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36596

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY NASH

PROJECT DESCRIPTION US 301 BYPASS FROM NC 43-48 (BENVENUE RD.) TO SR 1836 (MAY DR.)

SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3330	1	16

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 LIMIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (MIN-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 MOLCATED IN THE SUBSURFACE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY OF THE INVESTIGATION. THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATION THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED ANY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MICKLORY. 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 DIES 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.

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

PERSONNEL J.R. SWARTLEY O.B. OTI D.G. PINTER C. CONGLETON

INVESTIGATED BY <u>J.</u>R. SWARTLEY

CHECKED BY N.T. ROBERSON

SUBMITTED BY N.T. ROBERSON

DATE _FEBRUARY 2015



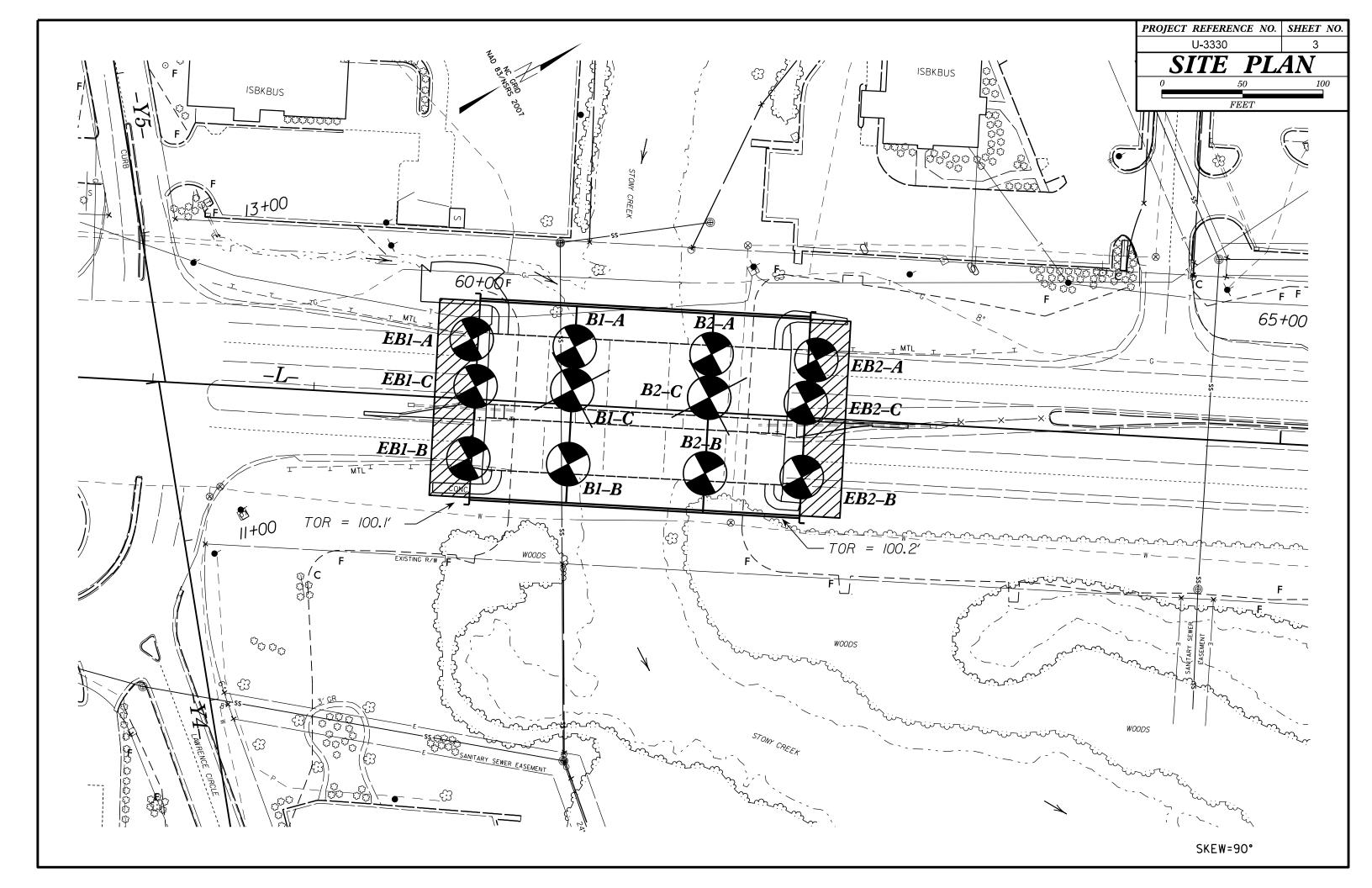
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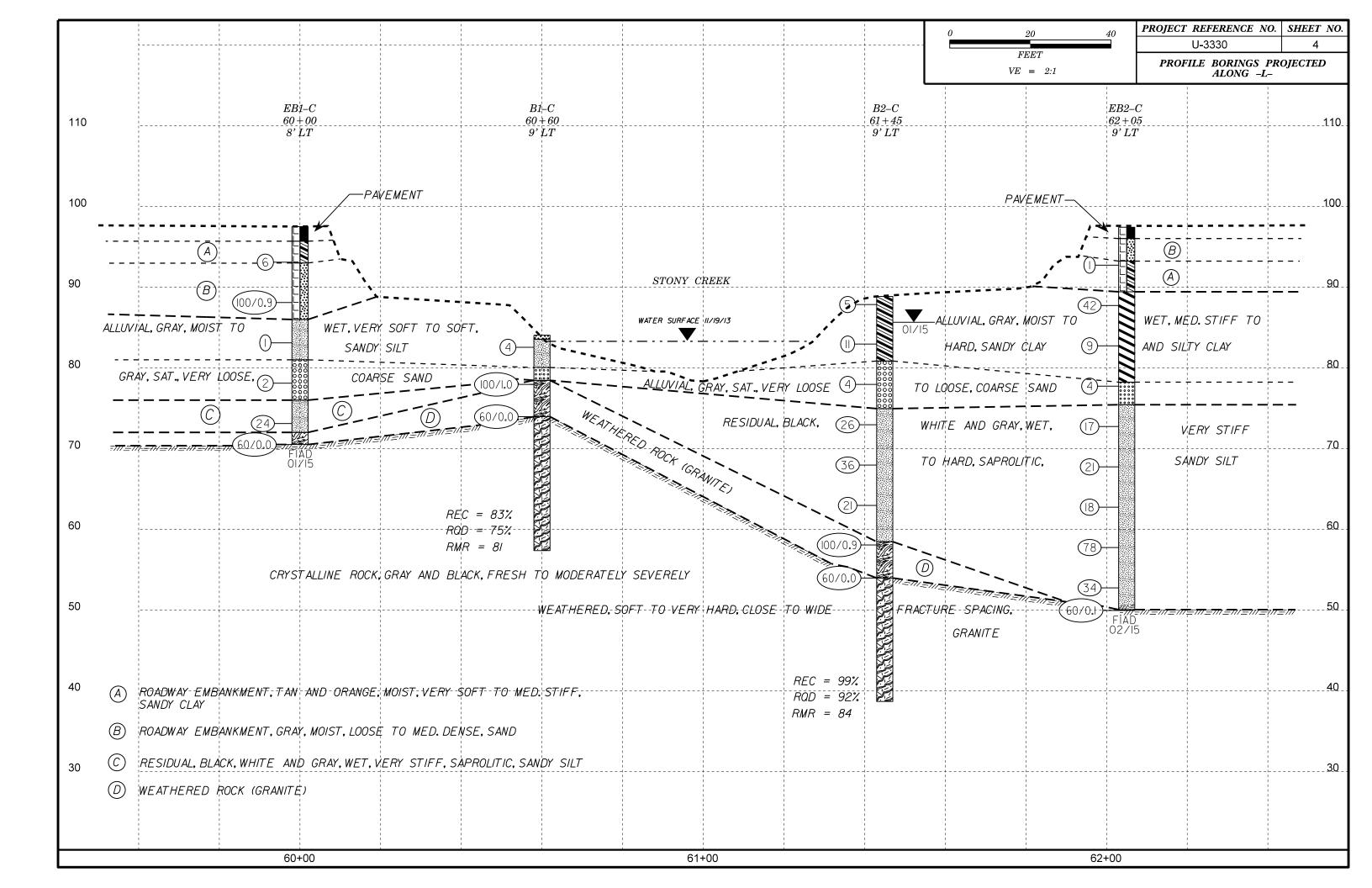
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

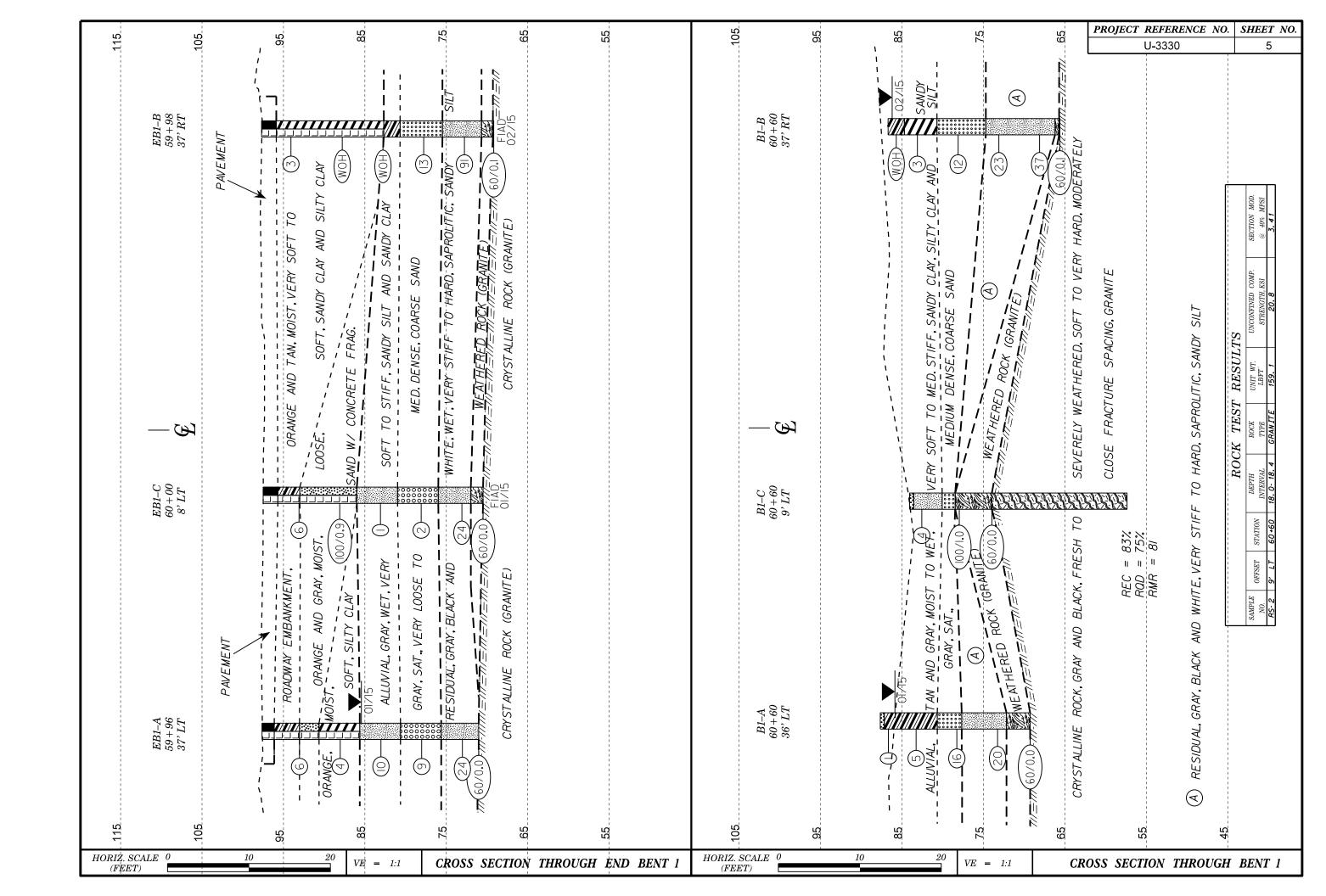
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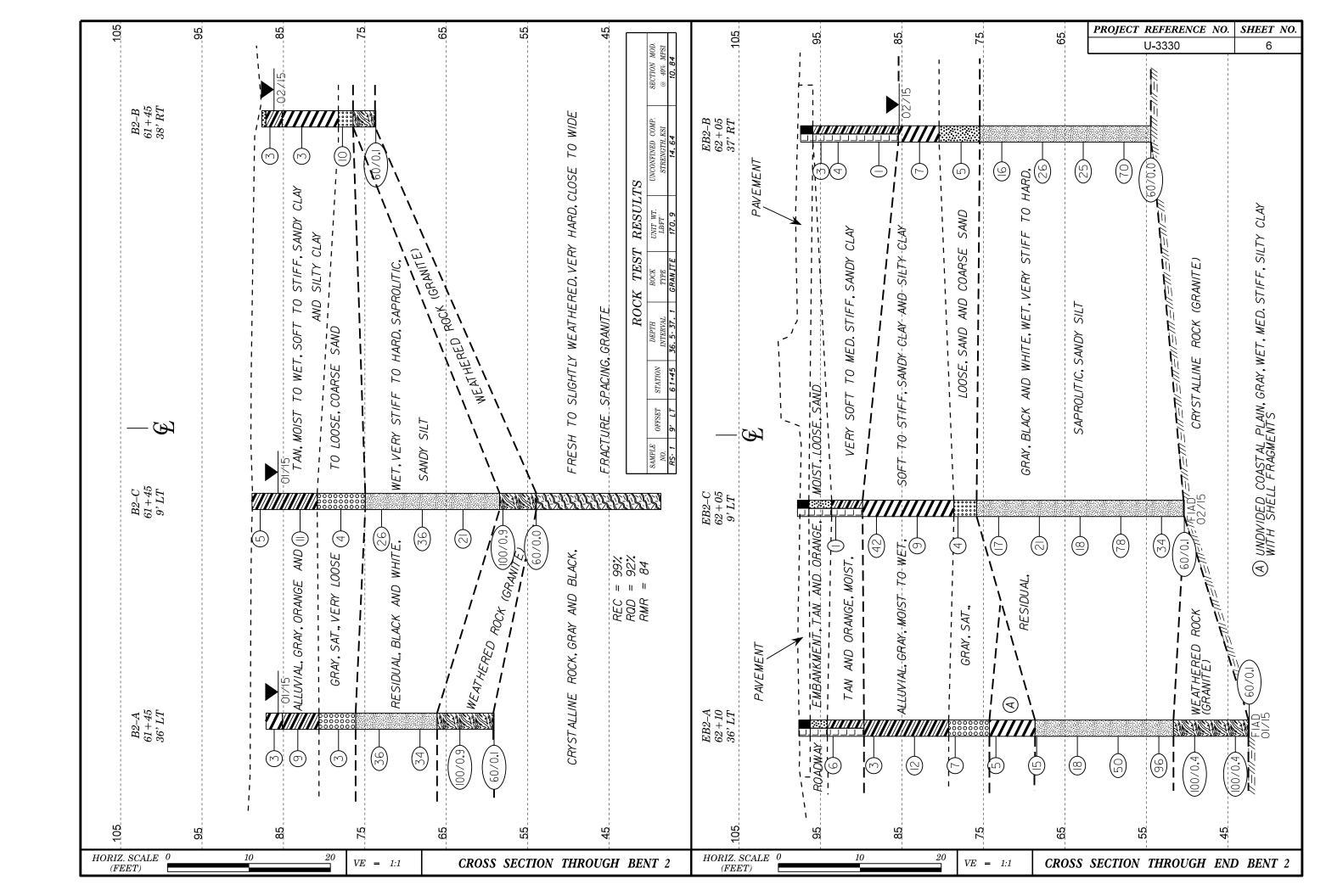
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

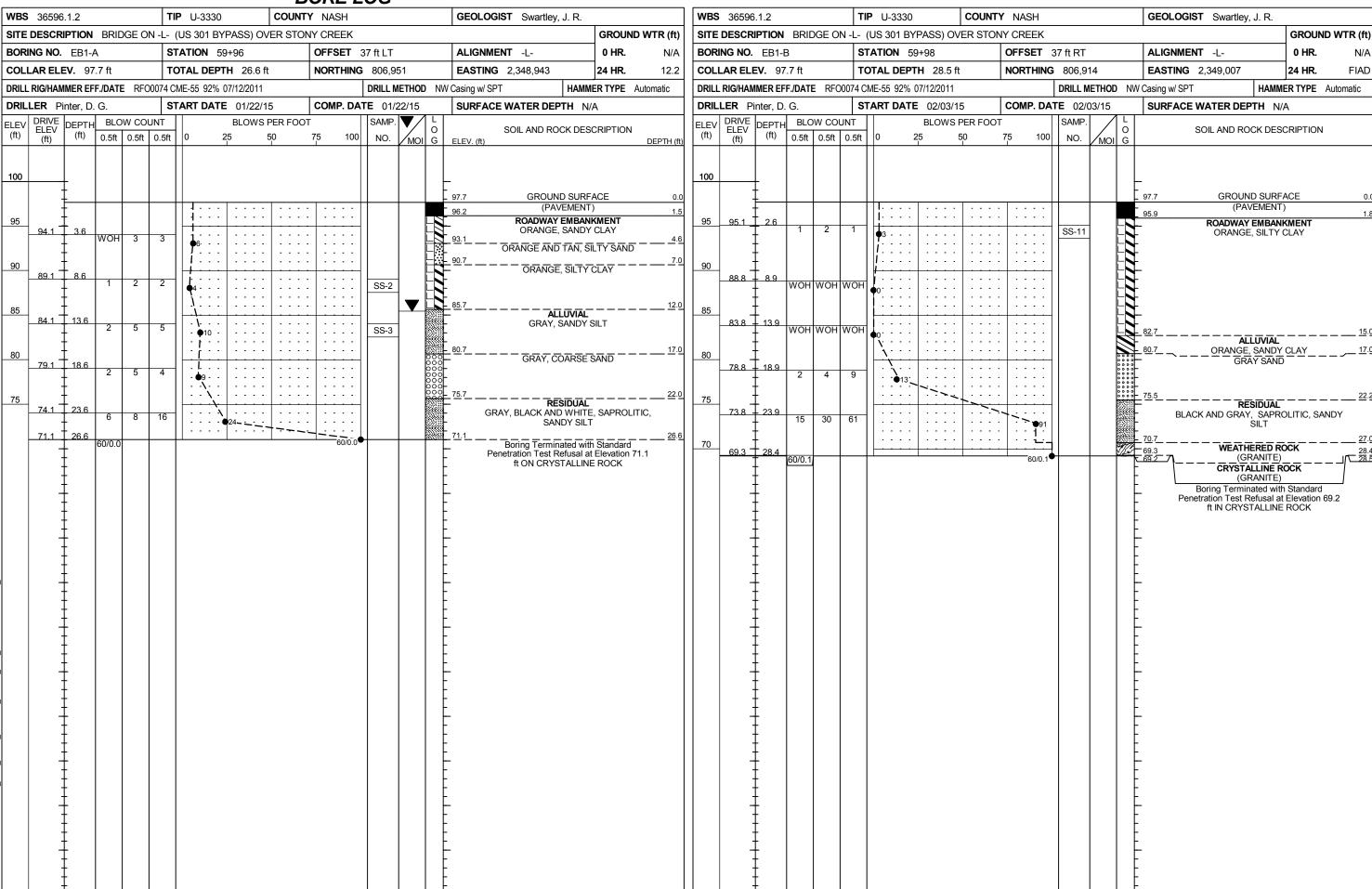
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF,GRAY,SILTY CLAY,MOIST WITH INTERBEDDED FINE SAND LAYERS,HIGHLY PLASTIC,A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNCISS, CABBRU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CATSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 0000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
■10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN PEAT *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN 50 MX 50	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL		ROCKS OR CUTS MASSIVE ROCK.
MATERIAL SOUND SOU	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 41 MN LITTLE OR PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRAGS. THE CITY OF CAMERY COLLEGE CO		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MATOR CRAVEL AND FINE SILIT OR CLATET SILIT CLATET MATTER		CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN, RATING EXCELLENT TO GOOD FAIR TO POOR PAIR TO POOR UNSUITABLE	√Pw PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA PERCHED WATER BE	(MOD.) 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	PARENT MATERIAL.
AS SUBGRADE POOR FOOT BOOK BOOK BOOK BOOK BOOK BOOK BOOK B	SPRING OR SEEP	WITH FRESH ROCK.	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
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PANCE OF CTANDARD RANCE OF LINCONFINED		(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACINESS OF PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(N-VALUE) (TUNS/FT-)	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE 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	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE 4 TO 10	SOIL SYMBOL SOIL SYMBOL SUPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR MEDIUM DENSE 10 TO 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50	THAN ROADWAY EMBANKMENT TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT	── INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER OF SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
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	UNDERCUT UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	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
COADCE	USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	UNDERCOT LAST ACCEPTABLE DEGRADABLE ROCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(CSE. SD.) (F SD.) (SE.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
	CL CLAY MOD MODERATELY γ - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS PENETRATION EQUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 _d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
<u> </u>	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON F - FINE SL SILT, SILTY ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	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.
	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MARK: GPS-3
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 98.21 FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE	
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	TOP OF NE RAIL = 100.2 feet
	X CME-55 CORE SIZE: CORE SIZE: -BH	INDURATION	TOP OF SE RAIL = 100,1 feet
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	CME-550 HARD FACED FINGER BITS TUNGCARBIDE INSERTS	PURRING WITH FINGER EREES NUMEROUS CRAINS.	
SLIGHTLY PLASTIC 6-15 SLIGHT	I VANE SHEAR TEST □ µAND TODIC.	FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	X CASING X W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER,	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST		
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
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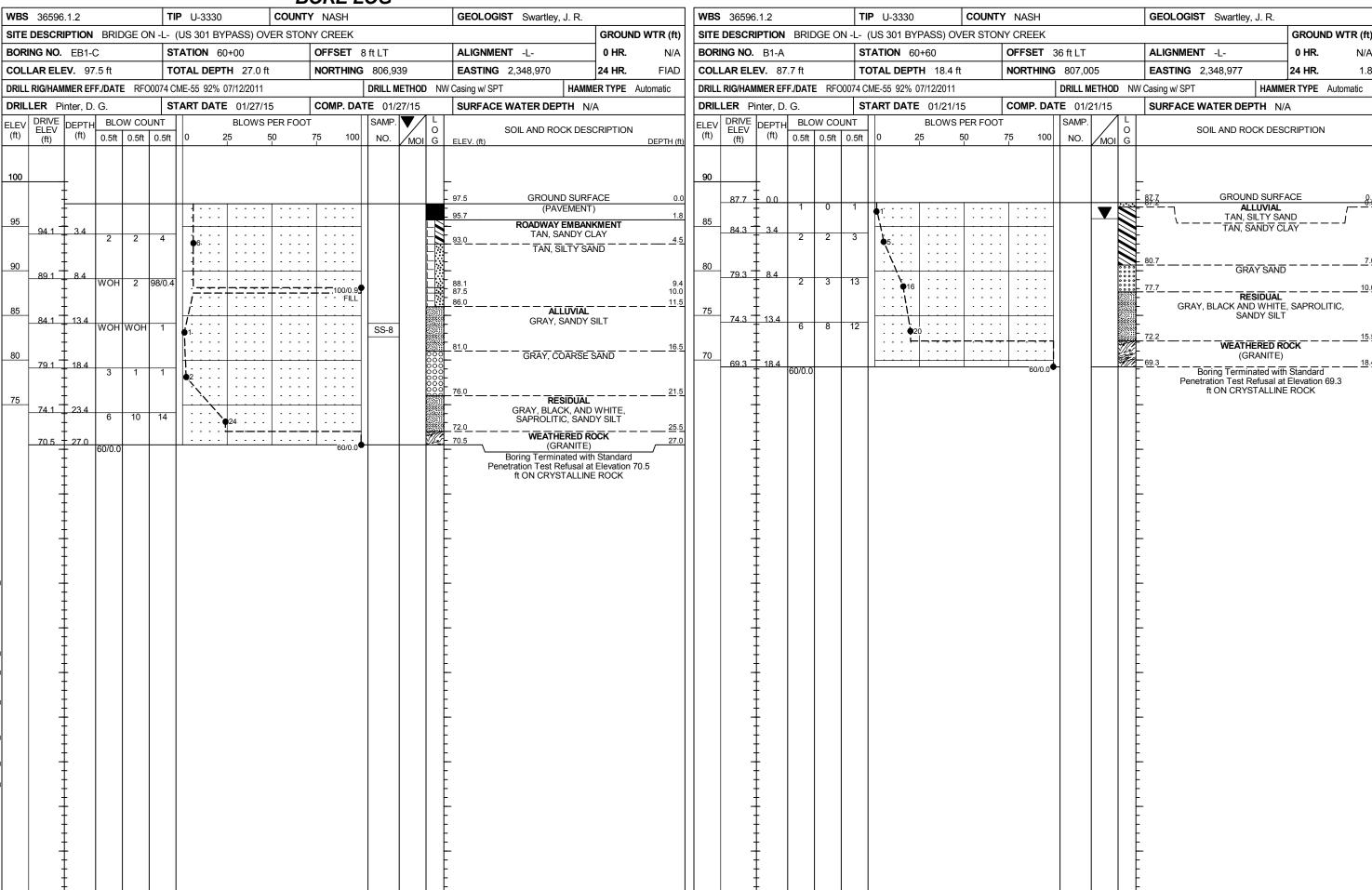












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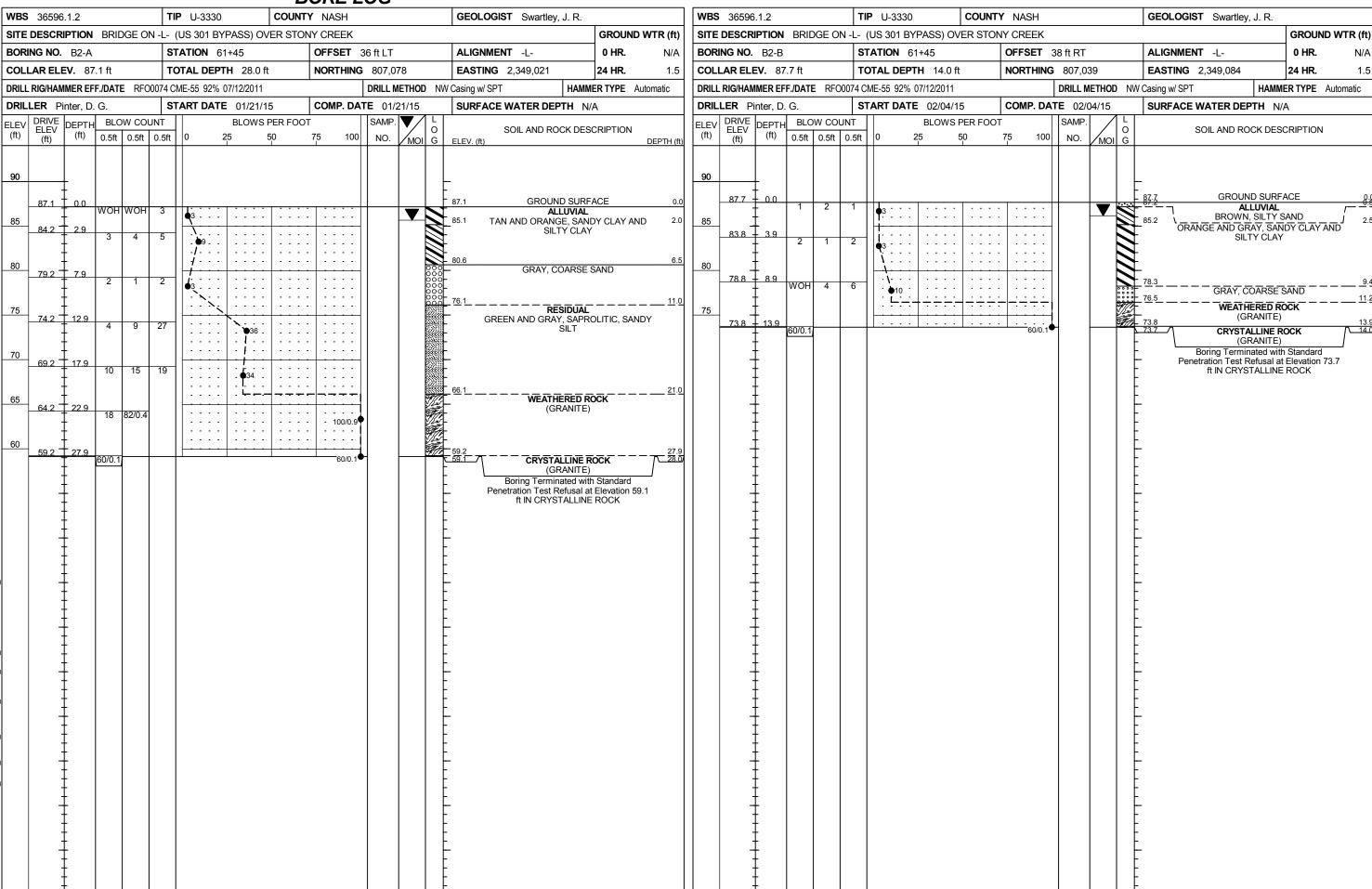
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				E RFC		ME-55 92%) NW	-	J IER TYPE	
	LER Pi					TART DATE		5	COMP. DA				SURFACE WATER DEPTH N/		
ELEV	DRIVE ELEV	DEPTH	BLC	W CO	UNT		BLOWS	PER FOOT	•	SAMP.		L	SOIL AND ROCK DES		
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 :	25	50	75 100	NO.	<u>MOI</u>				
90													_		
	86.7 -	0.0	WOH	WOH	WOH	•0	T	·			V		86.7 GROUND SURF	ACE	0.0
85	84.1	2.6				1		+					-84.7 GRAY, SANDY CLAY AND	SILTY CL	_AY 2.0
	-	<u> </u>	1	2	1	3									
80	-	Ė										••••	80.7 GRAY SAND	<u></u>	6.0
	79.1	7.6	3	4	8	. \	: : : :						- GRAY SANL	,	
	-	Ŧ				12.						0000			
75	74.1	12.6				\						0000	- <u>74.7</u>		12.0
	- / 4. -	12.0	7	10	13	::::/	23						RESIDUAL GRAY, BLACK AND WHITE	E, SAPROL	ITIC,
70	-	‡					/: : : :						SANDY SILT		
70	69.1	17.6	17	21	16		<u>``</u>	: : : :					-		
	-	‡	'′	-	'0		37 .						66.2		20.4
	65.7 -	21.0	60/0.1					+	60/0.1	•			66.2 - 65.7 - 65.6 (GRANITE)	ock	$-\frac{20.5}{1}$
													CRYSTALLINE R (GRANITE) Boring Terminated with Penetration Test Refusal at fit IN CRYSTALLINE	h Standard t Elevation	65.6

		ORE LOG		
VBS 36596.1.2	TIP U-3330 COUNT	Y NASH	GEOLOGIST Swartley, J. R.	
SITE DESCRIPTION BRIDGE ON	-L- (US 301 BYPASS) OVER STON	IY CREEK	7	GROUND WTR (ft)
BORING NO. B1-C	STATION 60+60	OFFSET 9 ft LT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 84.1 ft	TOTAL DEPTH 26.7 ft	NORTHING 806,991	EASTING 2,349,000	24 HR. N/A
RILL RIG/HAMMER EFF./DATE RF00	074 CME-55 92% 07/12/2011	DRILL METHOD NW	Casing W/SPT & Core HAMME	R TYPE Automatic
DRILLER Pinter, D. G.	START DATE 01/28/15	COMP. DATE 01/28/15	SURFACE WATER DEPTH 1.6	oft
LEV DRIVE ELEV (ft) DEPTH BLOW COU (ft) 0.5ft 0.5ft 1	NT BLOWS PER FOOT 0.5ft 0 25 50	75 100 SAMP. NO. MOI G	SOIL AND ROCK DESC ELEV. (ft)	CRIPTION DEPTH (ft
85	3		GROUND SURFA ALLUVIAL GRAY, SINTY SA BO.1 78.5 GRAY SAND WEATHERED RC (GRANITE) 74.0 CRYSTALLINE RC GRAY, FRESH TO MODERATI FRACTURE SPACING, REC = 83% RQD = 75% RMR = 81 57.4 Boring Terminated at Eleva CRYSTALLINE RC	DERATELY D, SOFT TO ELY CLOSE GRANITE 26.7

GEOTECHNICAL BORING REPORT

SHEET 10 OF 16

									C	OF	RE L	OG						-		
	36596.1.2					U-333			OUNT					GEOL	OGIST	Swartle	ey, J. R.			
	ESCRIPTION		BRID	GE ON -				OVER	STON			,		-				GROUN	ID WTR (fi	t)
	G NO. B1						60+60			-	FSET 9				IMENT			0 HR.	N/A	A
	R ELEV.						PTH 26.			NO	RTHING	806,991				349,000		24 HR.	N/A	Α
DRILL RI	IG/HAMMER	REFF.	/DATE	RFO007	4 CME-	-55 92%	6 07/12/20	11					THOD NV	N Casing W	//SPT & C	ore	HAMM	ER TYPE	Automatic	
DRILLE	R Pinter	, D. C	€.		STAF	RT DA	TE 01/2	8/15		СО	MP. DA	ΓE 01/28	3/15	SURF	ACE W	ATER DI	EPTH 1.	6ft		
	SIZE NW	/D3					N 16.6 ft		ATA								7			
ELEV E	RUN ELEV (ff (ff)	PTH F	RUN (ft)	DRILL RATE (Min/ft)	RL REC. (ft) %	RQD (ft) %	SAMP. NO.	STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)		DESCRIPT	TION AN	D REMA	RKS		DEPTH ((ft)
73.96											2					@ 10.1 f				
70 65	67.4 - 16 62.4 - 21	.7	5.0	N=60/0.0 :32/0.6 :53/1.0 1:14/1.0 1:13/1.0 1:11/1.0 :59/1.0 :34/1.0 1:14/1.0 1:24/1.0 3:27/1.0 5:40/1.0	(4.5) 90%	(1.5) 94% (2.3) 46% (3.7) 74%	RS-2 /	(13.7) 83%	(12.4) 75%	KIKIKIKIK	_ 74.0 - - - - - - - -	GRAY, FI	RESH TO I	MODERA	TELY SE	NE ROCK VERELY FRACTU	WEATHE	RED, SOF	T TO NITE).1
60	‡		5.0	9:00/1.0 31:00/1.0 3:45/1.0 4:15/1.0	(5.0) 100%	(4.9) 98%			1		-									
	<u>57.4 + 26</u>	.7		7:00/1.0							57.4	Pori	ng Termina	atad at Ela	votion E	7 4 # INI C	POVOTALL	NE BOCK	26	3.7
	+++++++++++++++++++++++++++++++++++++++																			

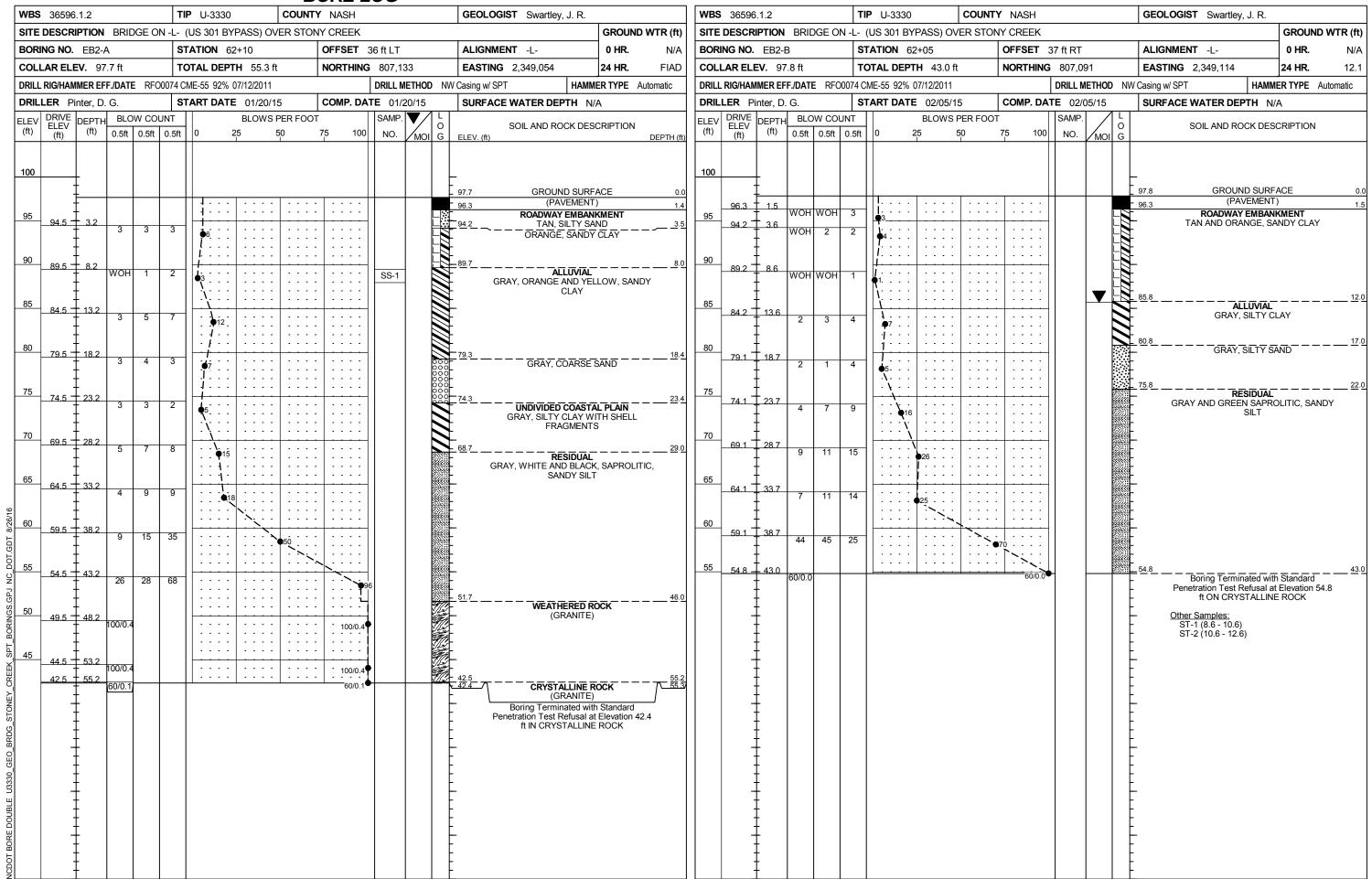


SHEET 12 OF 16

GEOTECHNICAL BORING REPORT BORE LOG

WBS 36596.1.2 TIP U-3330 **COUNTY** NASH **GEOLOGIST** Swartley, J. R. GROUND WTR (ft) SITE DESCRIPTION BRIDGE ON -L- (US 301 BYPASS) OVER STONY CREEK STATION 61+45 OFFSET 9 ft LT ALIGNMENT -L-0 HR. N/A BORING NO. B2-C **NORTHING** 807,064 **EASTING** 2,349,044 COLLAR ELEV. 88.9 ft TOTAL DEPTH 50.2 ft 24 HR. 3.2 DRILL RIG/HAMMER EFF/DATE RFO0074 CME-55 92% 07/12/2011 DRILL METHOD NW Casing W/SPT & Core HAMMER TYPE Automatic DRILLER Pinter, D. G. **START DATE** 01/29/15 **COMP. DATE** 01/29/15 SURFACE WATER DEPTH N/A ELEV (ft) | DRIVE (LEV (ft) | DEPTH | BLOW COUNT | 0.5ft | 0.5ft | 0.5ft | **BLOWS PER FOOT** SAMP. SOIL AND ROCK DESCRIPTION 75 100 NO. MOI G ELEV. (ft) DEPTH (ft 90 **GROUND SURFACE** 88.9 - 0.0 ALLUVIAL TAN, SANDY CLAY WOH 85 SS-10 80 GRAY, COARSE SAND 79.0 9.9 75 RESIDUAL GRAY, GREEN AND BLACK, SAPROLITIC, SANDY SILT 70 69.0 19.9 65 60 59.0 I 29.9 21 79/0.4 WEATHERED ROCK 100/0.9 (GRANITE) 55 54.0 34.9 60/0.0 CRYSTALLINE ROCK 60/0.0 GRAY, FRESH TO SLIGHTLY RS-1 WEATHERED, VERY HARD, CLOSE TO 50 WIDE FRACTURE SPACING, GRANITE REC = 99% RQD = 92% 45 40 Boring Terminated at Elevation 38.7 ft IN CRYSTALLINE ROCK

									C	O	RE L	OG					
WBS	36596.	1.2			TIP	U-333	30	С	OUNT	ΥN	NASH			GEOLOGIST Swartley,	J. R.		
	DESCRIP			DGE ON -				OVER	STO	VY C	REEK					GROUN	D WTR (ft)
	ING NO.				-		61+45	,		+	FSET 9		-	ALIGNMENT -L-		0 HR.	N/A
	LAR ELE						PTH 50		,	NC	PRTHING	807,064		EASTING 2,349,044	1	24 HR.	3.2
	. RIG/HAMN			E RFO00	r					T			NW C	Casing W/SPT & Core		ER TYPE	Automatic
	LER Pin				-		TE 01/2			CC	OMP. DAT	E 01/29/15		SURFACE WATER DEF	TH N/	Α	
	E SIZE N			DRILL	R	IJN	N 15.3 f	STR	RATA	L	I						
ELEV (ft)	ELEV (ft)	EPTH (ft)	(ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft) %	O G	ELEV. (f)	DE	ESCRIPTION AND REMARK	(S		DEPTH (ft)
53.96	54.0 52.4 -	34.9 36.5	1.6	N=60/0.0	(1.5)	(0.9)		(15.1)	(14.0)		_ 54.0			Begin Coring @ 34.9 ft CRYSTALLINE ROCK			34.9
50	52.4	30.3	5.0	N=60/0.0 :47/0.6 \1:20/1.0 1:02/1.0 1:47/1.0 1:23/1.0	94% (4.9) 98%	56% (4.4) 88%	RS-1	99%′	(14.0) 92%		-	GRAY, FRESH	TO SI WIDE	LIGHTLY WEATHERED, VE FRACTURE SPACING, GF	RY HAR RANITE	D, CLOSE	то
45	47.4	41.5	5.0	1:23/1.0 1:47/1.0 1:48/1.0 1:37/1.0 1:55/1.0	(5.0) 100%	(5.0) 100%	2				- - -						ļ.
	42.4	46.5	3.7	2:04/1.0 2:15/1.0 3:00/1.0 3:10/1.0	(3.7)	(3.7)			ja 1		- -						
40	38.7	50.2		5:00/1.0 7:08/1.0 20:00/0.7	100%	100%	2				_ _ 38.7						50.2
	Ī								,		-	Boring Tern	ninate	d at Elevation 38.7 ft IN CR	/STALLII	NE ROCK	
	+					0											
	‡									7	_					`	
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SHEET 14 OF 16

WBS	36596	S.1.2			ТІ	P U-3330		COUNTY	Y NASH				GEOLOGIST S	wartlev.	J. R.		
			BRII	DGE O		(US 301 BYP	ASS) OV							,		GROUI	ND WTR (ft)
	NG NO.					TATION 62+			OFFSET	9 ft LT			ALIGNMENT -L			0 HR.	N/A
	AR ELI					OTAL DEPTH			NORTHING		15		EASTING 2,349			24 HR.	FIAD
DRILL	. RIG/HAN	MER E	F./DAT	E RFC	00074 C	:ME-55 92% 07/	/12/2011) NW	Casing w/ SPT		HAMMI	ER TYPE	Automatic
	LER P					TART DATE		5	COMP. DA				SURFACE WATI	ER DEP			
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	OW CO		0 25		PER FOOT	75 100	SAMP.	MOI	L O G	SOIL A	AND RO	CK DES	CRIPTION	N
	(1.7)										VIVIOI						
100																	
		Ŧ											97.4	CDOLIN	D SURF	ACE.	0.0
		lacksquare							1::::				96.0	(PAV	/EMENT))	1.4
95	93.7	3.7							+ : : : :				_	ADWAY TAN, S	EMBANI ILTY SAI	KMENT ND	
	33.7	- 3. /	1	0	1	1;							_ 93.2 OI		SANDY		4.2
90		Ŧ											- 90 4				9.0
	88.7	8.7	 WOH	WOH	42								_89.4		LUVIAL		8.0
		$ar{\mathbb{I}}$			-		FILL 142							GRAY,	SILTY CL	_AY	
85	83.7	13.7						 					_				
	00.7	- 13.7	2	4	5	9		: : : :									
80		£						<u> </u>					_				
	78.7	18.7	3	2	2	1											19.2
		Ŧ		_	-							0000		SRAY, CO	DARSE S	SAND	
75	70.7	Ŧ				- \						- -		RE	SIDUAL		22.0
	73.7	<u> 23.7</u>	6	6	11	17						F	GRE SAI	EEN, GR PROLITI	AY AND IC, SAND	BLACK, Y SILT	
70		‡				::::/:											
10	68.7	28.7			40	· · · · \			1			F	-				
	,	‡	6	9	12	21											
65	_	‡				• • • •							_				
	63.7	33.7	6	7	11	18											
60		‡				::::"											
- 00	58.7	38.7											-				
		‡	22	23	55			>	78								
55	_	‡						///					_				
	53.7	43.7	8	13	21		/	[::::				* t					
50		‡					. •••						50.0				47.4
_ 50	50.0	47.4	60/0.1			<u> </u>		L	60/0.1			_	$\frac{-\frac{50.0}{49.9}}{}$		LLINE R	OCK	$\frac{47.4}{\sqrt{47.5}}$
		‡											Boring Penetration	Termin	RANITE) ated with	Standard	
		‡											Penetration - ft IN	n Test R	efusal at	Elevation ROCK	49.9
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PROJ. NO. - 36596.1.2 ID NO. - U-3330 COUNTY - NASH

EB1-A

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY V	/EIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-2	37'LT	59+96	8.6'-9.7'	A-7-6(6)	41	24	30.3	27.1	16.4	26.3	94	74	43	-	-
SS-3	37'LT	59+96	13.6'-15.1'	A-4(5)	29	10	7.1	25.7	37.0	30.3	96	94	70	•	•

EB1-C

	SOIL TEST RESULTS														
SAMPLE			DEPTH	AASHTO				% BY V	VEIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-8	8'LT	60+00	13.4'-14.9'	A-4(3)	25	9	13.5	29.9	28.3	28.3	100	94	64	-	-

EB1-B

			S	OIL T	TE.	ST	RE	SUI	LTS						
SAMPLE			DEPTH	AASHTO				% BY V	VEIGHT		% PAS	SING (S	IEVES)	%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-11	37'RT	59+98	2.6'-4.1'	A-7-6(6)	43	24	36.0	22.8	12.9	28.3	97	73	43	-	-

B1-C

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO			% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-9	9'LT	60+60	0.5'-1.5'	A-4(1)	23	7	16.4	39.8	21.6	22.2	100	94	49		-

B2-C

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO			% BY WEIGHT				% PASSING (SIEVES)			%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-10	9'LT	61+45	4.9'-6.4'	A-6(11)	31	15	1.2	21.8	38.6	38.4	100	100	84	-	

EB2-A

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO		% BY WEIGHT				% PASSING (SIEVES)					%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	36'LT	62+10	8.2'-9.7'	A-6(13)	38	20	14.7	16.6	30.3	38.4	100	91	73	-	-



CORE PHOTOGRAPHS

B1-CBOXES 1 & 2: 10.1 - 26.7 FEET

RS-2: 18.0 - 18.4

FEET

B2-CBOXES 1 & 2: 34.9 - 50.2 FEET

