455.9	4.4		0:00/1.0							455.9	NON-CRYSTALLINE ROCK
455			5.0	0:00/0.3	(5.0) 100%	(1.1) 22%		(14.8) 99%	(4.2) 28%			Brown, Very Severely Weathered to Moderately Weathered, Soft to Moderately Hard META-ARGILLITE with Very Close to Close Fracture Spacing GSI=25
	450.9	9.4		1:52/1.0								Gray, Slightly Weathered to Fresh, Hard, META-ARGILLITE with Very Close to Close Fracture Spacing GSI=68
450			5.0	1:47/1.0	(4.9) 98%	(2.6) 52%						
	445.9	14.4		1:53/1.0			RS-4					
445			5.0	1:59/1.0								
	440.9	19.4		1:58/1.0	(4.9) 98%	(0.5) 10%					440.9	Boring Terminated at Elevation 440.9 ft in Non-Crystalline Rock (META-ARGILLITE)

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B4-B 24+35, 10.4' RT

Begin
1.1 feet



End
19.4 feet



GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

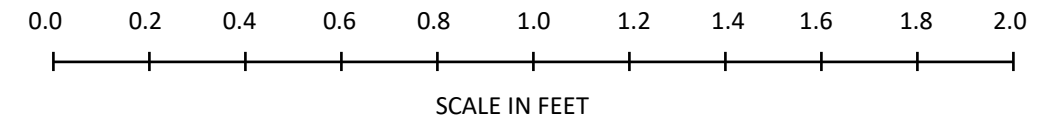
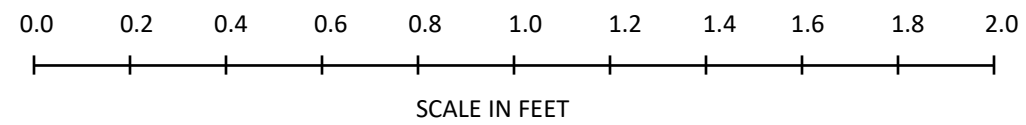
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. B5-A		STATION 25+07		OFFSET 11 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 465.1 ft		TOTAL DEPTH 20.1 ft		NORTHING 550,891		EASTING 1,560,424									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/09/19		COMP. DATE 04/09/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
470															
465														465.0	GROUND SURFACE
460														461.7	ALLUVIAL Sandy SILT NON-CRYSTALLINE ROCK (META-ARGILLITE)
455											RS-5				
450															
445														445.0	Boring Terminated at Elevation 445.0 ft in Non-Crystalline Rock (META-ARGILLITE)

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.							
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)						
BORING NO. B5-A		STATION 25+07		OFFSET 11 ft LT		ALIGNMENT -L-							
COLLAR ELEV. 465.1 ft		TOTAL DEPTH 20.1 ft		NORTHING 550,891		EASTING 1,560,424							
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic							
DRILLER Smith, C. L.		START DATE 04/09/19		COMP. DATE 04/09/19		SURFACE WATER DEPTH N/A							
CORE SIZE NX			TOTAL RUN 20.0 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)	
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %				
465	465.0	0.1	5.0	0:00/1.0 0:00/1.0 0:00/1.0 0:00/1.0	(3.5) 70%	(1.2) 24%		(2.0) 61%	(0.0) 0%		Begin Coring @ 0.1 ft NON-CRYSTALLINE ROCK	0.1	
460	460.0	5.1	5.0	1:34/1.0 1:43/1.0 1:48/1.0 1:36/1.0 1:51/1.0	(4.5) 90%	(2.5) 50%		(15.9) 95%	(12.4) 74%		Tan-Brown-Gray, Moderately Severely Weathered, Medium Hard, META-ARGILLITE with Very Close to Close Fracture Spacing GSI=40	3.4	
455	455.0	10.1	5.0	1:53/1.0 1:42/1.0 1:48/1.0 1:57/1.0 1:51/1.0	(4.8) 96%	(4.4) 88%	RS-5				Gray, Fresh, Hard, META-ARGILLITE with Very Close to Wide Fracture Spacing GSI=80		
450	450.0	15.1	5.0	1:54/1.0 1:42/1.0 1:46/1.0 1:39/1.0 1:38/1.0	(5.0) 100%	(4.3) 86%							
445	445.0	20.1										Boring Terminated at Elevation 445.0 ft in Non-Crystalline Rock (META-ARGILLITE)	20.1

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B5-A 25+07, 11.3' LT



GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.										
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)									
BORING NO. B5-B		STATION 25+06		OFFSET 10 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 467.1 ft		TOTAL DEPTH 21.4 ft		NORTHING 550,872		EASTING 1,560,416										
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic										
DRILLER Smith, C. L.		START DATE 04/14/19		COMP. DATE 04/14/19		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
470														467.1	GROUND SURFACE	0.0
465														465.7	ALLUVIAL SAND and Cobbles	1.4
460															NON-CRYSTALLINE ROCK (META-ARGILLITE)	
455																
450																
														445.7	Boring Terminated at Elevation 445.7 ft in Non-Crystalline Rock (META-ARGILLITE)	21.4

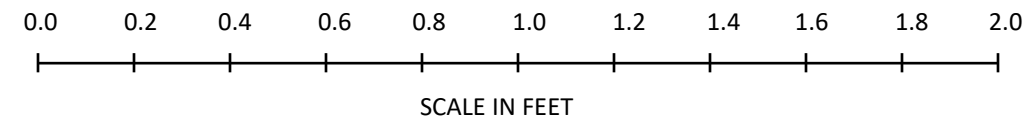
WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.						
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)					
BORING NO. B5-B		STATION 25+06		OFFSET 10 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 467.1 ft		TOTAL DEPTH 21.4 ft		NORTHING 550,872		EASTING 1,560,416						
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018				DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic						
DRILLER Smith, C. L.		START DATE 04/14/19		COMP. DATE 04/14/19		SURFACE WATER DEPTH N/A						
CORE SIZE NX				TOTAL RUN 20.0 ft								
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (ft)		REC. (ft)	RQD (ft)			
465.7	465.7	1.4	5.0	0:00/1.0 0:00/1.0 1:41/1.0 1:39/1.0 1:47/1.0	(4.6) 92%	(2.7) 54%		(19.4) 97%	(16.1) 81%		Begin Coring @ 1.4 ft	1.4
460	460.7	6.4	5.0	1:52/1.0 1:43/1.0 1:49/1.0 1:53/1.0 1:46/1.0	(5.0) 100%	(3.8) 76%					Gray, Slightly Weathered to 2.4' then Fresh, Hard, META-ARGILLITE with Close to Wide Fracture Spacing GSI=85	
455	455.7	11.4	5.0	1:50/1.0 1:47/1.0 1:52/1.0 1:51/1.0 1:45/1.0	(5.0) 100%	(4.8) 96%						
450	450.7	16.4	5.0	1:48/1.0 1:59/1.0 1:42/1.0 1:51/1.0 1:40	(4.8) 96%	(4.8) 96%						
	445.7	21.4									Boring Terminated at Elevation 445.7 ft in Non-Crystalline Rock (META-ARGILLITE)	21.4

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

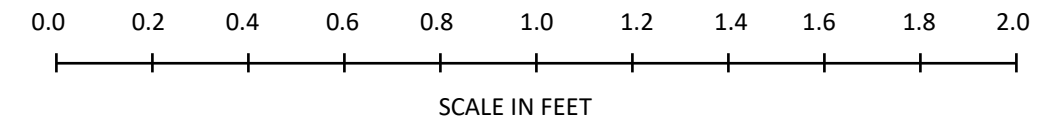
NCDOT CORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT.GDT 7/24/19

CORE PHOTOGRAPHS: Bridge No. 22 on NC 24/27 EBL over Rocky River, B5-B 25+06, 10.0' RT

Begin
1.4 feet



End
21.4 feet



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 25+75		OFFSET 20 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 505.5 ft		TOTAL DEPTH 13.2 ft		NORTHING 550,878		EASTING 1,560,491									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/07/19		COMP. DATE 04/07/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
510															
505														505.5	0.0
500	501.3	4.2	1	2	3							M	ROADWAY EMBANKMENT Red-Orange, Sandy Silty CLAY		
495	496.3	9.2	45	55/0.3									RESIDUAL Blue-Gray, Silty CLAY with Rock Fragments	9.2	
													WEATHERED ROCK Blue-Gray (META-ARGILLITE)	13.2	
													Boring Terminated with Casing Advancer Refusal at Elevation 492.3 ft on Non-Crystalline Rock (META-ARGILLITE)		

WBS 45764.1.1		TIP B-5810		COUNTY CABARRUS		GEOLOGIST Stickney, J. K.									
SITE DESCRIPTION Bridge No. 22 on NC 24/27 EBL over Rocky River							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 25+75		OFFSET 23 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 504.6 ft		TOTAL DEPTH 20.2 ft		NORTHING 550,838		EASTING 1,560,478									
DRILL RIG/HAMMER EFF./DATE HFC0072 CME-550X 92% 08/15/2018			DRILL METHOD NW Casing w/ SPT			HAMMER TYPE Automatic									
DRILLER Smith, C. L.		START DATE 04/07/19		COMP. DATE 04/07/19		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
505														504.6	0.0
500	501.1	3.5	1	1	2							M	ROADWAY EMBANKMENT Red-Orange, Sandy Silty CLAY		
495	496.1	8.5	WOH	WOH	1							M			
490	491.1	13.5	WOH	WOH	WOH							M			
485	486.1	18.5	100/0.2										RESIDUAL Blue-Gray, Silty CLAY with Rock Fragments	18.5	
													WEATHERED ROCK Blue-Gray (META-ARGILLITE)	20.2	
													Boring Terminated with Casing Advancer Refusal at Elevation 484.4 ft on Non-Crystalline Rock (META-ARGILLITE)		

NCDOT BORE DOUBLE B5810_GEO_BH_BRDG0022.GPJ NC_DOT_GDT 7/24/19

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NC 45764.1.1

TIP: B-5810

COUNTY: CABARRUS

Bridge No. 22 on NC 24/27 EBL over Rocky River

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD (%)	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Remarks
RS-1	B1-A	29.2-29.9	Meta-Argillite	CZmd	57	0.7	1.86	166.7	8,030	Bridge No. 22
RS-2	B2-A	25.4-26.2	Meta-Argillite	CZmd	77	0.8	1.87	169.9	16,970	Bridge No. 22
RS-3	B3-B	33.2-33.6	Meta-Argillite	CZmd	55	0.4	1.87	165.9	16,410	Bridge No. 22
RS-4	B4-A	12.2-12.6	Meta-Argillite	CZmd	5	0.4	1.86	166.5	11,260	Bridge No. 22
RS-5	B5-A	10.1-10.8	Meta-Argillite	CZmd	74	0.7	1.86	172.8	12,980	Bridge No. 22

Bridge No. 22 on NC 24/27 EBL over Rocky River

SITE PHOTOGRAPH



View Looking Downstream