

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

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

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-14	BORE LOGS, CORE REPORTS, & CORE PHOTOGRAPHS
15	ROCK CORE TEST RESULTS
16	SITE PHOTOGRAPHS

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.

REFERENCE: U-3109A

PROJECT: 34900.1.2

PERSONNEL

R. TOOTHMAN

W. TRAPP

INVESTIGATED BY T. WELLS

DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

DATE DECEMBER 2014



DocuSigned by:
Thomas R. Wells 12/19/2014
SIGNATURE DATE
F1D0E9B6454436

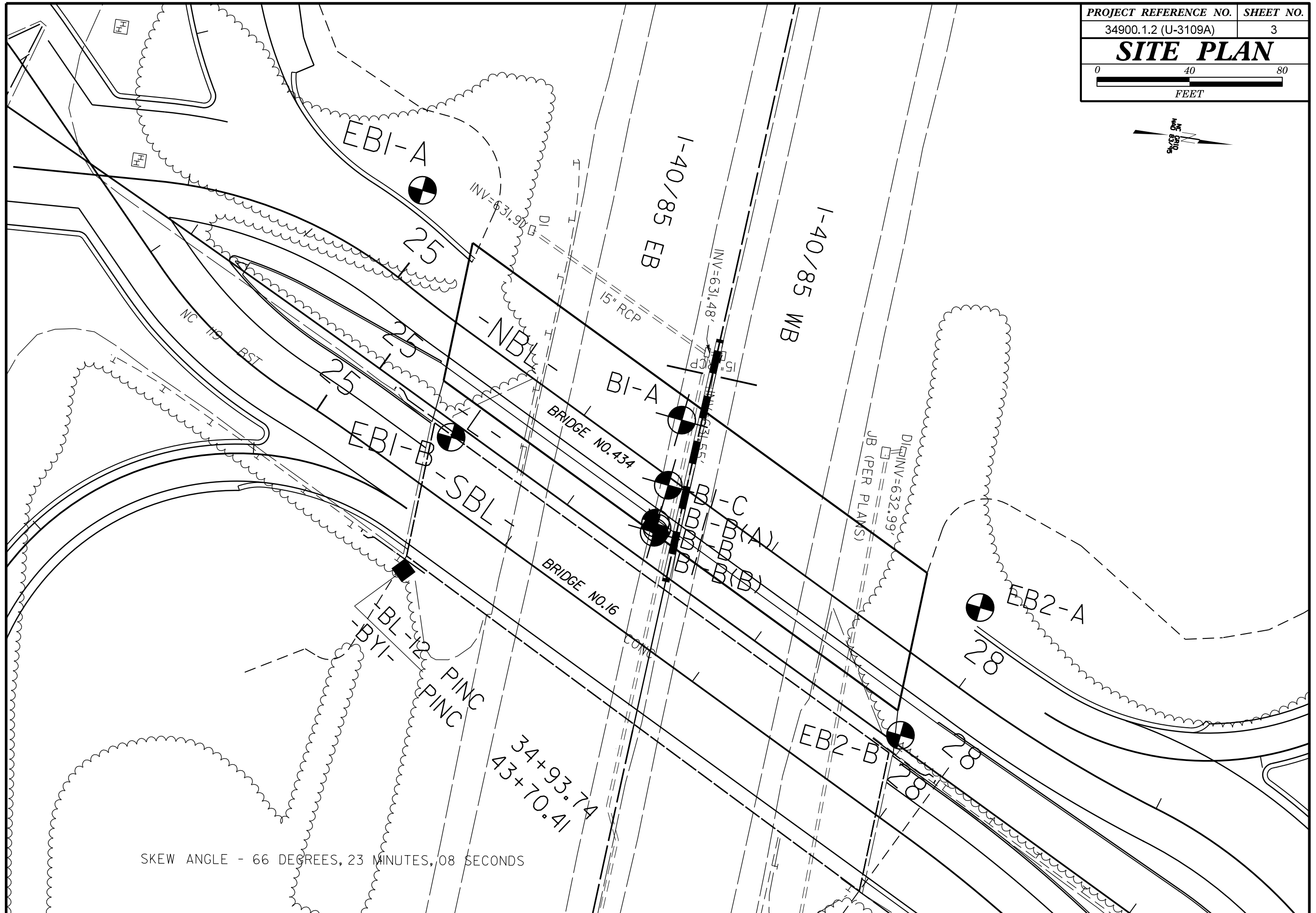
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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 208, 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>															
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-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7
SYMBOL															
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT	
MATERIAL PASSING #40 LL PI												SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS		
GROUP INDEX															
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	UNSATURABLE			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30															

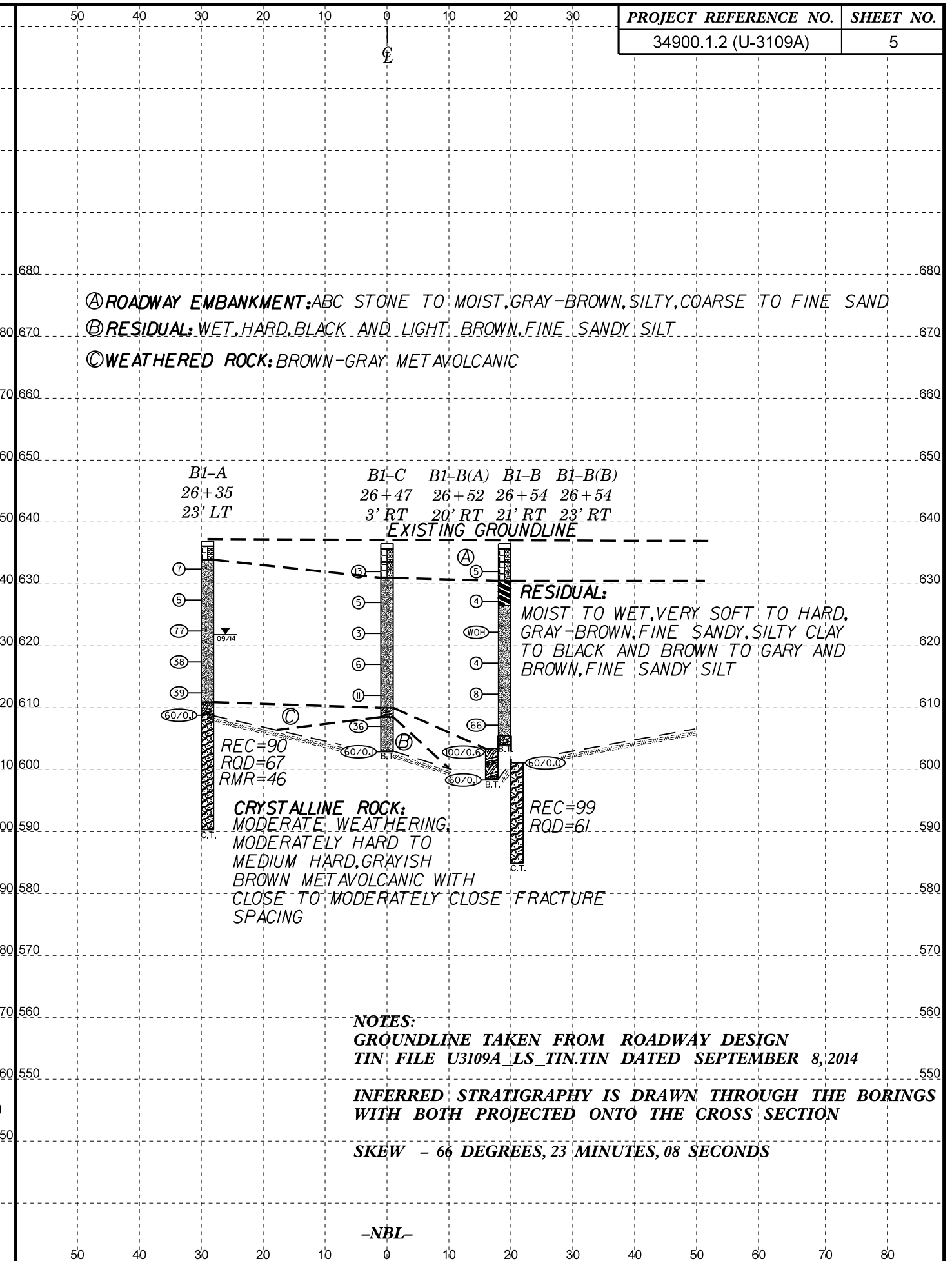
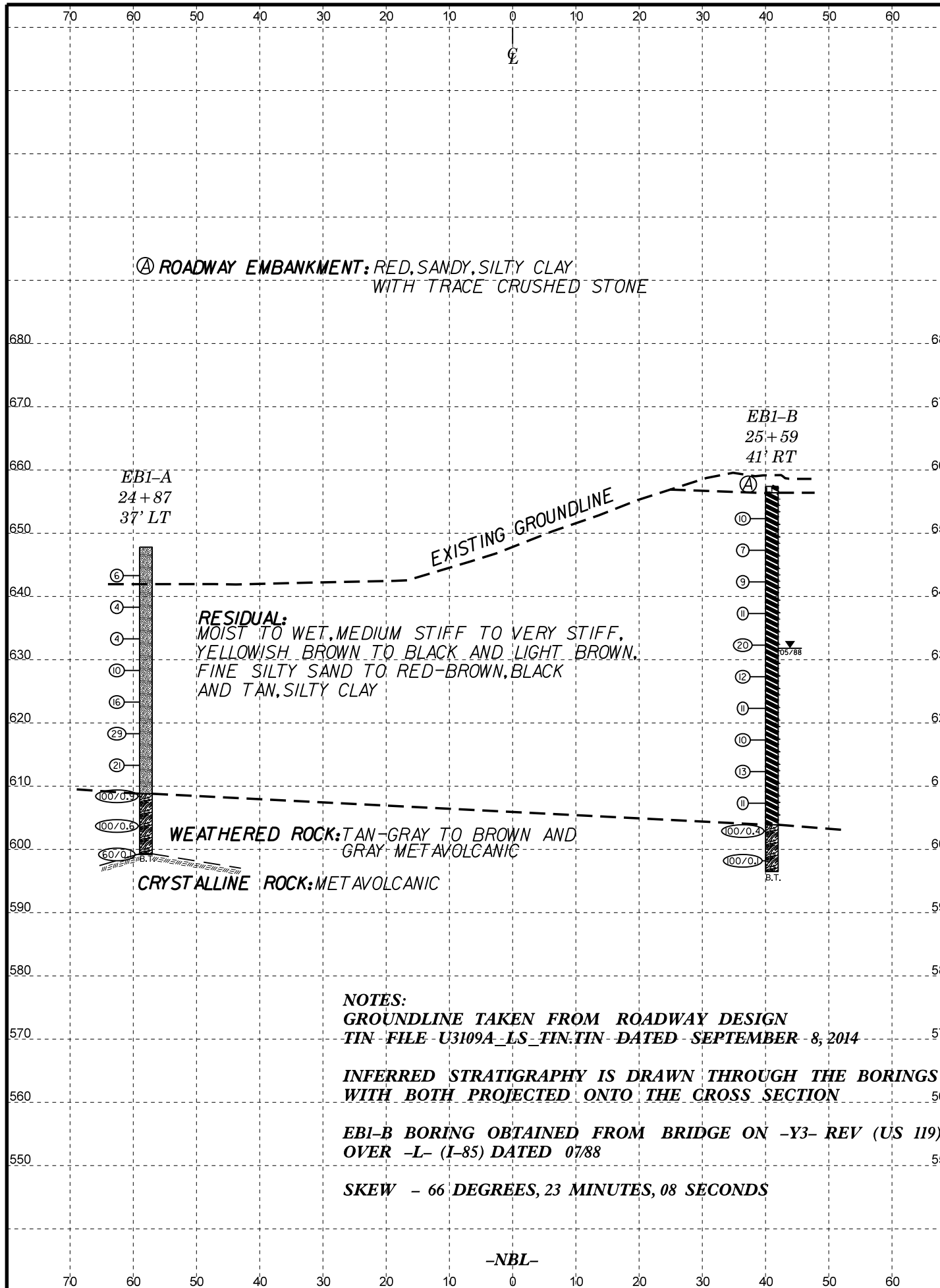
GRADATION			
WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.			
ANGULARITY OF GRAINS			
THE ANGULARITY 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		
	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		
	DIP & DIP DIRECTION OF ROCK STRUCTURES		
	SPT TEST BORING		
	AUGER BORING		
	CORE BORING		
	MONITORING WELL		
	PIEZOMETER INSTALLATION		
	SLOPE INDICATOR INSTALLATION		
	CONE PENETROMETER TEST		
	SOUNDING ROD		
	TEST BORING WITH CORE		
	SPT N-VALUE		
RECOMMENDATION SYMBOLS			
	UNDERCUT EXCAVATION		
	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	MED. - MEDIUM	VST - VANE SHEAR TEST	
BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED	
CL. - CLAY	MOD. - MODERATELY	W - UNIT WEIGHT	
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	W _d - DRY UNIT WEIGHT	
CSE. - COARSE	ORG. - ORGANIC	SAMPLE ABBREVIATIONS	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	S - BULK	
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	SS - SPLIT SPOON	
e - VOID RATIO	SD. - SAND, SANDY	ST - SHELBY TUBE	
F - FINE	SL. - SILTY, SILTY	RS - ROCK	
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY	RT - RECOMPACTED TRIAXIAL	
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	CBR - CALIFORNIA BEARING RATIO	
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT		
HI. - HIGHLY	V - VERY		

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 YIELD 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 SL.)	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 (SL.)	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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i>
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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i>
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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. FABRIC 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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROOVED 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 FINGER NAIL.
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 DISLOADED 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 (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE 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 EMBLACED 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 (SROD) - 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	



SKEW ANGLE - 66 DEGREES, 23 MINUTES, 08 SECONDS



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

EBI-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 0 20 40
(FEET)

VE = 1:1

**END BENT NO.1 CROSS SECTION
AT STA. 25+45.23**

HORIZ. SCALE 0 20 40
(FEET)

VE = 1:1

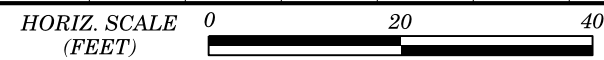
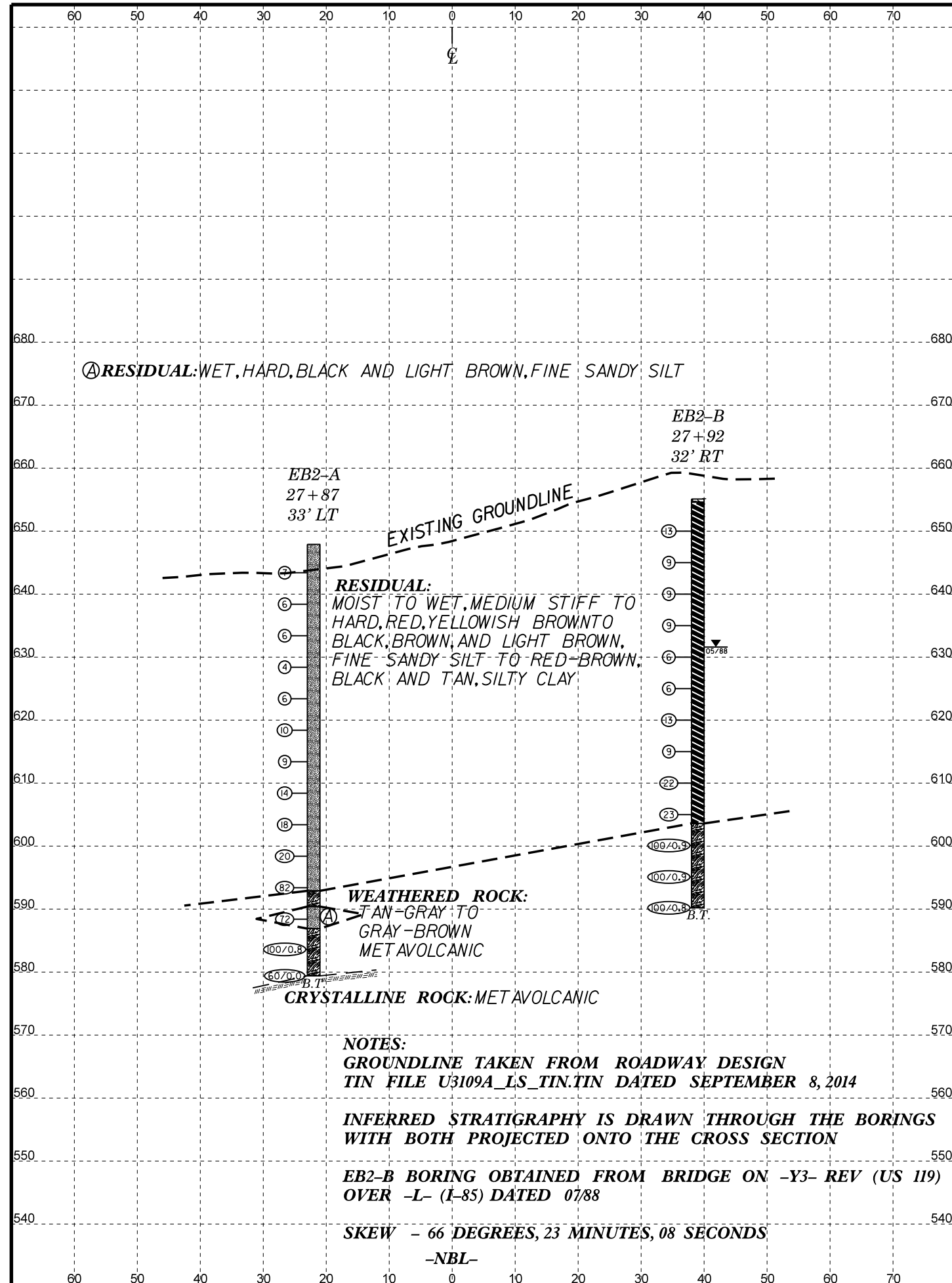
**BENT NO.1 CROSS SECTION
AT STA. 26+54.73**

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

SKEW - 66 DEGREES, 23 MINUTES, 08 SECONDS

-NBL-



VE = 1:1

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

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. EB1-A	STATION 24+87	OFFSET 37 ft LT	ALIGNMENT -NBL-
COLLAR ELEV. 647.8 ft	TOTAL DEPTH 48.6 ft	NORTHING 843,892	EASTING 1,911,560
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			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
650															647.8	GROUND SURFACE	0.0
645	644.3	3.5	2	3	3	6							M	RESIDUAL Yellowish Brown to Black and Light Brown, Fine Sandy SILT			
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											608.8	WEATHERED ROCK Tan-Gray to Brown and Gray METAVOLCANIC	39.0
605	604.3	43.5	66	34/0.1											599.3	CRYSTALLINE ROCK METAVOLCANIC	48.5
600	599.3	48.5	60/0.1												599.2	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 599.2 ft in CRYSTALLINE ROCK: METAVOLCANIC	48.6

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-
COLLAR ELEV. 657.4 ft	TOTAL DEPTH 60.9 ft	NORTHING 843,920	EASTING 1,911,664
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			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
660															657.4	GROUND SURFACE	0.0
655	653.3	4.1	3	4	6	10							M	ROADWAY EMBANKMENT Red, Sandy, Silty CLAY with Trace Crushed Stone	1.0		
650	648.3	9.1	2	3	4	7							M	RESIDUAL Red-Brown, Black and Tan. Silty CLAY			
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											
605	603.3	54.1	100/0.4												603.9	WEATHERED ROCK Brown and Gray METAVOLCANIC	53.5
600	598.3	59.1	100/0.1												596.5	Boring Terminated BY AUGER REFUSAL at Elevation 596.5 ft on CRYSTALLINE ROCK: METAVOLCANIC	60.9

NCDOT BORE DOUBLE U3109A_GEO_BRD0434_GINT.GPJ NC_DOT.GDT 12/12/14



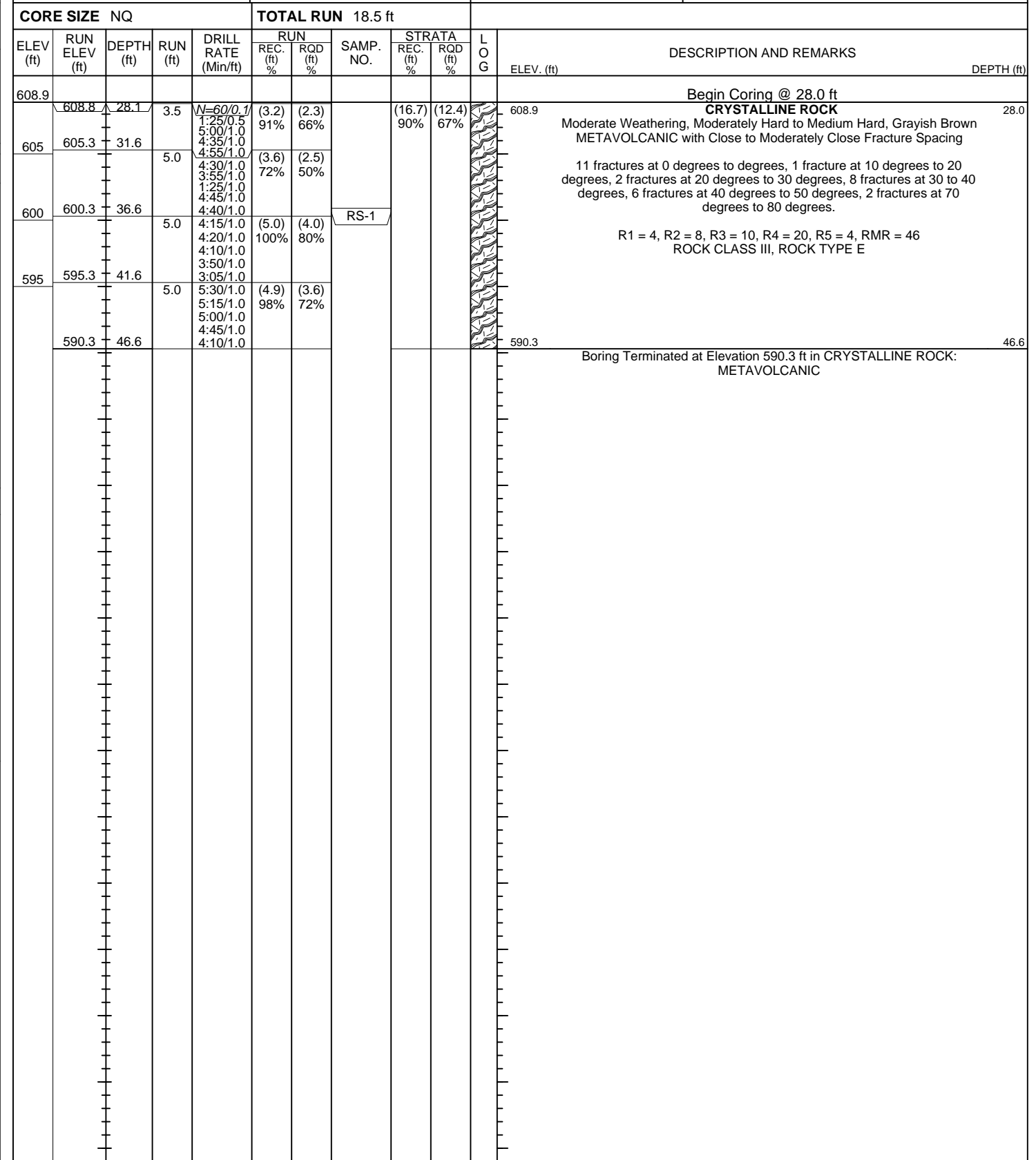
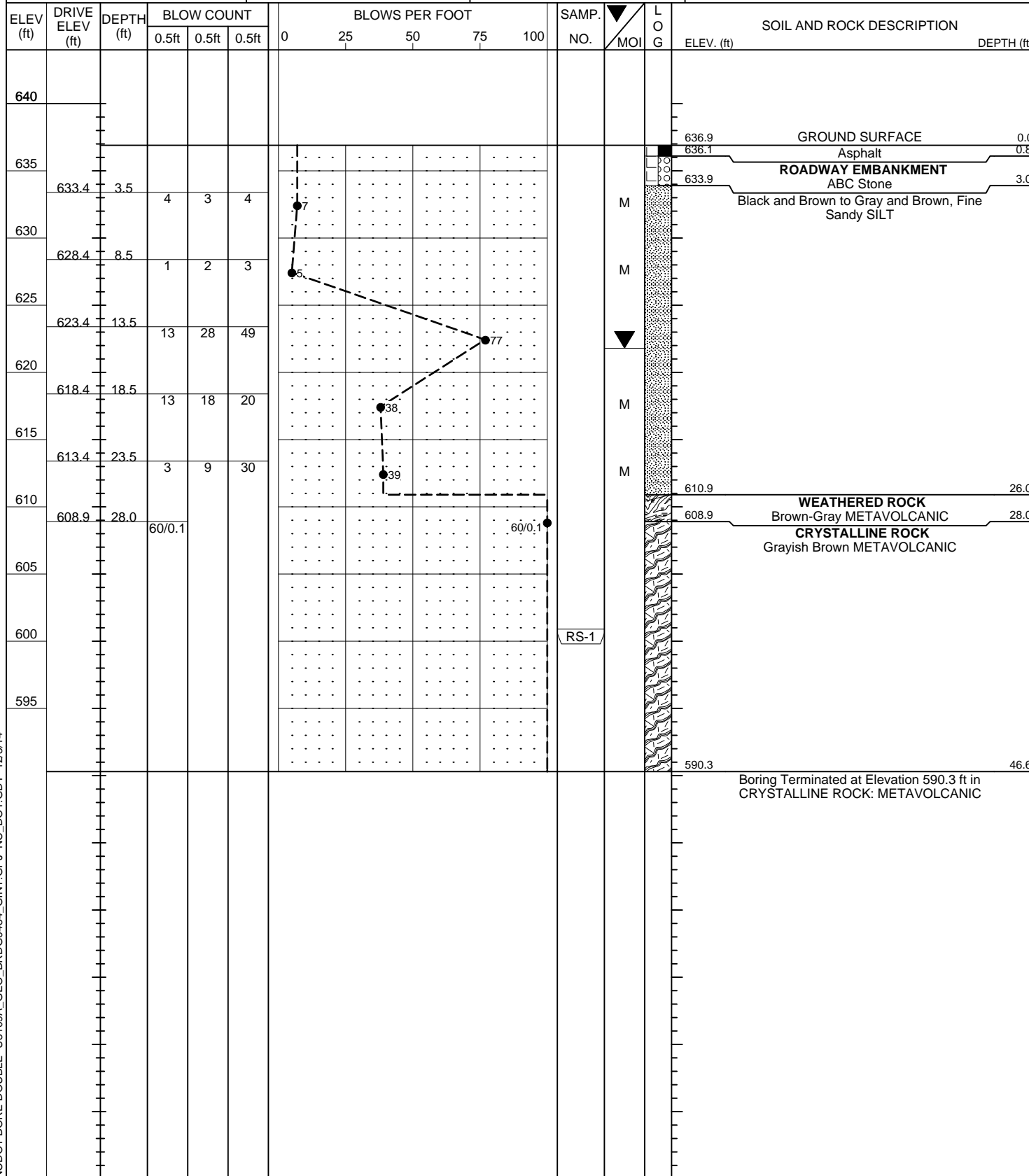
NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT



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-
COLLAR ELEV. 636.9 ft	TOTAL DEPTH 46.6 ft	NORTHING 844,018	EASTING 1,911,641
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

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-
COLLAR ELEV. 636.9 ft	TOTAL DEPTH 46.6 ft	NORTHING 844,018	EASTING 1,911,641
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

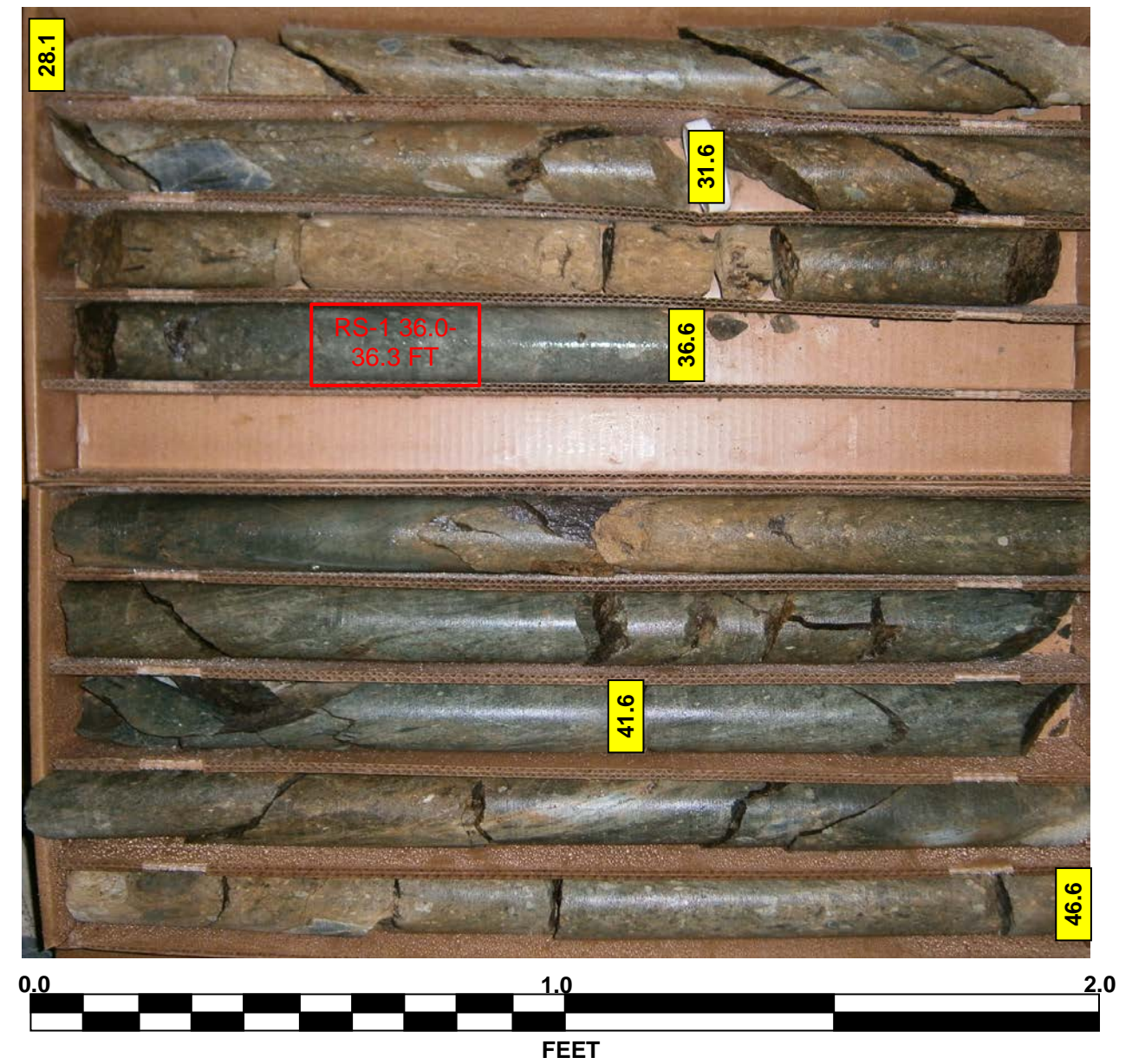


NCDOT BORE DOUBLE U3109A_GEO_BRDG0434_GINT.GPJ NC_DOT.GDT 12/5/14

CORE PHOTOGRAPHS

B1-A

BOXES 1 and 2: 28.1 to 46.6 FEET





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-C	STATION 26+47	OFFSET 3 ft RT	ALIGNMENT -NBL-
COLLAR ELEV. 636.5 ft	TOTAL DEPTH 33.6 ft	NORTHING 844,016	EASTING 1,911,670
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			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
640															
635														636.5 GROUND SURFACE 0.0	
														635.7 Asphalt 0.8	
	633.0	3.5												633.5 ROADWAY EMBANKMENT 3.0	
			5	6	7									ABC Stone	
630														631.0 Gray-Brown, Silty, Coarse to Fine SAND 5.5	
														RESIDUAL	
														Brown to Black and Brown, Fine Sandy SILT	
625															
	628.0	8.5	1	2	3										
620															
	623.0	13.5	WOH	1	2										
615															
	618.0	18.5	2	2	4										
610															
	613.0	23.5	3	4	7										
605															
	608.0	28.5	11	17	19									610.0 WEATHERED ROCK 26.5	
														608.5 Brown and Gray METAVOLCANIC 28.0	
														RESIDUAL	
														Brown, Coarse to Fine Sandy SILT with Trace Rock Fragments	
	603.0	33.5												603.0 CRYSTALLINE ROCK 33.5	
														602.9 Grayish Brown METAVOLCANIC 33.6	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 602.9 ft in CRYSTALLINE ROCK: METAVOLCANIC	

NCDOT BORE DOUBLE U3109A_GEO_BRD0434_GINT.GPJ NC_DOT.GDT 12/5/14



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT



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-										
COLLAR ELEV. 636.5 ft		TOTAL DEPTH 51.6 ft		NORTHING 844,013		EASTING 1,911,691										
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			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
640																
635																
630																
625																
620																
615																
610																
605																
600	601.1	35.4												601.1	35.4	CRISTALLINE ROCK Grayish Brown METAVOLCANIC
595																
590																
585																Boring Terminated at Elevation 584.9 ft in CRISTALLINE ROCK: METAVOLCANIC

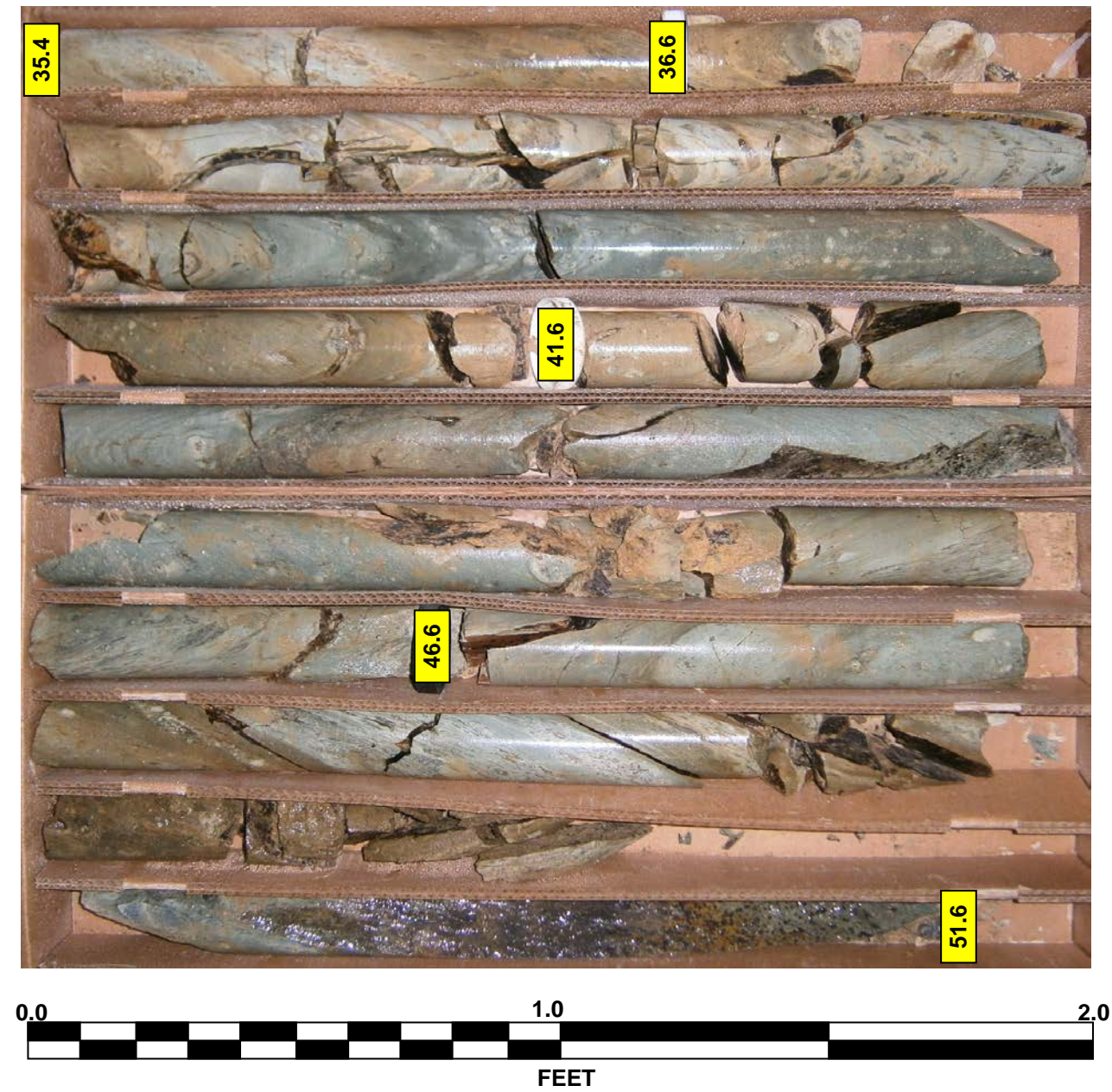
WBS 34900.1.2		TIP U-3109A		COUNTY ALAMANCE		GEOLOGIST Wells, T. R.					
SITE DESCRIPTION Bridge No. 434 on -NBL- over I-40/85 WB and I-40/85 EB (DDI)							GROUND WTR (ft)				
BORING NO. B1-B(B)		STATION 26+54		OFFSET 23 ft RT		ALIGNMENT -NBL-					
COLLAR ELEV. 636.5 ft		TOTAL DEPTH 51.6 ft		NORTHING 844,013		EASTING 1,911,691					
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		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		
601.1											
600	601.1	35.4	1.2	N=60/0.0 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	(1.2) 100%	(1.2) 100%		(16.0) 99%	(9.9) 61%		Begin Coring @ 35.4 ft CRISTALLINE ROCK 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	3:40/1.0 3:55/1.0 4:15/1.0 5:05/1.0 5:20/1.0	(5.0) 100%	(2.5) 50%					
590	589.9	46.6	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%					
585	584.9	51.6	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%					Boring Terminated at Elevation 584.9 ft in CRISTALLINE ROCK: METAVOLCANIC

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

CORE PHOTOGRAPHS

B1-B(B)

BOXES 1 and 2: 35.4 to 51.6 FEET





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. EB2-A	STATION 27+87	OFFSET 33 ft LT	ALIGNMENT -NBL-
COLLAR ELEV. 647.9 ft	TOTAL DEPTH 68.5 ft	NORTHING 844,157	EASTING 1,911,702
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			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
650																
														647.9		GROUND SURFACE
																RESIDUAL Red, Yellowish Brown to Black, Brown, and Light Brown, Fine Sandy SILT
645	644.4	3.5		3	3	4										
640	639.4	8.5		1	3	3										
635	634.4	13.5		1	3	3										
630	629.4	18.5		1	1	3										
625	624.4	23.5		2	3	3										
620	619.4	28.5		2	4	6										
615	614.4	33.5		2	4	5										
610	609.4	38.5		3	5	9										
605	604.4	43.5		3	6	12										
600	599.4	48.5		4	7	13										
595	594.4	53.5		15	26	56										
590	589.4	58.5		14	26	46										
585	584.4	63.5		60	40/0.3											
580	579.4	68.5		60/0.0												
														592.9		WEATHERED ROCK METAVOLCANIC
														590.4		RESIDUAL Black and Light Brown, Fine Sandy SILT
														586.9		WEATHERED ROCK Tan-Gray METAVOLCANIC
														579.4		Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 579.4 ft on 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. EB2-B	STATION 27+92	OFFSET 32 ft RT	ALIGNMENT -NBL-
COLLAR ELEV. 655.1 ft	TOTAL DEPTH 64.9 ft	NORTHING 844,131	EASTING 1,911,762
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			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
660																
														655.1		GROUND SURFACE
														654.6		ROADWAY EMBANKMENT Black, Fine Sandy, Silty CLAY
																RESIDUAL Red-Brown, Black and Tan, Silty CLAY
655																
650	651.0	4.1		3	6	7										
645	646.0	9.1		2	3	6										
640	641.0	14.1		3	3	6										
635	636.0	19.1		2	3	6										
630	631.0	24.1		1	2	4										
625	626.0	29.1		1	2	4										
620	621.0	34.1		2	4	9										
615	616.0	39.1		2	4	5										
610	611.0	44.1		6	9	13										
605	606.0	49.1		5	10	13										
600	601.0	54.1		49	51/0.4											
595	596.0	59.1		66	34/0.4											
	591.0	64.1		63	37/0.3											
														603.6		WEATHERED ROCK Gray-Brown METAVOLCANIC
														590.2		Boring Terminated at Elevation 590.2 ft in WEATHERED ROCK: METAVOLCANIC

NCDOT BORE DOUBLE U3109A_GEO_BRD0434_GINT.GPJ_NC_DOT.GDT_12/5/14

SITE PHOTOGRAPHS



View Looking North along -NBL- from End Bent 1



Profile of Bridge From Existing Bridge Looking West