

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	17BP.12.R.25	1	8

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.12.R.25 (17BP12R25) F.A. PROJ. _____

COUNTY ALEXANDER

PROJECT DESCRIPTION BRIDGE 53 OVER GREASY CREEK
ON SR 1422 (WHITE PLAINS RD.)

SITE DESCRIPTION _____

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PERSONNEL

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SUBMITTED BY C.B. LITTLE

DATE APRIL 2012

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) 250-4088. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

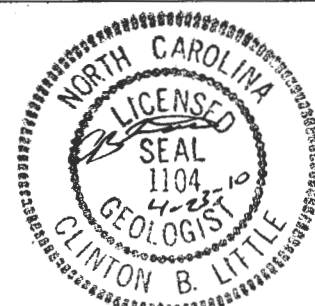
SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA, AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS 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 DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION 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 OFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

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

DRAWN BY: J.K. McCLURE



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

SOIL DESCRIPTION

SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:

VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, MODERATE PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS ($\leq 35\%$ 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-4, A-5			
SYMBOL												
% PASSING	50 MX 30 MX 50 MX 15 MX 25 MX	51 MN	35 MX 35 MX 10 MX	35 MX 35 MX 11 MN	35 MX 35 MX 11 MN	36 MN	36 MN	36 MN	36 MN			
LIQUID LIMIT	6 MX	NP	40 MX 41 MN 10 MX 10 MX	40 MX 41 MN 11 MN	40 MX 41 MN 11 MN	40 MX 41 MN 11 MN	40 MX 41 MN 11 MN	40 MX 41 MN 11 MN	40 MX 41 MN 11 MN			
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	16 MX	16 MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS				SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			
GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD				FAIR TO POOR		FAIR TO POOR	POOR	UNSATISFACTORY			

PI OF A-7-5 SUBGROUP IS $\leq$ LL - 30 ; PI OF A-7-6 SUBGROUP IS $>$ LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270
	4.75	2.00	0.42	0.25	0.075	0.053
BOULDER (BLDR.)						
COBBLE (COBB.)						
GRAVEL (GR.)						
COARSE SAND (CSE, SD.)						
FINE SAND (F SD.)						
SILT (SL.)						
CLAY (CL.)						
GRAIN SIZE	305	75	2.0	0.25	0.05	0.005
SIZE	IN.	3				

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE
MODERATELY COMPRESSIBLE
HIGHLY COMPRESSIBLE

LIQUID LIMIT LESS THAN 31
LIQUID LIMIT EQUAL TO 31-50
LIQUID LIMIT GREATER THAN 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME
HIGHLY ORGANIC	$> 10\%$	$> 20\%$	HIGHLY

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		TEST BORING
	SOIL SYMBOL		AUGER BORING
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		CORE BORING
	INFERRED SOIL BOUNDARY		MONITORING WELL
	INFERRED ROCK LINE		PIEZOMETER INSTALLATION
	ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION
	DIP & DIP DIRECTION OF ROCK STRUCTURES		CONE PENETROMETER TEST
			SOUNDING ROD

ABBREVIATIONS

AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST
BT - BORING TERMINATED	MICA - MICACEOUS	WEA. - WEATHERED
CL - CLAY	MOD. - MODERATELY	γ - UNIT WEIGHT
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	γ _d - DRY UNIT WEIGHT
CSE. - COARSE	ORG. - ORGANIC	
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST	SAMPLE ABBREVIATIONS
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC	S - BULK
e - VOID RATIO	SD. - SAND, SANDY	SS - SPLIT SPOON
F - FINE	SL. - SILT, SILTY	ST - SHELBY TUBE
FDSS. - FOSSILIFEROUS	SL. - SLIGHTLY	RS - ROCK
FRAC. - FRACTURED, FRACTURES	TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL
FRAGS. - FRAGMENTS	W - MOISTURE CONTENT	CBR - CALIFORNIA BEARING RATIO
HL. - HIGHLY	V - VERY	

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:
☐ MOBILE B- _____	☐ CLAY BITS	☒ AUTOMATIC ☐ MANUAL
☐ BK-51	☐ 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:
☐ CME-45C	☐ 8" HOLLOW AUGERS	☐ B- _____
☒ CME-55B	☐ HARD FACED FINGER BITS	☐ N- _____
☐ PORTABLE HOIST	☐ TUNG-CARBIDE INSERTS	☐ H- _____
☐ _____	☒ CASING ☒ W/ ADVANCER	HAND TOOLS:
☐ _____	☐ TRICONE _____ * STEEL TEETH	☐ POST HOLE DIGGER
☐ _____	☒ TRICONE 2 15/16" * TUNG-CARB.	☐ HAND AUGER
☐ _____	☐ CORE BIT	☐ SOUNDING ROD
		☐ VANE SHEAR TEST

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ROCK DESCRIPTION		TERMS AND DEFINITIONS	
HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS, IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:		ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.	
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. <u>IF TESTED, WOULD YIELD SPT REFUSAL</u>		
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. <u>IF TESTED, YIELDS SPT N VALUES > 100 BPF</u>		
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, YIELDS SPT N VALUES < 100 BPF</u>		
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIXES 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 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 FINGER NAIL.		
FRACTURE SPACING		BEDDING	
TERM	SPACING	TERM	THICKNESS
VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET
WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET
MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET
VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET
		THINLY LAMINATED	< 0.008 FEET
INDURATION			
FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			
FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.		
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.		
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.		
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.		

NOTES:

BENCH MARK: 01-0053-2
 STA. 11+93.70 -EL- 16.80 LT.
 N 802167.5630 E 1372378.8000 ELEVATION: 1029.30 FT.

BENCHMARKS (NAVD88)

 BM#1 ELEVATION = 1031.98'
 N 802303 E 1372382
 EL STATION 13+20 31' RIGHT
 RR SPIKE IN SOUTHERN ROOT
 OF 15' WHITE PINE

ALEXANDER COUNTY LOW IMPACT BRIDGE

STRUCTURE 010053
 LS 12-11-059
 WBS 17BP.12.R.25
 TIP 01-0053

PROJECT REFERENCE NO. SHEET

17BP.12.R.25

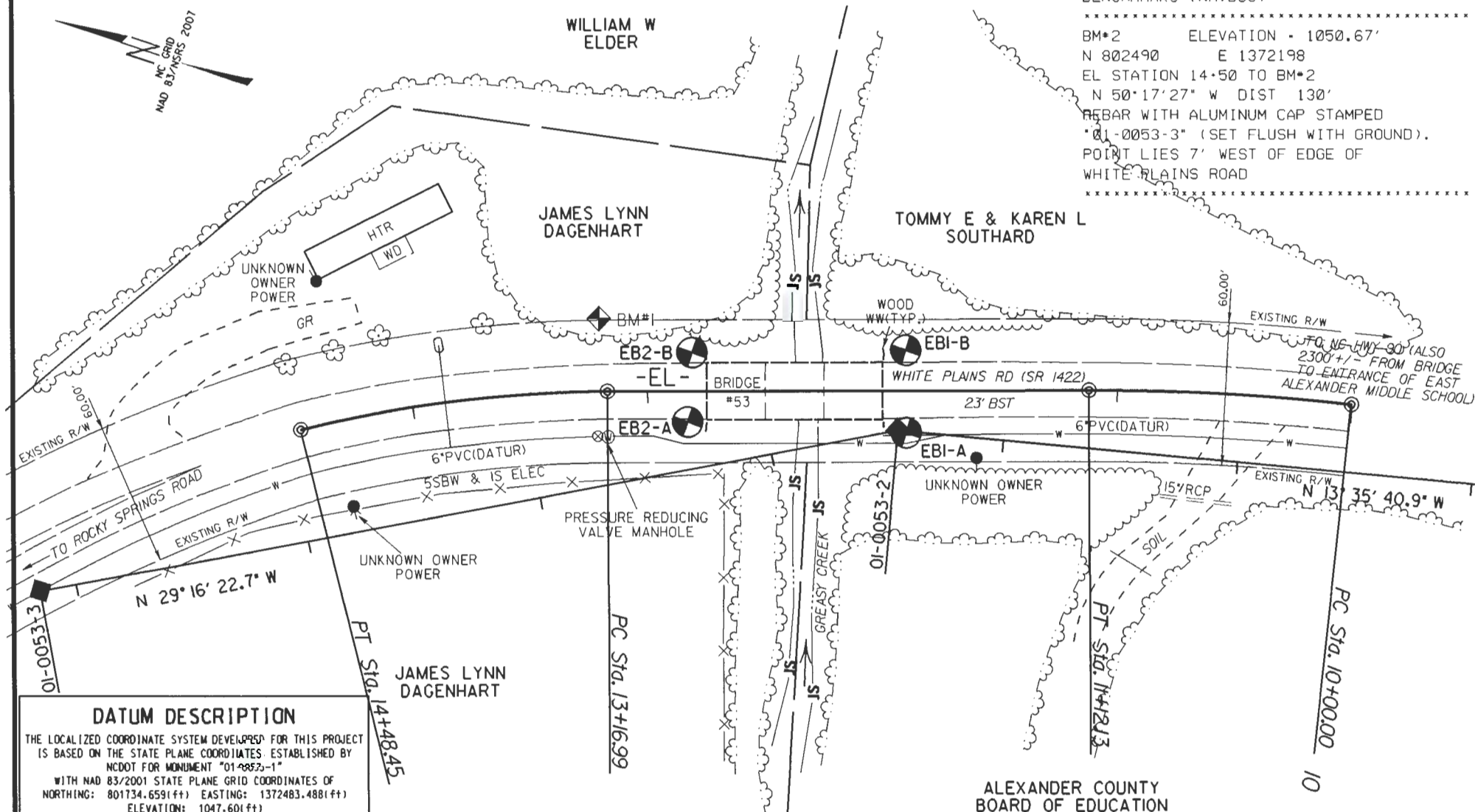
3

SITE PLAN

0 60 120
 FEET

BENCHMARKS (NAVD88)

 BM#2 ELEVATION = 1050.67'
 N 802490 E 1372198
 EL STATION 14+50 TO BM#2
 N 50°17'27" W DIST 130'
 REBAR WITH ALUMINUM CAP STAMPED
 "01-0053-3" (SET FLUSH WITH GROUND).
 POINT LIES 7' WEST OF EDGE OF
 WHITE PLAINS ROAD



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "01-0053-1" WITH NAD 83/2001 STATE PLANE GRID COORDINATES OF NORTHING: 801734.659(ft) EASTING: 1372483.488(ft) ELEVATION: 1047.60(ft) THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.9998985647 THE N.C. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GROUND DISTANCE FROM "01-0053-3" TO L- STATION IS

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

ALEXANDER COUNTY
BOARD OF EDUCATION

POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	01-0053-1	801734.6590	1372483.4880	1047.60	OUTSIDE PROJECT LIMITS	
2	01-0053-2	802167.5630	1372378.8000	1029.30	11+93.70	16.80 LT
3	01-0053-3	802490.4101	1372197.8268	1050.67	OUTSIDE PROJECT LIMITS	



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 4

WBS 17BP.12.R.25		TIP 17BP12R25		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.	
SITE DESCRIPTION BRIDGE 53 OVER GREASY CREEK ON SR 1422 (WHITE PLAINS RD.)							GROUND WTR (ft)
BORING NO. EB1-A		STATION 11+90		OFFSET 18 ft LT		ALIGNMENT -EL-	
COLLAR ELEV. 1,029.9 ft		TOTAL DEPTH 23.1 ft		NORTHING 802,164		EASTING 1,372,379	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic	
DRILLER Smith, C. L.		START DATE 03/28/12		COMP. DATE 03/28/12		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						
1030														1,029.9	GROUND SURFACE	0.0
															ROADWAY EMBANKMENT	
															RED-ORANGE SOFT TO MED. STIFF	
															MOIST SANDY SILTY CLAY (A-7)	
1025	1,025.4	4.5	1	2	2									1,023.9		6.0
															ALLUVIAL	
															BRN-GRAY & GRAY SOFT TO V. SOFT	
															MOIST TO WET SANDY SILTY CLAY &	
															SILTY SANDY CLAY (A-7)	
1020	1,020.4	9.5	2	1	1											
1015	1,015.4	14.5	0	1	0											
1010	1,010.4	19.5	12	57	43/0.1									1,012.9		17.0
															RESIDUAL	
															GRAY-WHITE MED. DENSE MOIST	
															CLAYEY SILTY SAND (A-2)	
														1,009.9		20.0
															WEATHERED ROCK	
															GRAY-WHITE SEV. WEATH.	
															CRYSTALLINE ROCK	
														1,006.8		23.1
															Boring Terminated BY TRI-CONE	
															REFUSAL at Elevation 1,006.8 ft ON	
															CRYSTALLINE ROCK	



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 5

WBS 17BP.12.R.25		TIP 17BP12R25		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.	
SITE DESCRIPTION BRIDGE 53 OVER GREASY CREEK ON SR 1422 (WHITE PLAINS RD.)							GROUND WTR (ft)
BORING NO. EB1-B		STATION 11+90		OFFSET 17 ft RT		ALIGNMENT -EL-	
COLLAR ELEV. 1,029.9 ft		TOTAL DEPTH 21.9 ft		NORTHING 802,175		EASTING 1,372,412	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic	
DRILLER Smith, C. L.		START DATE 03/28/12		COMP. DATE 03/28/12		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						
1030														1,029.9	GROUND SURFACE	0.0
1025	1,025.6	4.3	2	3	3								M	1,024.1	ROADWAY EMBANKMENT RED-ORANGE MED. STIFF MOIST SANDY SILTY CLAY (A-7)	5.8
1020	1,020.6	9.3	0	1	1								M		ALLUVIAL GRAY SOFT TO V. SOFT MOIST TO WET SANDY SILTY CLAY & SILTY SANDY CLAY (A-7) W/ WOOD @ 14.3	
1015	1,015.6	14.3	0	0	1								M/W	1,013.2	RESIDUAL GRAY-WHITE LOOSE MOIST CLAYEY SILTY SAND (A-2)	16.7
1010	1,010.6	19.3	2	8	100/0.4									1,009.6		20.3
														1,008.0	WEATHERED ROCK GRAY-WHITE SEV. WEATH. CRYSTALLINE ROCK Boring Terminated BY TRI-CONE REFUSAL at Elevation 1,008.0 ft ON CRYSTALLINE ROCK	21.9



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET 6

WBS 17BP.12.R.25		TIP 17BP12R25		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.	
SITE DESCRIPTION BRIDGE 53 OVER GREASY CREEK ON SR 1422 (WHITE PLAINS RD.)							GROUND WTR (ft)
BORING NO. EB2-A		STATION 12+83		OFFSET 13 ft LT		ALIGNMENT -EL-	
COLLAR ELEV. 1,030.3 ft		TOTAL DEPTH 25.5 ft		NORTHING 802,253		EASTING 1,372,353	
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic	
DRILLER Smith, C. L.		START DATE 03/28/12		COMP. DATE 03/28/12		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)	
1035																
1030															1,030.3	GROUND SURFACE
1025	1,025.8	4.5	1	1	2								M		1,024.3	ROADWAY EMBANKMENT RED-ORANGE V. LOOSE MOIST CLAYEY SILT SAND (A-2)
1020	1,020.8	9.5	0	0	0								M			ALLUVIAL GRAY V. LOOSE MOIST CLAYEY SILTY SAND (A-2)
1015	1,015.8	14.5	5	8	54								M		1,015.3	RESIDUAL GRAY-WHITE & BRN-WHITE V. DENSE TO LOOSE MOIST MICA. TO V. MICA. CLAYEY SILTY SAND (A-2)
1010	1,010.8	19.5	1	3	3								M			
1005	1,005.8	24.5	100/0.2												1,006.3	24.0
															1,004.8	25.5
																WEATHERED ROCK GRAY-WHITE SEV. WEATH. CRYSTALLINE ROCK Boring Terminated BY TRI-CONE REFUSAL at Elevation 1,004.8 ft ON CRYSTALLINE ROCK



NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

SHEET 7

WBS 17BP.12.R.25		TIP 17BP12R25		COUNTY ALEXANDER		GEOLOGIST Stickney, J. K.							
SITE DESCRIPTION BRIDGE 53 OVER GREASY CREEK ON SR 1422 (WHITE PLAINS RD.)						GROUND WTR (ft)							
BORING NO. EB2-B		STATION 12+81		OFFSET 16 ft RT		ALIGNMENT -EL-							
COLLAR ELEV. 1,029.7 ft		TOTAL DEPTH 27.0 ft		NORTHING 802,261		EASTING 1,372,382							
DRILL RIG/HAMMER EFF./DATE HFO0072 CME-550 89% 09/02/2009				DRILL METHOD NW Casing w/ Advancer		HAMMER TYPE Automatic							
DRILLER Smith, C. L.		START DATE 03/30/12		COMP. DATE 03/30/12		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT			SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		ELEV. (ft)	DEPTH (ft)
1030												1,029.7	0.0
												GROUND SURFACE	
												ROADWAY EMBANKMENT	
												RED-ORANGE V. LOOSE MOIST	
												CLAYEY SILTY SAND (A-2)	
1025	1,025.5	4.2	0	1	1						M	1,023.7	6.0
												ALLUVIAL	
												GRAY V. LOOSE TO LOOSE MOIST	
												CLAYEY SILTY SAND (A-2)	
1020	1,020.5	9.2	0	1	2						M		
												RESIDUAL	
1015	1,015.5	14.2	3	4	5						M	1,011.9	17.8
												1,010.5	19.2
1010	1,010.5	19.2	32	68/0.3						100/0.8		GRAY-WHITE LOOSE MOIST CLAYEY	
												SILTY SAND (A-2)	
												WEATHERED ROCK	
												GRAY-WHITE SEV. WEATH.	
												CRYSTALLINE ROCK	
1005	1,005.5	24.2	100/0.3							100/0.3		1,002.7	27.0
												Boring Terminated BY TRI-CONE	
												REFUSAL at Elevation 1,002.7 ft ON	
												CRYSTALLINE ROCK	

ALEXANDER COUNTY

LOW IMPACT BRIDGE

STRUCTURE 010053

LS 12-II-059

WBS 17BP12.R.25

TIP 01-0053

BENCHMARKS (NAVD88)

BM-1

ELEVATION = 1031.98'

N 802303

E 1372382

EL STATION 13+20.31' RIGHT

RR SPIKE IN SOUTHERN ROOT

OF 15" WHITE PINE



DATUM DESCRIPTION

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY WOODS FOR CORNER "01-0053-1"

WITH WGS 84/2011 STATE PLANE GRID COORDINATES OF NORTHING: 801346.656(11) EASTING: 1572483.488(11) ELEVATION: 1047.60(11)

THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT IS 0.999999547

THE N.G.S. LAMBERT GRID BEARING AND LOCALIZED HORIZONTAL GRID DISTANCE FROM "01-0053-1" TO "STATION 15"

ALL LINEAR DIMENSIONS ARE LOCALIZED HORIZONTAL DISTANCES. VERTICAL DATUM USED IS NAVD 80

POINT	DESC.	NORTH	EAST	ELEVATION	EL STATION	OFFSET
1	01-0053-1	801734.6590	1372483.4880	1047.60	OUTSIDE PROJECT LIMITS	
2	01-0053-2	802167.5630	1372378.8000	1029.30	11+93.70	16.80 LT
3	01-0053-3	802490.4101	1372197.8268	1050.67	OUTSIDE PROJECT LIMITS	