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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5123	1	20

REFERENCE: B-5123

PROJECT: 42265

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *CABARRUS*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER AND ACCESS ROAD*

SITE DESCRIPTION

CONTENTS

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.

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

NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J.K. STICKNEY
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C.E. BURRIS

INVESTIGATED BY *J.E. BEVERLY*
DRAWN BY *J.K. McCLURE*
CHECKED BY *C.B. LITTLE*
SUBMITTED BY *C.B. LITTLE*
DATE *FEBRUARY 2015*

NORTH CAROLINA LICENSED SEAL 1104 GEOLOGIST CLINTON B. LITTLE

Digitally signed by: Clinton B. Little
930443D5AC8E3C2...
3/10/2015

SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
B-5123	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM 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

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

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

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

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.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT EXCAVATION
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [X] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [X] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [X] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q/NO & NXWL

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO 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.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

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

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.

TERMS AND DEFINITIONS

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 INTRUDED 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

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.

BENCH MARK: BL-4
STA. 24+09.39 -BL-
N 589930.5520 E 1500384.4430 ELEVATION: 585.73 FEET

NOTES:

SOIL STRATIGRAPHY IS THROUGH THE BORINGS FOR PROFILES & CROSS-SECTIONS.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B-5123)	3

SITE PLAN

0 50 100
FEET

-DET2- PT Sta.14+20.72
-SRVRD- PT Sta.12+12.39
BEGIN BRIDGE
-DET2- Sta.14+64.00+/-
-SRVRD- PC Sta.12+95.51
BEGIN APPROACH SLAB
-L- Sta.20+09.00+/-
-SRVRD- PT Sta.13+77.22
-SRVRD- PC Sta.14+07.86
END BRIDGE
-DET2- Sta.17+23.00+/-
-DET2- PC Sta.17+52.34
END APPROACH SLAB
-L- Sta.22+79.15+/-
-DET2- PRC Sta.19+49.95
END CONSTRUCTION
-SRVRD- STA.17+25.00
-SRVRD- PT Sta.16+55.28
BEGIN BRIDGE
-L- Sta.20+34.00+/-
END BRIDGE
-L- Sta.22+54.08 +/-

N 81° 28' 53.2" E
S 85° 08' 29.3" E
N 67° 31' 16.3" E
N 67° 31' 16.3" E
S 23° 54' 14.2" W
S 26° 21' 10" E 339.57'
N 22° 20' 08" W 307.47'
N 52° 15' 06" W 127.22'
S 67° 38' 52" W 15.39'
N 88° 59' 31" W 92.19'
N 82° 16' 10" W 89.89'
N 76° 57' 10" W 167.31'
N 76° 57' 48" W 48.12'
S 87° 40' 00" W 293.71'
N 41° 34' 43" W 30.00'
103.39'
120.00'
160.00'

BANK OF NORTH CAROLINA
DB 9450 PG 252
MANHOLE IS NOW BURIED
ELEV AND INVERTS TAKEN FROM OLD SURVEY
BANK OF NORTH CAROLINA
DB 9450 PG 252
LINDA P. MORRISON, TRUSTEE
DB 10032 PG 224
CITY OF CONCORD
EASEMENT PER PB 46 PG 12
ROCKY RIVER

EB1(DET)
EBI-B (NBL)
BI-A (SBL)
BI-A (NBL)
B-1 (PED)
BI-B (NBL)
B-2(PED)
B-3
EB2-A (SBL)
EB2 (PED)
BM#2

W.P. #1 STA. 20+29.92 -L-
W.P. #1 STA. 20+38.29 -L-
W.P. #2 STA. 21+39.92 -L-
W.P. #2 STA. 21+48.29 -L-
W.P. #3 STA. 22+49.92 -L-
W.P. #3 STA. 22+58.29 -L-
CONC BRIDGE #19
CONC BRIDGE #14
10' WD PED BRIDGE

INV=552.17
TOP=571.00'
INV=549.74'
INV=549.69'
TOP=570.26'
INV=555.02'
INV=549.37'
TOP=572.68'
INV=549.26'
TOP=570.22'
INV=561.69'
INV=561.80'
INV=570.44'
TOP=584.27'
INV=570.75'
TOP = 585.84'

15" RCP
12" DI
30" DI
54" DI
48" CHL
8" PVC
12" CMP
30" CONC C&G
8" STEEL GAS TEST STATION
16" DIP
FIBER OPTIC MARKER
WATER MARKER (2)
MTL POLE
ELEC METER
SIGNAL LT
OVHD SIGNAL BAR
UNKNOWN SIZE/TYPE
RETAINING WALL
RIP RAP
CONC SLAB
DIR ONLY
IN CONDUIT
BILLBOARD
CAP
GUY
EOI
FO
BST
GRASS
WOODS
BRUSH
GRAVEL
24' GRAVEL
20' GR & BST
24' BST
26.8' BST
35' BST
US 29 SBL
US 29 NBL
LEFT LANE CONTROL LINE
RIGHT LANE CONTROL LINE
SOIL MEDIAN
EXISTING R/W
NC GRID NAD 83/2001
IS MTL BUS

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B-5123)	4
Profile –L– (LT.) SBL Bridge No. 019	

0 50 100 FEET V.E. = 5:1

STA. 20+29.92
GP EL 589.78

SBL STA 21+40
GP. EL. 589.5
TWO SPANS
2@ 110', 72" MBT
70° SKEW, 4' END BENT CAPS

US 29 SBL

PROPOSED GRADE

SS-4
SS-5
SS-6
SS-7
SS-8

B1-A(SBL)
21+16 –L–
42.0 LT.
ELEV. 567.3

B-3
22+42 –L–
45.0 LT.
ELEV. 583.0

STA. 22+49.92
GP EL 589.12

588.37

PROPOSED GRADE ALONG SBL CONTROL LINE
(-)0.3000%
GROUND SURFACE (34' LT. OF –L–)
(-)0.3000%

ROADWAY EMBANKMENT (FILL)

-SOVRD-

100 YR WSEL 577.08
50 YR WSEL 575.9

BST

ROADWAY EMBANKMENT (FILL)
BRN MED STIFF MOIST SANDY SILTY CLAY (A-6)
(W/ ASPHALT & ROCK 0-1')

01/15

ALLUVIUM
GRAY MED. DENSE TO V. LOOSE
MOIST TO SAT. SILTY SAND (A-2-4)

WATER SURFACE 2/3/2015

01/15

ALLUVIUM

RESIDUAL
TAN-ORANGE-GRAY-WHITE
V. DENSE MOIST SILTY SAND (A-2-4)

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK

CRYSTALLINE ROCK

BLACK & WHITE SLI. WEATH. TO FRESH HARD GABBRO
WITH V. CLOSE TO MOD. CLOSE FRACTURE SPACING.
ROCK TYPE 'E'
R1=15, R2=13, R3=10, R4=15, R5=7
RMR=60

REC=95%
RQD=98%

BT

ROADWAY EMBANKMENT (FILL)
BRN-GRAY MED. STIFF
MOIST NON PLASTIC MICA.
CLAYEY SANDY SILT (A-4)

GRAY-BRN-ORANGE STIFF
MOIST MED. PLASTIC
SILTY SANDY CLAY (A-7-6)

RED-BRN MED. STIFF
MOIST LOW PLASTIC
SILTY SANDY CLAY (A-6)

ALLUVIUM
GRAY MED. STIFF TO SOFT MOIST
MED. PLASTIC SANDY SILTY CLAY (A-6)

GRAY V. LOOSE SAT. SAND (A-1)

RESIDUAL
GRAY DENSE MOIST SAND (A-1)

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK

CRYSTALLINE ROCK

AR CV @ 23.9 (4/29/10)

590
580
570
560
550
540
530
520
510

18 19 20 21 22 23 24

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B–5123)	5
Profile –L– (RT.) NBL Bridge No. 014	

0 50 100 FEET V.E. = 5:1

US 29 NBL

NBL STA 21+48
GP EL. 589.4
TWO SPANS
2@ 110', 72" MBT
70° SKEW, 4' END BENT CAPS

GP STA. 20+38.29
EL 589.75

GP STA. 22+58.29
EL 589.10

588.37

PROPOSED GRADE

PROPOSED GRADE ALONG NBL CONTROL LINE

(-)0.3000%

GROUND SURFACE (34' RT. OF –L–)

ROADWAY EMBANKMENT (FILL)

B1–B(NBL)
21+45 –L–
52.0 RT.
ELEV. 567.1

B–1(PED)
21+10 –L–
51 RT.
ELEV. 566.9

B–2(PED)
21+63 –L–
51.0 RT.
ELEV. 571.4

ROCKY RIVER

B–3(PED)
22+35 –L–
51.0 RT.
ELEV. 567.9

EB2(PED)
22+85 –L–
51.0 RT.
ELEV. 585.7

(-)0.3000%

590
580
570
560
550
540
530
520

100 YR WSEL 577.08

50 YR WSEL 575.9

-SRVRD-

BST

ROADWAY EMBANKMENT (FILL)
RED LOOSE WET SANDY SILT (A–4)

ALLUVIUM
RED LOOSE TO V. LOOSE WET TO SAT. SLI. MICA. SILTY CSE. SAND (A–2)

GRAY LOOSE TO V. LOOSE CSE. CLEAN SAND (A–1)

RESIDUAL
RED–BROWN MED. DENSE SILTY SAND (A–2)

WEATHERED ROCK (VERY DENSE INDURATED WEATHERED GABBRO ABOVE TRI–CONE REFUSAL.
CRYSTALLINE ROCK

VERY HARD FRESH WIDE SPACE FRACTURED GABBRO

WEATHERED ROCK
SEV. WEATH. CRYSTALLINE ROCK

BT

ARTIFICIAL FILL

WATER SURFACE 2/3/2015

ALLUVIUM

GRAY LOOSE TO V. LOOSE WET CLEAN CSE. SAND (A–1)

CRYSTALLINE ROCK

BT
FIAD
(5/15/01)

BLACK & WHITE FRESH HARD GABBRO WITH CLOSE TO MOD. CLOSE FRACTURE SPACING.
ROCK TYPE 'E'
R1 = 15, R2 = 17, R3 = 20, R4 = 20, R5 = 7
RMR = 79
REC = 96%
RQD = 80%

BT
FIAD
(1/27/15)

ROADWAY EMBANKMENT (FILL)
RED–BROWN MED. STIFF WET SANDY SILT (A–4)

ALLUVIUM
RED–BROWN SILTY SAND (A–2) OVER GRAY SLI. SILTY WET TO SAT. CSE. SAND (A–1)

WEATHERED ROCK
RED–BROWN V. DENSE INDURATED WEATHERD GABBRO

DARK GRAY FRESH VERY HARD WIDE SPACED FRACTURE GABBRO

AR
FIAD
(5/18/01)

CRYSTALLINE ROCK

WEATHERED ROCK
GRAY VERY DENSE INDURATED MATERIAL

18 19 20 21 22 23 24

BORING DESCRIPTIONS

(A) RED–BRN. LOOSE MOIST CLAYEY SILTY SAND (A–1) (ROADWAY EMBANKMENT)

(B) RED–BRN. V. LOOSE MOIST CLAYEY SILTY SAND (A–2) (ALLUVIAL)

(C) BRN LOOSE TO V. LOOSE MOIST TO WET CLAYEY SILTY SAND & GRAVEL (A–1) (ALLUVIAL)

(D) TAN–BRN. DENSE. MOIST. SILTY. SAND. (A–2) (RESIDUAL)

(E) RIP RAP AND POORLY CONSOLIDATED FILL (ARTIFICIAL FILL)

(F) RED MED. STIFF WET CLAYEY SANDY SILT (A–4) (ARTIFICIAL FILL)

(G) RED LOOSE TO V. LOOSE WET SLI. MICA. SAND (A–2) (ALLUVIAL)

(H) BOULDERS AND SAND EROSION PROTECTION OVER RED–BROWN LOOSE SILTY SAND (A–2) (ARTIFICIAL FILL)

(I) RED–BROWN LOOSE. WET. SLI. MICA. SILTY. SAND. (A–2) (ALLUVIAL)

(J) BROWN MODERATE TO HIGHLY ORGANIC SOFT SANDY CLAYEY SILT (A–4) (ALLUVIAL)

(K) RED–BROWN LOOSE TO V. LOOSE WET SILTY SAND (A–2) (ALLUVIAL)

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B–5123)	6

Section Through End Bent One
Sta. 20+34.11 –L–
Skew = 70 Deg.

0 20 40
FEET
V.E. = 1:1

US 29 SBL

W.P. #1 (LEFT LANE CONTROL LINE)
STA. 20+29.92 -L-

W.P. #1 (RIGHT LANE CONTROL LINE)
STA. 20+38.29 -L-

US 29 NBL

-SRVRD-

-SRVRD-

EB1(DET)
19+64 –L–
103.0 LT.
ELEV. 570.3

EB1-B(NBL)
20+58 –L–
98.0 RT.
ELEV. 568.7

GROUND SURFACE

ROADWAY EMBANKMENT (FILL)

RED–BRN LOOSE MOIST
CLAYEY SILTY SAND (A–1)

ARTIFICIAL FILL
LOOSE MOIST SOIL
& BURIED WOOD

ROADWAY EMBANKMENT
(FILL)

ALLUVIUM
GRAY V. SOFT MOIST SILTY CLAY (A–7)

ALLUVIUM

RED–BRN–YELLOW LOOSE MOIST TO WET
CLAYEY SILTY SAND & GRAVEL (A–1)

BRN–GRAY LOOSE MOIST TO WET CLAYEY SILTY SAND (A–2)

TAN–BRN DENSE MOIST SILTY SAND (A–2)

RESIDUAL

RESIDUAL

TAN–BRN DENSE MOIST SILTY SAND (A–2)

WEATHERED ROCK SEV. WEATH. CRYSTALLINE ROCK

WEATHERED ROCK
BRN–TAN, SEV. WEATH. CRYSTALLINE ROCK

CRYSTALLINE ROCK

CRYSTALLINE ROCK

CAR

CAR

01/15

01/15

01/15

4
0
5

7
4
7
30
38
100/.8
100/.6

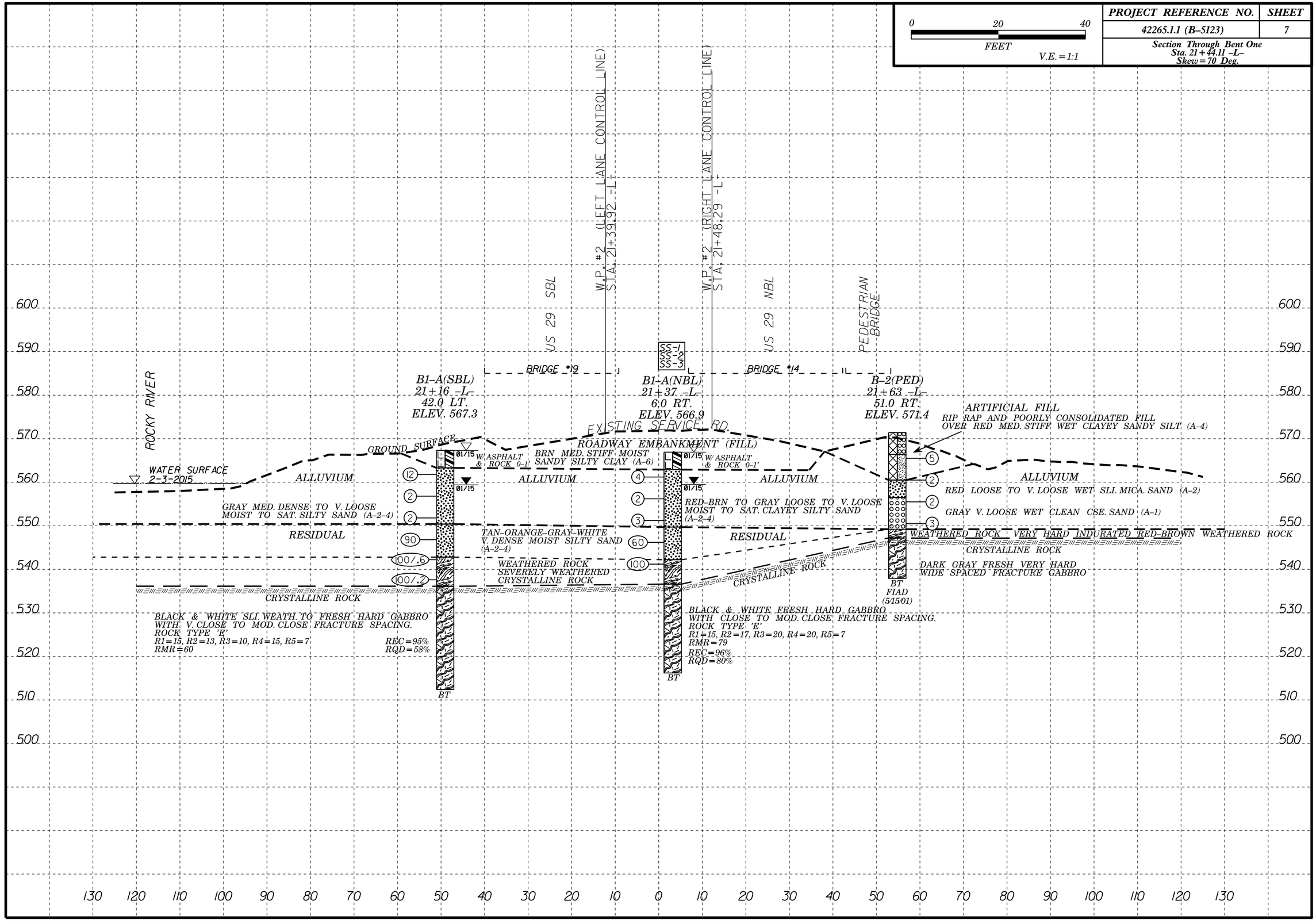
600
590
580
570
560
550
540
530
520
510
500

130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B–5123)	7

Section Through Bent One
Sta. 21+44.11 –L–
Skew = 70 Deg.

0 20 40
FEET
V.E. = 1:1

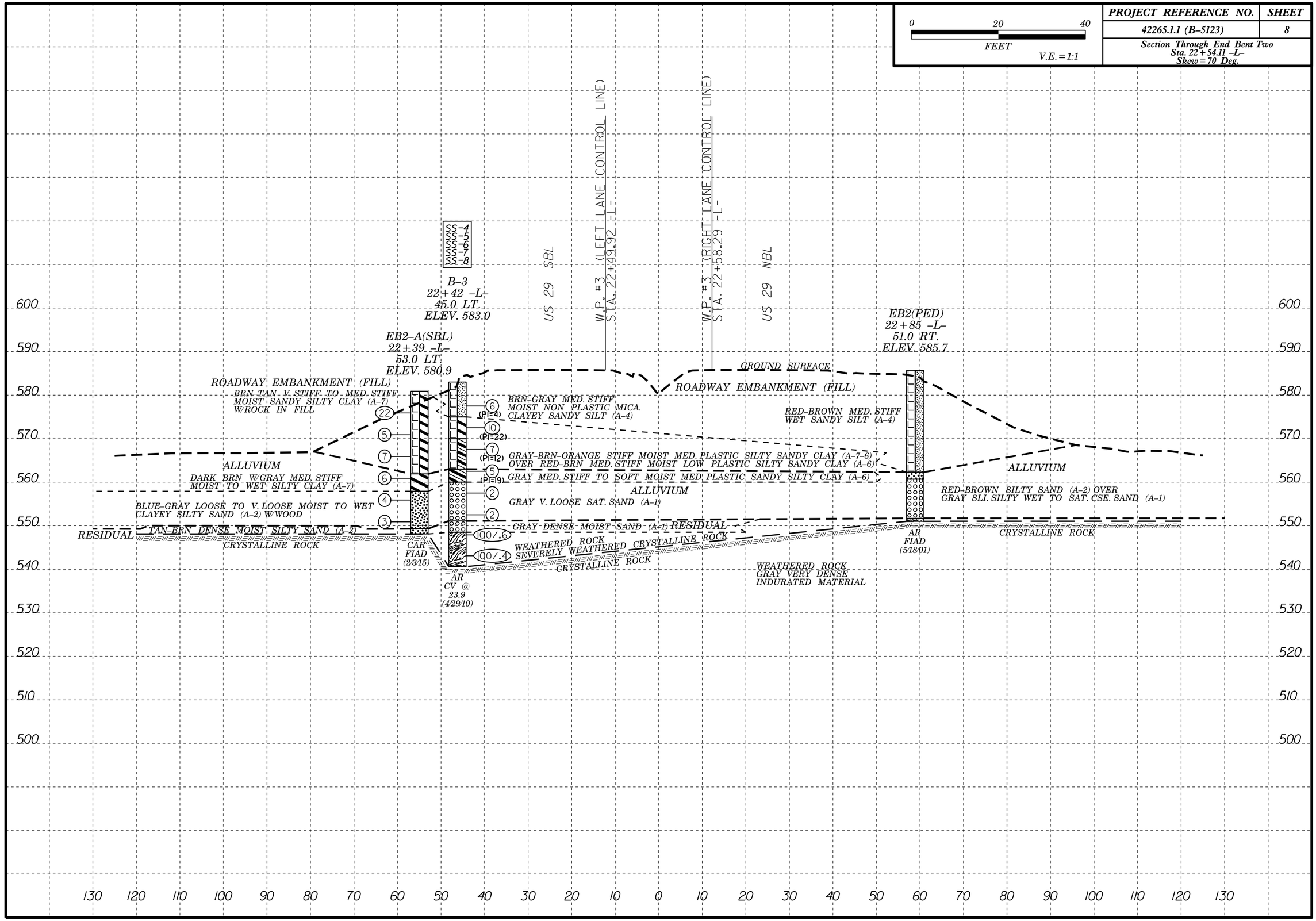


0	20	40
FEET		

V.E. = 1:1

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B–5123)	8

Section Through End Bent Two
Sta. 22+54.11 –L–
Skew = 70 Deg.



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. EB1(DET)	**STATION** 19+64	**OFFSET** 103 ft LT	**ALIGNMENT** -L-	**0 HR.** 9.7
COLLAR ELEV. 570.3 ft	**TOTAL DEPTH** 17.9 ft	**NORTHING** 589,968	**EASTING** 1,500,321	**24 HR.** 11.2
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
575										
570										570.3 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT RED-BRN LOOSE MOIST CLAYEY SILTY SAND (A-1)
565	565.5	4.8	1	2	2	4		M		563.8 6.5
										ALLUVIAL GRAY V. SOFT MOIST SILTY CLAY (A-7)
560	560.5	9.8	0	0	0 WOH	0				
								M/W		556.3 14.0
555	555.5	14.8	1	2	3	5				553.8 16.5 **ALLUVIAL** BRN-GRAY LOOSE MOIST TO WET CLAYEY SILTY SAND (A-2)
										552.7 17.6 **RESIDUAL** TAN-BRN DENSE MOIST SILTY SAND (A-2)
										552.4 17.9 **WEATHERED ROCK** SEV. WEATH. CRYSTALLINE ROCK
										Boring Terminated WITH CASING ADVANCER REFUSAL at Elevation 552.4 ft ON CRYSTALLINE ROCK

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. EB1-B(NBL)	**STATION** 20+58	**OFFSET** 98 ft RT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 568.7 ft	**TOTAL DEPTH** 36.1 ft	**NORTHING** 589,819	**EASTING** 1,500,484	**24 HR.** 8.6
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/30/15	**COMP. DATE** 01/30/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
570										568.7 GROUND SURFACE 0.0
										ARTIFICIAL FILL LOOSE MOIST SOIL & BURIED WOOD
565	564.5	4.2	0	7	0	7		M		562.7 6.0
										ALLUVIAL RED-BRN-YELLOW LOOSE MOIST TO WET CLAYEY SILTY SAND & GRAVEL (A-1)
560	559.5	9.2	1	1	3	4		M/W		
555	554.5	14.2	2	3	4	7		M/W		552.5 16.2
										RESIDUAL TAN-BRN DENSE MOIST SILTY SAND (A-2)
550	549.5	19.2	11	13	17	30		M		
545	544.5	24.2	6	14	24	38		M		540.6 28.1
540	539.5	29.2	53	47/0.3		100/.8				**WEATHERED ROCK** BRN-TAN SEV. WEATH. CRYSTALLINE ROCK
535	534.5	34.2	77	23/0.1		100/.6				532.6 36.1
										Boring Terminated WITH CASING ADVANCER REFUSAL at Elevation 532.6 ft ON CRYSTALLINE ROCK

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.			**GROUND WTR (ft)**
BORING NO. B1-A(SBL)	**STATION** 21+16	**OFFSET** 42 ft LT	**ALIGNMENT** -L- / **0 HR.** 0.0
COLLAR ELEV. 567.3 ft	**TOTAL DEPTH** 54.9 ft	**NORTHING** 589,970	**EASTING** 1,500,484 / **24 HR.** 7.9
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Smith, C. L.	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
570								▽		GROUND SURFACE	567.3	0.0
565	562.8	4.5	1	3	9	12		M		**ROADWAY EMBANKMENT** BRN MED. STIFF MOIST SANDY SILTY CLAY (A-6) (W/ ASPHALT & ROCK 0-1')	563.3	4.0
560	557.8	9.5	1	1	1	2		W		**ALLUVIAL** GRAY MED. DENSE TO V. LOOSE MOIST TO SAT. SILTY SAND (A-2-4)		
555	552.8	14.5	0	1	1	2		Sat.			550.4	16.9
550	547.8	19.5	6	35	55	90		M		**RESIDUAL** TAN-ORANGE-GRAY-WHITE V. DENSE MOIST SILTY SAND (A-2-4)	542.8	24.5
545	542.8	24.5	70	30/.1		100/.6		M		**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	536.1	31.2
540	537.8	29.5	100/.2			100/.2		M		**CRYSTALLINE ROCK**	512.4	54.9
535										Boring Terminated at Elevation 512.4 ft IN CRYSTALLINE ROCK (GABBRO)		
530												
525												
520												
515												

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B1-A(SBL)	**STATION** 21+16	**OFFSET** 42 ft LT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 567.3 ft	**TOTAL DEPTH** 54.9 ft	**NORTHING** 589,970	**EASTING** 1,500,484	**24 HR.** 7.9
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core		**HAMMER TYPE** Automatic
DRILLER Smith, C. L.	**START DATE** 01/29/15	**COMP. DATE** 01/29/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NO/NQ	**TOTAL RUN** 23.7 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS	ELEV. (ft)	DEPTH (ft)
536.07											Begin Coring @ 31.2 ft		
535	536.1	31.2	3.7		(3.7) 100%	(1.1) 30%		(22.5) 95%	(13.8) 58%		**CRYSTALLINE ROCK** BLACK & WHITE SLI. WEATH. TO FRESH HARD GABBRO WITH V. CLOSE TO MOD. CLOSE FRACTURE SPACING. ROCK TYPE 'E' R1=15, R2=13, R3=10, R4=15, R5=7 RMR=60	536.1	31.2
530	532.4	34.9	5.0		(4.0) 80%	(0.4) 8%							
525	527.4	39.9	5.0		(5.0) 100%	(4.7) 94%							
520	522.4	44.9	5.0		(5.0) 100%	(3.3) 66%							
515	517.4	49.9	5.0		(4.8) 96%	(4.3) 86%							
	512.4	54.9									Boring Terminated at Elevation 512.4 ft IN CRYSTALLINE ROCK (GABBRO)	512.4	54.9

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. EB2-A(SBL)	**STATION** 22+39	**OFFSET** 53 ft LT	**ALIGNMENT** -L-	**0 HR.** CV @ 4.3
COLLAR ELEV. 580.9 ft	**TOTAL DEPTH** 32.8 ft	**NORTHING** 590,027	**EASTING** 1,500,594	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing w/ SPT	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 02/03/15	**COMP. DATE** 02/03/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
585										
580										580.9 GROUND SURFACE 0.0
	576.9	4.0	0	5	17	22				**ROADWAY EMBANKMENT** BRN-TAN V. STIFF TO MED. STIFF MOIST SANDY SILTY CLAY (A-7) W/ ROCK IN FILL
575	571.9	9.0	2	2	3	5		M		
570	566.9	14.0	1	3	4	7		M		
565	561.9	19.0	1	2	4	6		M/W		561.9 19.0 **ALLUVIAL** DARK BRN W/ GRAY MED. STIFF MOIST TO WET SILTY CLAY (A-7)
560	556.9	24.0	1	1	3	4		M/W		557.9 23.0 **ALLUVIAL** BLUE-GRAY LOOSE TO V. LOOSE MOIST TO WET CLAYEY SILTY SAND (A-2) W/ WOOD
555	551.9	29.0	0	1	2	3		M/W		
550										549.3 31.6 548.1 32.8 **RESIDUAL** TAN-BRN DENSE MOIST SILTY SAND (A-2) Boring Terminated WITH CASING ADVANCER REFUSAL at Elevation 548.1 ft ON CRYSTALLINE ROCK

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B-3	**STATION** 22+42	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 583.0 ft	**TOTAL DEPTH** 42.4 ft	**NORTHING** 590,021	**EASTING** 1,500,600	**24 HR.** CV@23.9'
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 04/29/10	**COMP. DATE** 04/29/10	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
585										
580										583.0 GROUND SURFACE 0.0
	578.5	4.5	3	3	3	6	SS-4	M		**ROADWAY EMBANKMENT** BRN-GRAY MED. STIFF MOIST NON (PI=4) PLASTIC MICA. CLAYEY SANDY SILT (A-4)
575	573.5	9.5	1	3	7	10	SS-5	W		575.0 8.0 **ROADWAY EMBANKMENT** GRAY-BRN-ORANGE STIFF MOIST MED. (PI=22) PLASTIC SILTY SANDY CLAY (A-7-6)
570	568.5	14.5	2	3	4	7	SS-6	M		570.0 13.0 **ROADWAY EMBANKMENT** RED-BRN MED. STIFF MOIST LOW (PI=12) PLASTIC SILTY SANDY CLAY (A-6)
565	563.5	19.5	1	2	3	5	SS-7	M		563.0 20.0 **ALLUVIAL** GRAY MED. STIFF TO SOFT MOIST MED. (PI=19) PLASTIC SANDY SILTY CLAY (A-6)
560	558.5	24.5	0	1	1	2	SS-8	Sat.		560.0 23.0 **ALLUVIAL** GRAY V. LOOSE SAT. SAND (A-1)
555	553.5	29.5	0	1	1	2		Sat.		551.1 31.9 **RESIDUAL** GRAY DENSE MOIST SAND (A-1)
550	548.5	34.5	35	65/.1		100/.6				548.5 34.5 **WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK
545	543.5	39.5	100/.4			100/.4				540.6 42.4 Boring Terminated BY AUGER REFUSAL at Elevation 540.6 ft ON CRYSTALLINE ROCK

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B1-A(NBL)	**STATION** 21+37	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 566.9 ft	**TOTAL DEPTH** 50.7 ft	**NORTHING** 589,934	**EASTING** 1,500,522	**24 HR.** 7.4
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION / ELEV. (ft)	DEPTH (ft)
570										566.9 GROUND SURFACE	0.0
565								M		**ROADWAY EMBANKMENT** BRN MED. STIFF MOIST SANDY SILTY CLAY (A-6) (W/ ASPHALT & ROCK 0-1')	
	562.2	4.7								562.9	4.0
560			2	2	2	4	SS-1	M		**ALLUVIAL** RED-BRN TO GRAY LOOSE TO V. LOOSE MOIST TO SAT. CLAYEY SILTY SAND (A-2-4)	
	557.2	9.7									
555			1	1	1	2	SS-2	W			
	552.2	14.7									
550			1	2	1	3		Sat.		549.7	17.2
	547.2	19.7								**RESIDUAL** TAN-ORANGE-GRAY-WHITE V. DENSE MOIST SILTY SAND (A-2-4)	
545			25	30	30	60	SS-3	M			
	542.2	24.7								542.2	24.7
540			35	65/.5		100				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	
535										536.6	30.3
530										**CRYSTALLINE ROCK**	
525											
520										516.2	50.7
										Boring Terminated at Elevation 516.2 ft IN CRYSTALLINE ROCK (GABBRO)	

NCDOT BORE DOUBLE B5123_GEO_BH_BRDG00148OO19.GPJ NC_DOT.GDT 2/20/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B1-A(NBL)	**STATION** 21+37	**OFFSET** 6 ft RT	**ALIGNMENT** -L-	**0 HR.** 0.0
COLLAR ELEV. 566.9 ft	**TOTAL DEPTH** 50.7 ft	**NORTHING** 589,934	**EASTING** 1,500,522	**24 HR.** 7.4
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Smith, C. L.	**START DATE** 01/28/15	**COMP. DATE** 01/28/15	**SURFACE WATER DEPTH** N/A	
CORE SIZE NO/NQ	**TOTAL RUN** 20.4 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS / ELEV. (ft)	DEPTH (ft)
536.62											Begin Coring @ 30.3 ft	
535	536.6	30.3	4.3		(4.3) 100%	(3.7) 86%		(20.1) 99%	(14.9) 73%		536.6 **CRYSTALLINE ROCK**	30.3
	532.3	34.6									BLACK-WHITE V. SLI. WEATH. TO FRESH GABBRO WITH CLOSE TO WIDE FRACTURE SPACING. ONE INSTANCE OF MOD. SEV. WEATHERING FROM 44.0-44.4	
530			5.0		(5.0) 100%	(3.9) 78%					ROCK TYPE 'E' R1=15, R2=13, R3=20, R4=20, R5=7 RMR=75	
	527.3	39.6										
525			5.0		(4.7) 94%	(1.4) 28%						
	522.3	44.6										
520			5.0		(5.0) 100%	(4.8) 96%						
	517.3	49.6										
	516.2	50.7	1.1		(1.1) 100%	(1.1) 100%					516.2	50.7
											Boring Terminated at Elevation 516.2 ft IN CRYSTALLINE ROCK (GABBRO)	

NCDOT CORE SINGLE B5123_GEO_BH_BRDG00148OO19.GPJ NC_DOT.GDT 2/20/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.			**GROUND WTR (ft)**
BORING NO. B1-B(NBL)	**STATION** 21+45	**OFFSET** 52 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 567.1 ft	**TOTAL DEPTH** 41.2 ft	**NORTHING** 589,894	**EASTING** 1,500,547 — **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Smith, C. L.	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
570											
										567.1 GROUND SURFACE	0.0
565										**ROADWAY EMBANKMENT** RED-BRN LOOSE MOIST CLAYEY SILTY SAND (A-1)	
										564.1	3.0
	561.5	5.6	1	2	1	3		M		**ALLUVIAL** RED-BRN V. LOOSE MOIST CLAYEY SILTY SAND (A-2)	
560											
										557.1	10.0
555	556.5	10.6	2	2	2	4		M/W		**ALLUVIAL** BRN LOOSE TO V. LOOSE MOIST TO WET CLAYEY SILTY SAND & GRAVEL (A-1)	
	551.5	15.6	1	1	2	3		M/W			
550										548.9	18.2
	546.5	20.6	100/0.3			100/.3				**RESIDUAL** TAN-BRN DENSE MOIST SILTY SAND (A-2)	
545										546.5	20.6
										545.3 **WEATHERED ROCK** SEV. WEATH. CRYSTALLINE ROCK	21.8
540										**CRYSTALLINE ROCK**	
535											
530										525.9	41.2
										Boring Terminated at Elevation 525.9 ft IN CRYSTALLINE ROCK (GABBRO)	

NCDOT BORE DOUBLE B5123_GEO_BH_BRDG0014&0019.GPJ NC_DOT.GDT 2/20/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Stickney, J. K.
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.			**GROUND WTR (ft)**
BORING NO. B1-B(NBL)	**STATION** 21+45	**OFFSET** 52 ft RT	**ALIGNMENT** -L- — **0 HR.** N/A
COLLAR ELEV. 567.1 ft	**TOTAL DEPTH** 41.2 ft	**NORTHING** 589,894	**EASTING** 1,500,547 — **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 88% 03/19/2014		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic
DRILLER Smith, C. L.	**START DATE** 01/27/15	**COMP. DATE** 01/27/15	**SURFACE WATER DEPTH** N/A
CORE SIZE NO/NQ	**TOTAL RUN** 19.4 ft		

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS — ELEV. (ft)	DEPTH (ft)
545.26											Begin Coring @ 21.8 ft	
	545.3	21.8	4.4		(4.4) 100%	(3.9) 89%		(18.6) 96%	(15.5) 80%		545.3 **CRYSTALLINE ROCK** BLACK & WHITE FRESH HARD GABBRO WITH CLOSE TO MOD. CLOSE FRACTURE SPACING. ROCK TYPE 'E' R1=15, R2=17, R3=20, R4=20, R5=7 RMR=79	21.8
	540.9	26.2	5.0		(5.0) 100%	(4.9) 98%						
540												
	535.9	31.2	5.0		(4.6) 92%	(2.5) 50%						
535												
	530.9	36.2	5.0		(4.6) 92%	(4.2) 84%						
530												
	525.9	41.2									525.9 Boring Terminated at Elevation 525.9 ft IN CRYSTALLINE ROCK (GABBRO)	41.2

NCDOT CORE SINGLE B5123_GEO_BH_BRDG0014&0019.GPJ NC_DOT.GDT 2/20/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Callaway, R. Q.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B-1(PED)	**STATION** 21+10	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 566.9 ft	**TOTAL DEPTH** 29.7 ft	**NORTHING** 589,881	**EASTING** 1,500,514	**24 HR.** 7.0
DRILL RIG/HAMMER EFF./DATE CME-550		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 05/17/01	**COMP. DATE** 05/17/01	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
										566.9	GROUND SURFACE 0.0
											ROADWAY EMBANKMENT RED LOOSE WET SANDY SILT (A-4)
	561.7	5.2	3	3	1	4				562.2	4.7
											ALLUVIAL RED LOOSE TO V. LOOSE WET TO SAT. SLI. MICA. SILTY CSE. SAND (A-2)
	556.7	10.2	6	6	1	7				556.9	10.0
											ALLUVIAL GRAY LOOSE TO V. LOOSE CSE. CLEAN SAND (A-1)
	551.7	15.2	2	4	7	11				550.9	16.0
										549.9	**RESIDUAL** 17.0
											RED-BROWN MED. DENSE SILTY SAND (A-2)
	546.7	20.2	100/0.2			100/.2				546.1	**WEATHERED ROCK** 20.8
											VERY DENSE INDURATED WEATHERED GABBRO ABOVE TRI-CONE REFUSAL.
											CRYSTALLINE ROCK VERY HARD FRESH WIDE SPACE FRACTURED GABBRO
										537.2	29.7
											Boring Terminated at Elevation 537.2 ft IN CRYSTALLINE ROCK (GABBRO)
											NOTE: THIS BORING WAS ORIGINALLY BORING 'B-1' FROM PROJECT 9.8100492 U-3827.

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Callaway, R. Q.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B-2(PED)	**STATION** 21+63	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 571.4 ft	**TOTAL DEPTH** 33.5 ft	**NORTHING** 589,902	**EASTING** 1,500,563	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME-550		**DRILL METHOD** NW Casing W/SPT & Core	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 05/15/01	**COMP. DATE** 05/15/01	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										571.4 GROUND SURFACE 0.0
										ARTIFICIAL FILL RIP RAP AND POORLY CONSOLIDATED FILL
	566.5	4.9	2	2	3	5				566.4 5.0
										ARTIFICIAL FILL RED MED. STIFF WET CLAYEY SANDY SILT (A-4)
	561.5	9.9	2	1	1	2				560.5 10.9
										ALLUVIAL RED LOOSE TO V. LOOSE WET SLI. MICA. SAND (A-2)
	556.5	14.9	2	1	1	2				556.5 14.9
										ALLUVIAL GRAY V. LOOSE WET CLEAN CSE. SAND (A-1)
	551.5	19.9	1	1	2	3				549.2 22.2
										WEATHERED ROCK
										547.2 VERY HARD INDURATED RED-BROWN WEATHERED ROCK 24.2
										CRYSTALLINE ROCK DARK GRAY FRESH VERY HARD WIDE SPACED FRACTURE GABBRO
										537.9 33.5
										Boring Terminated at Elevation 537.9 ft IN CRYSTALLINE ROCK (GABBRO)
										NOTE: THIS BORING WAS ORIGINALLY BORING 'B-2' FROM PROJECT 9.8100492 U-3827.

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Callaway, R. Q.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. B-3(PED)	**STATION** 22+35	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 567.9 ft	**TOTAL DEPTH** 21.4 ft	**NORTHING** 589,929	**EASTING** 1,500,630	**24 HR.** 8.0
DRILL RIG/HAMMER EFF./DATE CME-550		**DRILL METHOD** NW Casing w/ SPT & Tri-Cone	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 05/18/01	**COMP. DATE** 05/18/01	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
570										GROUND SURFACE	567.9	0.0
										ARTIFICIAL FILL BOULDERS AND SAND EROSION PROTECTION		
565											562.7	5.2
	562.7	5.2	2	3	2	5				**ARTIFICIAL FILL** RED-BROWN LOOSE SILTY SAND (A-2)	560.7	7.2
560										**ALLUVIAL** RED-BROWN LOOSE WET SLI. MICA. SILTY SAND (A-2)	558.7	9.2
	557.7	10.2	0	1	1	2				**ALLUVIAL** BROWN MODERATE TO HIGHLY ORGANIC SOFT SANDY CLAYEY SILT (A-4)	556.4	11.5
555										**ALLUVIAL** RED-BROWN LOOSE TO V. LOOSE WET SILTY SAND (A-2)	554.9	13.0
										ALLUVIAL GRAY LOOSE TO V. LOOSE WET CLEAN CSE. SAND (A-1)	549.4	18.5
550	547.7	20.2	8	13	50/0.2	100/.7				**WEATHERED ROCK** RED-BROWN V. DENSE INDURATED WEATHERD GABBRO	546.5	21.4

Boring Terminated BY TRI-CONE REFUSAL at Elevation 546.5 ft ON CRYSTALLINE ROCK

NOTE: THIS BORING WAS ORIGINALLY BORING 'B-3' FROM PROJECT 9.8100492 U-3827.

NOTE: DRIVE AT 15.2 WAS NOT TAKEN DUE TO SAND BLOW BACK, PROCEEDED TO NEXT DRIVE.

WBS 42265.1	**TIP** B-5123	**COUNTY** CABARRUS	**GEOLOGIST** Callaway, R. Q.	
SITE DESCRIPTION REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS RD.				**GROUND WTR (ft)**
BORING NO. EB2(PED)	**STATION** 22+85	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** NM
COLLAR ELEV. 585.7 ft	**TOTAL DEPTH** 34.7 ft	**NORTHING** 589,948	**EASTING** 1,500,676	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE CME-550		**DRILL METHOD** Solid Augers	**HAMMER TYPE** Automatic	
DRILLER Estep, J. E.	**START DATE** 05/18/01	**COMP. DATE** 05/18/01	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
590										GROUND SURFACE	585.7	0.0
										ROADWAY EMBANKMENT RED-BROWN MED. STIFF WET SANDY SILT (A-4)		
585											562.3	23.4
										ALLUVIAL RED-BROWN SILTY SAND (A-2)	560.7	25.0
580										**ALLUVIAL** GRAY SLI. SILTY WET TO SAT. CSE. SAND (A-1)		
575											551.7	34.0
570										**WEATHERED ROCK** GRAY VERY DENSE INDURATED MATERIAL - AUGER REFUSAL AT BASE.	551.0	34.7
565												
560												
555												

Boring Terminated BY AUGER REFUSAL at Elevation 551.0 ft ON CRYSTALLINE ROCK

NOTE: THIS BORING WAS ORIGINALLY BORING 'EB2' FROM PROJECT 9.8100492 U-3827.

TEST RESULTS

PROJECT: 42265.1.1 (B-5123)
COUNTY: CABARRUS
SITE DESCRIPTION: BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER & ACCESS ROAD

SHEET
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SOIL SAMPLE RESULTS

SAMPLE NO.	*OFFSET*	*STATION*	*DEPTH INTERVAL*	*AASHTO CLASS*	*N*	*L.L.*	*P.I.*	*% BY WEIGHT*				*% PASSING SIEVES*			*%*	*%*	*UNIT*	*VOID*
								C. SAND	*F. SAND*	*SILT*	*CLAY*	*10*	*40*	*200*	*MOISTURE*	*ORGANIC*	*WT. (d)*	*RATIO*
		B1-A (NBL)																
SS-1	6.0 RT.	21+37 -L-	5.2-6.2	A-2-4(0)	4	26	NP	50.9	30.0	11.0	8.1	95	67	21	-	-		
SS-2	6.0 RT.	21+37 -L-	10.2-11.2	A-2-4(0)	2	32	NP	43.8	35.5	12.7	8.1	100	82	23	-	-		
SS-3	6.0 RT.	21+37 -L-	20.2-21.2	A-2-4(0)	60	21	NP	40.7	44.8	12.5	2.0	100	80	20	-	-		
		B-3																
SS-4	45.0 LT.	22+42 -L-	5.0-6.0	A-4(0)	6	28	4	30.0	39.9	20.0	10.1	97	80	36	-	-		
SS-5	45.0 LT.	22+42 -L-	10.0-11.0	A-7-6(15)	10	48	22	11.6	25.7	26.2	36.5	100	94	69	-	-		
SS-6	45.0 LT.	22+42 -L-	15.0-16.0	A-6(3)	7	33	12	21.7	33.4	22.6	22.3	100	88	51	-	-		
SS-7	45.0 LT.	22+42 -L-	20.0-21.0	A-6(13)	5	40	19	7.5	23.9	28.1	40.5	100	96	74	-	-		
SS-8	45.0 LT.	22+42 -L-	25.0-26.0	A-1-b(0)	2	19	NP	69.3	22.9	4.8	3.0	92	49	9	-	-		

ROCK SAMPLE RESULTS

SAMPLE NO.	*OFFSET*	*STATION*	*DEPTH INTERVAL*	*RQD*	*UNIT WT (pcf)*	Q(ksf)	E(MPsi)

42265.1.1 (B-5123)
CABARRUS COUNTY
REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER AND ACCESS ROAD

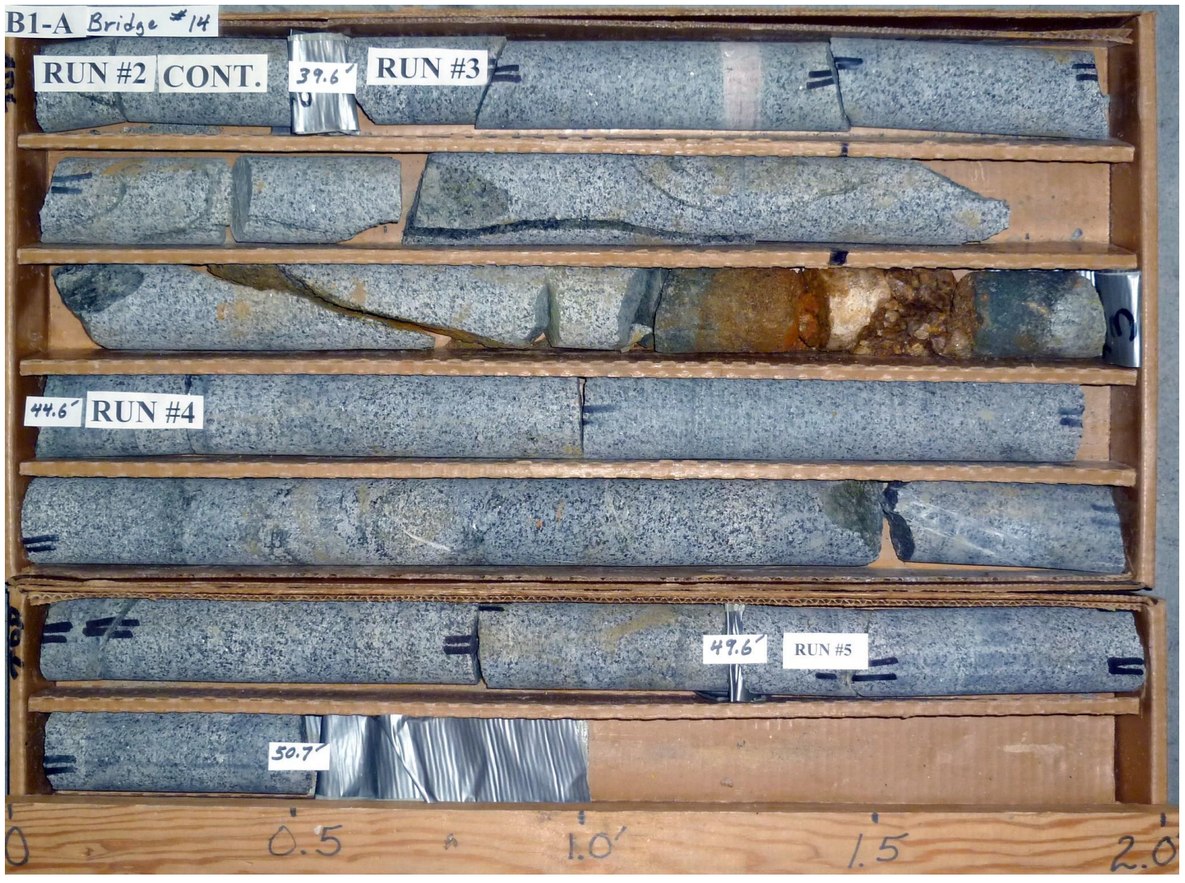
CORE PHOTOS

B1-A(SBL)

42265.1.1 (B-5123)
CABARRUS COUNTY
REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER AND ACCESS ROAD

CORE PHOTOS

B1-A(NBL)



42265.1.1 (B-5123)
CABARRUS COUNTY
REPLACE BRIDGE NO. 014 & 019 ON US 29 OVER ROCKY RIVER AND ACCESS ROAD

CORE PHOTOS

B1-B(NBL)

PROJECT REFERENCE NO.	SHEET
42265.1.1 (B-5123)	20

Aerial Photo

0 50 100

FEET

-DET2- PT Sta. 14+20.72

-SRVRD- PT Sta. 12+12.39

-SRVRD- PC Sta. 12+95.51

-SRVRD- PT Sta. 13+77.22

-SRVRD- PC Sta. 14+07.86

END BRIDGE
-DET2- Sta. 17+23.00+/-

-DET2- PC Sta. 17+52.34

-DET2- PRC Sta. 19+49.95

-SRVRD-

N 81° 28' 53.2" E

S 85° 08' 29.3" E

N 67° 31' 16.3" E

-DET2-

BEGIN BRIDGE
-DET2- Sta. 14+64.00+/-

EBI(DET)

GUY

RETAINING WALL

BL-4

ROCKY RIVER

BST

EB2-A
(SBL)

B-3

BI-A
(SBL)

CONC BRIDGE #19

US 29 SBL

W.P. #1
STA. 20+29.92 -L-

W.P. #2
STA. 21+39.92 -L-

W.P. #3
STA. 22+49.92 -L-

LEFT LANE CONTROL LINE

GRAVEL

24' GRAVEL

20

15

25

20

N 67° 31' 16.3" E

-L-

US 29 NBL

W.P. #1
STA. 20+38.29 -L-

BI-A
(NBL)

W.P. #2
STA. 21+48.29 -L-
CONC BRIDGE #14

W.P. #3
STA. 22+58.29 -L-

RIGHT LANE CONTROL LINE

US 29 NBL

10' WD PED BRIDGE

EB2
(PED)

B-1
(PED)

BI-B
(NBL)

B-2(PED)

B-3
(PED)

BM #2

GUY

EBI-B
(NBL)

BST

10' GR & SOIL

20' GR & BST

20' GR & BST

20' GR & BST

35' BST

S 23° 54' 14.2" W

END BRIDGE
-L- Sta. 22+54.08 +/-

-SRVRD- PT Sta. 16+55.28

NC GRID
NAD 83/2001

IS MTL BUS