STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	45355.1.19 (BD-5109S)	1	13

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

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 45355.1.19 (BD-5109S) F.A. PROJ. BRZ-1771(3)

COUNTY ROWAN

PROJECT DESCRIPTION REPLACE BRIDGE #16 OVER SILLS CREEK ON SR 1771 - LYERLY RD.

SITE DESCRIPTION

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-8	CROSS SECTIONS
9-12	BORE LOGS
13	SITE PHOTO

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) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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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 THIS 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.

PERSONNEL

C. C. MURRAY

J. E. ESTEP

M. R. MOORE

INVESTIGATED BY C. B. LITTLE

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE AUGUST 2012

NORTH CAROLINA LICENSED SEAL 1104 GEOLOGIST CLINTON B. LITTLE 9-5-12

DRAWN BY: C. E. BURRIS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT: 45355.1.19

ID: BD-5109S

PROJECT REFERENCE NO.	SHEET NO.
45355.1.19 (BD-5109S)	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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
# 40	30 MX	50 MX	51 MN											
# 200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX		NP	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PLASTIC INDEX				10 MX	10 MX	11 MX	11 MN	10 MX	10 MX	11 MN	11 MN			
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 A 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 0.50 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
GRAIN SIZE 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	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 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 W/ CORE
- SPT N-VALUE
- REF SPT REFUSAL

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:
- [ ] MOBILE B-___
- [ ] BK-51
- [ ] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC
- [ ] MANUAL

CORE SIZE:
- [ ] -B_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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: STA. -L- 14+22.08 13.6625 RT
STA. -EL- 14+22.25 13.88 RT
N 701802.5391 E 1508832.6674 ELEVATION: 688.27 FT.

NOTES:
STRATIGRAPHY SHOWN THROUGH BORINGS

REVISED 09/23/09

ROWAN COUNTY
LOW IMPACT BRIDGE

LS 09-11-093
WBS 45355.1.19
STRUCTURE 790016
TIP BD5109S

PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	3

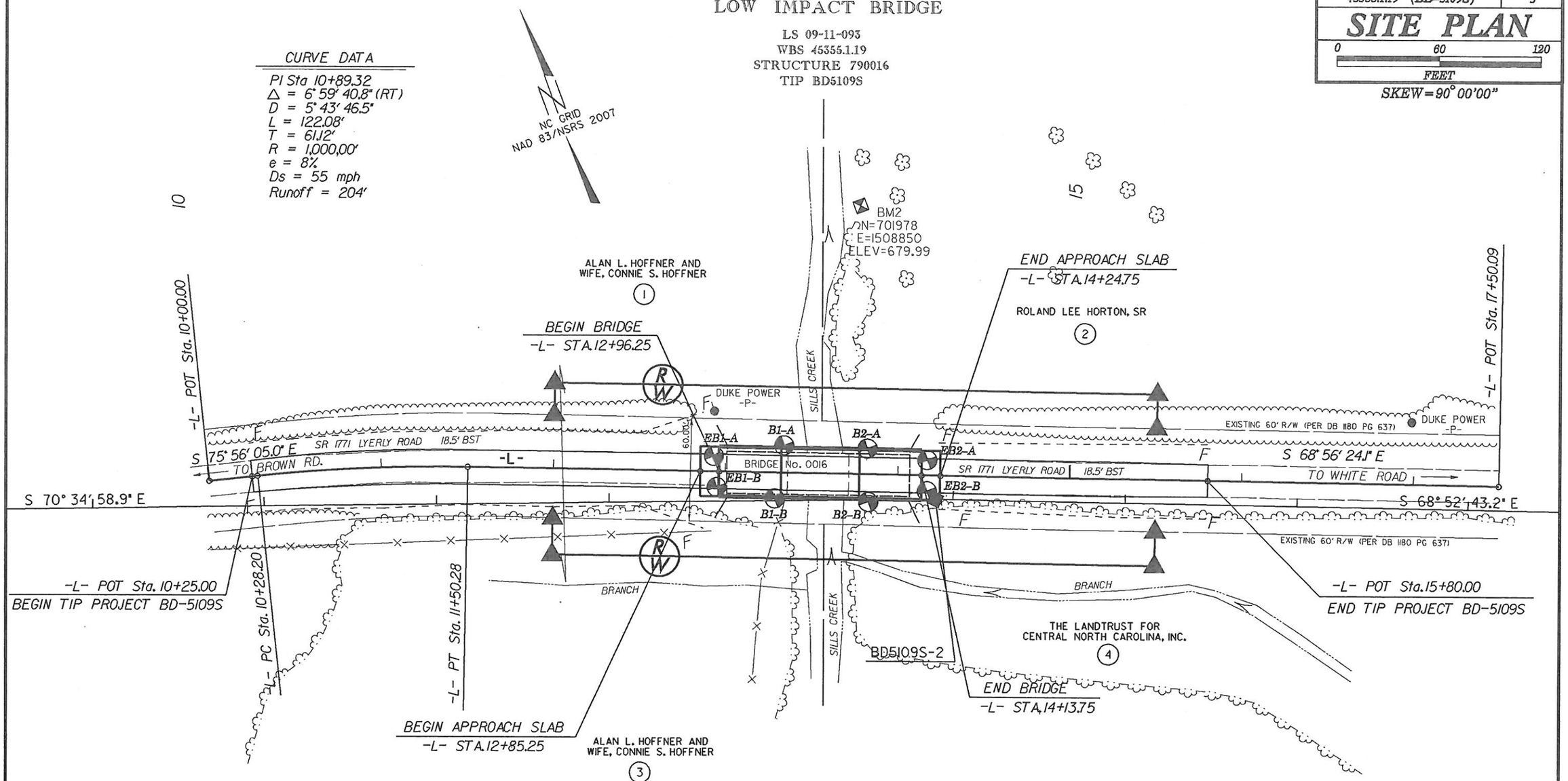
SITE PLAN

0 60 120
FEET

SKEW=90° 00'00"

CURVE DATA

PI Sta 10+89.32
△ = 6° 59' 40.8" (RT)
D = 5° 43' 46.5"
L = 122.08'
T = 61.12'
R = 1,000.00'
e = 8%
Ds = 55 mph
Runoff = 204'



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "BD5109S-1"
WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF
NORTHING: 701998.585(ft) EASTING: 1508276.491(ft)
ELEVATION: 707.48(ft)
THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9998700043
THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "BD5109S-1" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BL

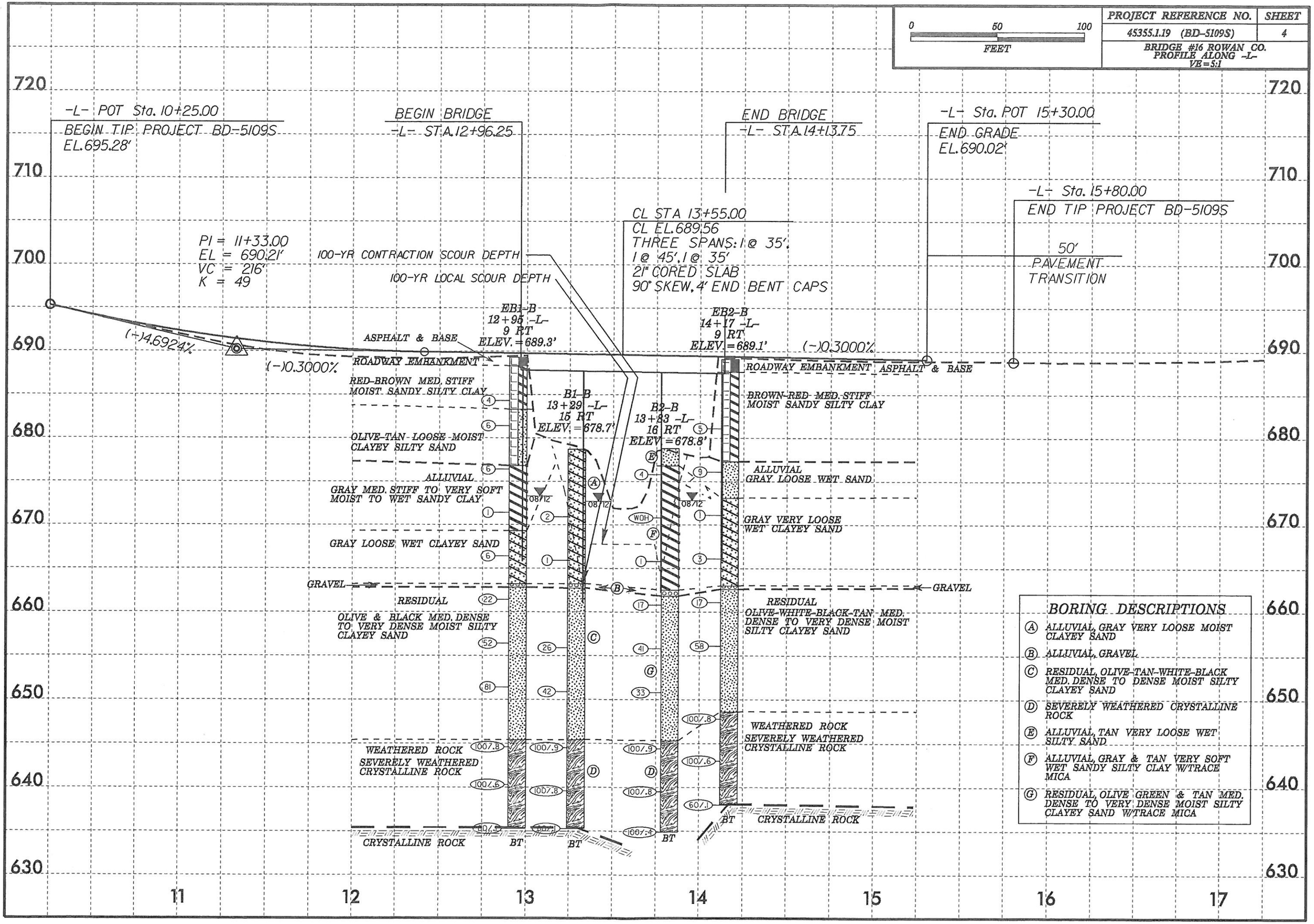
POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	BD5109S-1	701998.5850	1508276.4910	707.48	OUTSIDE PROJECT LIMITS	
2	BD5109S-2	701802.5391	1508832.6674	688.27	14+22.25	13.88 RT
3	BL-3	701642.9149	1509245.8849	689.36	OUTSIDE PROJECT LIMITS	

****
BM1 ELEVATION = 707.48
N 701999 E 1508276
COURSE FROM -EL- STA. 10+00
N 75°37'47" W 169.06'
BM1=GPS1 IRON PIN AND ALUMINUM CAP SET AND BEING N 74°07'03" W 469.94' FROM NW END OF BRIDGE AND BEING 5.70' FROM THE NORTH EOP OF LYERLY ROAD (SR1771)
****

****
BM2 ELEVATION = 679.99
N 701978 E 1508850
EL STATION 13+75 156 LEFT
R/R SPIKE SET IN BASE OF 18" LOCUST TREE
****

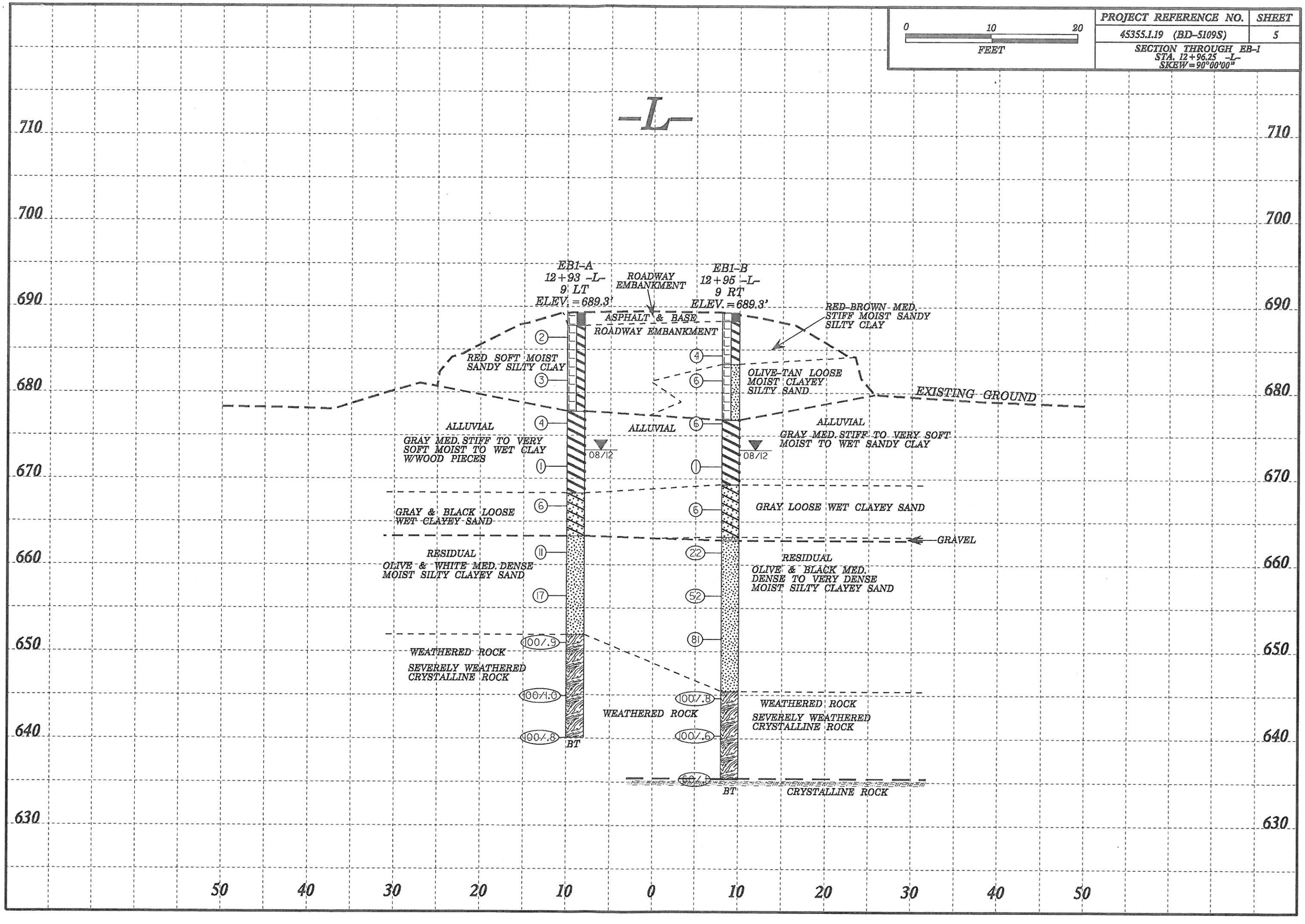
PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	4

BRIDGE #16 ROWAN CO.
PROFILE ALONG -L-
V/E = 5:1

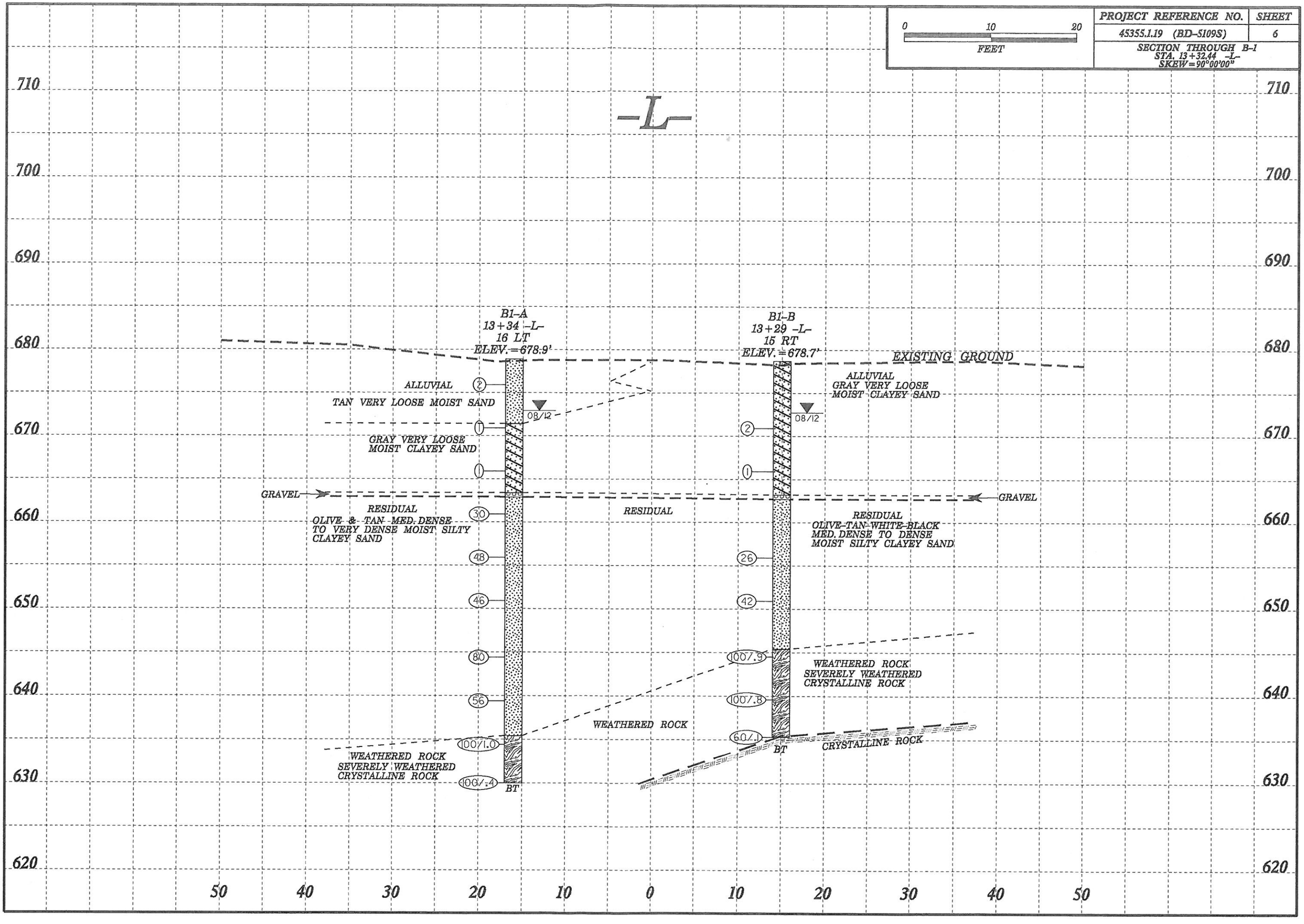


PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	5

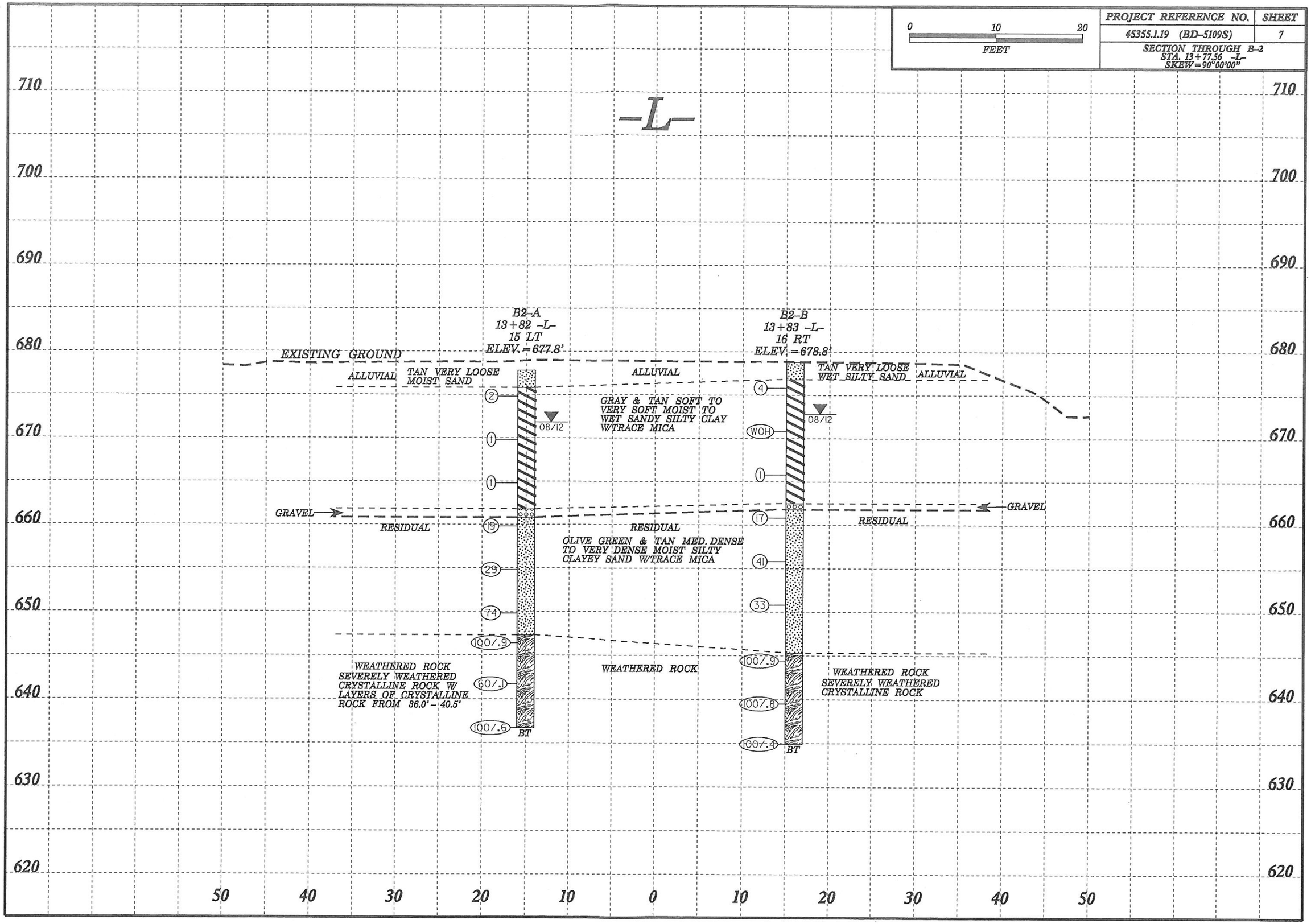
SECTION THROUGH EB-1
STA. 12+96.25 -L-
SKEW = 90°00'00"



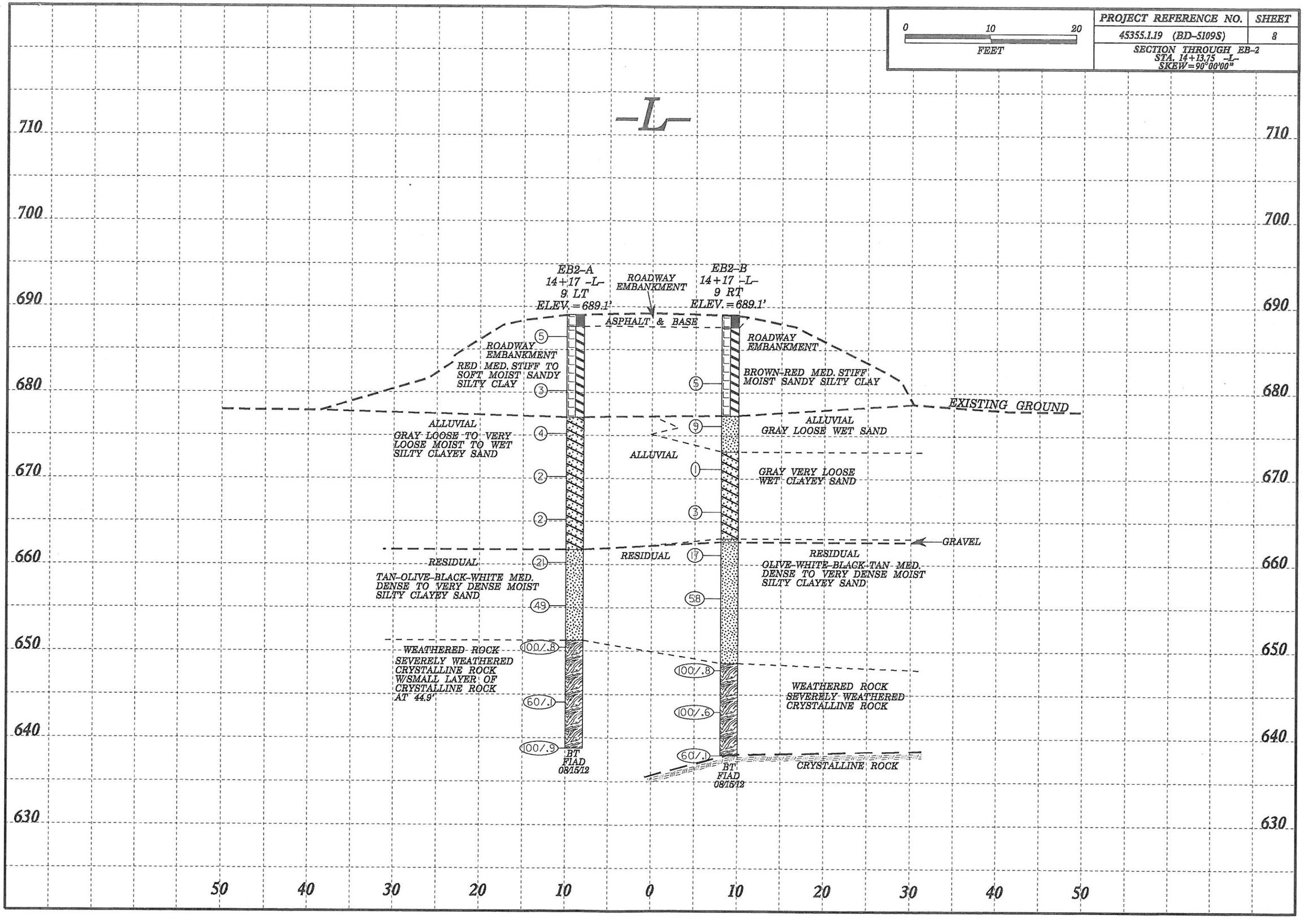
PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	6
SECTION THROUGH B-1 STA. 13+32.44 -L- SKEW=90°00'00"	



PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	7
SECTION THROUGH B-2 STA. 13+77.56 -L- SKEW=90°00'00"	



PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	8
SECTION THROUGH EB-2 STA. 14+13.75 -L- SKEW=90°00'00"	



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 12+93	**OFFSET** 9 ft LT	**ALIGNMENT** -L- — **0 HR.** 12.0
COLLAR ELEV. 689.3 ft	**TOTAL DEPTH** 49.2 ft	**NORTHING** 701,870	**EASTING** 1,508,720 — **24 HR.** 16.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/16/12	**COMP. DATE** 08/16/12	**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)
690										689.3 GROUND SURFACE	0.0
	687.4	1.9								687.8 **ROADWAY EMBANKMENT** ASPHALT & BASE	1.5
685			2	1	1	2		M		**ROADWAY EMBANKMENT** RED SOFT MOIST SANDY SILTY CLAY	
	682.4	6.9									
680			1	1	2	3		M			
	677.4	11.9								677.8	11.5
675			2	2	2	4		M		**ALLUVIAL** GRAY MED. STIFF TO VERY SOFT MOIST TO WET CLAY W/ WOOD PIECES	
	672.4	16.9									
670			0	0	1	1		W			
	667.8	21.5								668.3	21.0
665			0	3	3	6		W		**ALLUVIAL** GRAY & BLACK LOOSE WET CLAYEY SAND	
	662.4	26.9								663.3	26.0
660			9	5	6	11		M		**RESIDUAL** OLIVE & WHITE MED. DENSE MOIST SILTY CLAYEY SAND	
	657.4	31.9									
655			5	7	10	17		M			
	652.4	36.9								651.9	37.4
650			20	35	65/.4	100/.9				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	
	645.9	43.4									
645			45	55/.5		100/1.0					
	640.9	48.4								640.1	49.2
			36	64/.3		100/.8				Boring Terminated at Elevation 640.1 ft in severely weathered crystalline rock	

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 12+95	**OFFSET** 9 ft RT	**ALIGNMENT** -L- — **0 HR.** 16.0
COLLAR ELEV. 689.3 ft	**TOTAL DEPTH** 54.0 ft	**NORTHING** 701,853	**EASTING** 1,508,716 — **24 HR.** 16.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/14/12	**COMP. DATE** 08/14/12	**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)
690										689.3 GROUND SURFACE	0.0
										688.3 **ROADWAY EMBANKMENT** ASPHALT & BASE	1.0
685	685.3	4.0	0	2	2	4		M		**ROADWAY EMBANKMENT** RED-BROWN MED. STIFF MOIST SANDY SILTY CLAY	
	682.4	6.9								683.3	6.0
680			1	3	3	6		M		**ROADWAY EMBANKMENT** OLIVE-TAN LOOSE MOIST CLAYEY SILTY SAND	
	677.4	11.9									
675			3	3	3	6		M			
	672.4	16.9								676.8	12.5
670			0	1	0	1				**ALLUVIAL** GRAY MED. STIFF TO VERY SOFT MOIST TO WET SANDY CLAY	
	667.4	21.9								669.3	20.0
665			1	1	5	6		W		**ALLUVIAL** GRAY LOOSE WET CLAYEY SAND	
	662.4	26.9								663.2	26.1
660			8	10	12	22		M		662.8 **ALLUVIAL** GRAVEL	26.5
	657.4	31.9								**RESIDUAL** OLIVE & BLACK MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND	
655			20	22	30	52		M			
	652.4	36.9									
650			20	33	48	81		M			
	645.9	43.4								645.4	43.9
645			38	54	46/.3	100/.8				**WEATHERED ROCK** SEVERELY WEATHERED CRYSTALLINE ROCK	
	640.9	48.4									
640			52	48/.1		100/.6					
	635.9	53.4								635.4	53.9
			44	60/.1		60/.1				635.3 **CRYSTALLINE ROCK**	54.0
										Boring Terminated at Elevation 635.3 ft in crystalline rock	

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	TIP BD5109S	COUNTY ROWAN	GEOLOGIST Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			GROUND WTR (ft)
BORING NO. B1-A	STATION 13+34	OFFSET 16 ft LT	ALIGNMENT -L- / 0 HR. NM
COLLAR ELEV. 678.9 ft	TOTAL DEPTH 48.9 ft	NORTHING 701,862	EASTING 1,508,761 / 24 HR. 6.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/09/12	COMP. DATE 08/09/12	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)
680										678.9 GROUND SURFACE	0.0
675	676.9	2.0	2	1	1	2		M		ALLUVIAL TAN VERY LOOSE MOIST SAND	
670	671.9	7.0	1	0	1	1		M		671.4 ALLUVIAL GRAY VERY LOOSE MOIST CLAYEY SAND	7.5
665	666.9	12.0	0	0	1	1		M			
660	661.9	17.0	10	14	16	30		M		663.4 / 662.9 ALLUVIAL GRAVEL	15.5 / 16.0
655	656.9	22.0	16	16	32	48		M		RESIDUAL OLIVE & TAN MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND	
650	651.9	27.0	15	18	28	46		M			
645	645.4	33.5	25	39	41	80		M			
640	640.4	38.5	17	26	30	56		M			
635	635.4	43.5	35	65/.5		100/1.0				635.4 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	43.5
630	630.4	48.5	100/.4			100/.4				630.0 Boring Terminated at Elevation 630.0 ft in severely weathered crystalline rock	48.9

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	TIP BD5109S	COUNTY ROWAN	GEOLOGIST Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			GROUND WTR (ft)
BORING NO. B1-B	STATION 13+29	OFFSET 15 ft RT	ALIGNMENT -L- / 0 HR. NM
COLLAR ELEV. 678.7 ft	TOTAL DEPTH 43.4 ft	NORTHING 701,835	EASTING 1,508,745 / 24 HR. 6.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 08/08/12	COMP. DATE 08/08/12	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)
680										678.7 GROUND SURFACE	0.0
675	671.9	6.8	1	1	1	2		M		ALLUVIAL GRAY VERY LOOSE MOIST CLAYEY SAND	
670	666.9	11.8	0	1	0	1		M			
665	656.9	21.8	9	11	15	26		M		663.2 / 662.7 ALLUVIAL GRAVEL	15.5 / 16.0
660	651.9	26.8	12	14	28	42		M		RESIDUAL OLIVE-TAN-WHITE-BLACK MED. DENSE TO DENSE MOIST SILTY CLAYEY SAND	
655	645.4	33.3	55	45/.4		100/.9				645.4 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	33.3
650	640.4	38.3	50	50/.3		100/.8					
645	635.4	43.3	60/.1			60/.1				635.4 / 635.3 CRYSTALLINE ROCK Boring Terminated at Elevation 635.3 ft in crystalline rock	43.3 / 43.4

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 13+82	**OFFSET** 15 ft LT	**ALIGNMENT** -L- / **0 HR.** 5.0
COLLAR ELEV. 677.8 ft	**TOTAL DEPTH** 41.1 ft	**NORTHING** 701,844	**EASTING** 1,508,806 / **24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/08/12	**COMP. DATE** 08/08/12	**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)
680											
										677.8 GROUND SURFACE	0.0
675	675.8	2.0	2	0	2	2		M		675.8 ALLUVIAL TAN VERY LOOSE MOIST SAND	2.0
670	670.8	7.0	1	0	1	1		M		ALLUVIAL GRAY & TAN SOFT TO VERY SOFT MOIST SANDY SILTY CLAY W/ TRACE MICA	
665	665.8	12.0	0	0	1	1		M			
										661.8	16.0
660	660.8	17.0	7	9	10	19		M		660.8 ALLUVIAL GRAVEL	17.0
655	655.8	22.0	4	10	19	29		M		RESIDUAL OLIVE GREEN & TAN MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND W/ TRACE MICA	
650	650.8	27.0	17	28	46	74		M			
645	647.3	30.5	27	63/.4		100/.9				647.3 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK W/ LAYERS OF CRYSTALLINE ROCK FROM 36.0' - 40.5'	30.5
640	642.3	35.5	58	60/.1		60/.1					
	637.3	40.5	60	40/.1		100/.6				636.7 Boring Terminated at Elevation 636.7 ft in severely weathered crystalline rock	41.1

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 13+83	**OFFSET** 16 ft RT	**ALIGNMENT** -L- / **0 HR.** NM
COLLAR ELEV. 678.8 ft	**TOTAL DEPTH** 43.9 ft	**NORTHING** 701,814	**EASTING** 1,508,795 / **24 HR.** 6.0
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/07/12	**COMP. DATE** 08/07/12	**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)
680											
										678.8 GROUND SURFACE	0.0
675	676.8	2.0	2	2	2	4		W		676.8 ALLUVIAL TAN VERY LOOSE WET SILTY SAND	2.0
670	671.8	7.0	0	0	0 WOH	0		W		ALLUVIAL GRAY & TAN VERY SOFT WET SANDY SILTY CLAY W/ TRACE MICA	
665	666.8	12.0	0	0	1	1		W			
										662.5	16.3
660	661.8	17.0	6	7	10	17		W		661.8 ALLUVIAL GRAVEL	17.0
655	656.8	22.0	11	19	22	41		M		RESIDUAL OLIVE GREEN & TAN MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND W/ TRACE MICA	
650	651.8	27.0	11	14	19	33		M			
645	645.3	33.5	45	55/.4		100/.9				645.3 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	33.5
640	640.3	38.5	45	55/.3		100/.8					
635	635.3	43.5	100/.4			100/.4				634.9 Boring Terminated at Elevation 634.9 ft in severely weathered crystalline rock	43.9

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 14+17	**OFFSET** 9 ft LT	**ALIGNMENT** -L- / **0 HR.** 12.0
COLLAR ELEV. 689.1 ft	**TOTAL DEPTH** 50.3 ft	**NORTHING** 701,826	**EASTING** 1,508,836 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/15/12	**COMP. DATE** 08/15/12	**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)
690										689.1 GROUND SURFACE	0.0
685	687.5	1.6	2	2	3	5		M		687.7 ROADWAY EMBANKMENT ASPHALT & BASE	1.4
										ROADWAY EMBANKMENT RED MED. STIFF TO SOFT MOIST SANDY SILTY CLAY	
680	681.2	7.9	2	1	2	3		M			
675	676.2	12.9	3	2	2	4		M		677.1 ALLUVIAL GRAY LOOSE TO VERY LOOSE MOIST TO WET SILTY CLAYEY SAND	12.0
670	671.2	17.9	0	0	2	2		W			
665	666.2	22.9	1	1	1	2		W			
660	661.2	27.9	9	9	12	21		M		661.7 RESIDUAL TAN-OLIVE-BLACK-WHITE MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND	27.4
655	656.2	32.9	19	23	26	49		M			
650	651.2	37.9	48	52/.3		100/.8				651.2 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK W/ SMALL LAYER OF CRYSTALLINE ROCK AT 44.9'	37.9
645	644.7	44.4	65	60/.1		60/.1					
640	639.7	49.4	41	59/.4		100/.9				638.8 Boring Terminated at Elevation 638.8 ft in severely weathered crystalline rock	50.3

NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 45355.1.19	**TIP** BD5109S	**COUNTY** ROWAN	**GEOLOGIST** Murray, C. C.
SITE DESCRIPTION Bridge #16 over Sills Creek on SR 1771			**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+17	**OFFSET** 9 ft RT	**ALIGNMENT** -L- / **0 HR.** NM
COLLAR ELEV. 689.1 ft	**TOTAL DEPTH** 51.1 ft	**NORTHING** 701,809	**EASTING** 1,508,830 / **24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 81% 09/02/2009		**DRILL METHOD** NW Casing w/ Advancer	**HAMMER TYPE** Automatic
DRILLER Estep, J. E.	**START DATE** 08/15/12	**COMP. DATE** 08/15/12	**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)
690										689.1 GROUND SURFACE	0.0
685										687.6 ROADWAY EMBANKMENT ASPHALT & BASE	1.5
										ROADWAY EMBANKMENT BROWN-RED MED. STIFF MOIST SANDY SILTY CLAY	
680	682.1	7.0	2	3	2	5		M			
675	677.1	12.0	4	4	5	9		W		677.3 ALLUVIAL GRAY LOOSE WET SAND	11.8
670	672.1	17.0	0	0	1	1		W		673.1 ALLUVIAL GRAY VERY LOOSE WET CLAYEY SAND	16.0
665	667.1	22.0	1	2	1	3		W			
660	662.1	27.0	4	6	11	17		M		663.0 662.6 ALLUVIAL GRAVEL	26.1 26.5
655	657.1	32.0	17	25	33	58		M		RESIDUAL OLIVE-WHITE-BLACK-TAN MED. DENSE TO VERY DENSE MOIST SILTY CLAYEY SAND	
650	648.6	40.5	45	55/.3		100/.8				648.6 WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	40.5
645	643.6	45.5	63	37/.1		100/.6					
640	638.6	50.5	59	60/.1		60/.1				638.1 638.0 CRYSTALLINE ROCK Boring Terminated at Elevation 638.0 ft in crystalline rock	51.0 51.1

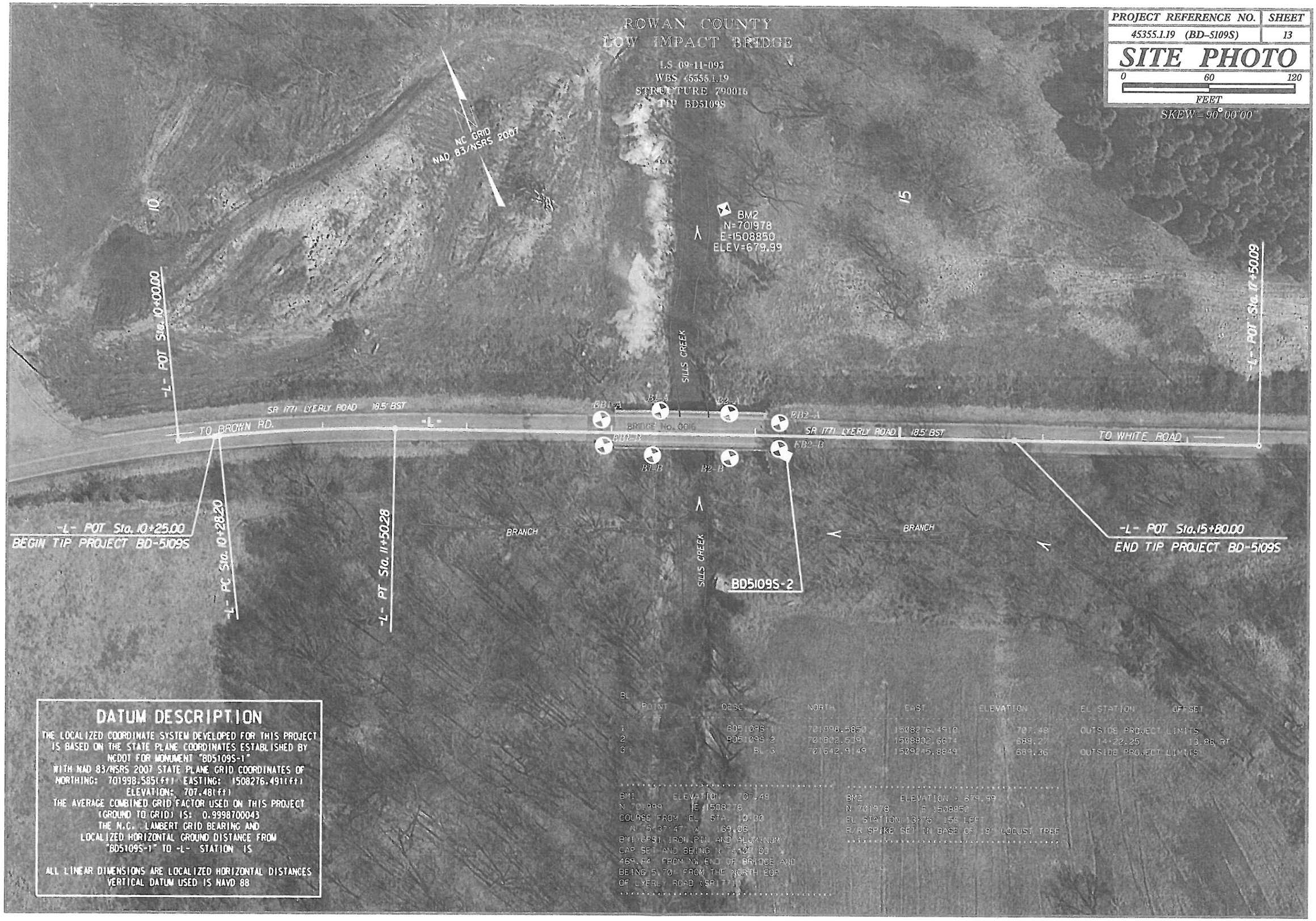
NCDOT BORE SINGLE BD5109S_GEO_BH_BRDG0016_ROWAN.GPJ NC_DOT.GDT 8/23/12

PROJECT REFERENCE NO.	SHEET
45355.1.19 (BD-5109S)	13

SITE PHOTO

0 60 120
FEET

SKEW=90°00'00"



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "BD5109S-1" WITH NAD 83/NSRS 2007 STATE PLANE GRID COORDINATES OF NORTHING: 701998.585(ft) EASTING: 1508276.491(ft) ELEVATION: 707.48(ft)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9998700043

THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "BD5109S-1" TO -L- STATION IS

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES
VERTICAL DATUM USED IS NAVD 88

BL

POINT	DESC	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	BD5109S-1	701998.5850	1508276.4910	707.48	OUTSIDE PROJECT LIMITS	
2	BD5109S-2	701802.5391	1508802.6674	689.27	14+22.25	13.88 RT
3	BL-3	701642.9149	1509245.8849	689.36	OUTSIDE PROJECT LIMITS	

BM1 ELEVATION = 707.48
N 701999 E 1508276
COURSE FROM -EL- STA. 10+00
N 75°37'47" W 169.06
BM1=GPS1 IRON PIN AND ALUMINUM CAP SET AND BEING N 74°07'03" 469.84 FROM NW END OF BRIDGE AND BEING 5.70 FROM THE NORTH EOR OF LYERLY ROAD (SR1771)

BM2 ELEVATION = 679.99
N 701978 E 1508850
EL STATION 13+75 154 LEFT
R/R SPIKE SET IN BASE OF 18" LOCUST TREE