STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34900.1.2 (U-3109A)	1	16

REFERENCE: U-3109A

PROJECT: 34900.1.2

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *ALAMANCE*

PROJECT DESCRIPTION *MEBANE – NC 119 RELOCATION FROM I-40/85 TO NORTH OF US 70*

SITE DESCRIPTION *BRIDGE NO. 434 ON -NBL- OVER I-40/85 WB AND I-40/85 EB (DDI)*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

R. TOOTHMAN

W. TRAPP

INVESTIGATED BY *T. WELLS*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *DECEMBER 2014*

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells
F1D0E9B1B6454300...
SIGNATURE

12/19/2014
DATE

PROJECT REFERENCE NO.	SHEET NO.
34900.1.2 (U-3109A)	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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] MOBILE B-57
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 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.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q

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: SEE NOTES

ELEVATION: IN NOTES FEET

NOTES:

FIAD - FILLED IN AFTER DRILLING

BENCHMARKS:

TOP OF DRAIN AT STA. 26+27, 53' LT -NBL- (844,024 FT N, 1,911,611 FT E) ELEV. 636.96 FT

BL-12 AT STA. 25+59.46, 64.36' RT -L- (843,908.51 FT N, 1,911,723.39 FT E) ELEV. 658.75

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
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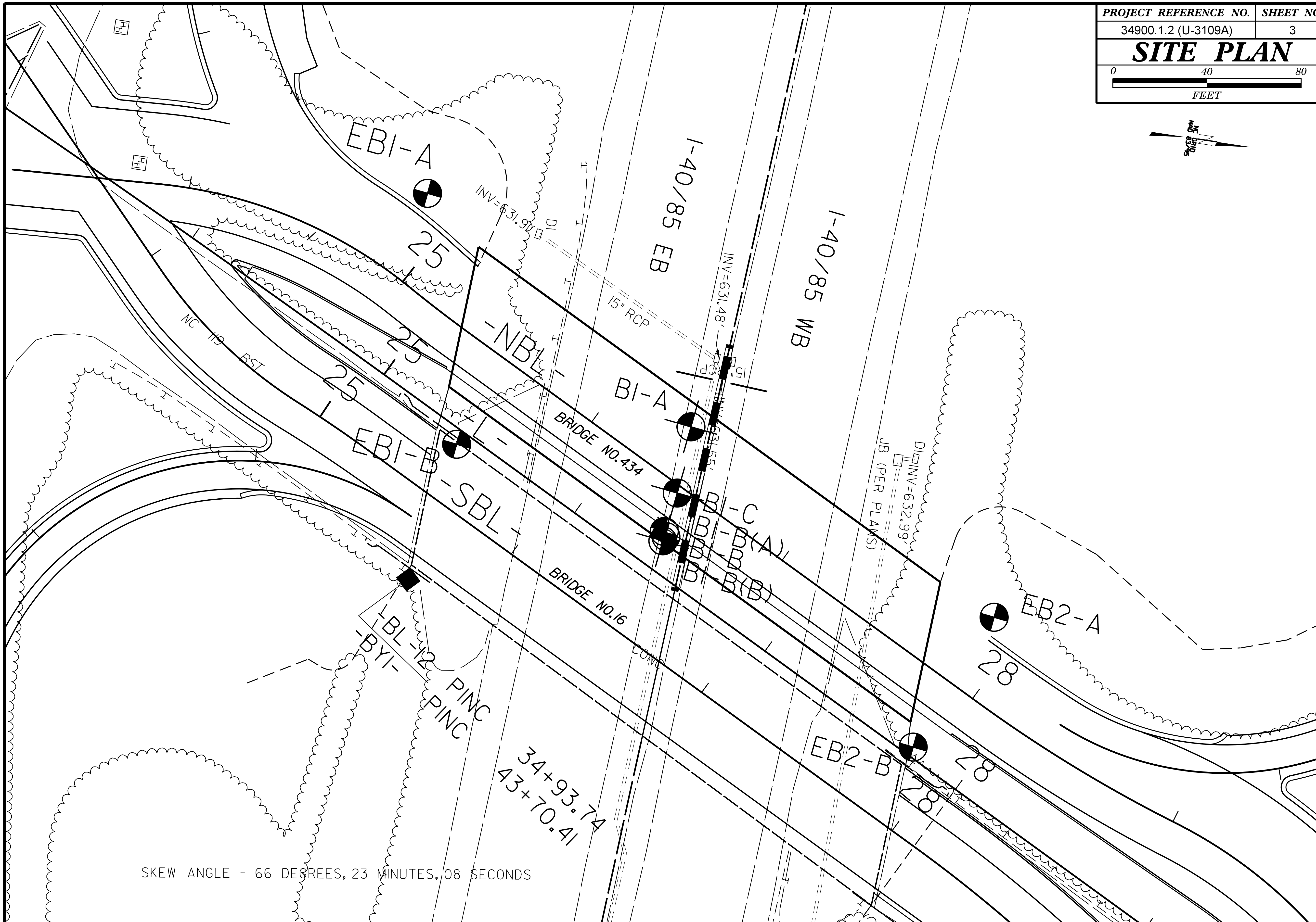
SITE PLAN



PROJECT REFERENCE NO.	SHEET NO.
34900.1.2 (U-3109A)	4
BRIDGE NO. 434 PROFILE ON -NBL-	

0 50 100
FEET
VE = 5:1

Ⓐ **RESIDUAL:** WET, HARD, BLACK AND LIGHT BROWN, FINE SANDY SILT

PROPOSED END BENT NO. 1

PROPOSED BENT NO. 1

PROPOSED END BENT NO. 2

EXISTING GROUNDLINE

EB1–A
24+87
37' LT

B1–A
26+35
23' LT

EB2–A
27+87
33' LT

ROADWAY EMBANKMENT:
PAVEMENT AND ABC STONE

RESIDUAL:
MOIST TO WET, SOFT TO HARD, YELLOWISH BROWN, BLACK, LIGHT BROWN, GRAY, BROWN, AND RED, FINE SANDY SILT

6, 4, 4, 10, 16, 29, 21, 100/0.9, 100/0.6, 60/0.1

7, 5, 77, 10/14, 38, 39, 60/0.1

7, 6, 6, 4, 6, 10, 9, 14, 18, 20, 82, 72, Ⓐ, 100/0.8, 60/0.6

WEATHERED ROCK:
BROWN-GRAY, TAN-GRAY TO BROWN

B.T.

CRYSTALLINE ROCK:
MODERATE WEATHERING, MODERATELY HARD TO MEDIUM HARD, GRAYISH BROWN METAVOLCANIC WITH CLOSE TO MODERATELY CLOSE FRACTURE SPACING

REC=90
RQD=67
RMR=46

C.T.

GRAY METAVOLCANIC

B.T.

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN FILES

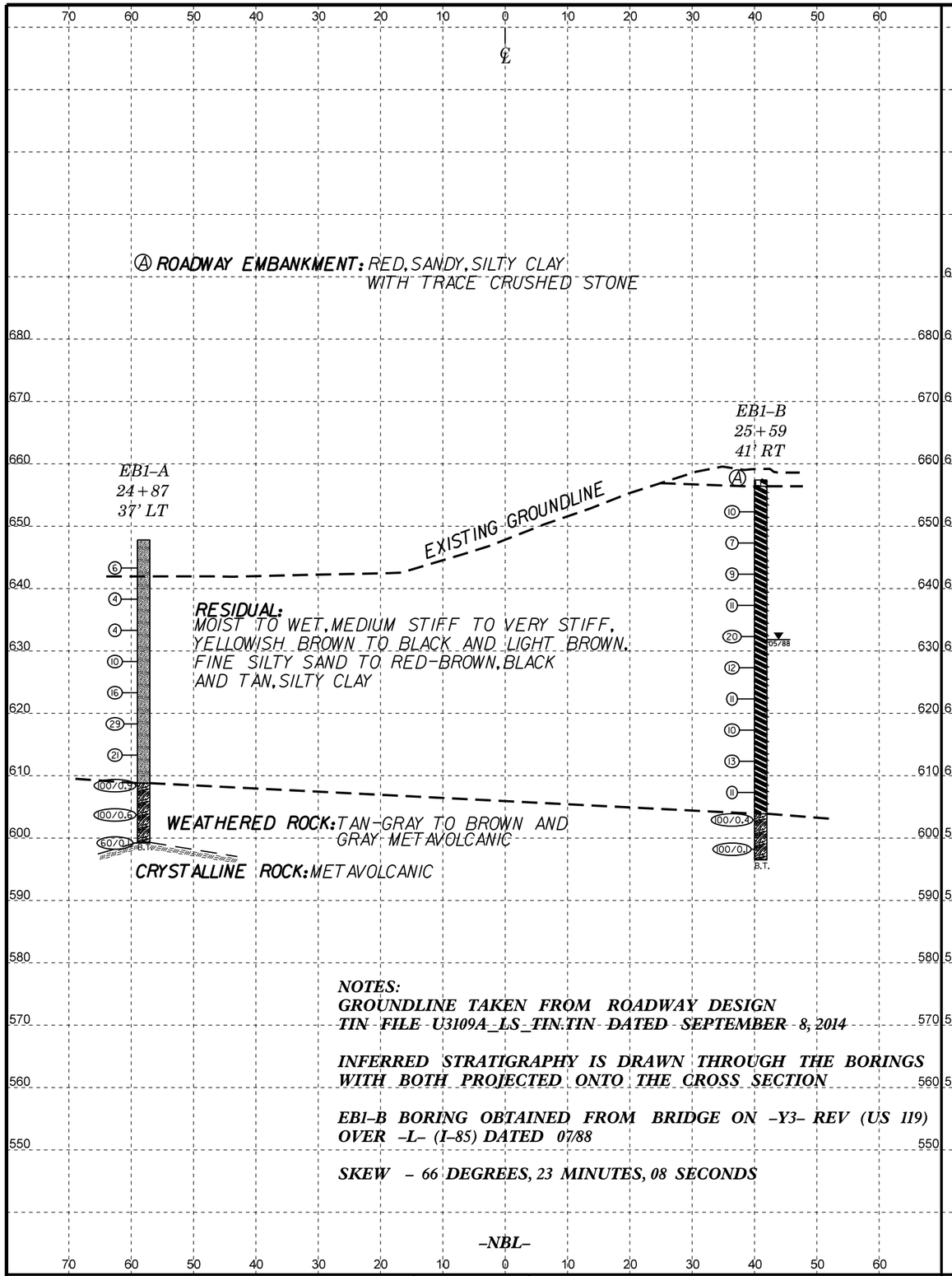
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

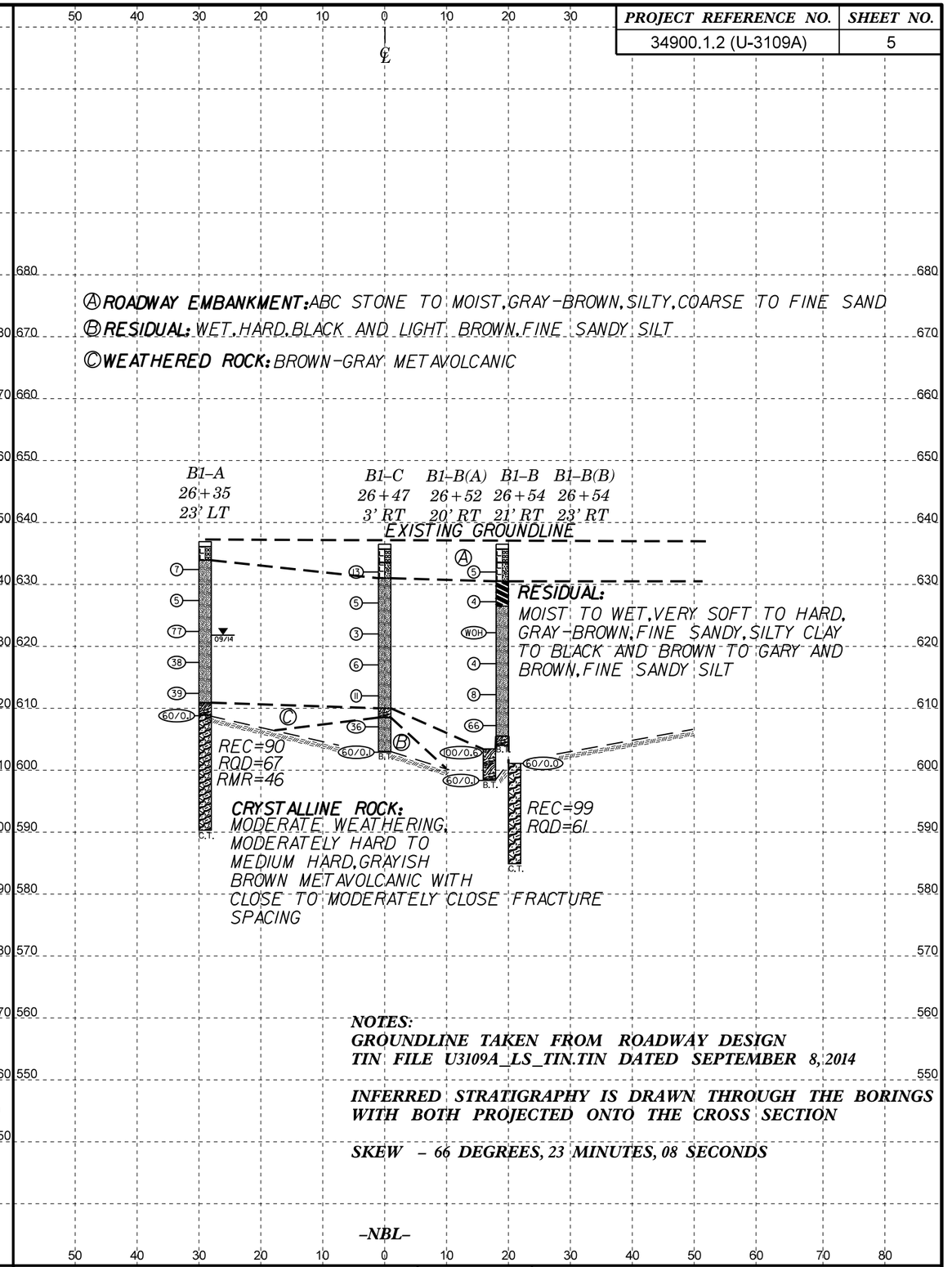
SKEW - 66 DEGREES, 23 MINUTES, 08 SECONDS

670, 660, 650, 640, 630, 620, 610, 600, 590, 580

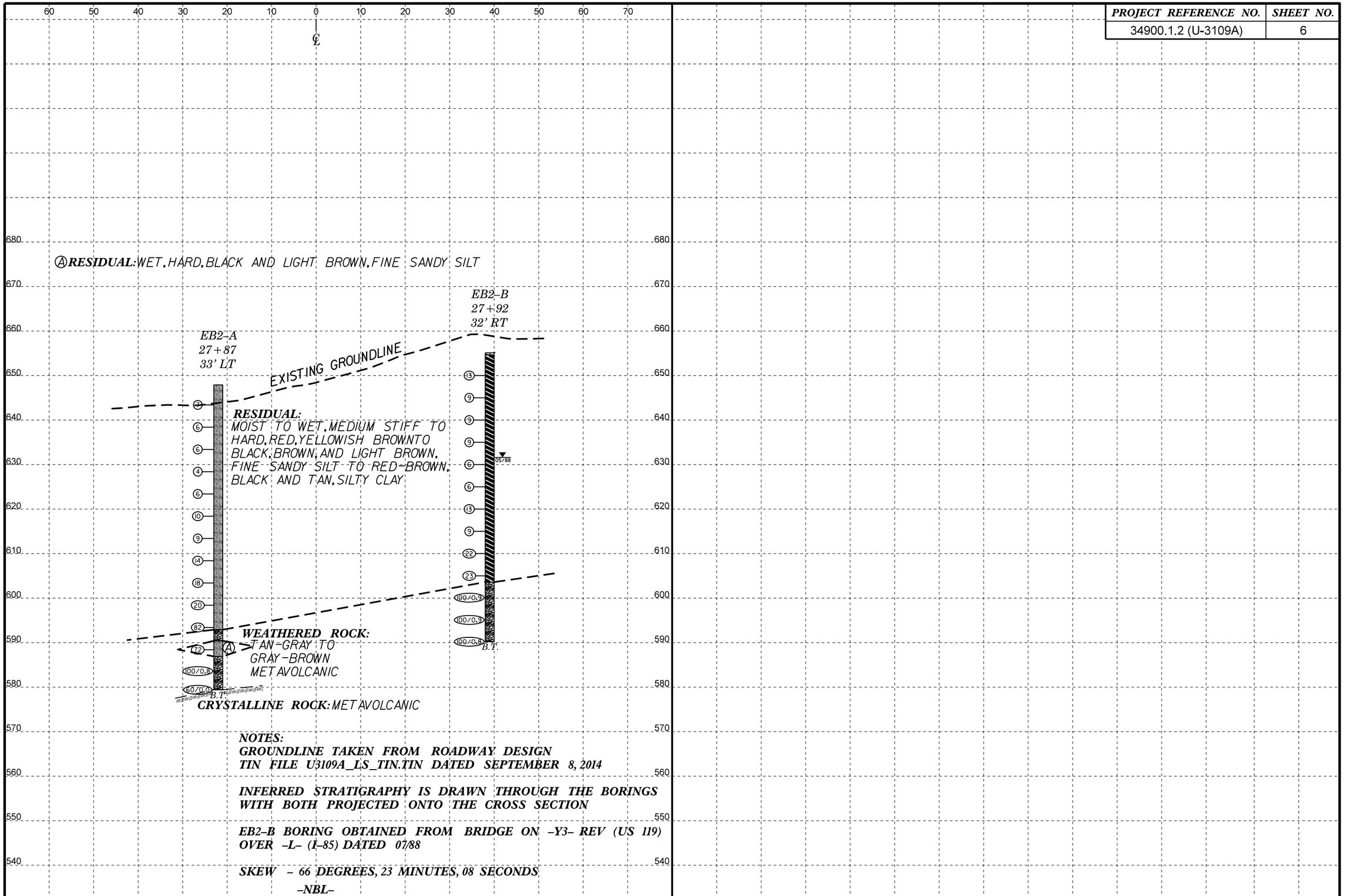
23+00, 23+50, 24+00, 24+50, 25+00, 25+50, 26+00, 26+50, 27+00, 27+50, 28+00, 28+50, 29+00, 29+50

PROJECT REFERENCE NO.	SHEET NO.
34900.1.2 (U-3109A)	5





PROJECT REFERENCE NO.	SHEET NO.
34900.1.2 (U-3109A)	6



NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014

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

EB2–B BORING OBTAINED FROM BRIDGE ON –Y3– REV (US 119) OVER –L– (I–85) DATED 07/88

SKEW – 66 DEGREES, 23 MINUTES, 08 SECONDS

–NBL–

HORIZ. SCALE (FEET) 0 20 40

VE = 1:1

END BENT NO. 2 CROSS SECTION AT STA. 27+65.23

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 24+87	**OFFSET** 37 ft LT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 647.8 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** 843,892	**EASTING** 1,911,560	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 10/03/14	**COMP. DATE** 10/03/14	**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)
650										647.8 GROUND SURFACE 0.0
										RESIDUAL Yellowish Brown to Black and Light Brown, Fine Sandy SILT
645	644.3	3.5	2	3	3	6		M		
640	639.3	8.5	1	2	2	4		M		
635	634.3	13.5	1	2	2	4		M		
630	629.3	18.5	2	4	6	10		M		
625	624.3	23.5	4	6	10	16		M		
620	619.3	28.5	5	10	19	29		M		
615	614.3	33.5	6	9	12	21		M		
610	609.3	38.5	20	60/0.4		100/0.9				
605	604.3	43.5	66	34/0.1		100/0.6				
600	599.3	48.5	60/0.1			60/0.1				608.8 39.0 **WEATHERED ROCK** Tan-Gray to Brown and Gray METAVOLCANIC
										599.3 48.5 599.2 48.6 **CRYSTALLINE ROCK** METAVOLCANIC
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 599.2 ft in CRYSTALLINE ROCK: METAVOLCANIC

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Campbell, H. D.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 25+59	**OFFSET** 41 ft RT	**ALIGNMENT** -NBL-	**0 HR.** 29.3
COLLAR ELEV. 657.4 ft	**TOTAL DEPTH** 60.9 ft	**NORTHING** 843,920	**EASTING** 1,911,664	**24 HR.** 25.6
DRILL RIG/HAMMER EFF./DATE CME-45		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Manual	
DRILLER N/A	**START DATE** 05/23/88	**COMP. DATE** 05/24/88	**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
660										657.4 GROUND SURFACE 0.0
										656.4 **ROADWAY EMBANKMENT** 1.0 Red, Sandy, Silty CLAY with Trace Crushed Stone
										RESIDUAL Red-Brown, Black and Tan. Silty CLAY
655	653.3	4.1	3	4	6	10		M		
650	648.3	9.1	2	3	4	7		M		
645	643.3	14.1	2	4	5	9		M		
640	638.3	19.1	2	5	6	11		M		
635	633.3	24.1	7	9	11	20		M		
630	628.3	29.1	4	6	6	12		M		
625	623.3	34.1	3	4	7	11		W		
620	618.3	39.1	2	4	6	10		W		
615	613.3	44.1	2	4	9	13		W		
610	608.3	49.1	2	2	9	11		W		
605	603.3	54.1	100/0.4			100/0.4				603.9 53.5 **WEATHERED ROCK** Brown and Gray METAVOLCANIC
600	598.3	59.1	100/0.1			100/0.1				596.5 60.9
										Boring Terminated BY AUGER REFUSAL at Elevation 596.5 ft on CRYSTALLINE ROCK: METAVOLCANIC

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 26+35	**OFFSET** 23 ft LT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.9 ft	**TOTAL DEPTH** 46.6 ft	**NORTHING** 844,018	**EASTING** 1,911,641	**24 HR.** 15.1
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE Automatic	
DRILLER Toothman, R. E.	**START DATE** 09/29/14	**COMP. DATE** 09/30/14	**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)
640											
										636.9 GROUND SURFACE	0.0
										636.1 Asphalt	0.8
										ROADWAY EMBANKMENT	
635										633.9 ABC Stone	3.0
	633.4	3.5	4	3	4	7		M		Black and Brown to Gray and Brown, Fine Sandy SILT	
630											
	628.4	8.5	1	2	3	5		M			
625											
	623.4	13.5	13	28	49	77					
620											
	618.4	18.5	13	18	20	38		M			
615											
	613.4	23.5	3	9	30	39		M			
610										610.9 **WEATHERED ROCK**	26.0
	608.9	28.0	60/0.1			60/0.1	RS-1			608.9 Brown-Gray METAVOLCANIC	28.0
605										**CRYSTALLINE ROCK**	
										Grayish Brown METAVOLCANIC	
600											
595										590.3	46.6
										Boring Terminated at Elevation 590.3 ft in CRYSTALLINE ROCK: METAVOLCANIC	

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 26+35	**OFFSET** 23 ft LT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.9 ft	**TOTAL DEPTH** 46.6 ft	**NORTHING** 844,018	**EASTING** 1,911,641	**24 HR.** 15.1
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE Automatic	
DRILLER Toothman, R. E.	**START DATE** 09/29/14	**COMP. DATE** 09/30/14	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 18.5 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)
608.9											Begin Coring @ 28.0 ft	
	608.8	28.1	3.5	W=60/0.1	(3.2) 91%	(2.3) 66%		(16.7) 90%	(12.4) 67%		608.9 **CRYSTALLINE ROCK**	28.0
605	605.3	31.6		1:25/0.5 5:00/1.0 4:35/1.0							Moderate Weathering, Moderately Hard to Medium Hard, Grayish Brown METAVOLCANIC with Close to Moderately Close Fracture Spacing	
			5.0	4:55/1.0	(3.6) 72%	(2.5) 50%					11 fractures at 0 degrees to degrees, 1 fracture at 10 degrees to 20 degrees, 2 fractures at 20 degrees to 30 degrees, 8 fractures at 30 to 40 degrees, 6 fractures at 40 degrees to 50 degrees, 2 fractures at 70 degrees to 80 degrees.	
600	600.3	36.6		4:30/1.0 3:55/1.0 1:25/1.0 4:45/1.0 4:40/1.0			RS-1				R1 = 4, R2 = 8, R3 = 10, R4 = 20, R5 = 4, RMR = 46 ROCK CLASS III, ROCK TYPE E	
			5.0	4:15/1.0 4:20/1.0 4:10/1.0 3:50/1.0 3:05/1.0	(5.0) 100%	(4.0) 80%						
595	595.3	41.6										
			5.0	5:30/1.0 5:15/1.0 5:00/1.0 4:45/1.0 4:10/1.0	(4.9) 98%	(3.6) 72%						
	590.3	46.6									590.3 Boring Terminated at Elevation 590.3 ft in CRYSTALLINE ROCK: METAVOLCANIC	46.6

CORE PHOTOGRAPHS

B1-A

BOXES 1 and 2: 28.1 to 46.6 FEET

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 26+47	**OFFSET** 3 ft RT	**ALIGNMENT** -NBL-	**0 HR.** 14.1
COLLAR ELEV. 636.5 ft	**TOTAL DEPTH** 33.6 ft	**NORTHING** 844,016	**EASTING** 1,911,670	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Toothman, R. E.	**START DATE** 09/29/14	**COMP. DATE** 09/29/14	**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)
640										
										636.5 GROUND SURFACE 0.0
635										635.7 Asphalt 0.8
										ROADWAY EMBANKMENT
	633.0	3.5	5	6	7	13		M		633.5 ABC Stone 3.0
630										Gray-Brown, Silty, Coarse to Fine SAND
	628.0	8.5	1	2	3	5		W		631.0 5.5
625										**RESIDUAL**
	623.0	13.5	WOH	1	2	3		W		Brown to Black and Brown, Fine Sandy SILT
620										
	618.0	18.5	2	2	4	6		M		
615										
	613.0	23.5	3	4	7	11		M		
610										610.0 26.5
	608.0	28.5	11	17	19	36		M		608.5 **WEATHERED ROCK** 28.0
605										Brown and Gray METAVOLCANIC
										RESIDUAL
										Brown, Coarse to Fine Sandy SILT with Trace Rock Fragments
	603.0	33.5	60/0.1			60/0.1				603.0 33.5
										602.9 **CRYSTALLINE ROCK** 33.6
										Grayish Brown METAVOLCANIC
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 602.9 ft in CRYSTALLINE ROCK: METAVOLCANIC

NCDOT BORE DOUBLE U3109A_GEO_BRDG0434_GINT.GPJ NC_DOT.GDT 12/5/14

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 26+54	**OFFSET** 21 ft RT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.5 ft	**TOTAL DEPTH** 32.5 ft	**NORTHING** 844,014	**EASTING** 1,911,689	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 09/28/14	**COMP. DATE** 09/29/14	**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)
640											
										636.5 GROUND SURFACE	0.0
635										635.7 Asphalt	0.8
										ROADWAY EMBANKMENT	
	633.0	3.5	2	2	3	5		M		633.5 ABC Stone	3.0
630										Gray-Brown, Silty, Coarse to Fine SAND	
										630.5	6.0
	628.2	8.3	1	1	3	4		M		**RESIDUAL** Gray-Brown, Fine Sandy, Silty CLAY	
625										626.5	10.0
	623.2	13.3	WOH	WOH	WOH	0		M		Black and Brown to Grayish Brown, Coarse to Fine Sandy SILT	
620											
	618.2	18.3	1	1	3	4		W			
615											
	613.2	23.3	1	2	6	8		W			
610											
	608.2	28.3	6	33	33	66		M		605.5	31.0
605										**WEATHERED ROCK** METAVOLCANIC	
										604.0	32.5
										Boring Terminated at Elevation 604.0 ft in WEATHERED ROCK: METAVOLCANIC	

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-B(A)	**STATION** 26+52	**OFFSET** 20 ft RT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.5 ft	**TOTAL DEPTH** 38.6 ft	**NORTHING** 844,013	**EASTING** 1,911,687	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 09/30/14	**COMP. DATE** 10/01/14	**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
640										
										636.5 GROUND SURFACE 0.0
635										Probe to 33.5 feet
630										
625										
620										
615										
610										
605										
	603.0	33.5	83	17/0.1		100/0.6				603.0 WEATHERED ROCK 33.5
600										Brown-Gray METAVOLCANIC
	598.0	38.5	60/0.1			60/0.1				598.0 38.5
										597.9 CRYSTALLINE ROCK 38.6
										Brown-Gray METAVOLCANIC
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 597.9 ft in CRYSTALLINE ROCK: METAVOLCANIC

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-B(B)	**STATION** 26+54	**OFFSET** 23 ft RT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.5 ft	**TOTAL DEPTH** 51.6 ft	**NORTHING** 844,013	**EASTING** 1,911,691	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE Automatic	
DRILLER Toothman, R. E.	**START DATE** 10/01/14	**COMP. DATE** 10/02/14	**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)
636.5										GROUND SURFACE	0.0
										Probe to 35.4 feet	
601.1		35.4		60/0.0		60/0.0				CRYSTALLINE ROCK Grayish Brown METAVOLCANIC	35.4
584.9		51.6								Boring Terminated at Elevation 584.9 ft in CRYSTALLINE ROCK: METAVOLCANIC	51.6

NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

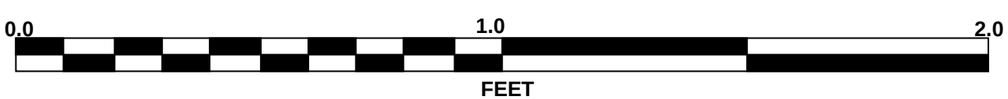
WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. B1-B(B)	**STATION** 26+54	**OFFSET** 23 ft RT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 636.5 ft	**TOTAL DEPTH** 51.6 ft	**NORTHING** 844,013	**EASTING** 1,911,691	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		DRILL METHOD Mud Rotary/NQ Core	HAMMER TYPE Automatic	
DRILLER Toothman, R. E.	**START DATE** 10/01/14	**COMP. DATE** 10/02/14	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 16.2 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)
601.1											Begin Coring @ 35.4 ft	
600	601.1	35.4	1.2	*N=60/0.0*	(1.2) 100%	(1.2) 100%		(16.0) 99%	(9.9) 61%		601.1 **CRYSTALLINE ROCK**	35.4
	599.9	36.6	5.0	0:40/0.2 5:15/1.0 3:40/1.0 3:55/1.0 4:15/1.0 5:05/1.0 5:20/1.0	(5.0) 100%	(2.5) 50%					Moderate Weathering, Moderately Hard, Grayish Brown METAVOLCANIC with Close to Moderately Close Fracture Spacing 13 fractures at 0 degrees to degrees, 5 fracture at 10 degrees to 20 degrees, 8 fractures at 30 degrees to 40 degrees, 2 fractures at 40 to 50 degrees, 10 fractures at 60 degrees to 70 degrees, 1 fracture at 70 degrees to 80 degrees, 1 fracture at 80 degrees to 90 degrees.	
595	594.9	41.6	5.0	3:15/1.0 3:30/1.0 3:25/1.0 3:45/1.0 3:45/1.0	(5.0) 100%	(3.5) 70%						
590	589.9	46.6	5.0	5:11/1.0 3:33/1.0 5:14/1.0 3:15/1.0 3:50/1.0	(4.8) 96%	(2.7) 54%						
585	584.9	51.6									584.9 Boring Terminated at Elevation 584.9 ft in CRYSTALLINE ROCK: METAVOLCANIC	51.6

CORE PHOTOGRAPHS

B1-B(B)

BOXES 1 and 2: 35.4 to 51.6 FEET



NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 27+87	**OFFSET** 33 ft LT	**ALIGNMENT** -NBL-	**0 HR.** N/A
COLLAR ELEV. 647.9 ft	**TOTAL DEPTH** 68.5 ft	**NORTHING** 844,157	**EASTING** 1,911,702	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI9435 CME-55 81% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 10/03/14	**COMP. DATE** 10/03/14	**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)
650										647.9 GROUND SURFACE	0.0
	644.4	3.5	3	3	4	7		M		**RESIDUAL** Red, Yellowish Brown to Black, Brown, and Light Brown, Fine Sandy SILT	
640	639.4	8.5	1	3	3	6		M			
635	634.4	13.5	1	3	3	6		M			
630	629.4	18.5	1	1	3	4		M			
625	624.4	23.5	2	3	3	6		M			
620	619.4	28.5	2	4	6	10		M			
615	614.4	33.5	2	4	5	9		W			
610	609.4	38.5	3	5	9	14		W			
605	604.4	43.5	3	6	12	18		W			
600	599.4	48.5	4	7	13	20		W			
595	594.4	53.5	15	26	56	82		W		592.9 **WEATHERED ROCK** METAVOLCANIC	55.0
590	589.4	58.5	14	26	46	72		W		590.4 **RESIDUAL** Black and Light Brown, Fine Sandy SILT	57.5
585	584.4	63.5	60	40/0.3		100/0.8		W		586.9 **WEATHERED ROCK** Tan-Gray METAVOLCANIC	61.0
580	579.4	68.5	60/0.0			60/0.0				579.4 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 579.4 ft on CRYSTALLINE ROCK: METAVOLCANIC	68.5

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Campbell, H. D.	
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 27+92	**OFFSET** 32 ft RT	**ALIGNMENT** -NBL-	**0 HR.** 30.4
COLLAR ELEV. 655.1 ft	**TOTAL DEPTH** 64.9 ft	**NORTHING** 844,131	**EASTING** 1,911,762	**24 HR.** 23.5
DRILL RIG/HAMMER EFF./DATE CME-45		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER N/A	**START DATE** 05/26/88	**COMP. DATE** 05/27/88	**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)
660										655.1 GROUND SURFACE	0.0
655										654.6 **ROADWAY EMBANKMENT** Black, Fine Sandy, Silty CLAY	0.5
	651.0	4.1	3	6	7	13		M		**RESIDUAL** Red-Brown, Black and Tan, Silty CLAY	
650	646.0	9.1	2	3	6	9		M			
645	641.0	14.1	3	3	6	9		M			
640	636.0	19.1	2	3	6	9		M			
635	631.0	24.1	1	2	4	6		M			
630	626.0	29.1	1	2	4	6		M			
625	621.0	34.1	2	4	9	13		W			
620	616.0	39.1	2	4	5	9		W			
615	611.0	44.1	6	9	13	22		W			
610	606.0	49.1	5	10	13	23		W			
605	601.0	54.1	49	51/0.4		100/0.9		W		603.6 **WEATHERED ROCK** Gray-Brown METAVOLCANIC	51.5
600	596.0	59.1	66	34/0.4		100/0.9		W			
595	591.0	64.1	63	37/0.3		100/0.8				590.2 Boring Terminated at Elevation 590.2 ft in WEATHERED ROCK: METAVOLCANIC	64.9

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34900.1.2 (U-3109A)
F.A. NO.: STP-0119 (10)
COUNTY: ALAMANCE
BRIDGE NO. 434 ON -NBL- OVER I-40/85 WB AND 1-40/85 EB (DDI)

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Splitting Tensile Strength (PSI)	Remarks
RS-1	B1-A	36.0-36.3	METAVOLCANIC	Cziv	50	3.98	1.97	171.4	6,060	N/M	N/M	RMR=46

SITE PHOTOGRAPHS

View Looking North along -NBL- from End Bent 1

Profile of Bridge From Existing Bridge Looking West

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3109A	1	21

REFERENCE: U-3109A

PROJECT: 34900

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *ALAMANCE*

PROJECT DESCRIPTION *DUAL BRIDGES ON -L- (FUTURE NC 119) OVER SR 1963 (HOLT STREET), NCRR/NSRR, AND -Y16- (US 70)*

CONTENTS

CAUTION NOTICE

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PERSONNEL

W. WHICHARD

E. ESTEP

R. TOOTHMAN

W. TRAPP

INVESTIGATED BY *D. GOODNIGHT*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER*

DATE *MARCH 2015*

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells 4/7/2015
SIGNATURE DATE
7DA5D2D0518E450...

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] MOBILE B-57
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [X] 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: BM - STA 146+20, 153' LT -L- (854,803' N, 1,912,756' E)

ELEVATION: 641.59 FEET

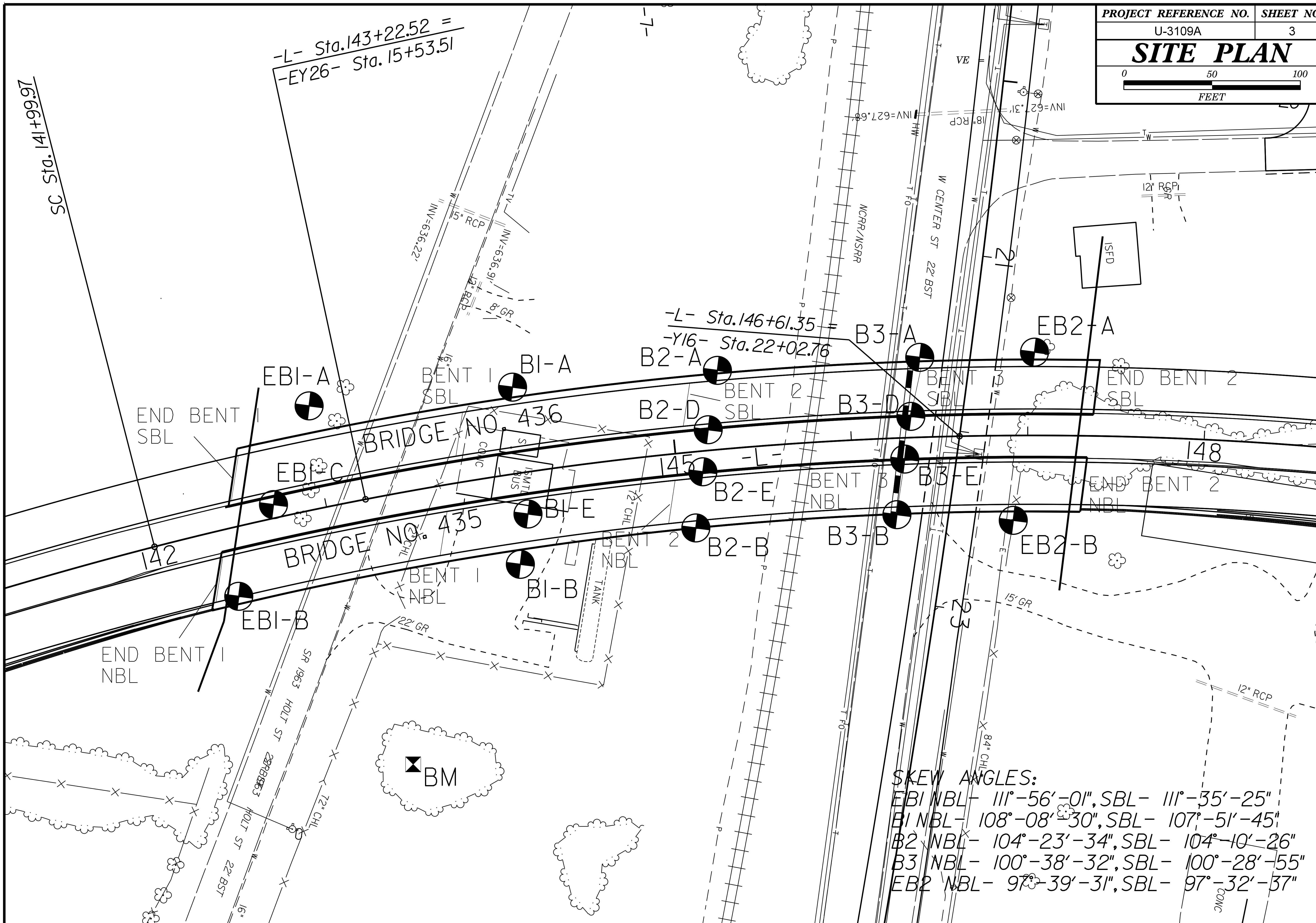
NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	3

SITE PLAN


0 50 100
FEET
-L- Sta.143+22.52 =
-EY26- Sta. 15+53.51
SC Sta. 141+99.97
-L- Sta.146+61.35 =
-Y16- Sta.22+02.76
EB1-A
EB1-C
EB1-B
B1-A
B1-E
B1-B
B2-A
B2-D
B2-E
B2-B
B3-A
B3-D
B3-E
B3-B
EB2-A
EB2-B
END BENT 1 SBL
END BENT 1 NBL
BENT 1 SBL
BENT 1 NBL
BENT 2 SBL
BENT 2 NBL
BENT 3 SBL
BENT 3 NBL
END BENT 2 SBL
END BENT 2 NBL
BRIDGE NO. 436
BRIDGE NO. 435
142
145
148
-L-
-Y2-
-Y3-
-L-
NCRR/NSRR
W CENTER ST 22' BST
SR 1963 HOLT ST
HOLT ST 22' BST
1SFD
BM
TANK
CONC
15" RCP
12" RCP
18" RCP
INV=636.22'
INV=636.91'
INV=627.68'
INV=627.31'
72" CHL
84" CHL
8' GR
22' GR
15' GR
VE

SKEW ANGLES:
EB1 NBL- 111°-56'-01", SBL- 111°-35'-25"
B1 NBL- 108°-08'-30", SBL- 107°-51'-45"
B2 NBL- 104°-23'-34", SBL- 104°-10'-26"
B3 NBL- 100°-38'-32", SBL- 100°-28'-55"
EB2 NBL- 97°-39'-31", SBL- 97°-32'-37"

PROJECT REFERENCE NO.	SHEET NO.
34900.1.2 (U-3109A)	4
BRIDGE NO. 436 ON -L- 39' LEFT	

0 50 100
FEET
VE = 5:1

650
640
630
620
610
600
590
580
570
560

Ⓐ **ROADWAY EMBANKMENT:** PAVEMENT AND MOIST STIFF, TAN-RED COARSE TO FINE SANDY SILTY CLAY WITH TRACE GRAVEL

Ⓑ **RESIDUAL:** MOIST, HARD, TAN AND BROWN, FINE SANDY SILT

EXISTING GROUND

EB1
EB1–A
143+02
58' LT
9 23 6 5 8 7 10 9 16 21 15
100/0.2
60/0.0
B.T.
12/14

B1
B1–A
144+14
49' LT
32 13 5 7 6 11 7 13 61 94
100/0.4
67
100/0.4
B.T.
12/14

B2
B2–A
145+28
45' LT
6 14 6 4 2 6 12 14 18 23 32 68 96 61 92
100/0.7
B.T.
02/15

B3
B3–A
146+40
45' LT
9 11 11 7 9 10 14 11 23 44 31
100/1.0
93
100
100/0.5
100/0.2
B.T.
12/14

EB2
EB2–A
147+04
47' LT
7 30 16 7 18 24 47 43 74
100/0.9
100/0.8
100/0.3
B.T.
12/14

RESIDUAL: MOIST TO WET, MEDIUM STIFF TO HARD, RED, TAN-RED, REDDISH BROWN, TAN-RED, RED-BROWN, CLAYEY, COARSE TO FINE SANDY SILT TO RED-TAN, BLACK, GRAY, AND BROWN, COARSE TO FINE SILTY CLAY, RED, TAN-BROWN, SANDY SILT

CRYSTALLINE ROCK: FELSIC METAVOLCANIC ROCK

WEATHERED ROCK: TAN, BROWN AND GRAY FELSIC METAVOLCANIC ROCK

141+50 142+00 142+50 143+00 143+50 144+00 144+50 145+00 145+50 146+00 146+50 147+00 147+50 148+00

NOTES:

GROUNDLINE TAKEN FROM ROADWAY TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	5
BRIDGE NO. 435 ON -L- 39' RIGHT	

0 50 100
FEET
VE = 5:1

Ⓐ **ARTIFICIAL FILL:** MOIST, HARD, GRAY-BROWN, COARSE TO FINE SANDY SILT

Ⓑ **ROADWAY EMBANKMENT:** PAVEMENT AND MOIST, STIFF, RED, COARSE TO FINE SANDY, SILTY CLAY WITH TRACE GRAVEL

Ⓒ **WEATHERED ROCK:** BROWN FELSIC METAVOLCANIC ROCK

EB1
EB1–B
142 + 40
39' RT

B1
B1–B
144 + 04
51' RT

B2
B2–B
145 + 07
43' RT

B3
B3–B
146 + 24
43' RT

EB2
EB2–B
146 + 92
48' RT

RESIDUAL: MOIST TO WET, SOFT TO HARD, RED-BROWN, TAN, RED, COARSE TO FINE SANDY, SILTY CLAY, TAN-RED, BROWN, RED-BROWN, AND RED, CLAYEY, COARSE TO FINE SANDY SILT TO TAN, BROWN, GRAY, GREEN, COARSE TO FINE SANDY SILT

12/14

WEATHERED ROCK:
TAN, GRAY AND BROWN FELSIC METAVOLCANIC ROCK

B.T.
DRY
12/14

CRYSTALLINE ROCK:
FELSIC METAVOLCANIC ROCK

B.T.

B.T.
DRY
12/14

B.T.

B.T.

NOTES:

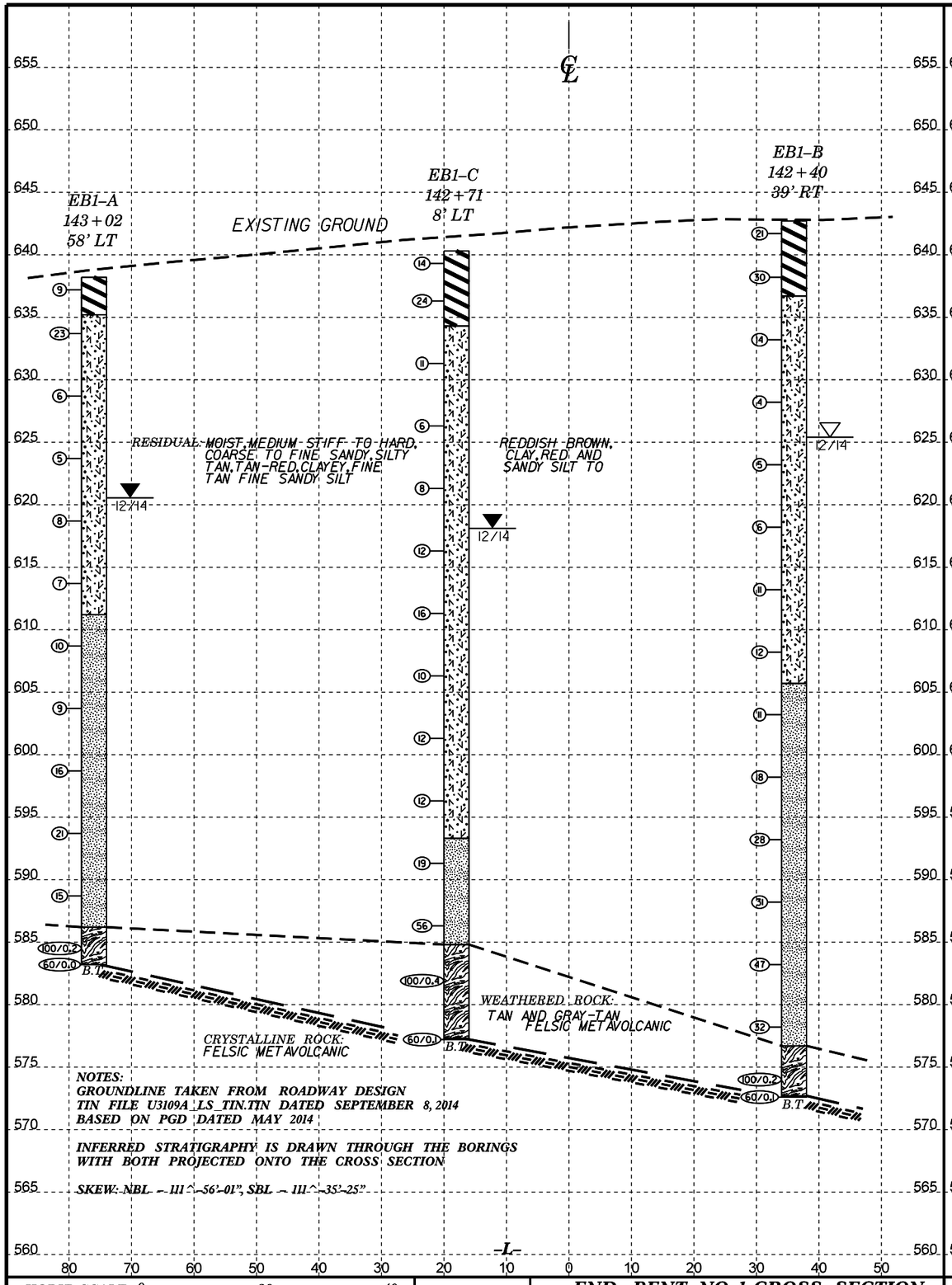
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014

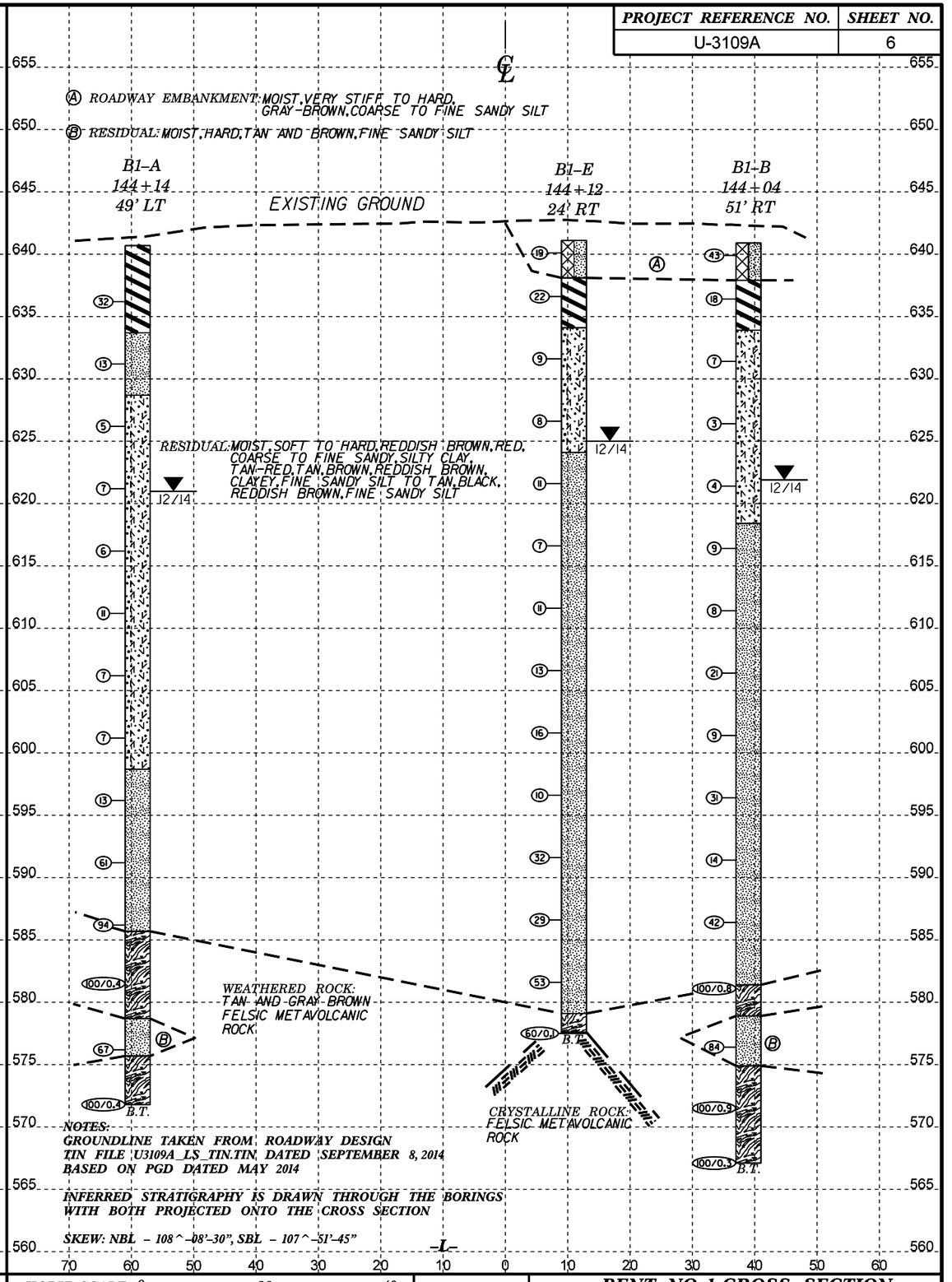
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

650 640 630 620 610 600 590 580 570 560

141+50 142+00 142+50 143+00 143+50 144+00 144+50 145+00 145+50 146+00 146+50 147+00 147+50 148+00

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	6



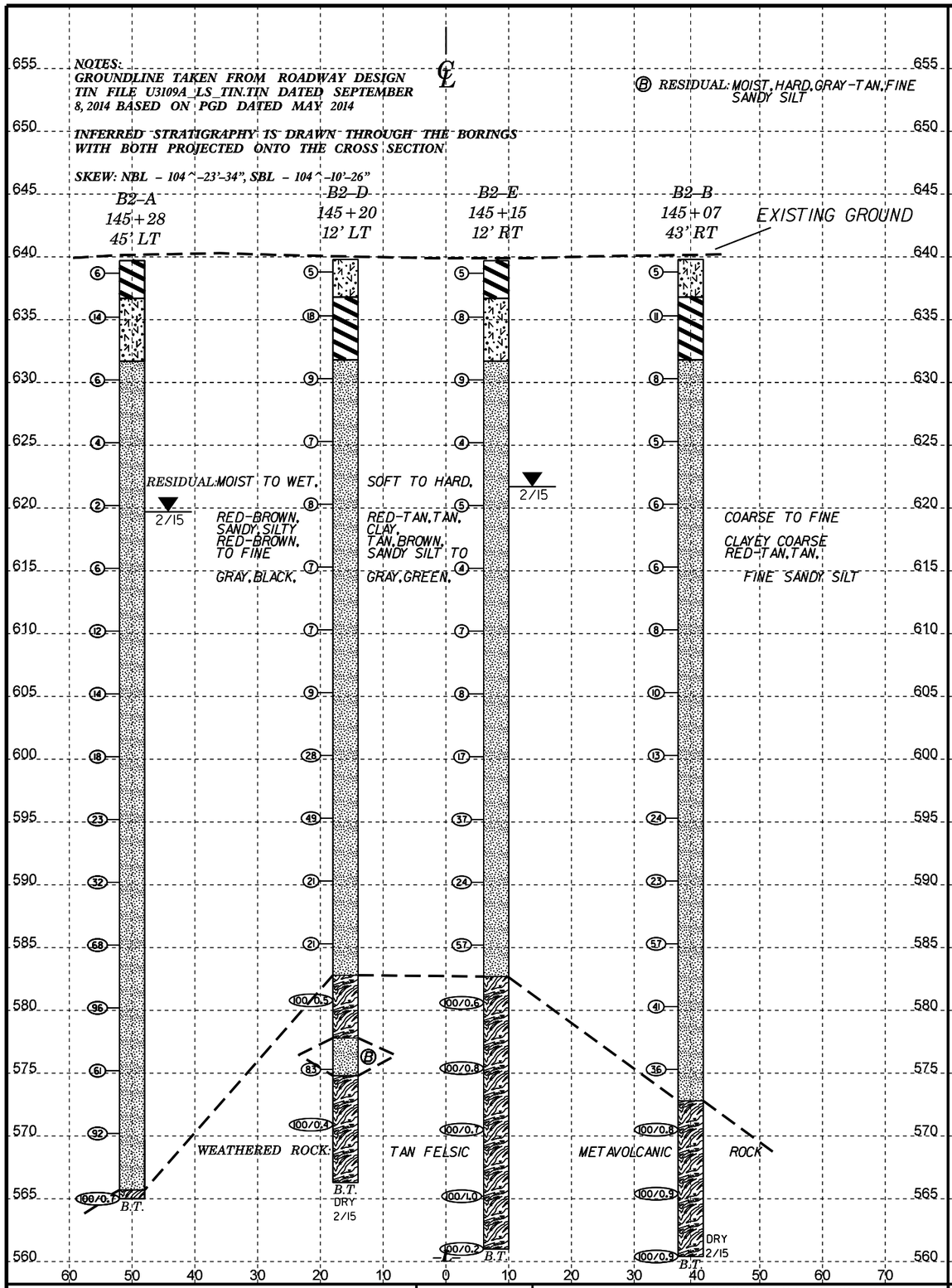


PROJECT REFERENCE NO.	SHEET NO.
U-3109A	7

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014 BASED ON PGD DATED MAY 2014

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

SKEW: NBL – 104°–23'–34", SBL – 104°–10'–26"



HORIZ. SCALE (FEET) 0 20 40

VE = 2:1

BENT NO. 2 CROSS SECTION AT STA 145+02.2

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014 BASED ON PGD DATED MAY 2014

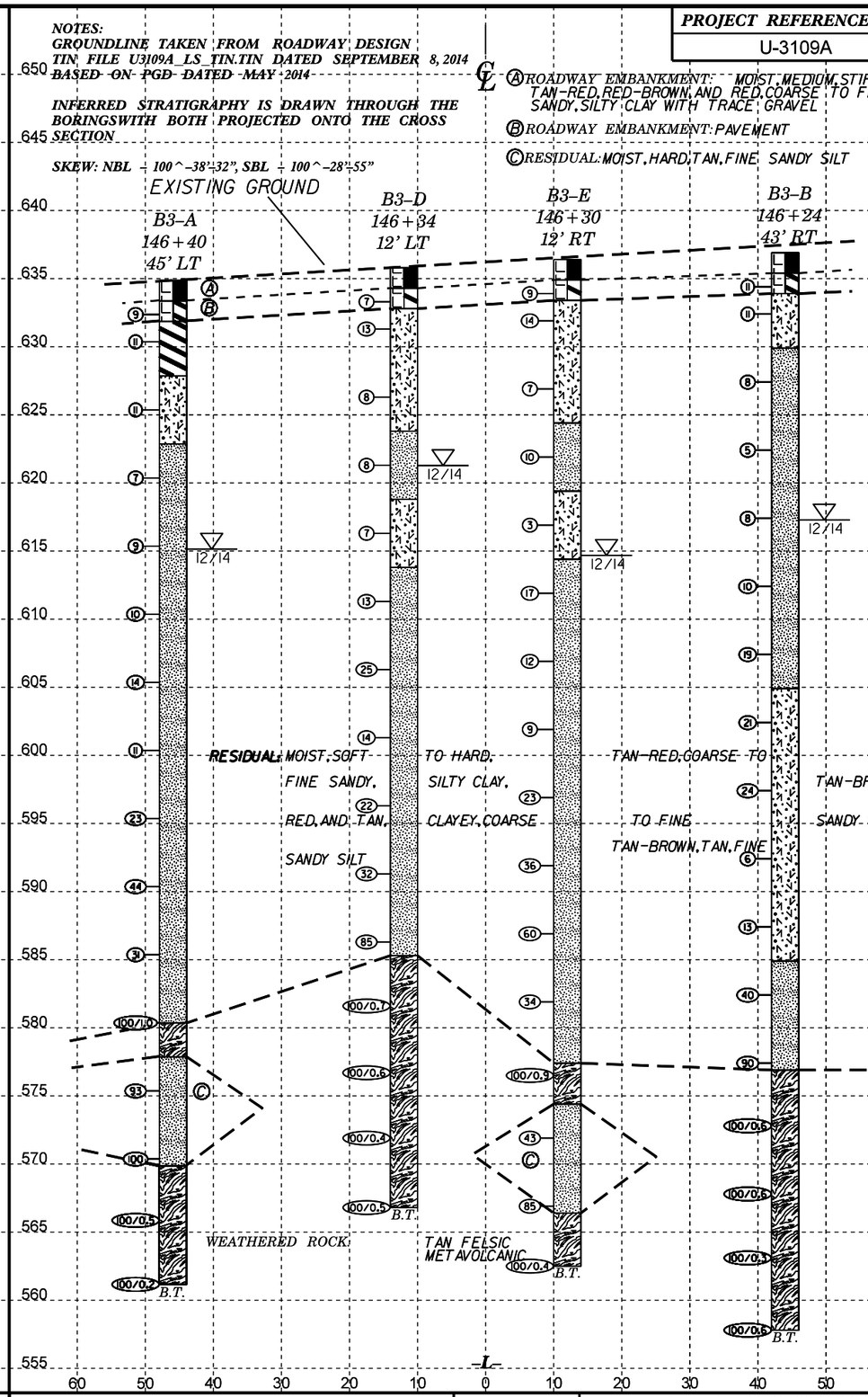
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGSWITH BOTH PROJECTED ONTO THE CROSS SECTION

SKEW: NBL – 100°–38'–32", SBL – 100°–28'–55"

Ⓐ ROADWAY EMBANKMENT: MOIST, MEDIUM, STIFF TO STIFF, TAN-RED, RED-BROWN, AND RED, COARSE TO FINE SANDY, SILTY CLAY WITH TRACE GRAVEL

Ⓑ ROADWAY EMBANKMENT: PAVEMENT

Ⓒ RESIDUAL: MOIST, HARD, TAN, FINE SANDY SILT

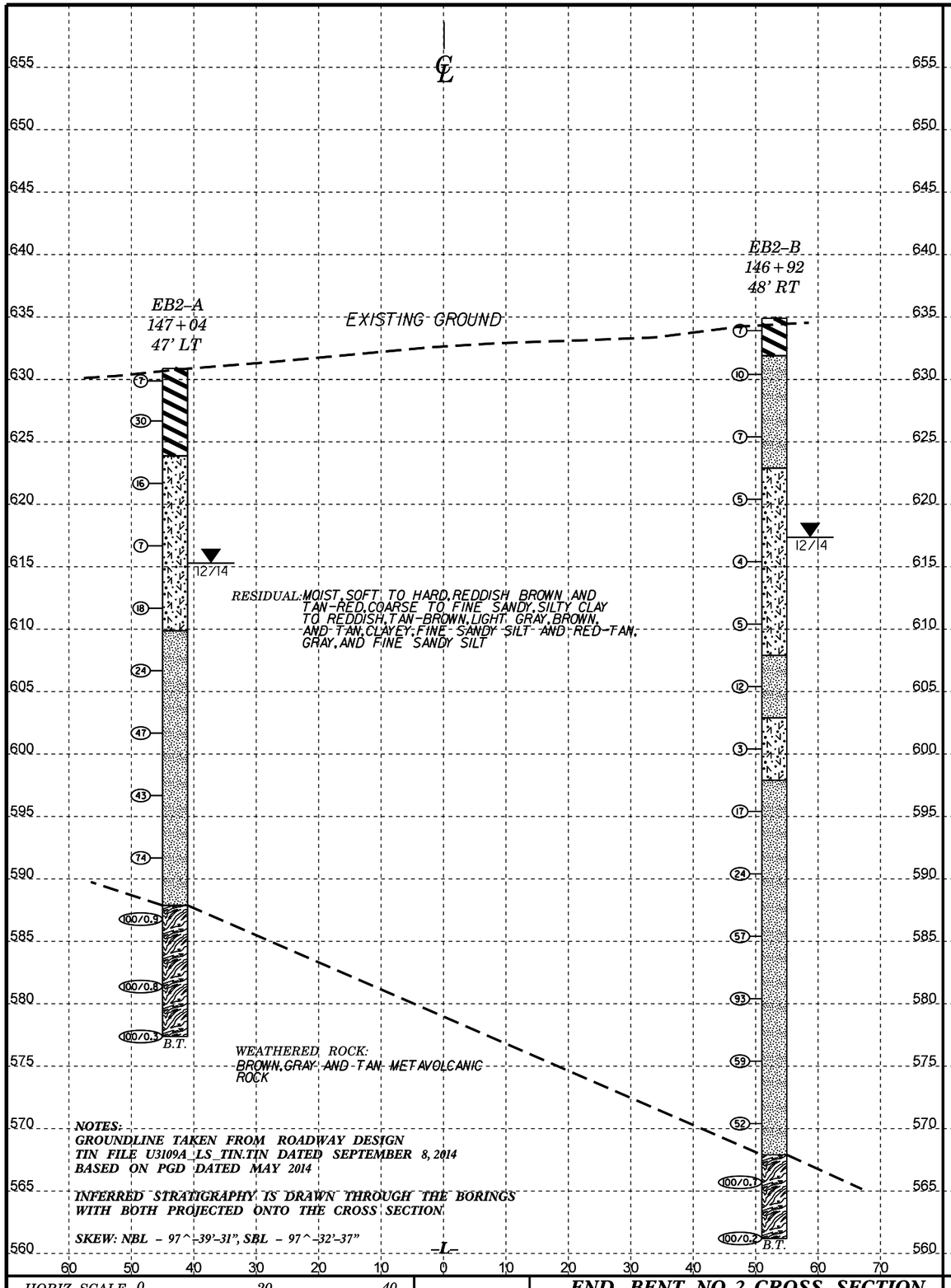


HORIZ. SCALE (FEET) 0 20 40

VE = 2:1

BENT NO. 3 CROSS SECTION AT STA. 146+32.1

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	8



NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U3109A_LS_TIN.TIN DATED SEPTEMBER 8, 2014 BASED ON PGD DATED MAY 2014

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

SKEW: NBL – 97^–39'–31", SBL – 97^–32'–37"

HORIZ. SCALE (FEET) 0 20 40

VE = 2:1

END BENT NO. 2 CROSS SECTION AT STA 147+35.4

NCDOT GEOTECHNICAL ENGINEERING UNIT
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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 143+02	**OFFSET** 58 ft LT	**ALIGNMENT** -L-	**0 HR.** 25.2
COLLAR ELEV. 638.2 ft	**TOTAL DEPTH** 55.0 ft	**NORTHING** 854,719	**EASTING** 1,912,562	**24 HR.** 19.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/09/14	**COMP. DATE** 12/09/14	**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
640										ELEV. (ft) DEPTH (ft)
	638.2	0.0	3	4	5	9 23		M		638.2 0.0 GROUND SURFACE **RESIDUAL** Red, Fine Sandy, Silty CLAY
635	634.7	3.5	5	14	9			M		635.2 3.0 Red, Clayey SILT with Trace Quartz Fragments
630	629.7	8.5	2	3	3	6		M		
625	624.7	13.5	2	2	3	5		M		
620	619.7	18.5	2	3	5	8		M		
615	614.7	23.5	2	2	5	7		M		
610	609.7	28.5	2	4	6	10		M		
605	604.7	33.5	2	3	6	9		M		
600	599.7	38.5	5	7	9	16		M		
595	594.7	43.5	6	7	14	21		M		
590	589.7	48.5	6	6	9	15		M		
585	584.7	53.5	100/0.2			100/0.2				611.2 27.0 Tan, Fine Sandy SILT
	583.2	55.0	60/0.0			60/0.0				586.2 52.0 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK 583.2 55.0 Boring Terminated with Standard Penetration Test Refusal at Elevation 583.2 ft on CRYSTALLINE ROCK: FELSIC METAVOLCANIC ROCK

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 142+71	**OFFSET** 8 ft LT	**ALIGNMENT** -L-	**0 HR.** 22.3
COLLAR ELEV. 640.3 ft	**TOTAL DEPTH** 63.1 ft	**NORTHING** 854,706	**EASTING** 1,912,620	**24 HR.** 22.2
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/10/14	**COMP. DATE** 12/11/14	**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
645										
640	640.3	0.0	5	6	8	14		M		640.3 0.0 GROUND SURFACE **RESIDUAL** Red, Coarse to Fine Sandy, Silty CLAY
	637.3	3.0	5	10	14	24		M		634.3 6.0 Tan-Red to Tan, Clayey SILT
635	632.3	8.0	4	5	6	11		M		
630	627.3	13.0	2	3	3	6		M		
625	622.3	18.0	2	3	5	8		M		
620	617.3	23.0	2	4	8	12		M		
615	612.3	28.0	4	6	10	16		M		
610	607.3	33.0	3	4	6	10		M		
605	602.3	38.0	3	4	8	12		M		
600	597.3	43.0	3	4	8	12		M		
595	592.3	48.0	5	8	11	19		M		593.3 47.0 Tan, Fine Sandy SILT
590	587.3	53.0	13	21	35	56		M		584.8 55.5 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK
585	582.3	58.0	100/0.4			100/0.4				577.3 63.0 **CRYSTALLINE ROCK** Gray-Tan FELSIC METAVOLCANIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 577.2 ft in CRYSTALLINE ROCK: FELSIC METAVOLCANIC ROCK
580	577.3	63.0	60/0.1			60/0.1				

NCDOT GEOTECHNICAL ENGINEERING UNIT
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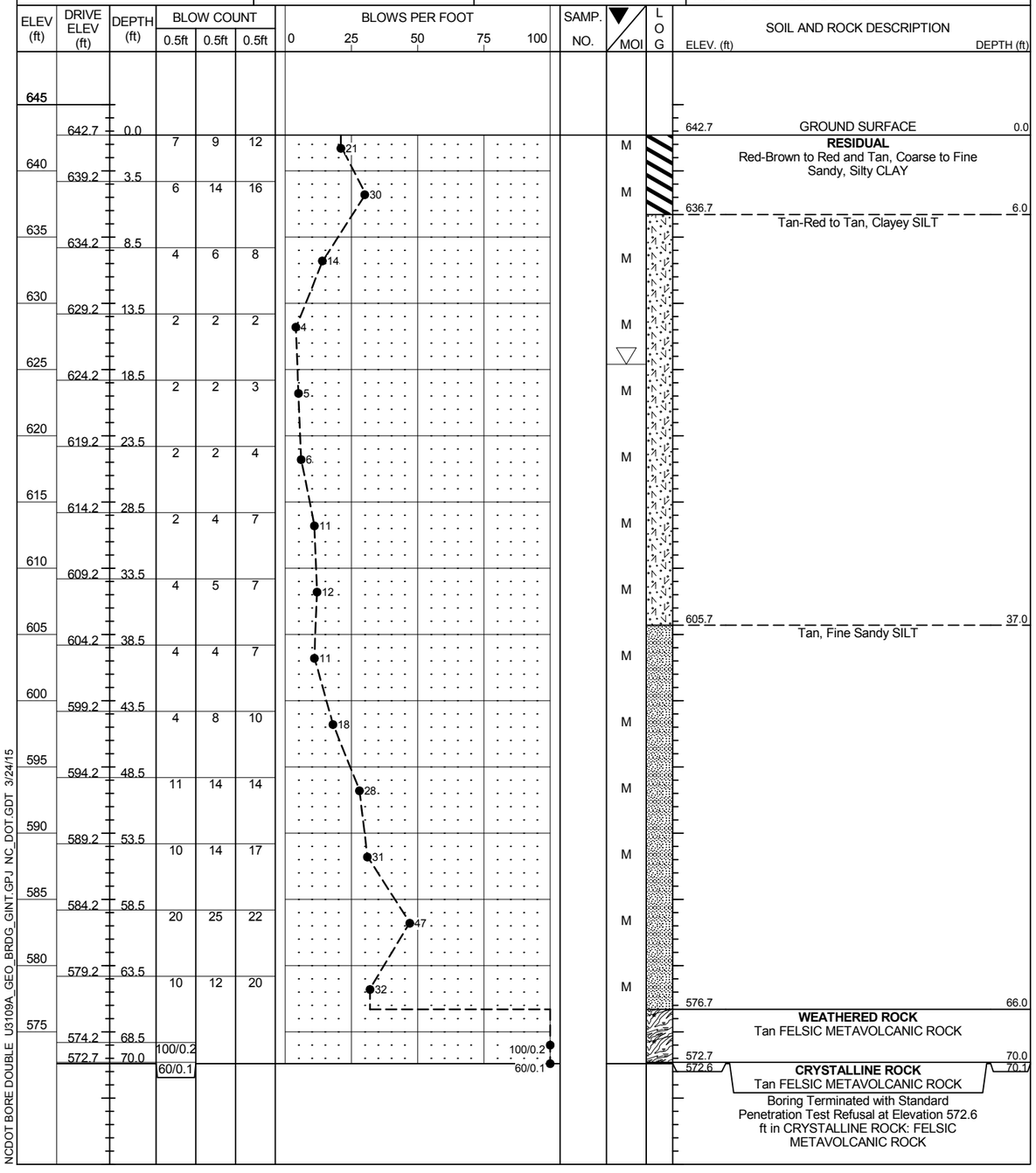
WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 142+40	**OFFSET** 39 ft RT	**ALIGNMENT** -L-	**0 HR.** 17.3
COLLAR ELEV. 642.7 ft	**TOTAL DEPTH** 70.1 ft	**NORTHING** 854,693	**EASTING** 1,912,674	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/10/14	**COMP. DATE** 12/10/14	**SURFACE WATER DEPTH** N/A	



NCDOT BORE DOUBLE U3109A_GEO_BRDG_GINT.GPJ NC_DOT.GDT 3/24/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 144+14	**OFFSET** 49 ft LT	**ALIGNMENT** -L- **0 HR.** 22.0
COLLAR ELEV. 640.7 ft	**TOTAL DEPTH** 68.9 ft	**NORTHING** 854,832	**EASTING** 1,912,537 **24 HR.** 20.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Whichard, S. W.	**START DATE** 12/11/14	**COMP. DATE** 12/11/14	**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)
645											
640										640.7 GROUND SURFACE	0.0
										RESIDUAL Red, Coarse to Fine Sandy, Silty CLAY with Trace Quartz Fragments	
	637.2	3.5	8	14	18	32		M			
635										633.7 Red-Tan, Coarse to Fine Sandy SILT	7.0
	632.2	8.5	5	6	7	13		M			
630										628.7 Tan-Red to Tan, Clayey SILT	12.0
	627.2	13.5	2	2	3	5		M			
625											
	622.2	18.5	2	2	5	7		M			
620											
	617.2	23.5	2	3	3	6		M			
615											
	612.2	28.5	3	4	7	11		M			
610											
	607.2	33.5	3	3	4	7		M			
605											
	602.2	38.5	2	3	4	7		M			
600											
	597.2	43.5	3	5	8	13		M		598.7 Tan, Fine Sandy SILT	42.0
595											
	592.2	48.5	18	26	35	61		M			
590											
	587.2	53.5	17	27	67	94		M		585.7 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	55.0
585											
	582.2	58.5	45	55/0.2		100/0.4					
580										578.7 **RESIDUAL** Tan and Brown, Fine Sandy SILT	62.0
	577.2	63.5	35	29	38	67		M		575.7 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	65.0
575											
	572.2	68.5	100/0.4			100/0.4				571.8 Boring Terminated at Elevation 571.8 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK	68.9

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B1-E	**STATION** 144+12	**OFFSET** 24 ft RT	**ALIGNMENT** -L- **0 HR.** N/A
COLLAR ELEV. 641.1 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 854,850	**EASTING** 1,912,607 **24 HR.** 16.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Whichard, S. W.	**START DATE** 12/23/14	**COMP. DATE** 12/23/14	**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
645										
	641.1	0.0								641.1 GROUND SURFACE 0.0
640			4	6	13	19		M		**ARTIFICIAL FILL** Gray-Brown, Coarse to Fine Sandy SILT
	637.6	3.5								638.1 3.0
			3	9	13	22		M		**RESIDUAL** Reddish Brown, Fine Sandy, Silty CLAY
635										634.1 7.0
	632.6	8.5	3	4	5	9		M		Tan and Brown, Clayey, Fine Sandy SILT
630										
	627.6	13.5	3	4	4	8		M		
625										
	622.6	18.5	3	4	7	11		M		624.1 17.0 Black, Reddish Brown, Tan and Brown, Fine Sandy SILT
620										
	617.6	23.5	2	3	4	7		M		
615										
	612.6	28.5	3	4	7	11		M		
610										
	607.6	33.5	3	5	8	13		M		
605										
	602.6	38.5	4	6	10	16		M		
600										
	597.6	43.5	2	4	6	10		M		
595										
	592.6	48.5	5	11	21	32		M		
590										
	587.6	53.5	11	14	15	29		M		
585										
	582.6	58.5	12	21	32	53		M		
580										
	577.6	63.5	60/0.1			60/0.1				579.1 62.0
										577.6 **WEATHERED ROCK** FELSIC METAVOLCANIC ROCK 63.5
										577.5 **CRYSTALLINE ROCK** FELSIC METAVOLCANIC ROCK 63.6
										Boring Terminated with Standard Penetration Test Refusal at Elevation 577.5 ft in CRYSTALLINE ROCK: FELSIC METAVOLCANIC ROCK

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 144+04	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 640.9 ft	**TOTAL DEPTH** 73.8 ft	**NORTHING** 854,849	**EASTING** 1,912,636	**24 HR.** 19.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/23/14	**COMP. DATE** 12/29/14	**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))
650										
645										
640	640.9	0.0	3	21	22	43		M		640.9 / 0.0 GROUND SURFACE
	637.4	3.5	3	8	10	18		M		**ARTIFICIAL FILL** Gray-Brown, Coarse to Fine Sandy SILT — 637.9 / 3.0
635								M		**RESIDUAL** Reddish Brown, Fine Sandy, Silty CLAY — 633.9 / 7.0
	632.4	8.5	2	3	4	7		M		Reddish Brown to Tan and Brown, Clayey, Fine Sandy SILT
630										
	627.4	13.5	2	1	2	3		M		
625										
	622.4	18.5	1	2	2	4		M		
620										
	617.4	23.5	1	4	5	9		M		618.4 / 22.5 Brown to Tan and Brown, Fine Sandy SILT
615										
	612.4	28.5	2	3	5	8		M		
610										
	607.4	33.5	5	8	13	21		M		
605										
	602.4	38.5	2	3	6	9		M		
600										
	597.4	43.5	8	13	18	31		M		
595										
	592.4	48.5	4	6	8	14		M		
590										
	587.4	53.5	11	18	24	42		M		
585										
	582.4	58.5	11	34	66/0.3	100/0.8		M		581.4 / 59.5 **WEATHERED ROCK** Brown FELSIC METAVOLCANIC ROCK — 578.9 / 62.0
580										**RESIDUAL** Tan and Brown, Fine Sandy SILT
	577.4	63.5	19	44	40	84		M		574.9 / 66.0
575										**WEATHERED ROCK** Gray and Brown FELSIC METAVOLCANIC ROCK
	572.4	68.5	30	70/0.4		100/0.9		M		
570										

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 144+04	**OFFSET** 51 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 640.9 ft	**TOTAL DEPTH** 73.8 ft	**NORTHING** 854,849	**EASTING** 1,912,636	**24 HR.** 19.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/23/14	**COMP. DATE** 12/29/14	**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						Match Line				
	567.4	73.5	100/0.3			100/0.3				567.1 / 73.8 Boring Terminated at Elevation 567.1 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B2-A	**STATION** 145+28	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** 11.7
COLLAR ELEV. 639.7 ft	**TOTAL DEPTH** 74.7 ft	**NORTHING** 854,946	**EASTING** 1,912,513	**24 HR.** 20.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 02/02/15	**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)
640											
	639.7	0.0	2	3	3	6		M		639.7 GROUND SURFACE	0.0
										RESIDUAL Red-Brown, Fine Sandy, Silty CLAY	
	636.2	3.5								636.7	3.0
635			4	6	8	14		M		Red-Brown, Clayey, Fine Sandy SILT	
	631.2	8.5								631.7	8.0
630			2	3	3	6		M		Red-Tan to Tan and Black, Fine Sandy SILT	
	626.2	13.5									
625			2	2	2	4		M			
	621.2	18.5									
620			1	1	1	2		M			
	616.2	23.5									
615			1	2	4	6		W			
	611.2	28.5									
610			3	5	7	12		W			
	606.2	33.5									
605			2	5	9	14		W			
	601.2	38.5									
600			5	8	10	18		W			
	596.2	43.5									
595			6	11	12	23		W			
	591.2	48.5									
590			10	14	18	32		W			
	586.2	53.5									
585			13	27	41	68		W			
	581.2	58.5									
580			20	26	70	96		M			
	576.2	63.5									
575			27	27	34	61		M			
	571.2	68.5									
570			17	36	56	92		M			
	566.2	73.5								565.7	74.0
565			20	45	55/0.2	100/0.7				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	74.7
										565.0 Boring Terminated at Elevation 565.0 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK	

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B2-D	**STATION** 145+20	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 639.8 ft	**TOTAL DEPTH** 73.5 ft	**NORTHING** 854,945	**EASTING** 1,912,547	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R. E.	**START DATE** 02/05/15	**COMP. DATE** 02/06/15	**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)
640											
	639.8	0.0	1	2	3	5		M		639.8 GROUND SURFACE	0.0
										RESIDUAL Red-Brown, Clayey, Coarse to Fine Sandy	
	636.3	3.5								SILT 636.8	3.0
635			4	7	11	18		M		Red-Tan, Fine Sandy, Silty CLAY	
	631.3	8.5								631.8	8.0
630			3	4	5	9		M		Tan-Red, Fine Sandy SILT	
	626.3	13.5									
625			2	2	5	7		M			
	621.3	18.5									
620			2	3	5	8		M			
	616.3	23.5									
615			1	3	4	7		W			
	611.3	28.5									
610			2	3	4	7		W			
	606.3	33.5									
605			2	4	5	9		W			
	601.3	38.5									
600			6	11	17	28		M			
	596.3	43.5									
595			17	22	27	49		M			
	591.3	48.5									
590			7	9	12	21		M			
	586.3	53.5									
585			7	10	11	21		M			
	581.3	58.5								582.8	57.0
580			100/0.5			100/0.5				Tan FELSIC METAVOLCANIC ROCK	
	576.3	63.5								577.8	62.0
575			30	40	43	83		M		Gray-Tan, Fine Sandy SILT	
	571.3	68.5								574.8	65.0
570			100/0.4			100/0.4				Tan FELSIC METAVOLCANIC ROCK	
										566.3	73.5
										Boring Terminated at Elevation 566.3 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK	
										Notes: Drill rods broke while being removed prior to performing last SPT.	

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B2-E	**STATION** 145+15	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 20.7
COLLAR ELEV. 639.7 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 854,945	**EASTING** 1,912,571	**24 HR.** 18.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Toothman, R. E.	**START DATE** 02/03/15	**COMP. DATE** 02/04/15	**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)
645											
640	639.7	0.0	1	2	3	5		M		639.7 GROUND SURFACE	0.0
										RESIDUAL Tan, Coarse to Fine Sandy, Silty CLAY	
	636.2	3.5								636.7	3.0
635			3	3	5	8		M		Tan, Clayey, Fine Sandy SILT	
	631.2	8.5								631.7	8.0
630			3	3	6	9		M		Tan, Red-Tan to Tan-Green, Fine Sandy SILT	
	626.2	13.5									
625			1	2	2	4		M			
	621.2	18.5									
620			1	2	3	5		W			
	616.2	23.5									
615			1	1	3	4		W			
	611.2	28.5									
610			2	3	4	7		M			
	606.2	33.5									
605			2	3	5	8		M			
	601.2	38.5									
600			4	7	10	17		M			
	596.2	43.5									
595			8	15	22	37		M			
	591.2	48.5									
590			7	11	13	24		M			
	586.2	53.5									
585			13	21	36	57		M			
	581.2	58.5								582.7	57.0
580			84	16/0.1		100/0.6				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	
	576.2	63.5									
575			29	71/0.3		100/0.8					
	571.2	68.5									
570			50	50/0.2		100/0.7					
	566.2	73.5									
565			19	81/0.5		100/1.0					

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B2-E	**STATION** 145+15	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 20.7
COLLAR ELEV. 639.7 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 854,945	**EASTING** 1,912,571	**24 HR.** 18.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Toothman, R. E.	**START DATE** 02/03/15	**COMP. DATE** 02/04/15	**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
565						Match Line				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK *(continued)*
	561.2	78.5	100/0.2			100/0.2				561.0 78.7
										Boring Terminated at Elevation 561.0 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 145+07	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 639.8 ft	**TOTAL DEPTH** 79.4 ft	**NORTHING** 854,945	**EASTING** 1,912,603	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Toothman, R. E.	**START DATE** 02/04/15	**COMP. DATE** 02/05/15	**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))
645										
640	639.8	0.0	1	2	3	5, 11		M		639.8 / 0.0 GROUND SURFACE **RESIDUAL** Brown, Clayey, Coarse to Fine Sandy SILT
	636.3	3.5								636.8 / 3.0
635			3	4	7			M		Tan, Fine Sandy, Silty CLAY
	631.3	8.5								631.8 / 8.0
630			2	3	5	8		M		Tan and Gray, Tan to Green-Tan, Fine Sandy SILT
	626.3	13.5								
625			1	2	3	5		W		
	621.3	18.5								
620			1	3	3	6		M		
	616.3	23.5								
615			2	3	3	6		M		
	611.3	28.5								
610			2	3	5	8		W		
	606.3	33.5								
605			2	4	6	10		M		
	601.3	38.5								
600			3	6	7	13		M		
	596.3	43.5								
595			6	10	14	24		M		
	591.3	48.5								
590			6	9	14	23		M		
	586.3	53.5								
585			14	22	35	57		M		
	581.3	58.5								
580			11	19	22	41		M		
	576.3	63.5								
575			9	15	21	36		M		
	571.3	68.5								572.8 / 67.0
570			40	60/0.3		100/0.8				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK
	566.3	73.5								
565			37	63/0.4		100/0.9				

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B2-B	**STATION** 145+07	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 639.8 ft	**TOTAL DEPTH** 79.4 ft	**NORTHING** 854,945	**EASTING** 1,912,603	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 92% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Toothman, R. E.	**START DATE** 02/04/15	**COMP. DATE** 02/05/15	**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
565						Match Line				
	561.3	78.5	40	60/0.4		100/0.9				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK *(continued)*
										560.4 / 79.4
										Boring Terminated at Elevation 560.4 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK

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WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B3-A	**STATION** 146+40	**OFFSET** 45 ft LT	**ALIGNMENT** -L-	**0 HR.** 19.8
COLLAR ELEV. 634.9 ft	**TOTAL DEPTH** 73.7 ft	**NORTHING** 855,059	**EASTING** 1,912,491	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/12/14	**COMP. DATE** 12/12/14	**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)
635										GROUND SURFACE	634.9	0.0
	633.4	1.5	3	4	5	9		M		**ROADWAY EMBANKMENT** Asphalt (0.0 feet to 1.0 feet) ABC Stone (1.0 feet to 1.5 feet)	633.4	1.5
	631.4	3.5	4	5	6	11		M		Tan Red, Coarse to Fine Sandy, Silty CLAY with Trace Gravel	631.9	3.0
630										**RESIDUAL** Tan-Red, Coarse to Fine Sandy, Silty CLAY	627.9	7.0
	626.4	8.5	4	4	7	11		M		Tan-Brown, Clayey, Coarse to Fine Sandy, SILT		
625											622.9	12.0
	621.4	13.5	2	3	4	7		M		Tan, Fine Sandy SILT		
620												
	616.4	18.5	2	3	6	9		▽				
615												
	611.4	23.5	2	3	7	10		M				
610												
	606.4	28.5	4	6	8	14		M				
605												
	601.4	33.5	3	4	7	11		M				
600												
	596.4	38.5	6	11	12	23		M				
595												
	591.4	43.5	10	18	26	44		M				
590												
	586.4	48.5	10	14	17	31		M				
585												
	581.4	53.5	24	76/0.5		100/1.0		M			580.4	54.5
580										**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	577.9	57.0
	576.4	58.5	13	32	61	93		M		**RESIDUAL** Tan, Fine Sandy SILT		
575												
	571.4	63.5	23	45	55	100		M			569.9	65.0
570										**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK		
	566.4	68.5	100/0.5			100/0.5						
565												
	561.4	73.5	100/0.2			100/0.2				Boring Terminated at Elevation 561.2 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK	561.2	73.7

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. B3-D	**STATION** 146+34	**OFFSET** 12 ft LT	**ALIGNMENT** -L-	**0 HR.** 14.5
COLLAR ELEV. 635.8 ft	**TOTAL DEPTH** 69.0 ft	**NORTHING** 855,058	**EASTING** 1,912,525	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/15/14	**COMP. DATE** 12/15/14	**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)
640										GROUND SURFACE	635.8	0.0
	634.3	1.5	4	3	4	7		M		**ROADWAY EMBANKMENT** Asphalt (0.0 feet to 0.7 feet) ABC Stone (0.7 feet to 1.5 feet)	634.3	1.5
	632.3	3.5	4	5	8	13		M		Red-Brown, Coarse to Fine Sandy, Silty CLAY with Trace Gravel	632.8	3.0
635										Tan, Clayey, Coarse to Fine Sandy SILT		
630												
	627.3	8.5	2	4	4	8		M			623.8	12.0
625										Tan, Fine Sandy SILT		
	622.3	13.5	3	3	5	8		▽				
620												
	617.3	18.5	3	3	4	7		M			618.8	17.0
615										Tan, Clayey, Fine Sandy SILT		
	612.3	23.5	3	6	7	13		M				
610												
	607.3	28.5	6	11	14	25		M				
605												
	602.3	33.5	4	7	7	14		M				
600												
	597.3	38.5	8	9	13	22		M				
595												
	592.3	43.5	9	12	20	32		M				
590												
	587.3	48.5	25	35	50	85		M			585.3	50.5
585										**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK		
	582.3	53.5	45	55/0.2		100/0.7						
580												
	577.3	58.5	75	25/0.1		100/0.6						
575												
	572.3	63.5	100/0.4			100/0.4						
570												
	567.3	68.5	100/0.5			100/0.5					566.8	69.0
										Boring Terminated at Elevation 566.8 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK		

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B3-E	**STATION** 146+30	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 21.7
COLLAR ELEV. 636.4 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 855,058	**EASTING** 1,912,549	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Whichard, S. W.	**START DATE** 12/17/14	**COMP. DATE** 12/17/14	**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)
645											
640											
635										636.4 GROUND SURFACE	0.0
	634.9	1.5								634.9 Asphalt (0.0 to 0.6 feet) ABC Stone (0.6 to 1.5 feet)	1.5
	632.9	3.5	3	4	5	9 14		M		633.4 **ROADWAY EMBANKMENT** Tan-Red, Fine Sandy, Sllty CLAY	3.0
630			4	6	8			M		**RESIDUAL** Tan and Red, Clayey, Fine Sandy SILT	
	627.9	8.5	2	3	4	7		M			
625										624.4 Tan, Fine Sandy SILT	12.0
	622.9	13.5	3	5	5	10		M			
620										619.4 Tan, Clayey, Fine Sandy SILT	17.0
	617.9	18.5	2	1	2	3		M			
615								▽		614.4 Tan, Fine Sandy SILT	22.0
	612.9	23.5	3	6	11	17		M			
610											
	607.9	28.5	3	4	8	12		M			
605											
	602.9	33.5	2	3	6	9		M			
600											
	597.9	38.5	6	9	14	23		M			
595											
	592.9	43.5	13	13	23	36		M			
590											
	587.9	48.5	14	24	36	60		M			
585											
	582.9	53.5	8	12	22	34		M			
580											
	577.9	58.5	18	33	67/0.4	100/0.9				577.4 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK	59.0
575										574.4 **RESIDUAL** Tan, Fine Sandy SILT	62.0
	572.9	63.5	11	15	28	43		M			
570											
	567.9	68.5	16	30	55	85		M		566.4	70.0
565											

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B3-E	**STATION** 146+30	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 21.7
COLLAR ELEV. 636.4 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 855,058	**EASTING** 1,912,549	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic
DRILLER Whichard, S. W.	**START DATE** 12/17/14	**COMP. DATE** 12/17/14	**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
565						Match Line				
	562.9	73.5			100/0.4	100/0.4				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK *(continued)* 562.5 73.9 Boring Terminated at Elevation 562.5 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 146+24	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.7
COLLAR ELEV. 637.3 ft	**TOTAL DEPTH** 79.1 ft	**NORTHING** 855,057	**EASTING** 1,912,581	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/18/14	**COMP. DATE** 12/18/14	**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)
645										
640										
										637.3 GROUND SURFACE 0.0
635	635.8	1.5	4	5	6	11		M		635.8 Apshalt (0.0 to 0.6 feet) ABC Stone (0.6 to 1.5 feet) 1.5
	633.8	3.5	3	5	6	11		M		634.3 **ROADWAY EMBANKMENT** Red, Coarse to Fine Sandy, Silty CLAY with Trace Gravel 3.0
630										630.3 **RESIDUAL** Red, Clayey, Fine Sandy SILT Tan-Brown, Fine Sandy SILT 7.0
	628.8	8.5	2	3	5	8		M		
625										
	623.8	13.5	2	2	3	5		M		
620										
	618.8	18.5	2	3	5	8		M		
615										
	613.8	23.5	2	4	6	10		M		
610										
	608.8	28.5	4	8	11	19		M		
605										605.3 Tan, Clayey. Fine Sandy SILT 32.0
	603.8	33.5	5	10	11	21		M		
600										
	598.8	38.5	4	11	13	24		M		
595										
	593.8	43.5	2	2	4	6		M		
590										
	588.8	48.5	3	4	9	13		M		
585										585.3 Tan, Fine Sandy SILT 52.0
	583.8	53.5	8	16	24	40		M		
580										
	578.8	58.5	16	34	56	90		M		577.3 **WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK 60.0
575										
	573.8	63.5	60	40/0.1		100/0.6				
570										
	568.8	68.5	70	30/0.1		100/0.6				
565										

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. B3-B	**STATION** 146+24	**OFFSET** 43 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.7
COLLAR ELEV. 637.3 ft	**TOTAL DEPTH** 79.1 ft	**NORTHING** 855,057	**EASTING** 1,912,581	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/18/14	**COMP. DATE** 12/18/14	**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
565						Match Line				
	563.8	73.5	100/0.3			100/0.3				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK *(continued)*
560										
	558.8	78.5	75	25/0.1		100/0.6				558.2 Boring Terminated at Elevation 558.2 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK 79.1

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Wells, T. R.
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)			**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 147+04	**OFFSET** 47 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 630.9 ft	**TOTAL DEPTH** 53.5 ft	**NORTHING** 855,123	**EASTING** 1,912,480	**24 HR.** 16.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/19/14	**COMP. DATE** 12/19/14	**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)
635											
	630.9	0.0								630.9 GROUND SURFACE	0.0
630			3	3	4	7		M		**RESIDUAL** Reddish Brown, Fine Sandy, Silty CLAY	
	627.7	3.2									
			5	12	18	30		M			
625											
	622.7	8.2									
			5	7	9	16		M			
620											
	617.7	13.2									
			3	3	4	7		M			
615											
	612.7	18.2									
			5	7	11	18		M			
610										609.9	21.0
	607.7	23.2								Gray and Brown, Fine Sandy SILT	
			8	11	13	24		M			
605											
	602.7	28.2									
			17	21	26	47		M			
600											
	597.7	33.2									
			11	16	27	43		M			
595											
	592.7	38.2									
			16	31	43	74		M			
590											
	587.7	43.2								587.9	43.0
			32	68/0.4		100/0.9				**WEATHERED ROCK** Brown and Gray FELSIC METAVOLCANIC ROCK	
585											
	582.7	48.2									
			18	37	63/0.3	100/0.8					
580											
	577.7	53.2	100/0.3			100/0.3				577.4	53.5
										Boring Terminated at Elevation 577.4 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK	

NCDOT BORE DOUBLE U3109A_GEO_BRDG_GINT.GPJ NC_DOT.GDT 3/24/15

NCDOT GEOTECHNICAL ENGINEERING UNIT
BOREHOLE REPORT

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 146+92	**OFFSET** 48 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.0
COLLAR ELEV. 634.9 ft	**TOTAL DEPTH** 73.7 ft	**NORTHING** 855,123	**EASTING** 1,912,576	**24 HR.** 17.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/16/14	**COMP. DATE** 12/16/14	**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
645										
640										
635	634.9	0.0	2	3	4	7		M		634.9 GROUND SURFACE 0.0
										RESIDUAL
	631.4	3.5								Tan-Red, Coarse to Fine Sandy, Silty CLAY
630			4	4	6	10		M		631.9 3.0
										Red and Tan, Fine Sandy SILT
	626.4	8.5								
625			2	3	4	7		M		
	621.4	13.5								622.9 12.0
620			1	2	3	5		M		Tan, Clayey, Fine Sandy SILT
	616.4	18.5								
615			2	2	2	4		M		
	611.4	23.5								
610			2	2	3	5		M		
	606.4	28.5								607.9 27.0
605			2	5	7	12		M		Tan, Fine Sandy SILT
	601.4	33.5								602.9 32.0
600			2	1	2	3		M		Tan, Clayey, Fine Sandy SILT
	596.4	38.5								597.9 37.0
595			5	6	11	17		M		Tan, Coarse to Fine Sandy SILT
	591.4	43.5								
590			7	9	15	24		M		
	586.4	48.5								
585			12	22	35	57		M		
	581.4	53.5								
580			20	43	50	93		M		
	576.4	58.5								
575			9	25	34	59		M		
	571.4	63.5								
570			8	19	33	52		M		
	566.4	68.5								567.9 67.0
565			55	45/0.2		100/0.7				**WEATHERED ROCK** Tan FELSIC METAVOLCANIC ROCK

WBS 34900.1.2	**TIP** U-3109A	**COUNTY** ALAMANCE	**GEOLOGIST** Goodnight, D. J.	
SITE DESCRIPTION Dual Bridges on -L- (Future NC 119) over SR 1962 (Holt Street), NCRR/NSRR, and -Y16- (US 70)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 146+92	**OFFSET** 48 ft RT	**ALIGNMENT** -L-	**0 HR.** 19.0
COLLAR ELEV. 634.9 ft	**TOTAL DEPTH** 73.7 ft	**NORTHING** 855,123	**EASTING** 1,912,576	**24 HR.** 17.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 73% 02/07/2014		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Whichard, S. W.	**START DATE** 12/16/14	**COMP. DATE** 12/16/14	**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
565						Match Line				**WEATHERED ROCK**
										Tan FELSIC METAVOLCANIC ROCK
										(continued)
	561.4	73.5	100/0.2			100/0.2				561.2 73.7
										Boring Terminated at Elevation 561.2 ft in WEATHERED ROCK: FELSIC METAVOLCANIC ROCK

Notes:

Topsoil (0.0 to 0.5 feet)

SITE PHOTOGRAPHS

View Looking East along -Y16- from Bent No. 3

Profile of Bridge From End Bent No. 1 Looking North

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3109A	1	5

REFERENCE: U-3109A

PROJECT: 34900

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *ALAMANCE*

PROJECT DESCRIPTION *MEBANE – NC 119 RELOCATION FROM I-40/85 TO NORTH OF US 70*

SITE DESCRIPTION *RETAINING WALLS AT END BENT 1 AND END BENT 2 OF DUAL BRIDGES ON NC 119 OVER HOLT ST., NSRR AND US 70*

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.

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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

D. GOODNIGHT

E. ESTEP

R. TOOTHMAN

W. TRAPP

T. PRESTON

INVESTIGATED BY *T. WELLS*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER SE*

DATE *SEPTEMBER 2015*

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas Wells 9/10/2015
7DA5D2D05... SIGNATURE DATE

NC ENGINEERING F-1143

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 7/16 " TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [ ] -N _____

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: BM - STA 146+20.153' LT -L- (854,803' N, 1,912,756' E)

ELEVATION: 641.59 FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	3

SITE PLAN

0 60 120
FEET

N

ISBKD

BEGIN MSE WALL
-Y16- 20+79.88
68.05 LT

END MSE WALL
-Y16- 22+93.77
64.80 LT

RW2-1
RW2-2
RW2-3
EB2-A
EB2-B

ISFD

15' GR

84" CHL

CITY OF MEBANE
WATERLINE EASEMENT
DB 1499 PG 815

24"

R=15' 20'BST

84" CHL

24" RCP

FIP

INV=631.31'

12" ASBESTOS CONCRETE

18" RCP

W CENTER ST 22' BST

HW

INV=627.69'

T FO

P

d

450' LANE SHIFT

RR

RR CONTROL BOX

-L- Sta.146+61.35 =
-Y16- Sta.22+02.76

72" CHL

TANK

ISMT
BUS

COMC

-L- 145+00

POT Sta. 17+74.98

S 76° 42' 11.2" E

-Y26-

TV

INV=636.91'

8' GR

12" RCP

15" RCP

INV=636.22'

16"

72" CHL

22' GR

-L- Sta.143+22.52 =
-Y26- Sta. 21+72.20

END MSE WALL
-Y26- 38+14.52
50.71 RT

SR 1863 MOLT ST 22'BST

EBI-A
EBI-C
EBI-B
RWI-1

12" RCP

10' GR

15" RCP

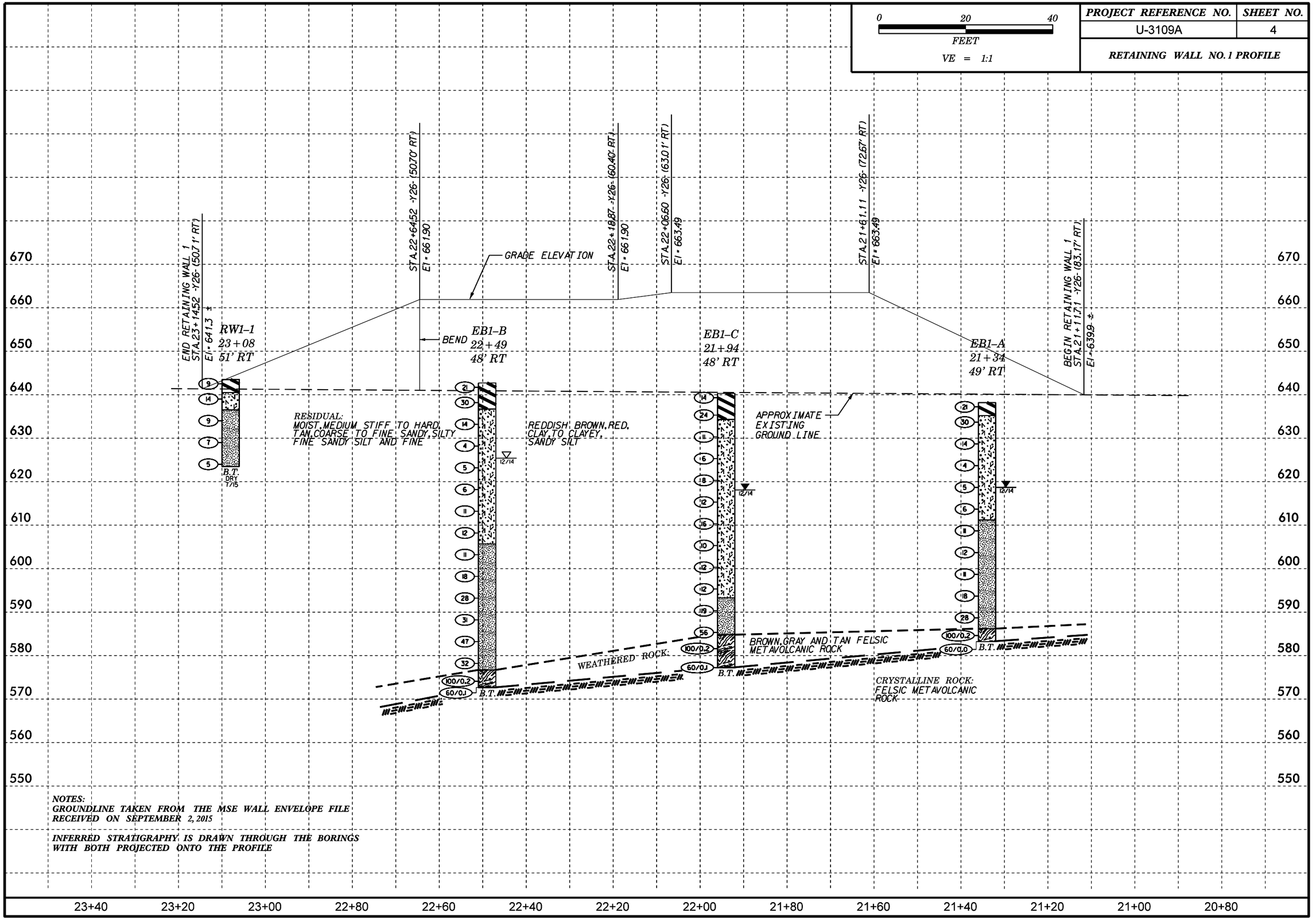
-Y26- 20

BEGIN MSE WALL
-Y26- 21+11.71
83.17 RT

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	4

RETAINING WALL NO. 1 PROFILE

0 20 40
FEET
VE = 1:1



NOTES:
GROUNDLINE TAKEN FROM THE MSE WALL ENVELOPE FILE RECEIVED ON SEPTEMBER 2, 2015

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

PROJECT REFERENCE NO.	SHEET NO.
U-3109A	5

RETAINING WALL NO. 2 PROFILE

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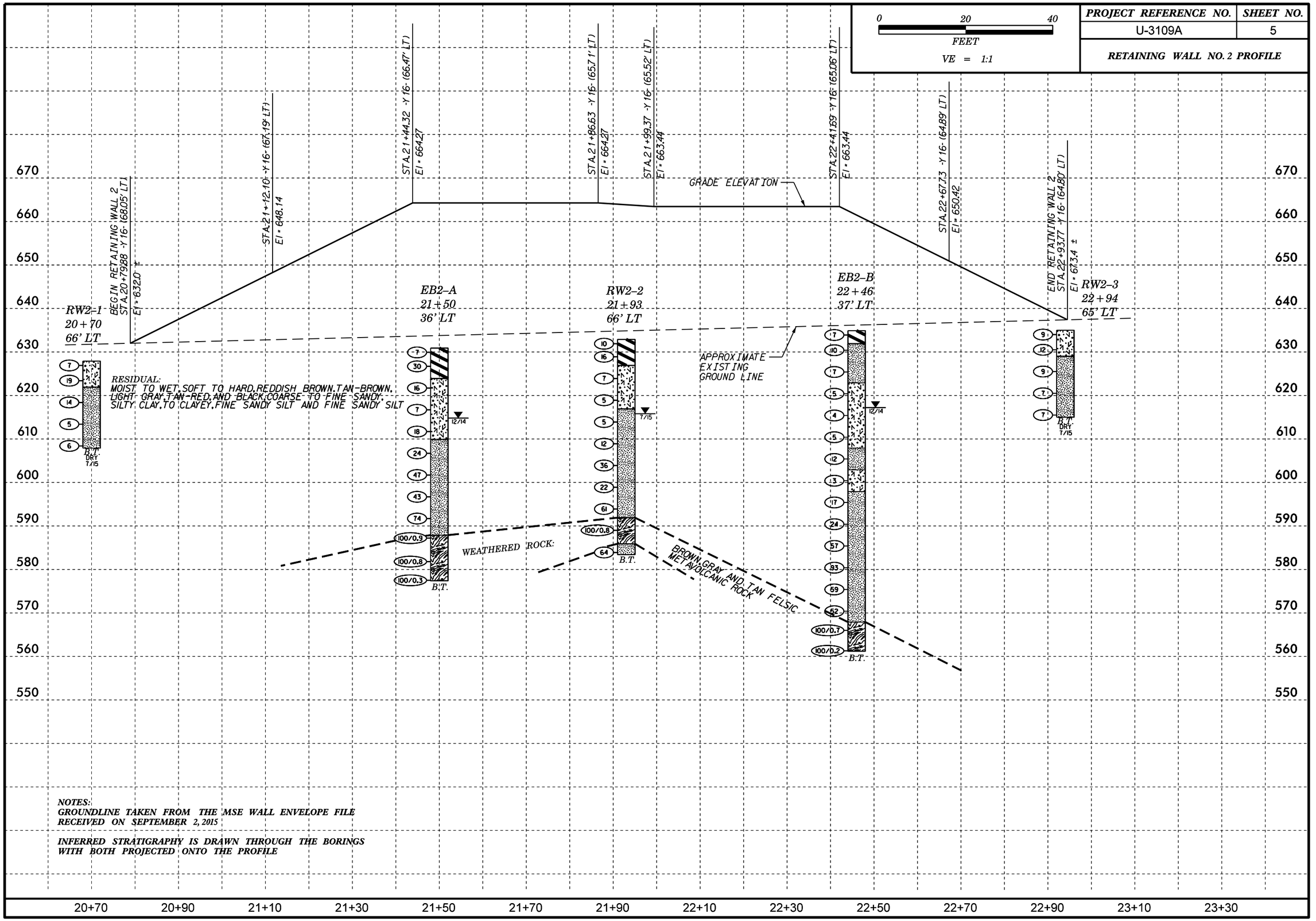
FEET
VE = 1:1



NOTES:
GROUNDLINE TAKEN FROM THE MSE WALL ENVELOPE FILE RECEIVED ON SEPTEMBER 2, 2015

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE