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STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY **<u>NASH</u>**

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

SITE DESCRIPTION **REPLACE BRIDGE NO. 196 ON -Y1-**(SUNSET AVE) OVER -L- (US 301 BYPASS)

STATE N.C.

NO

1

17

SHEETS

U-3330

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 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 (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 SUBJURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSDERABLY WITH TWE ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION CANNOT AND ANY VARY CONSDERABLY WITH TWE ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION CLIMATE DECOMPLY AND ANY ASKY CONSDERABLY WITH TWE ACCORDING IN CLIMATE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE AND THE INTERPRETATIONS MADE, OR 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 ADDITIONS TO DENOT OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

- 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 REDUESTED 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

CONSULTANT:

GEOSYNTEC

CONSULTANTS

INVESTIGATED BY MJOROGE WAINAINA

DRAWN BY _____C. TURLINGTON

CHECKED BY WESTON SHIN

SUBMITTED BY NJOROGE WAINAINA

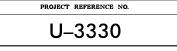
DATE **JUNE 2015**



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT** SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

					1						00107101	
BE PENETRATED WITH ACCORDING TO THE IS BASED ON TH	SUIL D UNCONSOLIDATED, SEMI-CONS 4 A CONTINUOUS FLIGHT POW STANDARD PENETRATION TES 4E AASHTO SYSTEM. BASIC D TEXTURE, MOISTURE, AASHTO	VER AUGER AND YIELD LESS ST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	THAN 100 BLOWS PE 586), SOIL CLASSIFI CLUDE THE FOLLOWI	R FOOT CATION NG:	UNIFORMLY GRADED - I	GRADATION NTES A GOOD REPRESENTATION OF PARTIC INDICATES THAT SOLL PARTICLES ARE ALL ES A MIXTURE OF UNIFORM PARTICLE SIZ ANGULARITY OF GRAIN	L APPROXIMATELY THE SAME SIZE. ZES OF TWO OR MORE SIZES.	ROCK LINE INDICA SPT REFUSAL IS F	TES THE LEV ENETRATION ASTAL PLAIN	EL AT WHICH NON-COAS BY A SPLIT SPOON SAN N MATERIAL, THE TRAN	CRIPTION DULD VIELD SPT REFUSAL IF 1 TAL PLAIN MATERIAL WOULD Y MPLER EQUAL TO OR LESS THA SITION BETWEEN SOIL AND R	IELD SPT REFUSAL.
AS MINERALOG	GICAL COMPOSITION, ANGULAR	ITY, STRUCTURE, PLASTICITY	, ETC. FOR EXAMPLE,	15 SULH	THE ANGULARI	TY OR ROUNDNESS OF SOIL GRAINS IS DE		ROCK MATERIALS #		Y DIVIDED AS FOLLOWS		
	OIL LEGEND AND 4				ANGULAR, SUBA	NGULAR, SUBROUNDED, OR ROUNDED.	TTON	WEATHERED ROCK (WR)		NON-COASTAL PLAIN 100 BLOWS PER FOO	I MATERIAL THAT WOULD YIELD)T IF TESTED.	SPT N VALUES >
CLASS. (:	GRANULAR MATERIALS ≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING =200)	ORGANIC MATER	ALS		MINERALOGICAL COMPOSI MES SUCH AS QUARTZ, FELDSPAR, MICA, TA IN DESCRIPTIONS WHEN THEY ARE CONSIDI	ALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)			RAIN IGNEOUS AND METAMORPHI REFUSAL IF TESTED. ROCK TYP HIST, ETC.	
GROUP A-1 CLASS. A-1-a A-1-b	A-3 A-2 A-2-4 A-2-5 A-2-6 A-2-1	A-4 A-5 A-6 A-7 7 A-7-5 A-7-6	A-1, A-2 A-4, A-5 A-3 A-6, A-7			COMPRESSIBILITY		NON-CRYSTALLINE			AIN METAMORPHIC AND NON-CO THAT WOULD YEILD SPT REFU	
SYMBOL					MODE	GHTLY COMPRESSIBLE ERATELY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN		ROCK TYPE INCLUDE	S PHYLLITE, SLATE, SANDSTONE DIMENTS CEMENTED INTO ROCK,	E,ETC.
% PASSING			SILT-	MUCK	HIGH	HLY COMPRESSIBLE PERCENTAGE OF MATER		SEDIMENTARY ROCH (CP)		 SPT REFUSAL. ROCK SHELL BEDS, ETC. 	TYPE INCLUDES LIMESTONE, S	ANDSTONE, CEMENTED
*10 50 MX *40 30 MX 50 MX			GRANULAR CLAY SOILS SOILS	MUCK, PEAT		GRANULAR SILT - CLAY				WEATH		
"200 15 MX 25 MX 1 MATERIAL PASSING "40 LL –	10 MX 35 MX 35 MX 35 MX 35 M	x 36 mn 36 mn 36 mn 36 mn n 40 mx 41 mn 40 mx 41 mn	SOILS WITH		ORGANIC MATERIAL TRACE OF ORGANIC M LITTLE ORGANIC MAT MODERATELY ORGANIC	MATTER 2 - 3% 3 - 5% ITER 3 - 5% 5 - 12%	<u>OTHER MATERIAL</u> TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35%	HAMN VERY SLIGHT ROCK	GENERALLY	ALLINE. FRESH, JOINTS STAINED, S	S MAY SHOW SLIGHT STAINING. F	AY COATINGS IF OPEN.
	NP 10 MX 10 MX 11 MN 11 MM		LITTLE OR MODERATE	HIGHLY	HIGHLY ORGANIC	> 10% > 20%	HIGHLY 35% AND ABOVE		CRYSTALLINE		HINE BRIGHTLY. ROCK RINGS UND	ER HAMMER BLUWS IF
GROUP INDEX Ø USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND	0 0 4 MX FINE SILTY OR CLAYEY	8 MX 12 MX 16 MX NO MX SILTY CLAYEY	AMOUNTS OF ORGANIC MATTER	ORGANIC		GROUND WATER		(SLI.) 1 INC	H. OPEN JOIN	TS MAY CONTAIN CLAY. I	ND DISCOLORATION EXTENDS INT N GRANITOID ROCKS SOME OCCAS STALLINE ROCKS RING UNDER HA	SIONAL FELDSPAR
MATERIALS SAND	SAND GRAVEL AND SAND	SOILS SOILS	FAIR TO POOR	UNSUITABLE	 	STATIC WATER LEVEL AFTER <u>24</u> F PERCHED WATER, SATURATED ZONE, OR	HOURS WATER BEARING STRATA	(MOD.) GRAN	ITOID ROCKS,	MOST FELDSPARS ARE DU	COLORATION AND WEATHERING EF JLL AND DISCOLORED, SOME SHOW WOWS SIGNIFICANT LOSS OF STRE	/ CLAY. ROCK HAS
AS SUBGRADE	PIOF A-7-5 SUBGROUP IS ≤ LL -	- 30 + PLOF A-7-6 SUBGROUP IS :	PUUR		- N-O	SPRING OR SEEP		WITH	FRESH ROCK.			
		Y OR DENSENESS				MISCELLANEOUS SYMBC	DLS	SEVERE AND	DISCOLORED 4	AND A MAJORITY SHOW K	STAINED. IN GRANITOID ROCKS, AOLINIZATION. ROCK SHOWS SEVE	RE LOSS OF STRENGTH
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNC COMPRESSIVE S (TONS/F1	TRENGTH	L ROADWAY EME	BANKMENT (RE) ^{25/025} DIP & DIP DIR ESCRIPTION - OF ROCK STRU		<u>IF T</u>	ESTED, WOULD	YIELD SPT REFUSAL	'S PICK. ROCK GIVES "CLUNK" SO STAINED. ROCK FABRIC CLEAR A	
GENERALLY GRANULAR	VERY LOOSE LOOSE	< 4 4 TO 10 10 TO 30	NZA		SOIL SYMBOL	VST PMT		(SEV.) REDU TO S	CED IN STREM OME EXTENT.	GTH TO STRONG SOIL. IN	N GRANITOID ROCKS ALL FELDSP RONG ROCK USUALLY REMAIN.	
MATERIAL (NON-COHESIVE)	MEDIUM DENSE DENSE VERY DENSE VERY SOFT	30 TO 50 > 50 < 2	< 0.25			FILL (AF) OTHER AY EMBANKMENT AUGER BORING DIL BOUNDARY	CONE PENETROMETER TEST	VERY ALL SEVERE BUT (V SEV.) REMA	ROCK EXCEPT MASS IS EFFE INING. SAPROL	OUARTZ DISCOLORED OR ECTIVELY REDUCED TO SC ITE IS AN EXAMPLE OF	STAINED. ROCK FABRIC ELEMENT DIL STATUS, WITH ONLY FRAGMEN ROCK WEATHERED TO A DEGREE	ITS OF STRONG ROCK THAT ONLY MINOR
GENERALLY SILT-CLAY MATERIAL	SOFT MEDIUM STIFF STIFF	2 TO 4 4 TO 8 8 TO 15	0.25 TO 0.5 TO 1 1 TO 2	.0	·····································	0	ELL - TEST BORING WITH CORE	COMPLETE ROCK	REDUCED TO	SOIL. ROCK FABRIC NOT	IN. <u>IF TESTED, WOULD YIELD SP</u> DISCERNIBLE, OR DISCERNIBLE C BE PRESENT AS DIKES OR STRIM	ONLY IN SMALL AND
(COHESIVE)	VERY STIFF HARD	15 TO 30 > 30	2 TO 4	ł	TTTTT ALLUVIAL SO	DIL BOUNDARY A PIEZOMETER INSTALLATION	- SPT N-VALUE	ALSC	AN EXAMPLE		DDNECC	
	TEXTURE	OR GRAIN SIZE				RECOMMENDATION SYMB	OLS	VERY HARD CANN	OT BE SCRAT	ROCK HA	P PICK. BREAKING OF HAND SPEC	IMENS REQUIRES
U.S. STD. SIEVE SIZE OPENING (MM)	4 10 4.76 2.00	40 60 200 0.42 0.25 0.075	270 0.053		UNDERCUT EXCAVATION	UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE	SEVE	RAL HARD BLO	OWS OF THE GEOLOGIST'S	PICK.	
BOULDER COE	BBLE GRAVEL	COARSE FINE SAND SAND	SILT	CLAY	SHALLOW UNDERCUT	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL	TO C	ETACH HAND	SPECIMEN.	Y WITH DIFFICULTY. HARD HAMM JGES OR GROOVES TO 0.25 INCH	
GRAIN MM 305	COB.) (GR.) 75 2.0	(CSE.SD.) (F SD. 0.25) (SL.) 0.05 0.005	(CL.)	AR - AUGER REFUSAL	ABBREVIATIONS MED MEDIUM	VST - VANE SHEAR TEST	HARD EXCA BY M	VATED BY HAI ODERATE BLO	RD BLOW OF A GEOLOGIS WS.	T'S PICK. HAND SPECIMENS CAN	BE DETACHED
SIZE IN. 12	3 SOIL MOISTURE - C		TEDMC		BT - BORING TERMINATE CL CLAY	MOD MODERATELY	WEA WEATHERED	HARD CAN	BE EXCAVATE) IN SMALL CHIPS TO PE	DEEP BY FIRM PRESSURE OF KN ICES 1 INCH MAXIMUM SIZE BY I	
SOIL MOISTURE S (ATTERBERG LIM	SCALE FIELD MO		TELD MOISTURE DES	SCRIPTION	CPT - CONE PENETRATIO CSE COARSE DMT - DILATOMETER TES	ORG ORGANIC	√ _d - DRY UNIT WEIGHT EST <u>SAMPLE ABBREVIATIONS</u>	SOFT CAN		R GOUGED READILY BY KM	NIFE OR PICK. CAN BE EXCAVATE BY MODERATE BLOWS OF A PICK	
	- SATURA (SAT.)		DUID; VERY WET, USU THE GROUND WATE		DPT - DYNAMIC PENETRA e - VOID RATIO F - FINE	ATION TEST SAP SAPROLITIC SD SAND, SANDY SL SILT, SILTY	S - BULK SS - SPLIT SPOON ST - SHELBY TUBE	PIEC VERY CAN	ES CAN BE BF BE CARVED W	ROKEN BY FINGER PRESSU ITH KNIFE. CAN BE EXCA	RE. VATED READILY WITH POINT OF	PICK. PIECES 1 INCH
LL LIQUID		(W) SEMISOLID; R	EQUIRES DRYING TO		FOSS FOSSILIFEROUS FRAC FRACTURED, FRAC	SLI SLIGHTLY CTURES TCR - TRICONE REFUSAL	RS – ROCK RT – RECOMPACTED TRIAXIAL	FING	ERNAIL.		FINGER PRESSURE. CAN BE SCF	
		ATTAIN OPTI	MUM MOISTURE		FRAGS FRAGMENTS HI HIGHLY	ω - MOISTURE CONTENT V - VERY	CBR - CALIFORNIA BEARING RATIO	TERM	TURE SF	SPACING	BEDDI	THICKNESS
OM OPTIMUN SL SHRINKA		- (M) SOLID; AT OF	R NEAR OPTIMUM MC	ISTURE	DRILL UNITS:	UIPMENT USED ON SUBJECT	PROJECT	VERY WIDE WIDE MODERATELY CL		RE THAN 10 FEET 3 TO 10 FEET 1 TO 3 FEET	VERY THICKLY BEDDED THICKLY BEDDED THINLY BEDDED	4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET
	- DRY - (DDITIONAL WATER TO MUM MOISTURE)	CME-45C	CLAY BITS	CORE SIZE:	CLOSE VERY CLOSE		0.16 TO 1 FOOT 5 THAN 0.16 FEET	VERY THINLY BEDDED THICKLY LAMINATED THINLY LAMINATED	0.03 - 0.16 FEET 0.008 - 0.03 FEET < 0.008 FEET
	PLA	STICITY				8" HOLLOW AUGERS	Вн			INDUR		
NON PLASTIC SLIGHTLY PLAS		CITY INDEX (PI) 0-5 6-15	DRY STRENG VERY LOW SLIGHT		CME-550	HARD FACED FINGER BITS	HAND TOOLS:	FOR SEDIMENTARY FRIABLE	ROCKS, INDUF	RUBBING WITH F	NG OF MATERIAL BY CEMENTIN 'INGER FREES NUMEROUS GRAIN Y HAMMER DISINTEGRATES SAM	4S;
MODERATELY PL HIGHLY PLASTIC	LASTIC C 26	16-25 5 OR MORE	MEDIUM		PORTABLE HOIST	CASING W/ ADVANCER TRICONE <u>2 15/16*</u> STEEL TEETH	POST HOLE DIGGER	MODERATEL	INDURATED		SEPARATED FROM SAMPLE WIT WHEN HIT WITH HAMMER.	H STEEL PROBE;
	C	COLOR				TRICONE TUNGCARB.	SOUNDING ROD	INDURATED			FICULT TO SEPARATE WITH ST REAK WITH HAMMER.	EEL PROBE:
	INCLUDE COLOR OR COLOR JCH AS LIGHT, DARK, STREAM					21/4 HOLLOW AUGERS	VANE SHEAR TEST	EXTREMELY	INDURATED	SHARP HAMMER	BLOWS REQUIRED TO BREAK SA ACROSS GRAINS.	MPLE;



TERMS AND DEFINITIONS

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 RUIT WHICH DOES NOT AFFECTATION OF THE RECOVERY IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND

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

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

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.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE

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

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT

<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT

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

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.

ELEVATION:

WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

 $\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

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

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

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

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.

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

OF AN INTERVENING IMPERVIOUS STRATUM.

RUN AND EXPRESSED AS A PERCENTAGE.

TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

BENCH MARK: BL-102, EL 97.35

THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.

FIAD - FILLED IN AFTER DRILLING.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

SURFACE.

ROCKS OR CUTS MASSIVE ROCK.

ITS LATERAL EXTENT.

POCK

OR SLIP PLANE.

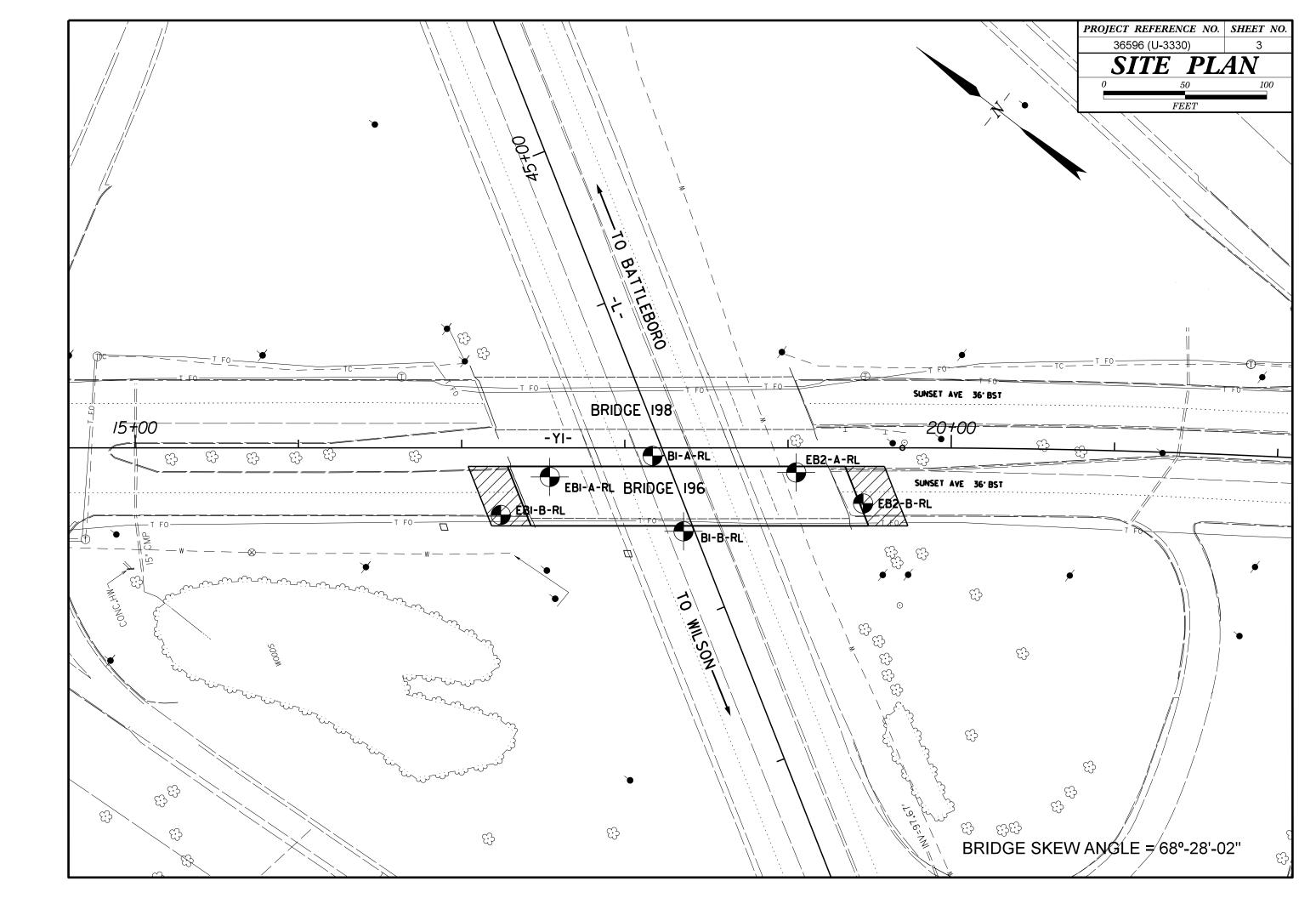
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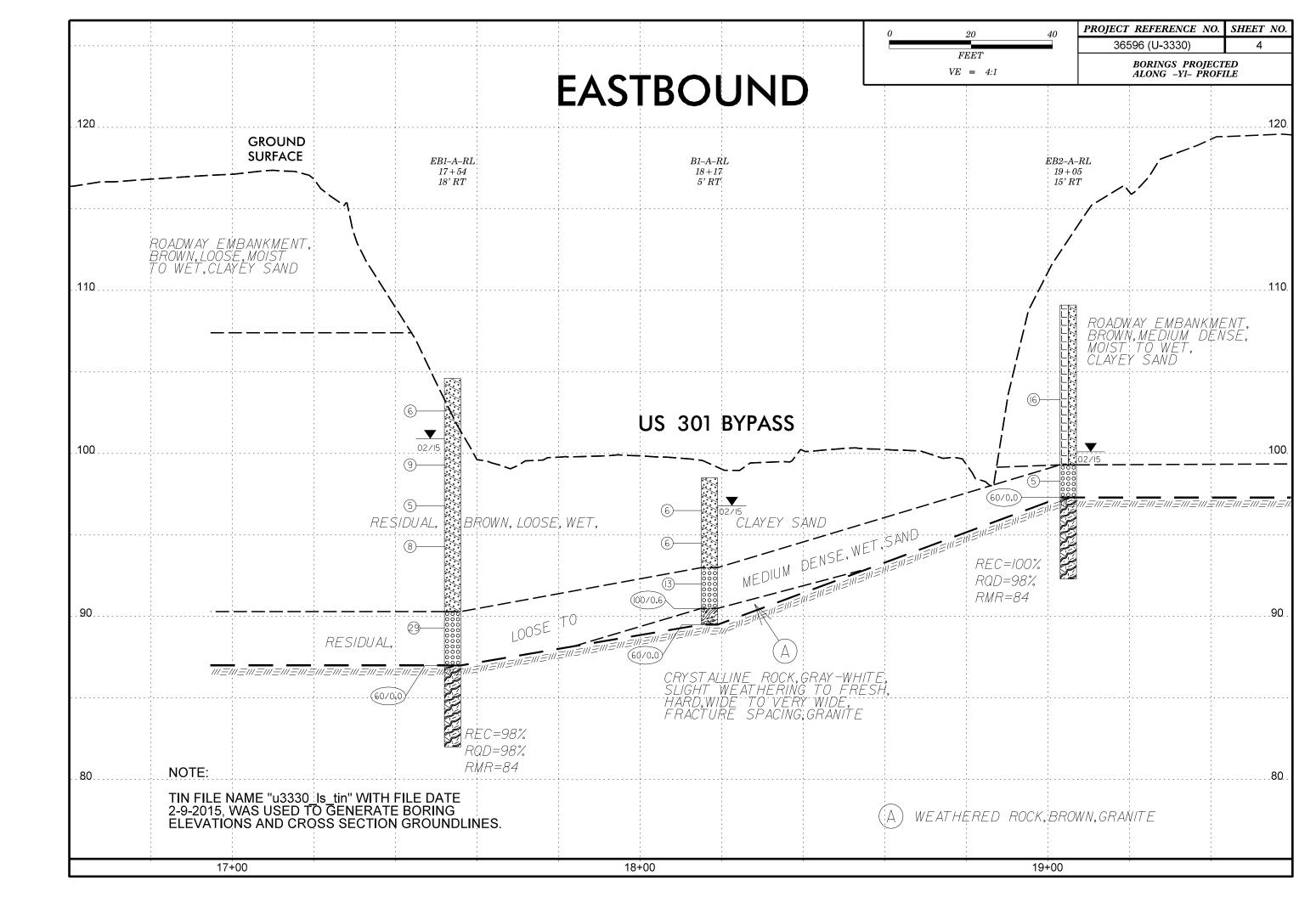
16 - 1.5 FEET NOTES: TIN FILE NAME "U3330_IS_TIN" WITH FILE DATE - 0.16 FEET 08 - 0.03 FEET 0.008 FEET

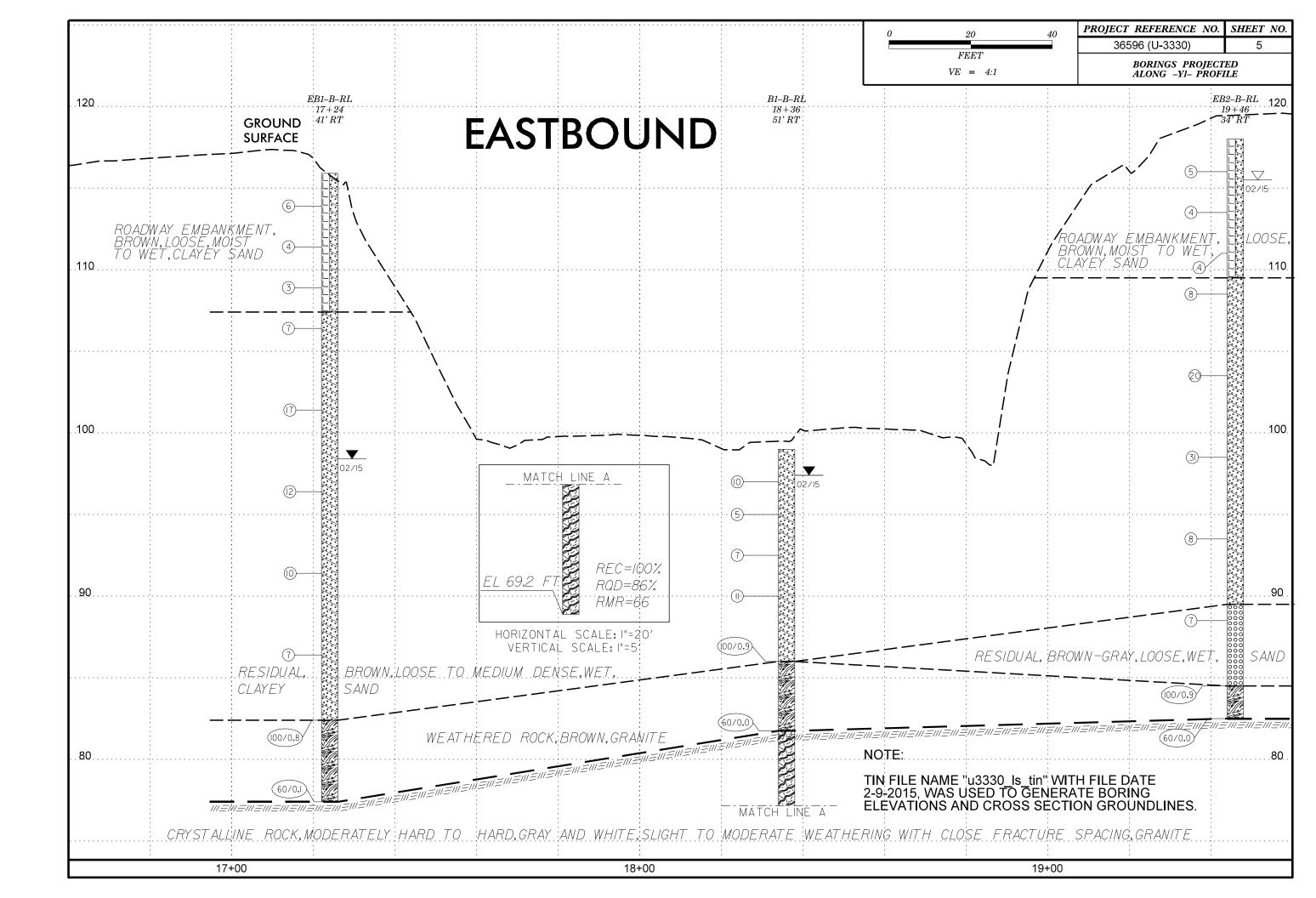
AT. PRESSURE. ETC.

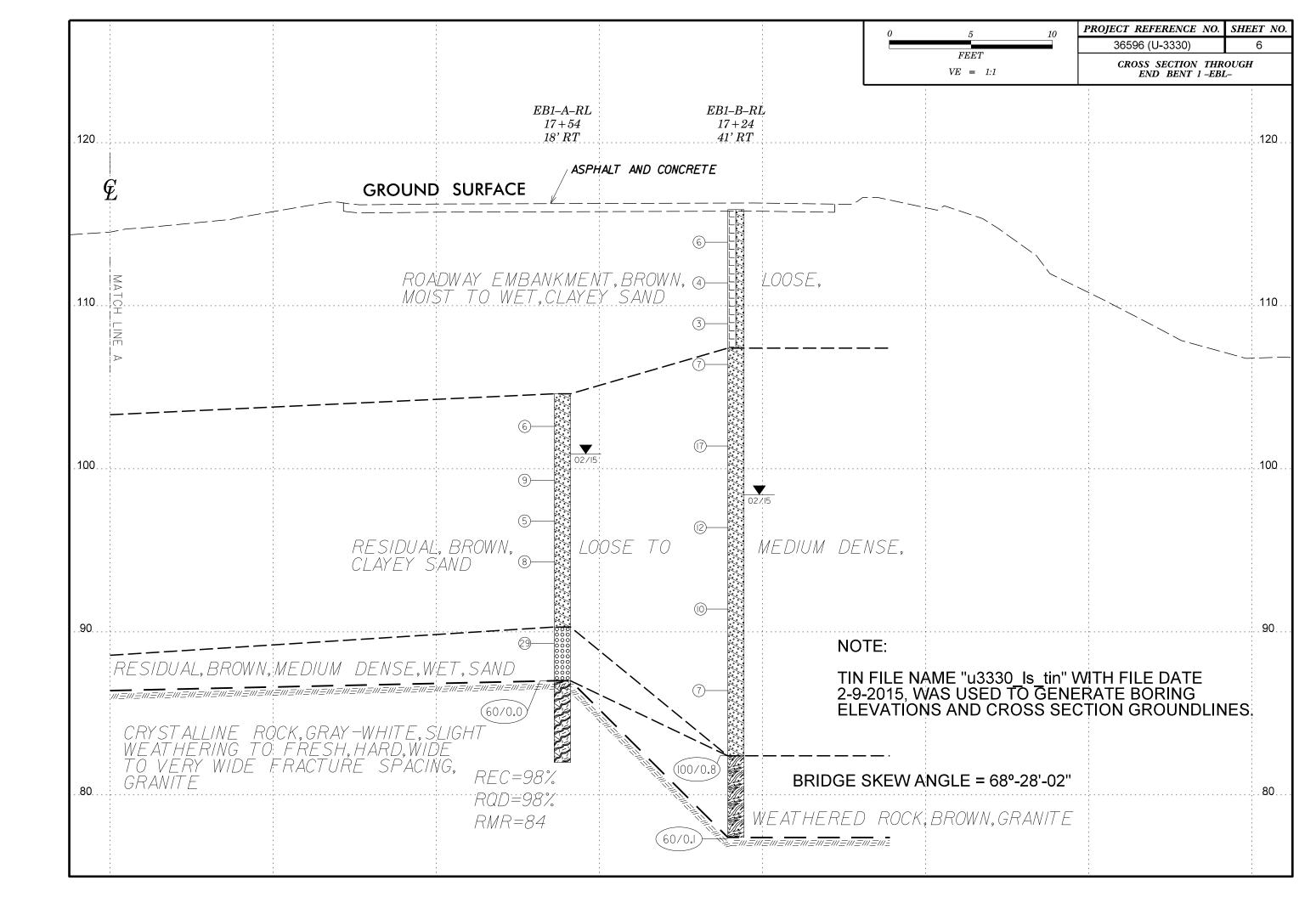
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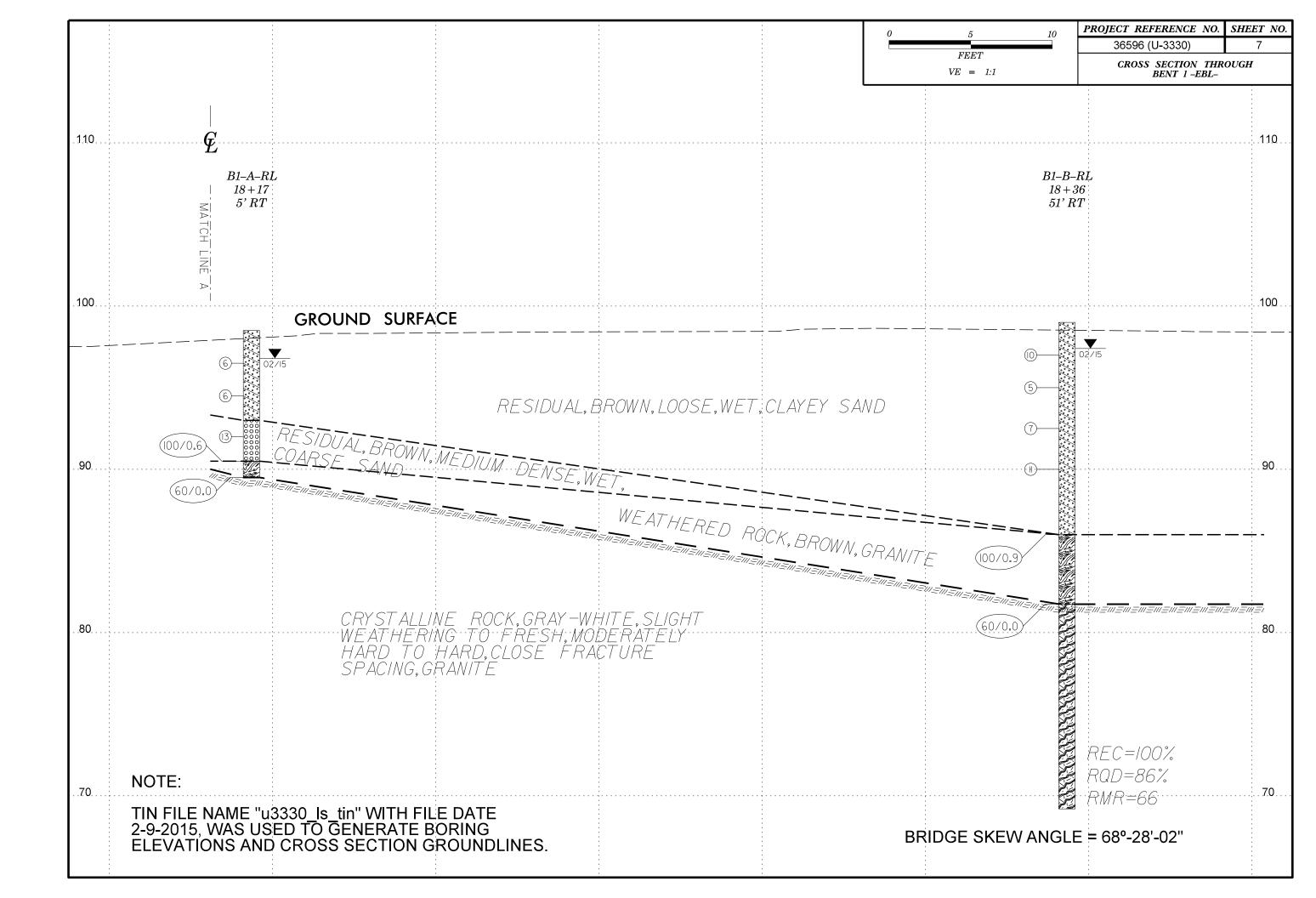
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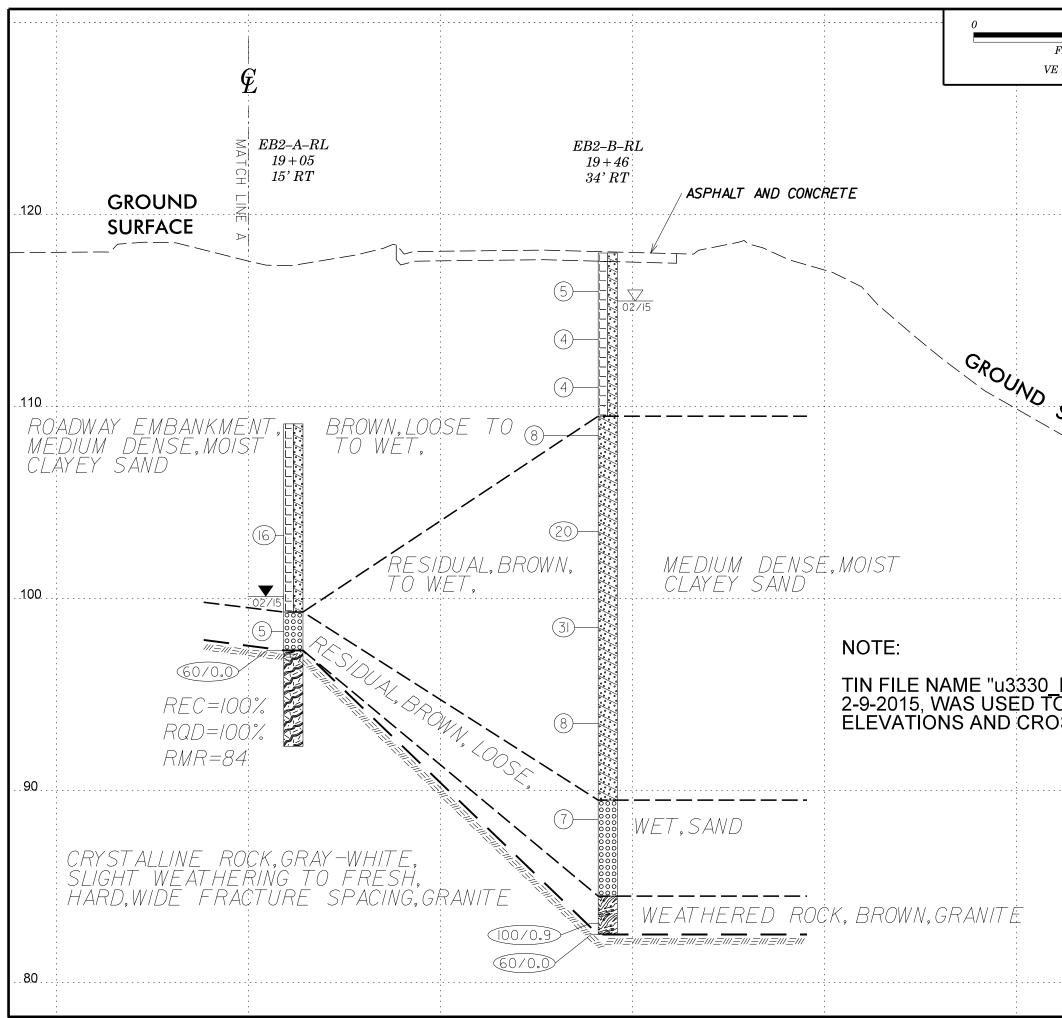












10	20		EET NO.
FEET		36596 (U-3330)	8
VE = 2:1		CROSS SECTION THROUG END BENT 2 -EBL-	H
			120
SURFACE			
RFACE			
	<u> </u>		
		<u> </u>	
)_ls_tin'' WIT	TH FIL		
OSS SECTI		È DATE ORING ROUNDLINES.	
BRIDGE	SKEVV	ANGLE = 68°-28'-02"	. 80

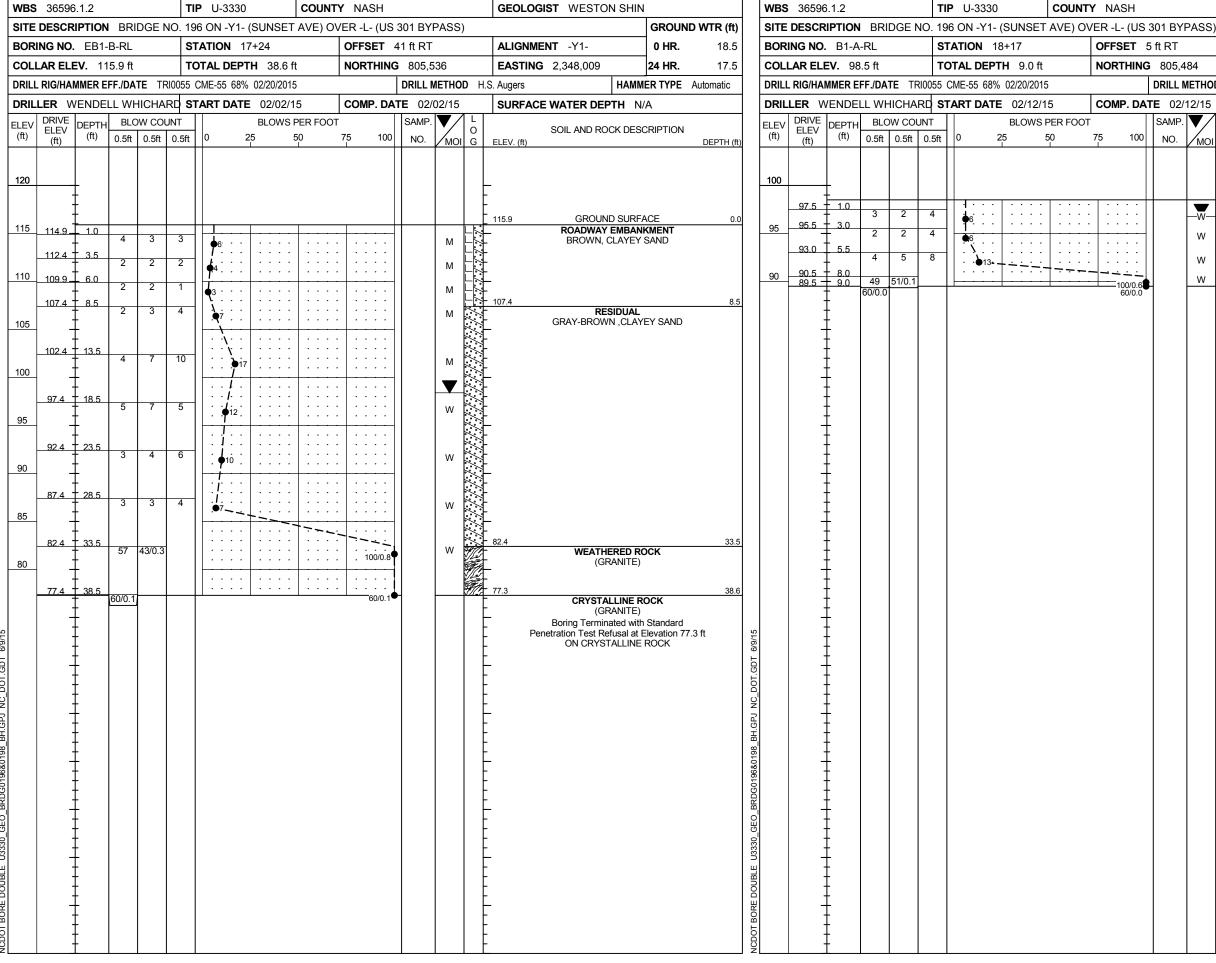


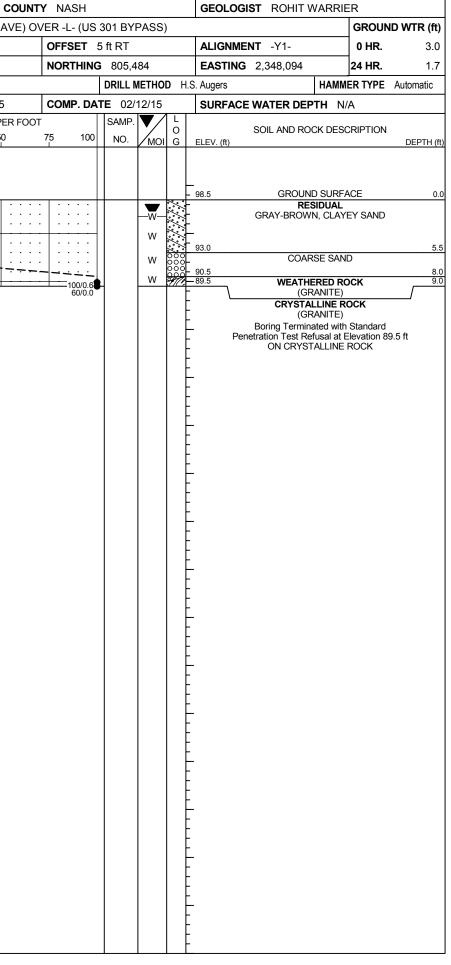
WBS	36596.1.2				P U-3330		COUNT	Y NASH				GEOLOGIST	ROHIT WARRI	ER		WB	S 36596					U-333			
SITE	DESCRIPTIO	N BR	IDGE I	NO. 19	6 ON -Y1-	(SUNSET	AVE) O	/ER -L- (US	301 BY	PASS	S)			GROUND W	/TR (ft)	SIT	E DESCR		I BRI	DGE NC	. 196 (DN -Y1	- (SUNS	ETAV	E) 0'
BOR	ING NO. EB	1-A-RL		SI	TATION 1	7+54		OFFSET	18 ft RT	-		ALIGNMENT	-Y1-	0 HR.	4.0	BO	ring no	. EB1-	A-RL		STA	ΓΙΟΝ	17+54	,	
COLI	LAR ELEV.	104.6 ft		тс	DTAL DEP	TH 22.61	ft	NORTHIN	G 805,	527		EASTING 2	348,046	24 HR.	3.7	co	LAR EL	EV. 10	04.6 ft		тот	AL DEF	PTH 22.	.6 ft	
DRILL	RIG/HAMMER	EFF./DA	TE T	RI0055	CME-55 68%	6 02/20/201	5		DRILL	METH	OD N	IW Casing W/SPT 8	Core HAMM	IER TYPE Aut	omatic	DRI	L RIG/HA	MMER E	FF./DA	TE TRIO	055 CM	E-55 68	% 02/20/2	2015	
DRIL	LER WEND	ELL W	HICHA	RD S1		E 02/04/*	15	COMP. D	TE 02	/04/15	5	SURFACE W		I/A		DRI	LLER V	VENDE	LL WH	HICHAR			E 02/0	4/15	
ELEV	DRIVE ELEV	···	oo wc	UNT		BLOWS	PER FOOT	-	SAMP			S	DIL AND ROCK DES	CRIPTION		co	RE SIZE	NQ-2			TOT	AL RUN	5 .0 ft		
(ft)	(ft) (ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	Имс	DI G	ELEV. (ft)			DEPTH (ft)	ELE	/ RUN ELEV	DEPTH		DRILL RATE	REC.	JN RQD	SAMP.	STRA REC. (ft) %	ATA RQD
																(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %
105								-				104.6	GROUND SURF		0.0	87	87.0	17.6	5.0	N-60/0 ((4.0)	(4.0)		(1.0)	(4.0)
	103.6 + 1.0	2	3	3				.		м	/./.	- - G	RESIDUAL RAY-BROWN, CLA			85		+	5.0	N=60/0.0 4:08/1.0 2:45/1.0 3:29/1.0 3:57/1.0 4:03/1.0	(4.9) 98%	(4.9) 98%		(4.9) 98%	(4.9) 98%
100	100.3 4.3				T							-					82.0	22.6		3:29/1.0					
	1 1	4	4	5	. •9				1	w	/./.	-					02.0	-		4.03/1.0					
	<u>97.8 + 6.8</u> +	2	2	3	./ ∳5 [.]						/./.	-					-	ŧ							
95	95.3 + 9.3	2	4	4	1					w	/./.	-						+							
	ļ 1											-					-	ŧ							
90	90.3 14.3	3										- 90.3			14.3			‡							
00	+	14	12	17		•29 ·			1	w	000 000 000	G	RAY-BROWN, COAI	RSE SAND				+							
	87.0 17.6	60/0.0	<u>,</u>					1 60/0.0	♦		000	87.0	CRYSTALLINE F		17.6		-	ŧ							
85	+ +				· · · ·		· · · ·					- — цл	(GRANITE) RD, GRAY AND WH					ŧ							
												WEA	THERING, WITH W	IDE TO VERY	22.6		-	ŧ							
									-				FRACTURE SPACI					ŧ							
													REC = 98% RQD	= 98%				ŧ							
	ļ											- L Boring	RMR = 84 Terminated at Eleva	ation 82.0 ft ON]		-	Ŧ							
												-	CRYSTALLINE F	ROCK				Ŧ							
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	+											-				6/9/1	-	Ŧ							
	+											-				GDT		ŧ.							
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												-				GPJ		ŧ							
	+											-				핆	-	Ŧ							
	+											-				\$019		‡							
	+											-				0196	-	ŧ							
												-				RDG		ŧ							
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	ļ											-				30 G	-	Ŧ							
	‡											-				U33		ŧ							
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	‡															NCDOT CORE DOUBLE U3330_GEO_BRDG0196&0198_BH.GPJ NC_DOT.GDT 6/9/15		ŧ							
	‡											F F				DOT	-	ŧ							
												t				NCI	1	†							

С	OUNT	YN	IASH				GEOLOG	IST	ROHIT V	/ARRIE	R	
ET A\	/E) 0\	/ER	-L- (US	301	BYPASS)						GROUN	D WTR (ft)
		OF	FSET	18 ft	RT		ALIGNME	NT	-Y1-		0 HR.	4.0
6 ft		NO	RTHING	3 80)5,527		EASTING	2,	348,046		24 HR.	3.7
015		•		DRI	LL METHOD	NW	Casing W/SI	PT &	Core	HAMM	R TYPE	Automatic
4/15		со	MP. DA	TE	02/04/15		SURFACE	E W/	ATER DEP	TH N/	A	
REC.	ATA RQD	L O				D	ESCRIPTIO	N AN	D REMARKS	6		
(ft) %	(ft) %	G	ELEV. (ft)			De sie Oe		0 47 0 #			DEPTH (ft)
(4.9)	(4.9)		87.0				Begin Cor CRYST		@ 17.6 ft NE ROCK			17.6
98%	98%			HAF	RD, GRAY AN	ND WI	HITE, FRESH	RANI I WE	ATHERING	, WITH V	VIDE TO V	'ERY
			82.0	_		WID	E FRACTUR	E SP	ACING, GR	ANITE		22.6
			-		Boring Terr	ninate	Ri ed at Elevatio	MR =				
			-		Doning Ten	mate		11 02.				
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	36596.1					D -3330			Y NASH				GEOI	OGIST ROHIT	WARRIE				S 3659					U-333			OUNTY
				GE N				T AVE) O	VER -L- (US			S)				GROUND WTR	• •					DGE NC	1		1- (SUNS	SET A\	/E) OV
BORI	NG NO.	B1-B-I	RL		_	ATION			OFFSET	51 ft R1	Γ		-	NMENT -Y1-		0 HR.	5.0	BO	RING NC	. B1-B	-RL				18+36		
	AR ELEV						TH 29.8		NORTHIN					ING 2,348,069			1.6		LAR EL						PTH 29		
	RIG/HAMM													W/SPT & Core		ER TYPE Automa	tic								8% 02/20/		
DRIL	LER WEI				_				COMP. DA			5	SURF	ACE WATER DE	PTH N/	A					LL WF	IICHARI	-		TE 02/1		$ \longrightarrow $
LEV (ft)		EPTH (ft)	BLOV 0.5ft			0	BLOWS	PER FOOT	г 7 <u>5</u> 100	SAMP	17			SOIL AND R	OCK DESC			CO		NQ-2			TOT		N 12.5		
(11)	(ft)		0.5π	0.51	0.511	0	25	50	15 100	NO.	/мс	DI G	ELEV. (f)		DEP	ΓH (ft)	ELE\ (ft)		DEPTH (ft)	RUN (ft)	DRILL RATE	REC. (ft) %	RQD (ft)	SAMP. NO.	REC. (ft)	RATA RQD (ft)
																			(11)	(,	(,	(Min/ft)	%	%		%	<u>%</u>
100	<u> </u>												99.0	GROU	ND SURFA	CE	0.0	81.75		17.3	3.0	3:11/1.0	(3.0)	(2.3)		(12.5)	(10.8) 86%
	I	1.0	4	4	6	 . ●10 ·								R i BROWN-GR	e sidual Ay, claye	EY SAND		80	78.8	+ <u>+</u> <u>28:3</u> _		3:11/1.0 N=60/0.0 2:04/1.0 1:31/1.0 1:00/1.0	100%	77%		100%	86%
95	96.0	3.0	2	2	3	.7					W		-							1 <u>20.3</u> -	4.5	1.16/1.0	(4.5) 100%	(3.6) 80%			
-	93.5	5.5	3	3	4	1 · · ·							-					75	74.2	+ 24.8		1:33/1.0 1:29/1.0			RS-1	1	
	91.0	8.0			·						W		-						17.2	+	5.0	1:50/1.0 1:31/1.0 1:16/1.0	(5.0) 100%	(4.9)			
90	+		3	4	7		·	<u> </u>		-	W		-					70		‡		1:16/1.0 1:30/1.0 1:32/1.0		90%			
	Ŧ								· · · · · ·									70	69.2	29.8		1:32/1.0					F
35	86.0 1	13.0	24	57	43/.4						w		86.0		HERED RO	OCK	13.0			‡							
	ŧ									•			-	(0	RANITE)					ŧ							
-	81.7 1	17.3	60/0.0							•			81.8	CRYST	ALLINE RO	ОСК	17.3			ŧ							
80	Ŧ									;			_		RANITE)					ŧ							
	Ŧ									!			-	AND WHITE, SI WEATHERING, W	IGHT TO I	MODÉRATE			· ·	ŧ							
5	Ŧ									RS-1	7				NG, GRAN					ŧ							
	Ŧ												-	REC = 10	0% RQD =	= 86%				ŧ							
	±									!			-	R	MR = 66					ŧ							
70	<u>+</u>												69.2				29.8			ŧ							
	Ŧ												-	Boring Terminate CRYST	d at Elevati ALLINE RC				· ·	ŧ							
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	Ŧ																	12		ŧ							
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	+												-					SORE		ŧ							
	ŧ																	NCDOT CORE DOUBLE U3330_GEO_BRDG0198.80198_BH.GPJ NC_DOT.GDT	· ·	ŧ							
	+												•					NCE		<u>t</u>							

		r y nash			GEOLOGIST	KOIIII		.n	
ET /	AVE) O	VER -L- (US	301 BYPA	SS)				GROUN	ID WTR (ft)
		OFFSET 5	51 ft RT		ALIGNMENT	-Y1-		0 HR.	5.0
8 ft		NORTHING			EASTING 2,			24 HR.	1.6
2015			DRILL MET		Casing W/SPT &		НАММ		Automatic
					-				Automatic
2/15	1	COMP. DA	IE 02/12/	15	SURFACE W		IN/	A	
t re-		<u> </u>							
REC (ft) %	CRATA C. RQD (ft) %	L O G ELEV. (f	ft)	D	ESCRIPTION AN	D REMARK	S		DEPTH (ft)
(10					Begin Coring				17.0
100	5) (10.8 % 86%	81.8	MODE MODE	RATELY H RATE WEA	CRYSTALLII (GRAN ARD TO HARD, (THERING, WITH GRAN	ITE) GRAY AND I CLOSE FF	WHITE, S ACTURE	SLIGHT TO SPACING	17.3) ;,
					RMR =	= 66			
		69.2							29.8
			Boring	g Terminate	ed at Elevation 69	2 ft ON CR	YSTALLI	NE ROCK	



	20500												A 01 1							CICT						ו ר												
	36596						U-333							204			、 、	GE	OLO	6151	ROHII	WAR				4 1-		3659						U-333				
	DESCRI						FION			А	c) U\		-L- (UE -SET			499)	•		IENT ·	V1		_	KOUND HR.	WTR (ft) 14.0	1 F		NG NC							- (SUNS 19+05		v =) (
	AR ELE						AL DEI			, ft			RTHIN			סר		_		G 2,34			24		9.0	1 1									PTH 16	0 ft		_
	RIG/HAN																			SPT & C					9.0 Automatic	4 4									3% 02/20/			_
	ER W											co	MP. DA					_	-					IFC /	Automatic	4 1-									TE 02/0			_
									BLOW		FOOT		WIF. D/		MP.		1 L	30	KFAU				IN/A			4 1-					/ / / //				N 5.0 ft			
LEV (ft)	ELEV (ft)	DEPTH (ft)		0.5ft	_	t 0	1	25		50	1001	75	100			мо	0 G	ELEV	((ft)	SOIL	_ AND R	ROCK DE	SCRIP	TION	DEPTH (ft	1 1		RUN		-		DRILL	REC.				RATA RQI	_
-	(,														ľ				. (11)							1	ELEV (ft)	ELEV (ft)	(ft)	H RU (ft		RATE (Min/ft)	REC. (ft) %	RQD (ft)	SAMP. NO.	REC. (ft) %	RQI (ft) %	נ
10																											97.3	(11)				(70	70		70	- 70	-
-10		-						•		· _ ·		-						109.1		R		JND SUF		NT	0.0			97.3	+ 11.8	5.	0 1	/=60/0.0 2:53/1 0	(5.0) 100%	(4.9)		(5.0)	(4.9 5 98%))
	‡						Ξį		· · · · · ·		· · · · · ·	.	· · · · · ·					-				LAYEY					95		+			/=60/0.0 2:53/1.0 2:09/1.0 1:29/1.0	100%	90%		100%	907	0
105	104.3	4.8					· · · 	·	· · ·									F										92.3	<u>+ 16.8</u>	-		2:34/1.0 3:27/1.0					+	_
	+		5	7	9		:: ;			. .	· · · · · ·	.	· · · · · ·			М		F											‡									
00	ŧ						: /:		· · · · · ·		· · · · · ·		· · · · · ·			▼		F											‡									
	99.3	9.8	2	2	3	-11	/							11		w	000	99.3				ESIDUA			9.8				‡									
┝	97.3	11.8	60/0.0	0			•5 				<u></u>	-		•			000	97.3		F	FINE TO	COARS	SE SAND	D	11.8	4			‡									
95	+	-						-	•••									F			(0	GRANITI	E)						‡									
	+								· · · · · ·		· · · · · ·		· · · · · ·					92.3		WEATI	HERING	G, WITH	MODER	RATELY					‡									
	+																	-		JLUSE		GRANITI		PACING	э,				‡									
	7																	F		F	REC = 1	00% RC	QD = 989	%					‡									
	Ŧ																	F				RMR = 8							‡									
	-	-																F	E	Boring To		ed at Ele FALLINE			N				‡									
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	C	OUNT	YN	ASH				GEOLOG	SIST	ROHIT V	VARRIE	R	
SΕΓ	ΓAV	/E) OV	/ER -	L- (US	30 <i>′</i>	1 BYPASS)						GROUN	D WTR (ft)
			OFF	SET	15 f	't RT		ALIGNM	ENT	-Y1-		0 HR.	14.0
.8	ft		NO	RTHING	6	305,408		EASTING	3 2,3	348,140		24 HR.	9.0
201	5				DF	RILL METHOD	NW	Casing W/S	PT &	Core	HAMM	ER TYPE	Automatic
)3/	15		col	MP. DA	TE	02/03/15		SURFAC	E WA	TER DEP	TH N/	A	
R	STR EC.	ATA RQD	L O				П	ESCRIPTIO	Ν ΔΝΙ	D REMARK	9		
	(ft) %	(ft) %	Ğ	ELEV. (1	t)						<u> </u>		DEPTH (ft)
	5.0)	(4.0)		97.3				Begin Co		@ 11.8 ft IE ROCK			11.8
10	5.0) 00%	(4.9) 98%		- 97.5				(0	RANI	TE)			
				92.3	п	ARD, GRAY A CLO	SE TO	WIDE FRA		RE SPACING	G, GRAN	ITE	LL T 16.8
F					\square				MR =				
				-		Boring Ter	minate	d at Elevati	on 92.	3 ft ON CR	YSTALLII	NE ROCK	
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WBS	36596					IP U-3330		COUNTY	Y NASH				GEOLOGIST ROHIT WARRI	ER
SITE	DESCR	IPTION	BRI	IDGE	NO. 19	96 ON -Y1-	(SUNSET	AVE) OV	'ER -L- (US	301 BY	PASS)		GROUND WTR (f
BORI	NG NO.	EB2-	B-RL		S	TATION 1	9+46		OFFSET	34 ft RT			ALIGNMENT -Y1-	0 HR. 2.
COLL	AR ELE	EV . 11	8.0 ft		Т	OTAL DEPT	TH 35.51	ft	NORTHING	G 805,3	364		EASTING 2,348,150	24 HR. FIAI
DRILL	RIG/HAI	MMER E	FF./DA	TE T	RI0055	CME-55 68%	02/20/201	5		DRILL	METHO	D Mu	ud Rotary HAMN	IER TYPE Automatic
DRIL	LER W	/ENDE	LL WH	HICHA		TART DATE	02/03/	15	COMP. DA	TE 02/	03/15			I/A
ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS	PER FOOT		SAMP.	▼/			
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 2	25	50	75 100	NO.	мо	O I G	SOIL AND ROCK DES	DEPTH
120														
	-	F										I F	- 118.0 GROUND SURF	ACE
-	117.0	1.0	5	3	2						5 <u>M</u> 7		ROADWAY EMBAN BROWN, CLAYEY	
115	114.5-	3.5				115.							-	0,112
	112.0	6.0	2	2	2	 • ⁴ · · · ·					M			
110	-	-	2	2	2						м			
	109.5	8.5	3	3	5						м		- 109.5 RESIDUAL	
	-	t t				· 🗣 · · ·	· · · · ·						BROWN, CLAYEY	SAND
105	- 104.5 -	13.5											_	
			6	11	9	1 : : : ` \2					м			
	-	Ł												
00	99.5 -	18.5	5	12	19		<u> </u>	+	+					
	-	Ł	ľ	12			• 31				M			
95	-	F										\sim		
	94.5 -	- 23.5	3	4	4	· <u>·</u> · ·					w		-	
	-	ŧ												
0	- 89.5 -	- 28.5] -i						///	- 89.5	
	-	÷.	2	3	4						w	000	COARSE SAM	ND
-	-	ŧ.					· · · ·	· + :- :- :				000		
85	84.5 -	33.5	12	18	82/0.4				<u> </u>				- 84.5 WEATHERED R	OCK
-	82.5	35.5	60/0.0						· 100/0.9 60/0.0	₿			82.5 (GRANITE)	
	-	Ł											CRYSTALLINE F (GRANITE)	
	-	Ł											Boring Terminated witl Penetration Test Refusal at	h Standard Elevation 82.5 ft
	-	ł											ON CRYSTALLINE	ROCK
	-	F										F	- -	
	-	F										I F		
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SHEET 13

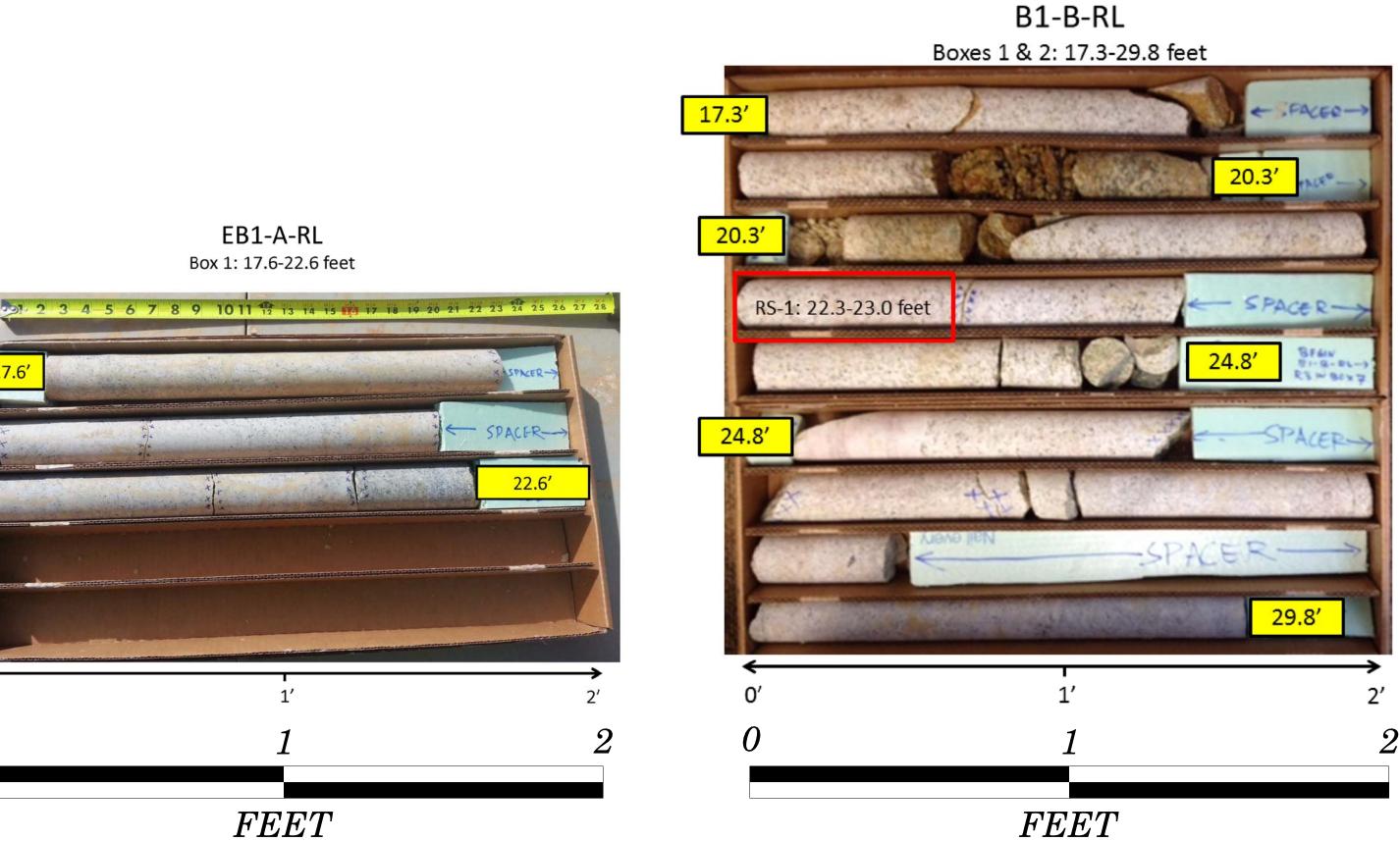
ROCK TEST RESULTS

B1-B-RL

ROC	CK TE	ST RE	ESULTS		
SAMPLE	OFFSET	STATION	DEPTH	ROCK	UNCONFINED COMP.
NO.	OFFSEI	STATION	INTERVAL	TYPE	STRENGTH, KSI
RS-1	51' RT	18 + 36	22.3–23.0	GRANITE	16.40

SHEET 14 36596.1.2 (U-3330) BRIDGE NO. 196 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

CORE PHOTOGRAPHS



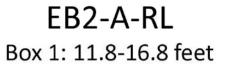
FEET

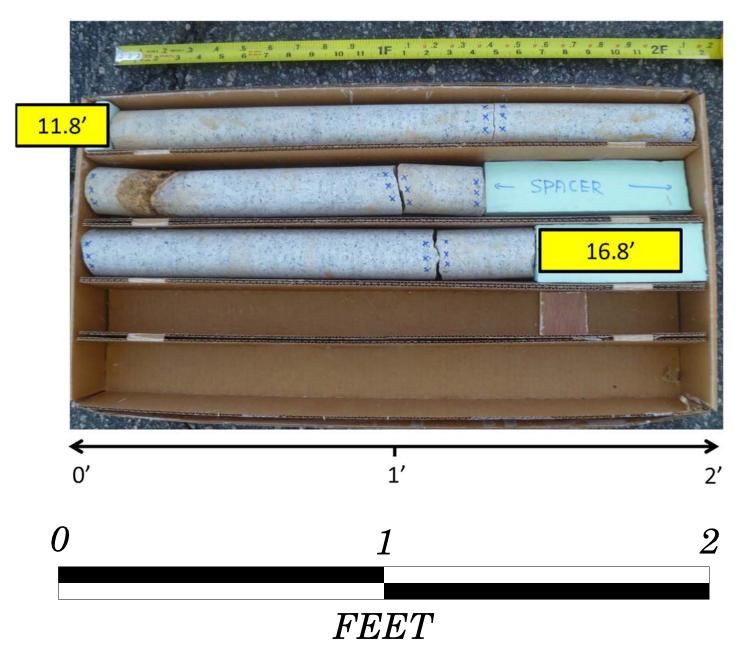
17.6'

0'

SHEET 15 36596.1.2 (U-3330) BRIDGE NO. 196 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

CORE PHOTOGRAPHS





SHEET 16 36596.1.2 (U-3330) BRIDGE NO. 196 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

SITE PHOTOGRAPH (LOOKING FROM SOUTH)



SHEET 17 36596.1.2 (U-3330) BRIDGE NO. 196 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

CONTENTS

330

m.

REFERENCE

<u>SHEET NO.</u>	DESCRIPTION
	TITLE SHEET
2	LEGEND
3	SITE PLAN
4-5	PROFILE(S)
6-8	CROSS SECTION(S)
9-13	BORE LOG(S) & CORE REPORT(S)
14	ROCK TEST RESULTS
15-16	CORE PHOTOGRAPH(S)
17	SITE PHOTOGRAPH(S)

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 **REPLACE BRIDGE NO. 198 ON -YI-**(SUNSET AVE) OVER -L- (US 301 BYPASS)

36596 PROJEC

STATE N.C.

NO

17

SHEETS



1

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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1999 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 (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 SUBJURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSDERABLY WITH TWE ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION CANNOT AND ANY VARY CONSDERABLY WITH TWE ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION CLIMATE DECOMPLY AND ANY ASKY CONSDERABLY WITH TWE ACCORDING IN CLIMATE 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE AND THE INTERPRETATIONS MADE, OR 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 ADDITIONS TO DENOT OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL COMPENSATION OR FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES

- 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 REDUESTED 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

CONSULTANT:

GEOSYNTEC

CONSULTANTS

INVESTIGATED BY MJOROGE WAINAINA

DRAWN BY _____C. TURLINGTON

CHECKED BY WESTON SHIN

SUBMITTED BY NJOROGE WAINAINA

DATE **JUNE 2015**



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

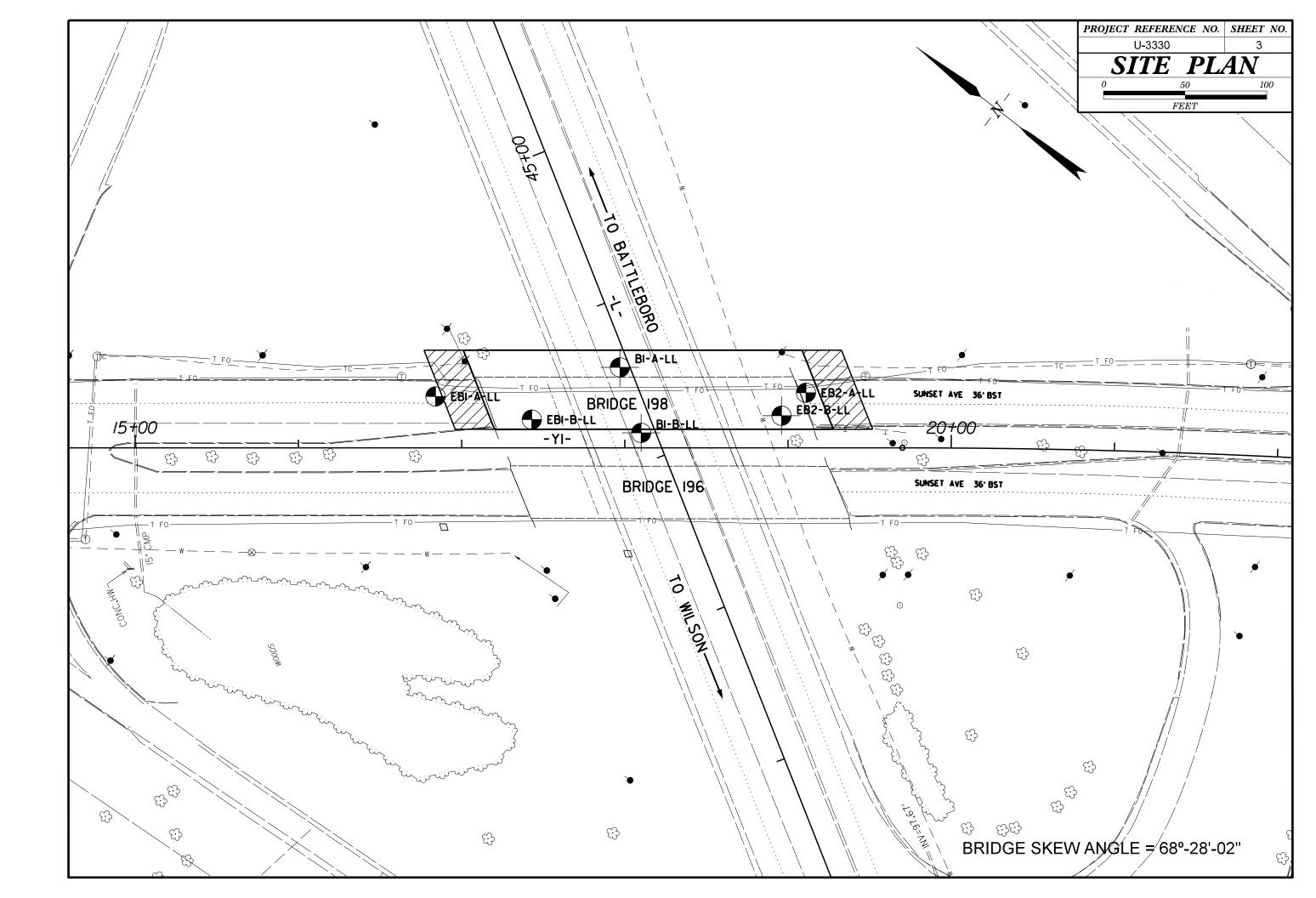
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

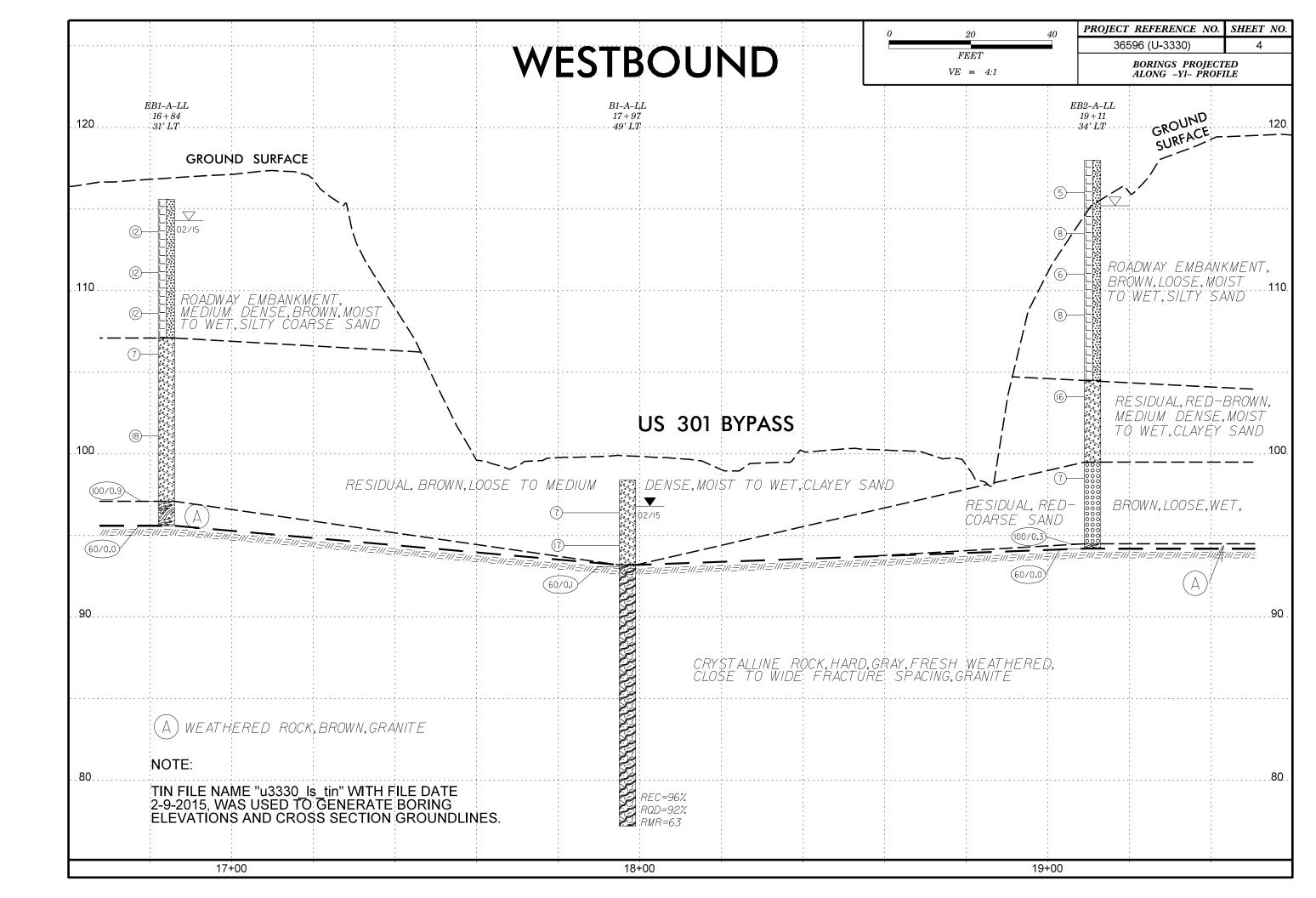
	SOIL DE	ESCRIPTION				GRADATION				ROCK DE	SCRIPTION
	UNCONSOLIDATED, SEMI-CONS A CONTINUOUS FLIGHT POWE					TES A GOOD REPRESENTATION OF PARTIC NDICATES THAT SOIL PARTICLES ARE AL					WOULD YIELD SPT REFUSAL IF TEST STAL PLAIN MATERIAL WOULD YIELD
ACCORDING TO THE	STANDARD PENETRATION TES E AASHTO SYSTEM, BASIC DE	T (AASHTO T 206,ASTM DI	586). SOIL CLASSIFICA	TION		ES A MIXTURE OF UNIFORM PARTICLE SI		SPT REFUSAL BLOWS IN NO	IS PENETRATI	ON BY A SPLIT SPOON S AIN MATERIAL, THE TRA	AMPLER EQUAL TO OR LESS THAN Ø. INSITION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR,	TEXTURE, MOISTURE, AASHTO GICAL COMPOSITION, ANGULARI	CLASSIFICATION, AND OTHE	R PERTINENT FACTORS			ANGULARITY OF GRAI	NS	REPRESENTED	BY A ZONE OF	F WEATHERED ROCK. ALLY DIVIDED AS FOLLOW	
	RAY, SILTY CLAY, MOIST WITH INTE					TY OR ROUNDNESS OF SOIL GRAINS IS D NGULAR, SUBROUNDED, OR <u>ROUNDED</u> .	ESIGNATED BY THE TERMS:	WEATHERED	SUCS.	1116	IN MATERIAL THAT WOULD YIELD SP
	OIL LEGEND AND A		CATION			MINERALOGICAL COMPOS		ROCK (WR)		100 BLOWS PER F	DOT IF TESTED.
	GRANULAR MATERIALS ≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIAL	S	MINERAL NA	MES SUCH AS QUARTZ, FELDSPAR, MICA, T		CRYSTALLINE			GRAIN IGNEOUS AND METAMORPHIC R REFUSAL IF TESTED. ROCK TYPE IN
GROUP A-1	A-3 A-2	A-4 A-5 A-6 A-7	A-1, A-2 A-4, A-5			N DESCRIPTIONS WHEN THEY ARE CONSID		ROCK (CR)		GNEISS, GABBRO, SI	
CLASS. A-1-a A-1-b	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-CRYSTALL ROCK (NCR)	.INE	SEDIMENTARY ROC	< THAT WOULD YEILD SPT REFUSAL
SYMBOL					MODE	HTLY COMPRESSIBLE ERATELY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAT	in	COASTAL PLAIN S	DES PHYLLITE, SLATE, SANDSTONE, ET EDIMENTS CEMENTED INTO ROCK, BUT
% PASSING			SILT-	MUCH	HIGHI	LY COMPRESSIBLE	LL > 50	SEDIMENTARY (CP)		SPT REFUSAL. ROO SHELL BEDS, ETC.	CK TYPE INCLUDES LIMESTONE, SAND
*10 50 MX *40 30 MX 50 MX			GRANULAR CLAY SOILS SOILS	MUCK, PEAT						WEAT	HERING
	10 MX 35 MX 35 MX 35 MX 35 MX	36 MN 36 MN 36 MN 36 MN	00120		ORGANIC MATERIAL TRACE OF ORGANIC M	<u>SOILS</u>	OTHER MATERIAL TRACE 1 - 10%		ROCK FRESH, CF		TS MAY SHOW SLIGHT STAINING. ROCK
MATERIAL PASSING #40			SOILS WITH		LITTLE ORGANIC MAT	TER 3 - 5% 5 - 12%	LITTLE 10 - 20%				SOME JOINTS MAY SHOW THIN CLAY (
LL – PI 6 MX		40 MX 41 MN 40 MX 41 MN 10 MX 10 MX 11 MN 11 MN	LITTLE OR	HIGHLY	MODERATELY ORGANIC HIGHLY ORGANIC	5 - 10% 12 - 20% > 10% > 20%	SOME 20 - 35% HIGHLY 35% AND ABOVE	(V SLI.)		A BROKEN SPECIMEN FACE	SHINE BRIGHTLY. ROCK RINGS UNDER I
GROUP INDEX Ø	0 0 4 MX	8 MX 12 MX 16 MX NO MX	MODERATE AMOUNTS OF	ORGANIC		GROUND WATER					AND DISCOLORATION EXTENDS INTO R
USUAL TYPES STONE FRAGS.	FINE SILTY OR CLAYEY	SILTY CLAYEY	ORGANIC MATTER	SOILS	∇	WATER LEVEL IN BORE HOLE IMMEDIA	ATELY AFTER DRILLING	(SLI.)	1 INCH. OPEN J	DINTS MAY CONTAIN CLAY.	IN GRANITOID ROCKS SOME OCCASION
OF MAJOR GRAVEL, AND MATERIALS SAND	SAND GRAVEL AND SAND	SOILS SOILS	MHITEN		▼	STATIC WATER LEVEL AFTER 24	HOURS				SCOLORATION AND WEATHERING EFFECT
GEN BATING			FAIR TO DOOD			PERCHED WATER, SATURATED ZONE, OF	WATER BEARING STRATA	(MOD.)	GRANITOID ROCK	KS, MOST FELDSPARS ARE I	DULL AND DISCOLORED, SOME SHOW CL
AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	POOR POOR L	JNSUITABLE	- O-M-	SPRING OR SEEP			WITH FRESH RO		SHOWS SIGNIFICANT LOSS OF STRENGT
	PI OF A-7-5 SUBGROUP IS ≤ LL -		> LL - 30								R STAINED. IN GRANITOID ROCKS, ALL
		OR DENSENESS RANGE OF STANDARD	RANGE OF UNCON			MISCELLANEOUS SYMBO	JLS				KAOLINIZATION. ROCK SHOWS SEVERE ST'S PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	PENETRATION RESISTENCE	COMPRESSIVE STR	RENGTH		BANKMENT (RE) 25/025 DIP & DIP DIR ESCRIPTION FROCK STRU	ECTION			JLD YIELD SPT REFUSAL	
	VERY LOOSE	(N-VALUE) < 4	(TONS/FT ²)			, CPT					R STAINED, ROCK FABRIC CLEAR AND I IN GRANITOID ROCKS ALL FELDSPARS
GENERALLY GRANULAR	LOOSE	4 TO 10			SOIL SYMBOL				TO SOME EXTEN		TRONG ROCK USUALLY REMAIN.
MATERIAL	MEDIUM DENSE DENSE	10 TO 30 30 TO 50	N/A			ILL (AF) OTHER AUGER BORING	CONE PENETROMETER				R STAINED. ROCK FABRIC ELEMENTS A
(NON-COHESIVE)	VERY DENSE	> 50				4		SEVERE	BUT MASS IS E	EFFECTIVELY REDUCED TO	SOIL STATUS, WITH ONLY FRAGMENTS (
GENERALLY	VERY SOFT SOFT	< 2 2 TO 4	< 0.25 0.25 TO 0.9	5	INFERRED SOI	\checkmark	SOUNDING ROD				F ROCK WEATHERED TO A DEGREE THA AIN. <u>IF TESTED, WOULD YIELD SPT N</u>
SILT-CLAY MATERIAL	MEDIUM STIFF STIFF	4 TO 8 8 TO 15	0.5 TO 1.0 1 TO 2		INFERRED ROOM	CK LINE MWONITORING W	ELL - TEST BORING WITH CORE				T DISCERNIBLE, OR DISCERNIBLE ONLY
(COHESIVE)	VERY STIFF	15 TO 30	2 TO 4		TTTTT ALLUVIAL SOI	IL BOUNDARY A PIEZOMETER	SPT N-VALUE		ALSO AN EXAMP		Y BE PRESENT AS DIKES OR STRINGER
	HARD	> 30 DR GRAIN SIZE	> 4			RECOMMENDATION SYMB		-		ROCK H	ARDNESS
						UNCLASSIFIED EXCAVATION -	[7.3] UNCLASSIFIED EXCAVATION -				RP PICK. BREAKING OF HAND SPECIMEN
U.S. STD. SIEVE SIZE OPENING (MM)	4 10 4.76 2.00	40 60 200 0.42 0.25 0.075	270 0.053			UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF			BLOWS OF THE GEOLOGIST	'S PICK. NLY WITH DIFFICULTY. HARD HAMMER B
BOULDER CO	BBLE GRAVEL	COARSE FINE	SILT	CLAY	SHALLOW	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL		TO DETACH HAN		
	(GR.)	SAND SAND (CSE. SD.) (F SD.	(SL)	(CL.)		ABBREVIATIONS					OUGES OR GROOVES TO 0.25 INCHES D ST'S PICK. HAND SPECIMENS CAN BE I
GRAIN MM 305	75 2.0	0.25	0.05 0.005		AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST		BY MODERATE E		
SIZE IN. 12	3				BT - BORING TERMINATED CL CLAY	D MICA MICACEOUS MOD MODERATELY	WEA WEATHERED γ - UNIT WEIGHT				DEEP BY FIRM PRESSURE OF KNIFE PEICES 1 INCH MAXIMUM SIZE BY HARD
	OIL MOISTURE - C		TERMS		CPT - CONE PENETRATIO		$\dot{\gamma}_{ m d}$ - dry unit weight			OLOGIST'S PICK.	
SOIL MOISTURE : (ATTERBERG LIN			IELD MOISTURE DESC	RIPTION	CSE COARSE DMT - DILATOMETER TES	ORG ORGANIC ST PMT - PRESSUREMETER TI	EST SAMPLE ABBREVIATIONS				KNIFE OR PICK. CAN BE EXCAVATED IN BY MODERATE BLOWS OF A PICK POI
	- SATURAT		UID; VERY WET, USUAL	I Y	DPT - DYNAMIC PENETRA e - VOID RATIO	TION TEST SAP SAPROLITIC SD SAND, SANDY	S - BULK SS - SPLIT SPOON			BROKEN BY FINGER PRES	
	(SAT.)		THE GROUND WATER		F - FINE	SL SILT, SILTY	ST - SHELBY TUBE				AVATED READILY WITH POINT OF PICK BY FINGER PRESSURE. CAN BE SCRATC
PLASTIC	LIMII	SEMICOL ID-	FOURES DRVING TO		 FOSS FOSSILIFEROUS FRAC FRACTURED, FRAC 	SLI SLIGHTLY CTURES TCR - TRICONE REFUSAL	RS – ROCK RT – RECOMPACTED TRIAXIAL		FINGERNAIL.	NorthEod of the Bridtert	
(PI) PL PLASTI	- WET - (1	W) ATTAIN OPTI	EQUIRES DRYING TO MUM MOISTURE		FRAGS FRAGMENTS	w - MOISTURE CONTENT	CBR - CALIFORNIA BEARING		RACTURE		BEDDING
PLL PLASTIC	C LIMIT				HI HIGHLY	V - VERY UIPMENT USED ON SUBJEC	RATIO	VERY WIDE		SPACING MORE THAN 10 FEET	VERY THICKLY BEDDED
ОМ ОРТІМИ	M MOISTURE - MOIST -	(M) SOLID; AT OF	R NEAR OPTIMUM MOIS	TURE	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	WIDE		3 TO 10 FEET	THICKLY BEDDED
SL SHRINK	AGE LIMIT				CME-45C	CLAY BITS		MODERATEL CLOSE		1 TO 3 FEET Ø.16 TO 1 FOOT	THINLY BEDDED 0. VERY THINLY BEDDED 0.
	- DRY - (6		DITIONAL WATER TO MUM MOISTURE			6' CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERY CLOS	.E L	ESS THAN 0.16 FEET	THICKLY LAMINATED 0.0 THINLY LAMINATED
	PI Δ	STICITY			CME-55	8" HOLLOW AUGERS	-в -н			INDUF	RATION
		CITY INDEX (PI)	DRY STRENGTH	4	CME-550	HARD FACED FINGER BITS	-N 02	FOR SEDIMENT	ARY ROCKS, IN	DURATION IS THE HARDEN	NING OF MATERIAL BY CEMENTING, H
NON PLASTIC		Ø-5	VERY LOW	-		TUNGCARBIDE INSERTS		FRIABL	E		FINGER FREES NUMEROUS GRAINS; BY HAMMER DISINTEGRATES SAMPLE
SLIGHTLY PLAS MODERATELY PL	LASTIC	6-15 16-25	SLIGHT MEDIUM		VANE SHEAR TEST	CASING W/ ADVANCER	HAND TOOLS:			CRAINS CAN D	E SEPARATED FROM SAMPLE WITH S
HIGHLY PLASTI	C 26	OR MORE	HIGH		PORTABLE HOIST	TRICONE 2 15/16" STEEL TEETH	HAND AUGER	MODERA	ATELY INDURAT		Y WHEN HIT WITH HAMMER.
	C	OLOR				TRICONE TUNGCARB.		INDURA	TED		IFFICULT TO SEPARATE WITH STEEL
	INCLUDE COLOR OR COLOR (GRAY).		CORE BIT	VANE SHEAR TEST				BREAK WITH HAMMER.
MODIFIERS SU	CH AS LIGHT, DARK, STREAK	ED, ETC. ARE USED TO DE	SCRIBE APPEARANCE.			21/4 HOLLOW AUGERS		EXTREM	MELY INDURATE		BLOWS REQUIRED TO BREAK SAMPL S ACROSS GRAINS.

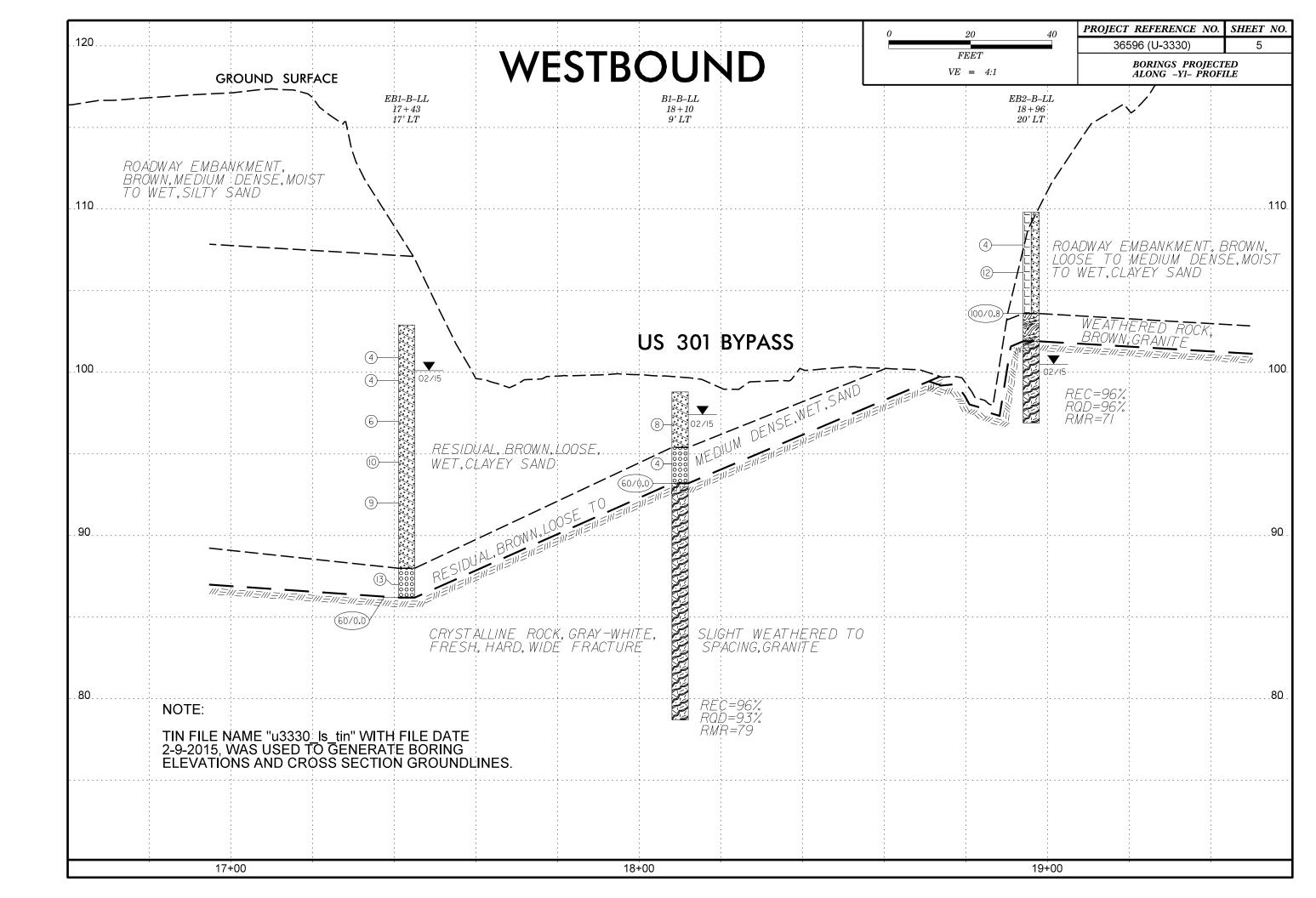


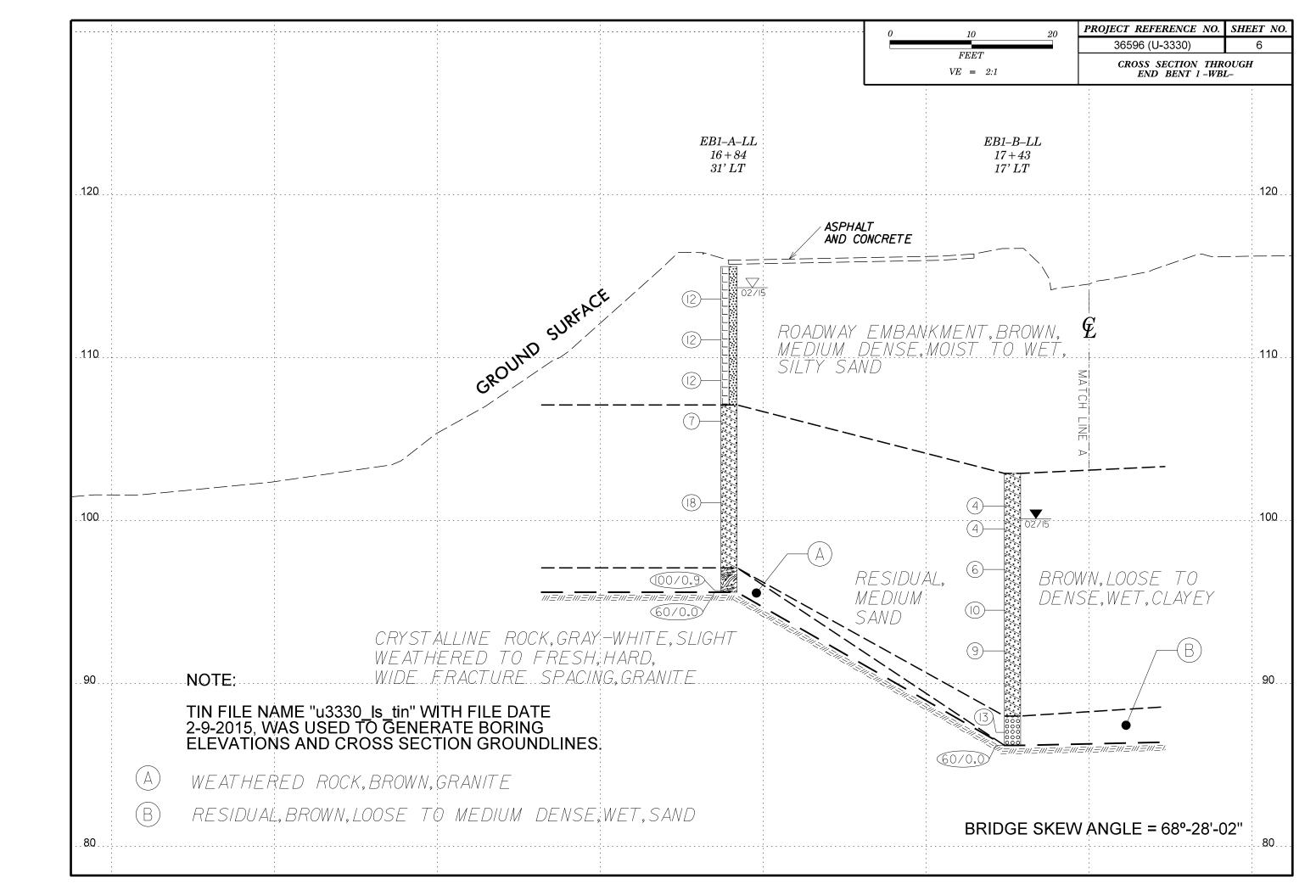
SHEET NO.

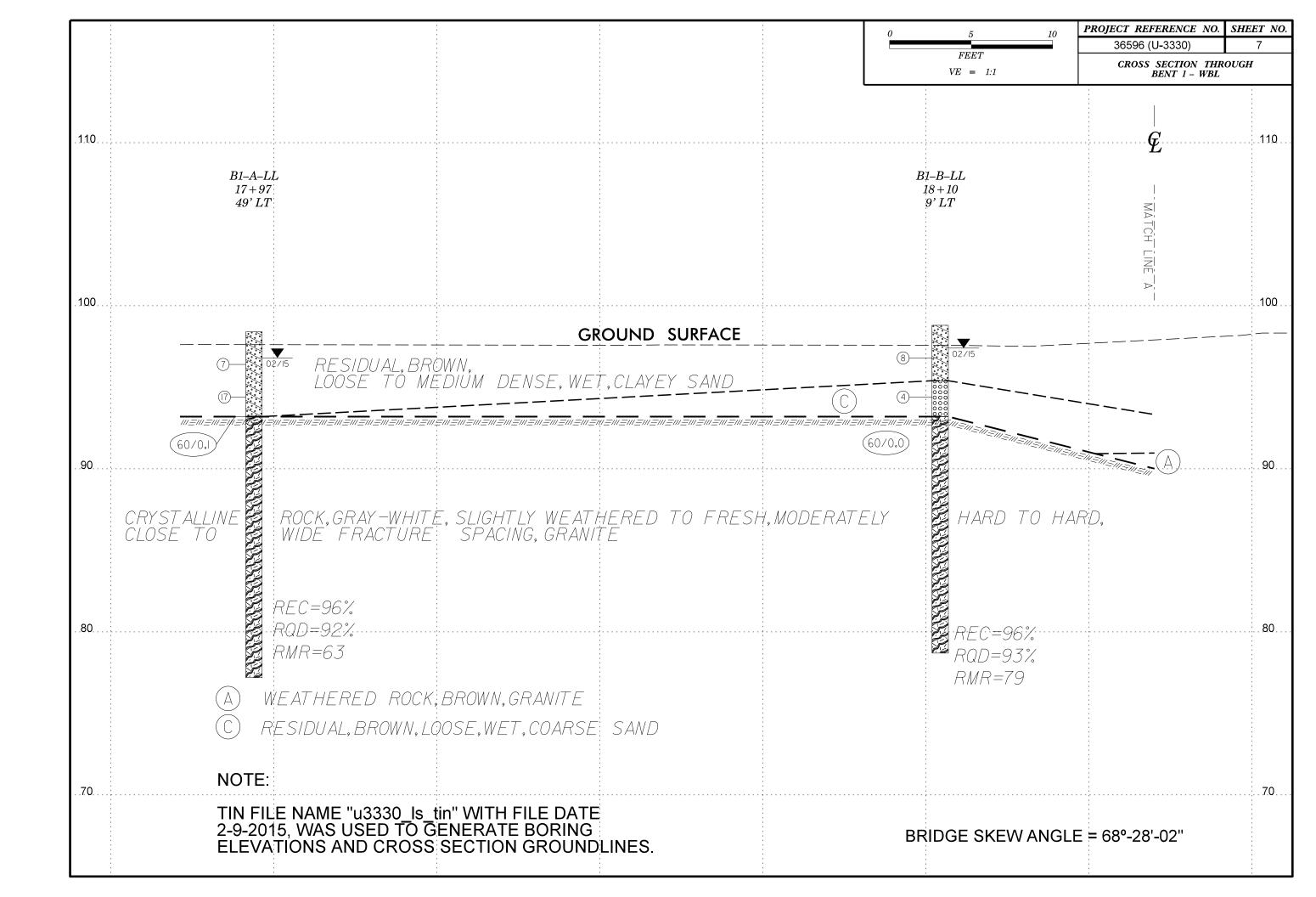
	TERMS AND DEFINITIONS
TED, AN INFERRED D SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS OFTEN	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
PT N VALUES >	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
ROCK THAT NCLUDES GRANITE,	SURFACE.
	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
TAL PLAIN IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
TC.	OF SLOPE.
T MAY NOT YIELD DSTONE, 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.
	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
CONTINCE IS ODEN	HORIZONTAL.
COATINGS IF OPEN, HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
OCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
AL FELDSPAR ER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
TS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AY. ROCK HAS	PARENT MATERIAL.
H AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
LOSS OF STRENGTH	FIELD.
WHEN STRUCK.	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
EVIDENT BUT ARE KAOLINIZED	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.
ARE DISCERNIBLE OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
T ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
VALUES < 100 BPF	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
RS. SAPROLITE IS	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
NS REQUIRES	ROCK.
no nedomeo	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
DEEP CAN BE DETACHED	<u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SE INCILO	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
D BLOWS OF THE	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
N FRAGMENTS NT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
. 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.
CHED READILY BY	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
THICKNESS	BENCH MARK: BL-102, EL 97.35
4 FEET	ELEVATION: FEET
1.5 - 4 FEET 0.16 - 1.5 FEET	
03 - 0.16 FEET	NOTES: TIN FILE NAME "U3330_IS_TIN" WITH FILE DATE
008 - 0.03 FEET < 0.008 FEET	2-9-2015, WAS USED TO GENERATE BORING ELEVATIONS AND CROSS SECTION GROUNDLINES.
< 0.008 FEET	
	FIAD - FILLED IN AFTER DRILLING.
EAT, PRESSURE, ETC.	
TEEL PROBE;	
PROBE:	
_E;	
	DATE: 8-15-14

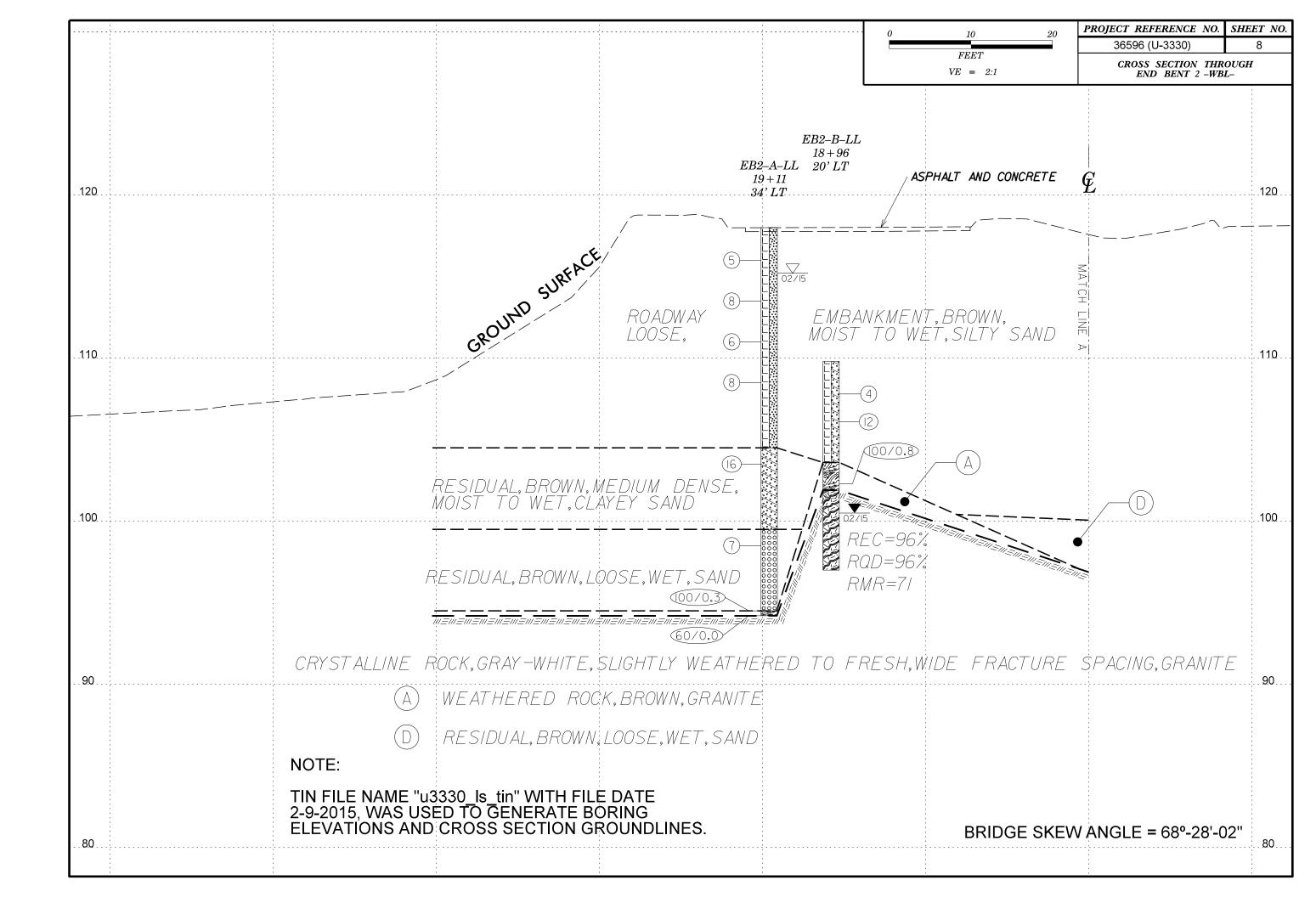














	COUNT	Y NASH				GEOLOGIS	ST ROHIT W	/ARRIE	R	
SUNSET	AVE) OV	/ER -L- (US	301 BY	PASS)				GROUNE) WTR (ft)
+43		OFFSET	17 ft LT			ALIGNMEN	NT -Y1-		0 HR.	0.0
H 16.7 ft		NORTHING	3 805,5	57		EASTING	2,348,067		24 HR.	2.8
02/20/2015			DRILL N	IETHO	D Mu	ud Rotary		HAMME	ER TYPE	Automatic
02/05/1	5	COMP. DA	TE 02/0	05/15		SURFACE	WATER DEP	TH N//	Ą	
BLOWS F	PER FOOT		SAMP.	▼∕					RIPTION	
5 5	50	75 100	NO.	моі		ELEV. (ft)	00127112 110			DEPTH (ft)
			NO.		0	ELEV. (ft) 102.9 88.0 86.2	SOIL AND ROO GROUNE RES CLAYI DENSE, BRO	CK DESC D SURFA SIDUAL EY SAND WN-RED LINE RC ANITE) atted with usal at E	CE CE D D, SAND DCK Standard levation 86.	0.0 14.9 16.7
			'	•						



WBS	36596.	1.2				P U-333		-	ITY NA	SH				GE	DLOGIST ROHIT	WARRIE	R		WBS	36596				-	U-333			OUNTY
SITE	DESCRI	PTION	BRI	DGE N	NO. 19	8 ON -Y1	- (SUNSE	T AVE) (OVER -L	- (US	301 BY	PASS)				GROUND WTR (1	t)	SITE	DESCR	RIPTION	BRI	DGE NO	D. 198 (ON -Y1	1- (SUNS	SET A	/E) OV
30RII	NG NO.	B1-A-	·LL		ST	ATION	17+97		OFFS	SET 4	9 ft LT			ALI	GNMENT -Y1-		0 HR. 1.	0	BOR	ING NO	. B1-A	-LL		STA	TION	17+97		
OLL	AR ELE	/. 98.	.4 ft		тс	DTAL DEP	PTH 21.2	ft	NOR	THING	805,5	533		EAS	TING 2,348,125		24 HR. 1.	6	COL	LAR EL	EV . 98	3.4 ft		тот	AL DE	PTH 21	.2 ft	
RILL	RIG/HAM	MER EF	F./DA	TE TR	RI0055 (CME-55 68	% 02/20/20	15			DRILL	METHO	DD N	W Casir	g W/SPT & Core	HAMME	R TYPE Automatic		DRIL	L RIG/HA	MMER E	FF./DA	TE TRIC	055 CM	IE-55 68	8% 02/20/	2015	
		INDEL	L WH	HICHA	rd st		FE 02/12	/15	СОМ	P. DA	FE 02/	/12/15		SUI	RFACE WATER DEI	PTH N/A	4		DRIL	LER V	VENDE	LL WH	HICHAR		RT DA	TE 02/1	2/15	
EV t)	DRIVE ELEV	DEPTH		W COL				S PER FOO		100	SAMP.	1.7	0		SOIL AND RC	OCK DESC	RIPTION		COR		NQ-2			тоти	AL RU	N 16.0		
+	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	Имо	I G	ELEV.	(ft)		DEPTH	(ft)	ELEV (ft)	RUN ELEV	DEPTH (ft)		DRILL RATE	REC. (ft) %	UN RQD	SAMP. NO.	REC.	RATA RQD
l																			(11)	(ft)	(11)	(ft)	(Min/ft)	%	%	110.	(ft) %	(ft) %
-	<u> </u>													 - 98.4	GROUN	ID SURFA	CE	0.0	93.2	93.2	5.2	1.0	3:22/1.0	(0.6)	(0.5)		(14.4)	(13.8)
	97.4	1.0	3	3	4	· · · ·							~~~~	-	RE	SIDUAL		5.0	90	92.2	+_0.2 +	5.0	3:22/1.0 N=60/0. 2:33/1.0 2:56/1.0 4:41/1.0 5:13/1.0 3:52/1.0 3:52/1.0	$\frac{1}{58\%}$	46%		90%	(13.8) 86%
	95.4	3.0	2	3	14							-w-		-	BROWN,	GLATETS	AND				Ŧ		2:56/1.0	98%	93%			
	93.2	5.2	2 60/0.1		14)• 	17 -	┉┽┷╧╧		 60/0.1		W		93.2				5.2		87.2	<u>† 11.2</u>	5.0	5:13/1.0	(4.9)	(4.9)			
	‡		JU/U. I			· · · ·		.						-		ALLINE RC RANITE)			85	-	ŧ		3 20/1 0	9070	98%			
1	+													-	CLOSE TO WIDE	FRACTUF	RE SPACING,			82.2	16.2	FO	3:48/1.0 4:20/1.0 3:33/1.0	(4.0)	(2.0)			
	‡					· · · ·	. .	.						-		RANITE	. 960/		80	. -	ŧ	5.0	3:54/1.0	(4.0) 80%	(3.8) 76%			
	‡													-	REC = 909		00%			77 2	21.2		3:53/1.0 4:29/1.0 5:52/1.0					
	‡						· · · · ·	.						-	RI	VR = 63					+		3.32/1.0	·				ľ
	ŧ						· · · · ·						B	-						-	ŧ							
	Ŧ													-							ŧ							
┢	+					•••	• • • • •		• • •		-			- 77.2 -	Boring Terminated	l at Elevati		.2		-	ŧ							
	Ŧ													_	CRYSTA	ALLINE RC	OCK				ŧ							
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		OUNT						GEOLOGIST	ROHIT	WARRIE		
S	ET AV	/E) O\				1 BYPASS)						DWTR (ft)
_	0.11		<u> </u>	FSET							0 HR.	1.0
	2 ft 015		NO	RIHIN		305,533	NDA	EASTING 2,3		LIAMAN	24 HR.	1.6
_			0		_		INVV	/ Casing W/SPT & (Automatic
	2/15		00	WP. D/	AIE	02/12/15		SURFACE WA	ATER DE	PIH N/	A	
f	STR	ATA	L									
	REC. (ft) %	RQD (ft) %	0 G	ELEV.	(ft)		D	ESCRIPTION AND	D REMAR	<s< td=""><td></td><td>DEPTH (ft)</td></s<>		DEPTH (ft)
	/0	70	-		(11)			Begin Coring	@ 5 2 ft			
	(14.4) 90%	(13.8) 86%	R	93.2				CRYSTALLIN (GRANI	IE ROCK			5.2
	0070	00,0	R	-		HARD, GRAY,	FRE	SH WEATHERING SPACING, G	G, CLOSE	TO WIDE	FRACTUR	RE
			R	-				RMR =				
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			X	77.2		Dariaa Tarr		ed at Elevation 77.				21.2
				-		Boring Term	inate	ed at Elevation 77.	Z TT ON CF	(151ALLII	NE RUCK	
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WBS	3659	6.1.2			ТІ	P U-333	30		COUNT	Y NASH					GEOLOGIST ROHIT	VARRIER			WBS	36596	5.1.2			TIP	U-333	30	С	OUN	ITY
SITE	DESCR	RIPTION	BRI	DGE N	NO. 19	08 ON -Y1	1- (SL	JNSET	AVE) O\	/ER -L- (US	301 BY	PASS	5)			G	ROUND WTR (ft)		SITE	DESCR		BRI	DGE NO	. 198 (DN -Y1	1- (SUNS	ET A	VE) (٥V
BOR	ING NO	. B1-B	-LL		SI	TATION	18+1	0		OFFSET	9 ft LT				ALIGNMENT -Y1-) HR. 1.0		BOR	ING NO	. B1-E	3-LL		STAT	TION	18+10			
COLI	LAR EL	EV. 98	.8 ft		т	OTAL DE	PTH	20.1 ft		NORTHIN	G 805,4	199			EASTING 2,348,101	24	4 HR. 1.4		COLI	AR ELI	EV. 98	3.8 ft		TOT	AL DE	PTH 20	.1 ft		
DRILL	_ RIG/HA	MMER E	FF./DA	TE TR	RI0055	CME-55 68	8% 02	/20/2015			DRILL	METHO	i dc	NW (asing W/SPT & Core	HAMMER	TYPE Automatic		DRILL	. RIG/HA	MMER E	FF./DA	TE TRIO	55 CM	E-55 68	8% 02/20/2	2015		
				HICHA	rd s i		TE C	02/11/1	5	COMP. DA	TE 02/	'11/15	5	;	SURFACE WATER DEI	PTH N/A			DRIL	LER V	VENDE	ELL WH	IICHARE	STAF	rt da	TE 02/1	1/15		
ELEV	DRIVE ELEV	DEPTH	BLC	w col	JNT		В	LOWS F	PER FOOT	-	SAMP.		L		SOIL AND RC		PTION	1	COR	e size	NQ-2			TOTA	AL RUI	N 14.5 f			
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	5	50	75 100	NO.	Имо	I G		_EV. (ft)	011020014	DEPTH (f	:)	ELEV	RUN ELEV	DEPTH	RUN	DRILL RATE	REC.	JN RQD	SAMP.	STF REC.	RATA RQI	
																			(ft)	(ft)	(ft)	(ft)	(Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	_
100		Ļ												L.			_		93.2	93.2 -				(0.0)	(0.0)	<u> </u>			_
	97.8	- 1.0	-									┟┳	~	+ 9i	RE	D SURFACE		5			5.6	4.5	3:41/1.0	(3.9) 87%	(3.9) 87%		(13.9) 96%	93%	3) 6
0.5	95.4	- - 3.4	2	3	5			· · ·				-w		∲ ∳ 9	RED-BROW	N, CLAYEY S	SAND 3.4	1	90	88.7	10.1		N=60/0.0 3:41/1.0 2:21/1.0 2:20/1.0 1:22/1.0 1:11/0.5						
95	1 -	†	2	2	2	4			<u>.</u>			w			LOOSE, BROV	VN, COARSI					Ì	5.0	<u>1:11/0.5</u> 3:43/1.0	(5.0) 100%	(4.6)	RS-1	-		
	93.2	<u> </u>	60/0.0					· · ·			•				CRYSTA			2	85	-	Ł		3:43/1.0 3:29/1.0 3:25/1.0 3:26/1.0		5070		1		
90	_	±								• • • •				Ł	MODERATELY H					83.7	15.1	5.0	2.55/10		(5.0)				
		ŧ												ł	AND WHITE, FRES CLOSE TO WIDE					-	Ŧ	5.0	2:47/1.0 2:53/1.0 3:33/1.0	100%	100%				
		Ŧ					. .				RS-1	1			GI	RANITE			80	78.7	T 20 1		2:02/1.0						
85	-	Ŧ						· · · ·		· · · · ·	!			F	REC = 96	% RQD = 93	3%			10.1	<u>+ 20.1</u>		3:01/1.0					+	┦
		Ŧ					. .							F	RM	/IR = 79				-	ŧ								
80		ŧ						· · · · · ·												-	ŧ								
		ŧ									i		مر الجنج محم	7		at Elsustian	20.7	<u>1</u>		-	ŧ								
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NCDOT BORE DOUBLE U3330_GEO_BRDG01968.0198_BH/GPJ_NC_DOT/GDT_69/15	-	Ŧ												F				CORE		-	‡								
DOT		‡												F				NCDOT CORE DOUBLE U3330_GEO_BRDG019680198_BH.GPJ NC_DOT.GDT		-	‡								
NCI		†												F				NC			ł								

C	OUNT	Y NASH			GEOLOGI	ST	ROHIT V	VARRIE	R	
ET A	/E) 0\	/ER -L- (US	301 BYPASS)						GROUN	D WTR (ft)
		OFFSET			ALIGNME	NT	-Y1-		0 HR.	1.0
.1 ft		NORTHING	G 805,499		EASTING	2,3	348,101		24 HR.	1.4
2015			DRILL METHOD	NW	Casing W/SP			НАММ		Automatic
1/15		COMP DA	TE 02/11/15		SURFACE					
t									/ \	
STF	RATA	L								
REC. (ft) %	RQD (ft) %	0		D	ESCRIPTION	ANI	D REMARK	S		DEDTU (II)
%	%	G ELEV. ((ft)				<u> </u>			DEPTH (ft)
(13.9)	(13.6)	93.2			Begin Cor CRYSTA	ing LLIN	@ 5.6 ft NE ROCK			5.6
96%	93%					RANI	TE)		EDEQU	
			WEATHERING,	WITH	I CLOSE TO \	NID!	E FRACTUR	RE SPAC	ING, GRA	NITE
-					RM	1R =	79			
1										
<u> </u>		- 78.7	Borina Terr	ninate	ed at Elevatior	ז ד 178	7 ft ON CR	YSTALLI	NE ROCK	20.1
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NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	36596	5.1.2			Т	I P U-33	30	COU	NTY N	ASH				GEOLOGIST ROHIT WAR	RIER	
SITE	DESCR	IPTION	I BRI	DGE I	NO. 19	98 ON -Y	′1- (SUNS	ET AVE)	OVER -	-L- (US	301 BYI	PASS)		GROU	ND WTR (f
BORI	NG NO.	EB2-	A-LL		S	TATION	19+11		OFF	SET :	34 ft LT			ALIGNMENT -Y1-	0 HR.	2.
COLL	AR ELE	E V. 11	8.0 ft		<u>т</u>	OTAL DE	EPTH 23.	8 ft	NOF	RTHING	3 805,4	33		EASTING 2,348,182	24 HR.	FIA
DRILL	RIG/HAI	MMER E	FF./DA	TE TF	RI0055	CME-55 6	68% 02/20/2	015			DRILL N	IETHO	D Mu	Id Rotary HA	MMER TYPE	Automatic
DRILI	L ER W	/ENDE	LL WH	HICHA	RD S	TART D	ATE 02/0	6/15	CO	MP. DA	TE 02/	06/15		SURFACE WATER DEPTH	N/A	
ELEV	DRIVE ELEV	DEPTH	BLC	w co	UNT		BLOW	/S PER FO	ОТ		SAMP.	▼∕	L	SOIL AND ROCK D	ESCRIPTION	1
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75	100	NO.	мо		ELEV. (ft)		DEPTH
20		Ļ												-		
		-											-	118.0 GROUND SU		
15		1.0	5	2	3	 	· · · · ·	· · · · · ·		· · · · · ·		5M7		ROADWAY EME BROWN, SILT		
15	114.5	- 3.5	2	4	4				.			м		-		
	112.0	6.0				.¶ ⁸ .	· · · · ·	· · · ·	.	· · · ·						
10	- 109.5 —	- 85	3	2	4	•6· ·			.			W		_		
	-103.5		2	3	5		· · · · ·	· · ·	.	· · ·		w				
	-	F											L			
05	104.5 -	- 13.5	4	7	9	$ -\tau$								- 104.5 RESIDU		
	-	F	7	'	5		16		.			W		RED-BROWN, CL		
00	-								.				\sim			
	99.5 -	<u>- 18.5</u> -	3	3	4	67.								-99.5 RED-BROWN ,CO	ARSE SAND	
	-	-							.							
95	94.5 - 94.2 -	- 23.5 23.8				· · ·	· · · ·	· · · · · · · · · · · · · · · · · · ·	·					-94.5		
	94.2	23.8	100/0.3 60/0.0				ľ	ľ		100/0.3 60/0.0			-	_94.2 WEATHERED (GRANIT		\int_{-}^{-}
	-	-												CRYSTALLIN (GRANI	EROCK	
	-	-												Boring Terminated	with Standard	
	-													Penetration Test Refusal ON CRYSTALLI		94.2 ft
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SHEET 12



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	36596					P U-3330			Y NASH					GEOLOGIST ROHIT WARRI	1			36596					U-333			UNT
				DGE N				AVE) OV	/ER -L- (US			5)			GROUND WTR (ft)	-					DGE NC			- (SUNS	ET AV	E) OV
	NG NO.				_	TATION 18			OFFSET					ALIGNMENT -Y1-	0 HR. 9.5				. EB2-					18+96		
	AR ELE					DTAL DEPT			NORTHIN	1				EASTING 2,348,162	24 HR. 9.3				EV. 10					PTH 12		
						CME-55 68%			i					-	IER TYPE Automatic									3% 02/20/2		
									COMP. DA			<u> </u>	_	SURFACE WATER DEPTH N	/A					LL WF	IICHAR			TE 02/0	5/15	
ELEV (ft)	ELEV	DEPTH (ft)		0.5ft		0 2		PER FOOT 50	75 100	SAMP.	17			SOIL AND ROCK DES					NQ-2				AL RUN JN	N 5.0 ft	STRA	
,	(ft)	()	0.511	0.511	0.511	0 2	1	1	100	NO.	/мо	I G	<u>і Е</u>	ELEV. (ft)	DEPTH (ft)		ELEV (ft)	RUN ELEV	DEPTH (ft)	RUN (ft)	DRILL RATE	REC. (ft)	RQD (ft) %	SAMP. NO.	REC. (ft) %	RQD (ft)
																		(ft)	(,	()	(Min/ft)	%	%		%	%
110	108.8					<u> </u>								09.8 GROUND SURF. ROADWAY EMBAN			101.9	101.9	7.9	5.0	5:30/1.0	(4.8)	(4.8)		(4.8) 98%	(4.8)
	107.1	2.7	3	2	2	4						∟∟		BROWN, SILTY S			100	-	ŧ		4:37/1.0 4:20/1.0		96%		98%	98%
05	_	-	4	5	7	• • • 12 -	·					∟∟						96.9	12.9		4:46/1.0 5:44/1.0					
	103.6	6.2	2	3	97/0.3		· · · ·		· · · · · ·					03.6 WEATHERED R	6.2			-	+							
	-	-	_	Ū			· · · ·		· 100/0.8					01.9 (GRANITE) CRYSTALLINE R	7.9				ŧ.							
0	-	-						<u> </u>						(GRANITE)					ł							
	-	-											9	HARD, GRAY AND WHITE 7.0 WEATHERING, WITH WI	DE TO VERY 12.8			-	ł							
	_	-											E	WIDE FRACTURE SPACI	NG, GRANITE				ŧ							
	7	-											E	REC = 96% RQD	= 96%				ŧ I							
	-	-											E	RMR = 71 Boring Terminated at Eleva	tion 97.0 ft ON				Ī							
	-	-											F	CRYSTALLINE R	OCK				Ŧ							
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C(DUNT	YN	IASH			GEOLOGIST	ROHIT	WARRIE	R	
ET AV	′E) O\	/ER	-L- (US 301	I BYPASS)					GROUN	ID WTR (ft)
			FSET 20 f			ALIGNMENT	-Y1-		0 HR.	9.5
8 ft			RTHING 8			EASTING 2,			24 HR.	9.3
015					NIM	Casing W/SPT &		намм		Automatic
		00			INVV					Automatic
5/15		CO	MP. DATE	02/05/15		SURFACE W	ATER DE	TH N/	A	
070	AT 4									
STR REC. (ft) %	RQD (ft) %	L O G	ELEV. (ft)		D	ESCRIPTION AN	ID REMARK	S		DEPTH (ft)
						Begin Coring	@ 7.9 ft			
(4.8) 98%	(4.8) 98%		_ 101.9			CRYSTALLI (GRAN				7.9
			– H/	ARD, GRAY AN		HITE, WITH FRE	SH WEATH	ERING, V		E TO
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ROCK TEST RESULTS

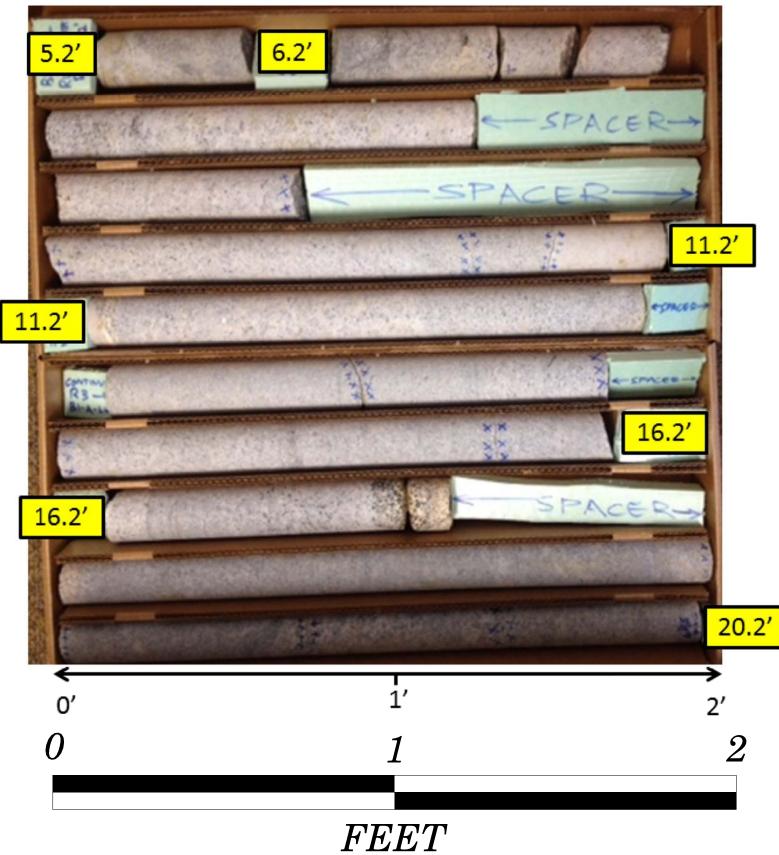
B1–B–LL

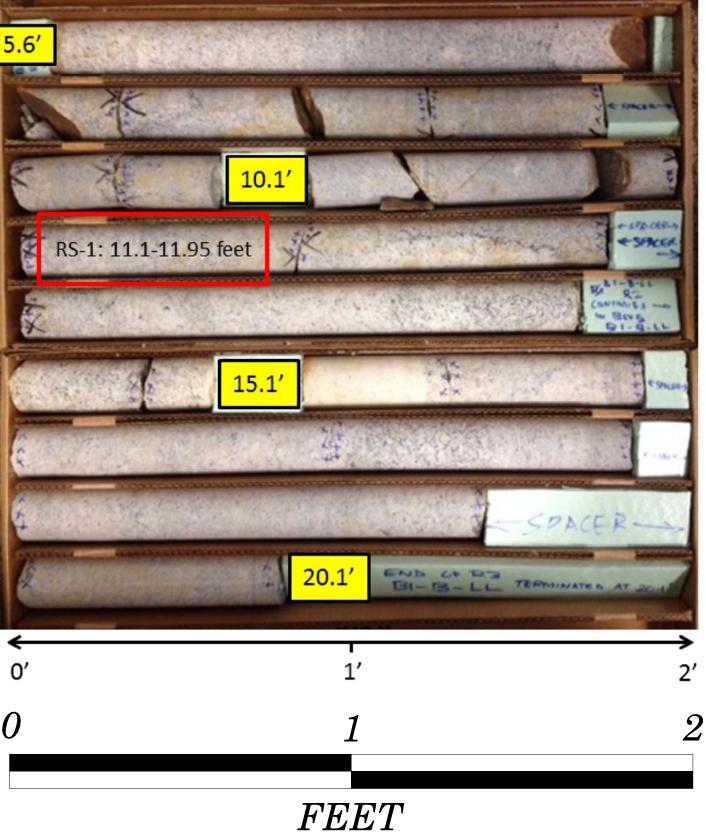
ROC	CK TE	ST RE	SULTS		
SAMPLE	OFFSET	STATION	DEPTH	ROCK	UNCONFINED COMP.
NO.	011011	51111011	INTERVAL	TYPE	STRENGTH, KSI
RS-1	9'LT	18+10	11.1–11.95	GRANITE	23.49

SHEET 14 36596.1.2 (U-3330) BRIDGE NO. 198 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

CORE PHOTOGRAPHS

B1-A-LL Boxes 1 & 2: 5.2-20.2 feet

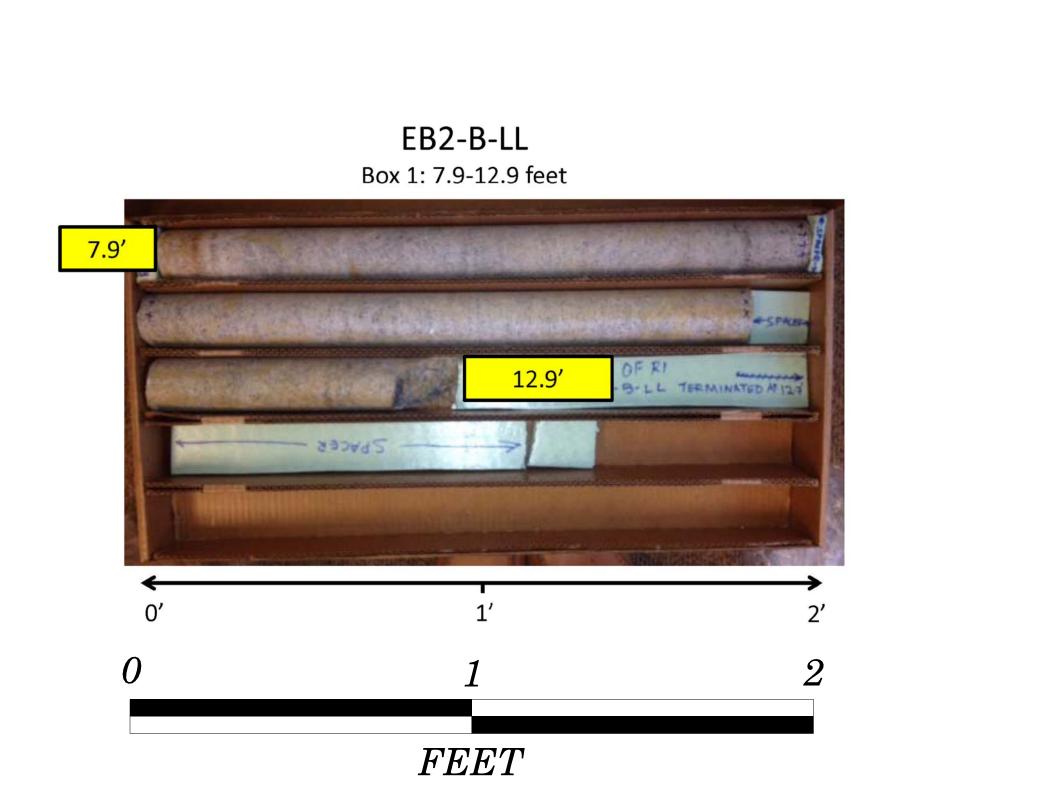




SHEET 15 36596.1.2 (U-3330) BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)

B1-B-LL Boxes 1 & 2: 5.6-20.1 feet

CORE PHOTOGRAPHS



SHEET 16 36596.1.2 (U-3330) BRIDGE NO. 198 ON -YI- (SUNSET AVE) OVER -L- (US 301 BYPASS)

SITE PHOTOGRAPH (LOOKING FROM EAST)



SHEET 17 36596.1.2 (U-3330) BRIDGE NO. 198 ON -Y1- (SUNSET AVE) OVER -L- (US 301 BYPASS)

CONTENTS

330

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REFERENCE

<u>SHEET NO.</u>	DESCRIPTION
I	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE(S)
5-6	CROSS SECTION(S)
7-14	BORE LOG(S) & CORE REPORT(S)
15	SOIL TEST RESULTS
16	CORE PHOTOGRAPH(S)

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**

36596 PROJEC

STATE N.C.

1

SHEETS 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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATIO GEOTECHNICL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 (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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 CALIDANE THAT TO FIAL 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 WADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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 INVESTIGATION AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO DE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- ES: 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 CLAINS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

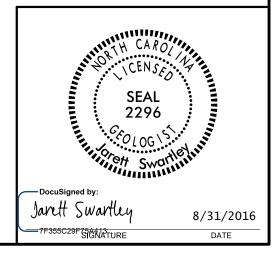
J.R. SWARTLEY

O.B. OTI

D.G. PINTER

C. CONGLETON

- INVESTIGATED BY _J.R. SWARTLEY
- DRAWN BY <u>T.</u> WALKER
- CHECKED BY <u>N.T. ROBERSON</u>
- SUBMITTED BY ______ N.T. ROBERSON
- DATE ______ FEBRUARY 2015



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

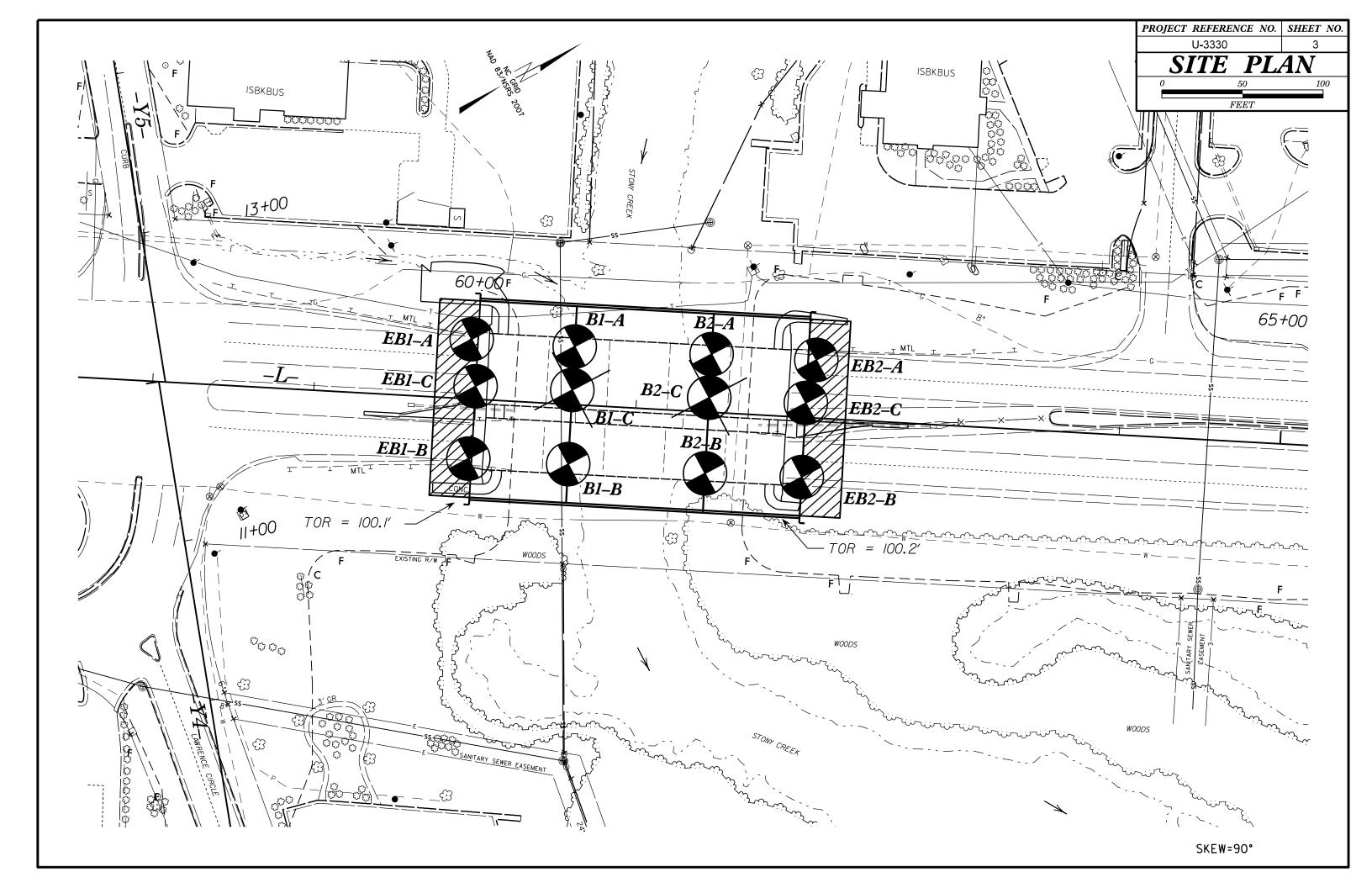
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

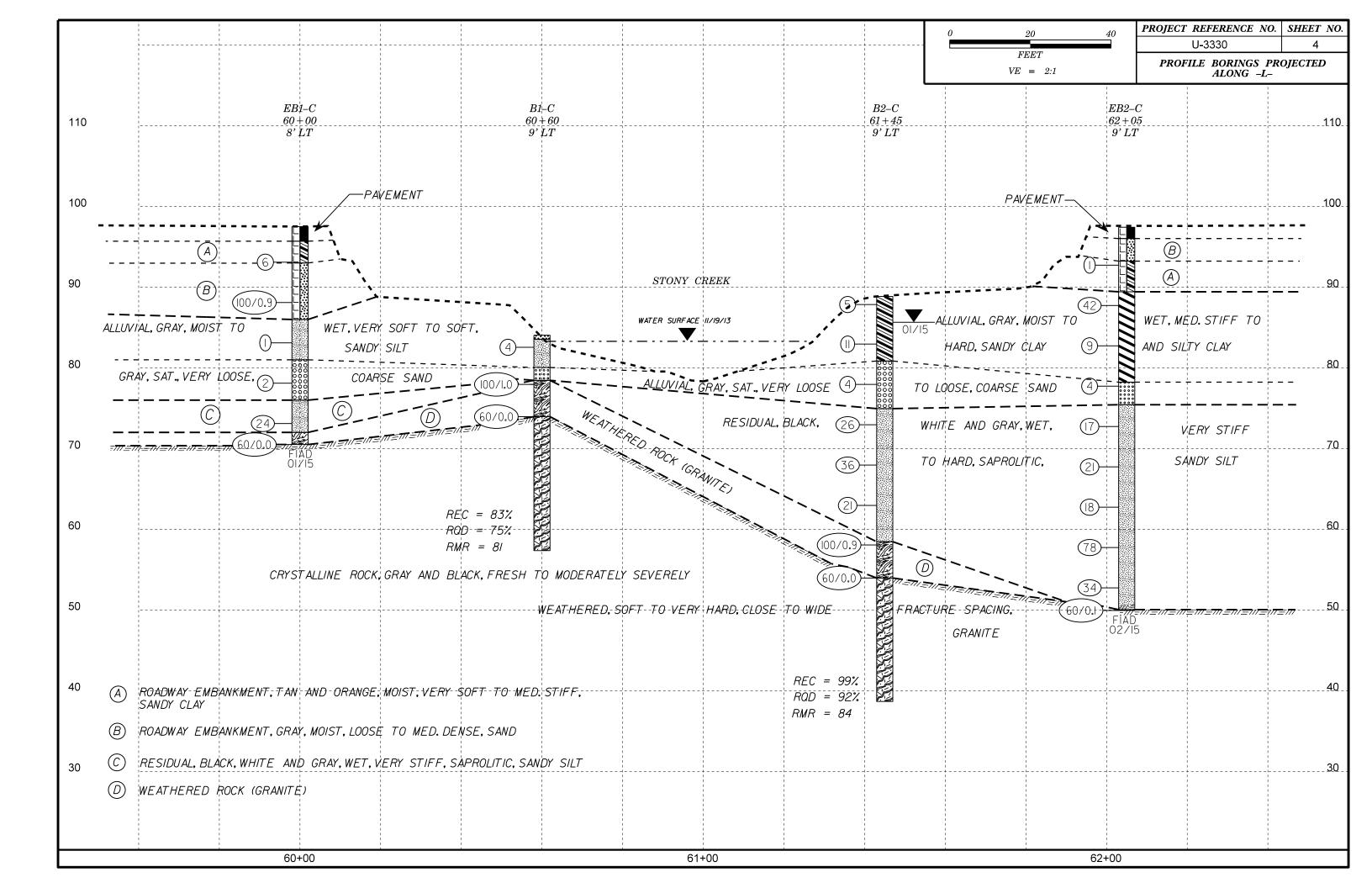
SOIL DESCRIPTION		GRADATION		Τ	ROCK DESCRIPTION
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS BE PENETRATED WITH A CONTINUOUS FLICHT POWER AUGER AND VIELD LESS THAN 100 BLOW ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO 1 206, ASTM DI586). SOIL CLASS IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLL CONSISTENCY COLOR LEVILUE AND STATUS OL CLASSING OL CLAS	S PER FOOT UNIFORMLY GRADE SIFICATION GAP-GRADED - IN OWING:	NDICATES A GOOD REPRESENTATION OF PARTIC D - INDICATES THAT SOIL PARTICLES ARE ALI ICATES A MIXTURE OF UNIFORM PARTICLE SIZ ANCLU ADITY OF CRAIN	L APPROXIMATELY THE SAME SIZE. ZES OF TWO OR MORE SIZES.	ROCK LINE INDICATES THE LE SPT REFUSAL IS PENETRATION	PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TEST EVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD IN BY A SPLIT SPOON SAMPLER EOUAL TO OR LESS THAN 0. IN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK WEATHERED ROCK.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FAC AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAM	PLE, THE AND	ANGULARITY OF GRAIN		ROCK MATERIALS ARE TYPICAL	ALLY DIVIDED AS FOLLOWS:
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A- SOIL LEGEND AND AASHTO CLASSIFICATION		SUBANGULAR, SUBROUNDED, OR ROUNDED.		WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SP1
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS	ITERIALS	MINERALOGICAL COMPOSI		CRYSTALLINE	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC RC
CLASS. (≤ 35%, PASSING *200) (> 35%, PASSING *200) (> 35%, PASSING *200) GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, 4	ABE	NE NAMES SUCH AS QUARTZ, FELDSPAR, MICA, T SED IN DESCRIPTIONS WHEN THEY ARE CONSID		ROCK (CR)	WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE IN GNEISS, GABBRO, SCHIST, ETC.
CLASS. A-1-8 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A		COMPRESSIBILITY		NON-CRYSTALLINE	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL
SYMBOL		SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE	LL < 31 LL = 31 - 50	COASTAL PLAIN	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ET COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT
7. PASSING		HIGHLY COMPRESSIBLE PERCENTAGE OF MATER	LL > 50	SEDIMENTARY ROCK	SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDS SHELL BEDS, ETC.
40 30 MX 50 MX 51 MN 200 15 MX 52 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 40 30 MX 50 MX 50 MX 50 MX 55 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	S PEAT	GRANULAR SILT - CLAY		·	WEATHERING
MATERIAL PASSING *40 LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 50LS WITH	- ORGANIC MA TRACE OF ORGA LITTLE ORGANI MODERATELY OF HIGHLY HIGHLY ORGANI	NIC MATTER 2 - 3% 3 - 5% MATTER 3 - 5% 5 - 12% GANIC 5 - 10% 12 - 20%	OTHER MATERIAL TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE	HAMMER IF CRYS VERY SLIGHT ROCK GENERALLY (V SLI.) CRYSTALS ON A	Y FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H
PI 6 MX NP 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN MODERATE MODERATE GROUP INDEX 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMQUNTS OF	ORGANIC	GROUND WATER		OF A CRYSTALLIM SLIGHT ROCK GENERALLY	INE NATURE. Y FRESH,JOINTS STAINED AND DISCOLORATION EXTENDS INTO RC
USUAL TYPES STONE FRAGS. OF MAJOR GRAVEL, AND MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	SOILS V	WATER LEVEL IN BORE HOLE IMMEDIA STATIC WATER LEVEL AFTER <u>24</u> +		(SLI.) 1 INCH. OPEN JOI CRYSTALS ARE D	INTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONA DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMEF RTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECT
	 	PERCHED WATER, SATURATED ZONE, OR		(MOD.) GRANITOID ROCKS	S, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE EXCELLENT TO GUOD FAIR TO POUR POOR POOR		SPRING OR SEEP		WITH FRESH ROCK	DER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH CK.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ;PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBO	115		PT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F) AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L
RANGE OF STANDARD RANGE OF		25 /025		(MOD. SEV.) AND CAN BE EXC	CAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND D YIELD SPT REFUSAL
PRIMARY SUIL TYPE CONSISTENCY PENETRATION RESISTENCE CUMPRESSIV GENERALLY VERY LOOSE < 4				SEVERE ALL ROCK EXCEP (SEV.) REDUCED IN STR	<u>PT DUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND E</u> RENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS / T. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
MATERIAL MEDIUM DENSE 10 TO 30 N				<u>IF TESTED, WOUL</u>	LD YIELD SPT N VALUES > 100 BPF
(NUN-LUHESIVE) VERY DENSE > 50 VERY SOFT < 2	0.25 INFERR	DADWAY EMBANKMENT DADWAY EMBANKMENT DADWAY EMBANKMENT DADWARY	TEST SOUNDING ROD	SEVERE BUT MASS IS EFI (V SEV.) REMAINING, SAPR	PT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF FFECTIVELY REDUCED TO SOLL STATUS, WITH ONLY FRAGMENTS O ROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT NGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N</u>
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 MATERIAL STIFF 8 TO 15 1 T			ELL - TEST BORING WITH CORE SPT N-VALUE	COMPLETE ROCK REDUCED T	TO SOIL. ROCK FABRIC NOT DISCERNIBLE,OR DISCERNIBLE ONLY CENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS
HARD > 30 >		INSTALLATION)	-	ROCK HARDNESS
TEXTURE OR GRAIN SIZE		RECOMMENDATION SYMB	ULS 조국 UNCLASSIFIED EXCAVATION -		ATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN
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	EXCAVATION	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF		BLOWS OF THE GEOLOGIST'S PICK. HED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER B
BOULDER COBBLE GRAVEL COARSE FINE SILT	CLAY SHALLOW UNDERCUT	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL	TO DETACH HAND	D SPECIMEN.
(BLDR.) (CDB.) (GR.) (CSE. SD.) (F SD.) (SL.) GRAIN MM 305 75 2.0 0.25 0.05 0.	(CL.) 005 AR - AUGER REFUS		VST - VANE SHEAR TEST	HARD EXCAVATED BY H BY MODERATE BL	
SIZE IN. 12 3	BT - BORING TERM CL CLAY	MOD MODERATELY	WEA WEATHERED $\widetilde{\chi}$ - UNIT WEIGHT	HARD CAN BE EXCAVAT	D OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE C TED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENET CSE COARSE	RATION TEST NP - NON PLASTIC ORG ORGANIC	$\dot{\gamma}_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOL SOFT CAN BE GROVED	DLOGIST'S PICK. OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE - SATURATED - USUALLY LIQUID; VERY WET,	DPT - DYNAMIC PE		ST <u>SAMPLE ABBREVIATIONS</u> S - BULK SS - SPLIT SPOON	FROM CHIPS TO PIECES CAN BE E	SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN BROKEN BY FINGER PRESSURE.
LL LIQUID LIMIT (SAT.) FROM BELOW THE GROUND W	TO FOSS FOSSILIFE	FRACTURES TCR - TRICONE REFUSAL	ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL	SOFT OR MORE IN THIC FINGERNAIL.	WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. CKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH
RANGE - WET - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMEN HI HIGHLY	S W - MOISTURE CONTENT V - VERY	CBR - CALIFORNIA BEARING RATIO	FRACTURE S	SPACING BEDDING SPACING TERM
OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM	MOISTURE DRILL UNITS:	EQUIPMENT USED ON SUBJECT ADVANCING TOOLS:	PROJECT HAMMER TYPE:		J. FEINO LEUNI IORE THAN 10 FEET VERY THICKLY BEDDED 3 TO 10 FEET THICKLY BEDDED 1 TO 3 FEET THINLY BEDDED
- DRY - (D) REQUIRES ADDITIONAL WATER ATTAIN OPTIMUM MOISTURE	CME-45C	CLAY BITS	X AUTOMATIC MANUAL		Ø.16 TO 1 FOOT VERY THINLY BEDDED 0.0 ESS THAN Ø.16 FEET THICKLY LAMINATED 0.00 THINLY LAMINATED <
PLASTICITY		X 8" HOLLOW AUGERS	В		INDURATION
PLASTICITY INDEX (PI) DRY STR NON PLASTIC 0-5 VERY SLIGHTLY PLASTIC 6-15 SLIG		HARD FACED FINGER BITS	X -N W	FOR SEDIMENTARY ROCKS, INDU	DURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDI HIGHLY PLASTIC 26 OR MORE HIG	UM	TRICONE STEEL TEETH	POST HOLE DIGGER	MODERATELY INDURATED	CRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR	[TRICONE TUNGCARB.		INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER.
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEAR			VANE SHEAR TEST	EXTREMELY INDURATED	

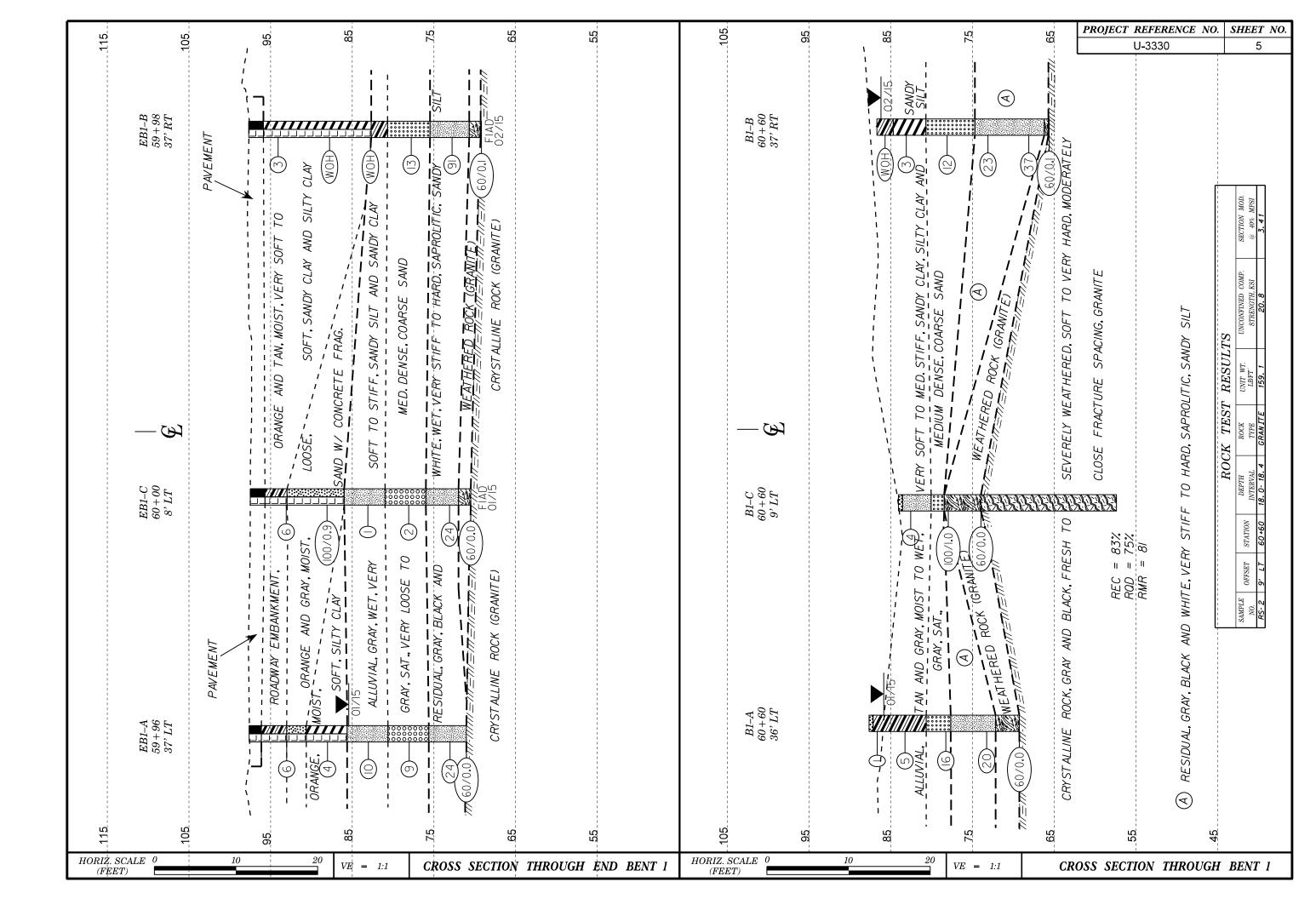
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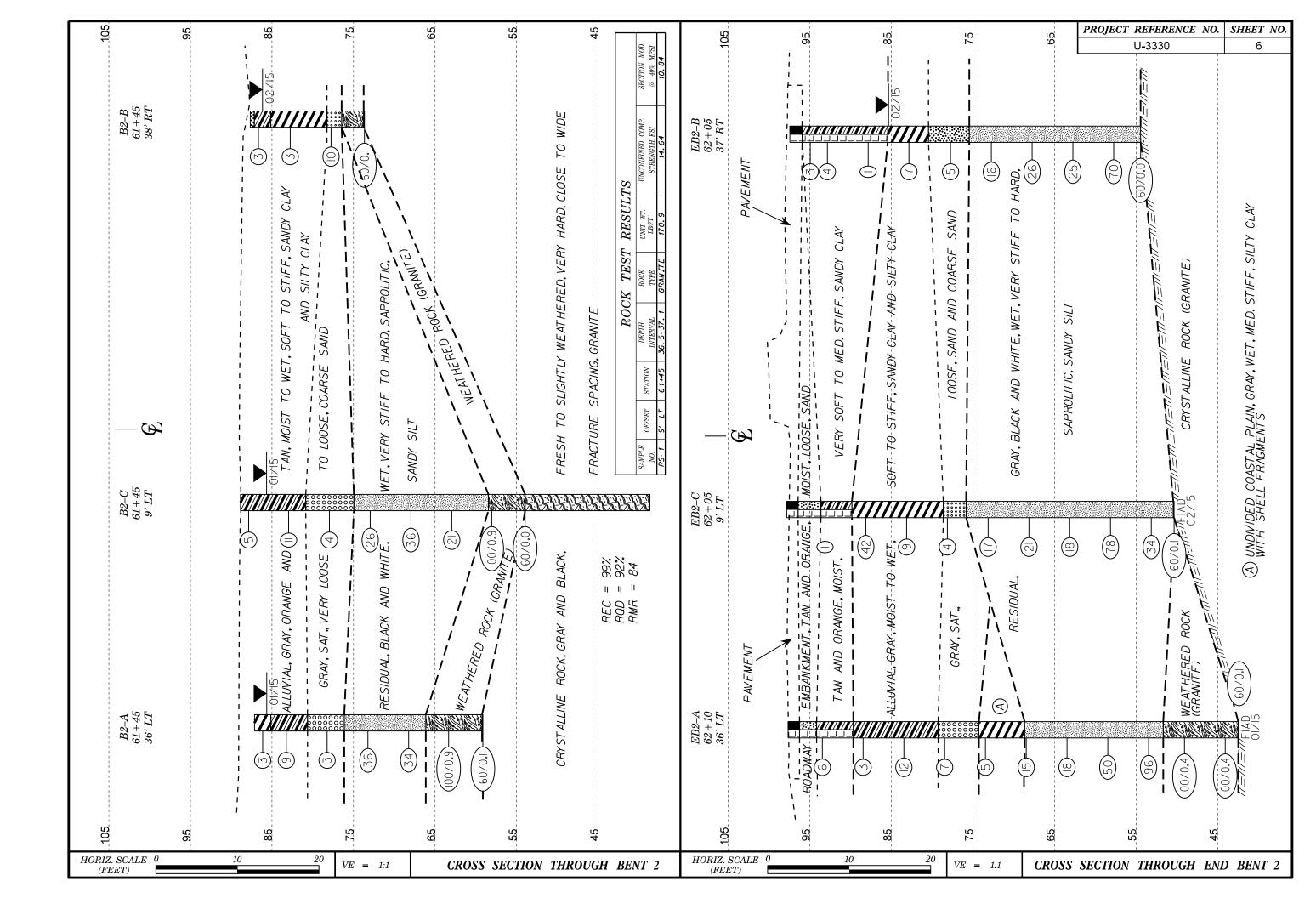
U-3330

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ED. AN INFERRED	TERMS AND DEFINITIONS
) SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
I FOOT PER 60 IS OFTEN	ADUIFER - 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
T N VALUES >	ANGULAREOUS - APPELED TO ALL MOUSS ON SUBSTANCES COMPOSED OF CLAY MINERALS, ON 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
DCK THAT NCLUDES GRANITE,	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.
AL PLAIN IF TESTED. C.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
MAY NOT YIELD STONE, 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.
RINGS UNDER	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
COATINGS IF OPEN,	$\underline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
HAMMER BLOWS IF	<u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
DCK UP TO AL FELDSPAR	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
R BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
AY. ROCK HAS H AS COMPARED	PARENT MATERIAL.
H HS CUMPHKED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
FELDSPARS DULL LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
ARE KAOLINIZED	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
RE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
OF STRONG ROCK T ONLY MINOR	<u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.
<u>VALUES < 100 BPF</u> IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
IN SMALL AND S. SAPROLITE IS	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.
NS REQUIRES	$\underline{SAPROLITE}$ - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
BLOWS REQUIRED	<u>SILL</u> - 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.
EEP CAN BE DETACHED	$\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
OR PICK POINT. BLOWS OF THE	STANDARD PENETRATION TEST (PENETRATION RESISTANCE)(SPI) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB.HAMMER FALLING 30 INCHES REDUIRED 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.
I FRAGMENTS NT. SMALL, THIN	<u>STRATA CORE RECOVERY (SREC.)</u> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
. PIECES 1 INCH HED READILY BY	STRATA ROCK QUALITY DESIGNATION (SRDD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENOTH 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: GPS-3
THICKNESS 4 FEET	
1.5 - 4 FEET	ELEVATION: 98.21 FEET
.16 - 1.5 FEET 03 - 0.16 FEET	NOTES:
08 - 0.03 FEET	TOP OF NE RAIL = 100.2 feet
0.008 FEET	TOP OF SE RAIL = 100.1 feet
EAT, PRESSURE, ETC.	
.	
TEEL PROBE:	
PROBE:	
E;	
	DATE: 8-15-14



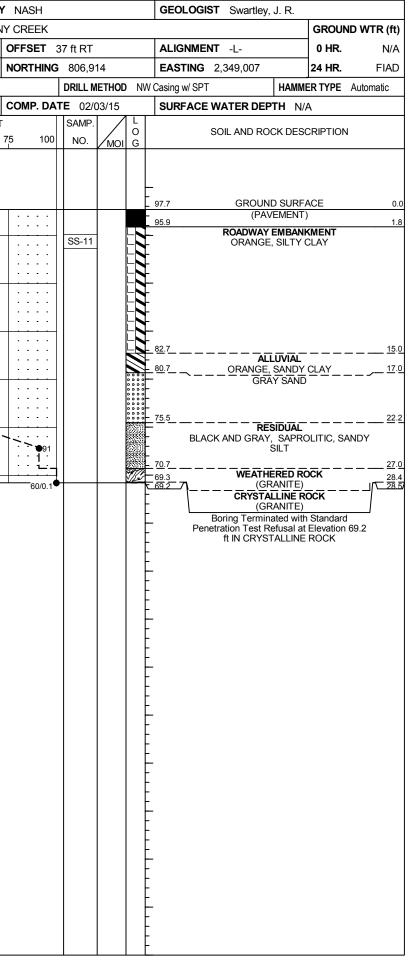






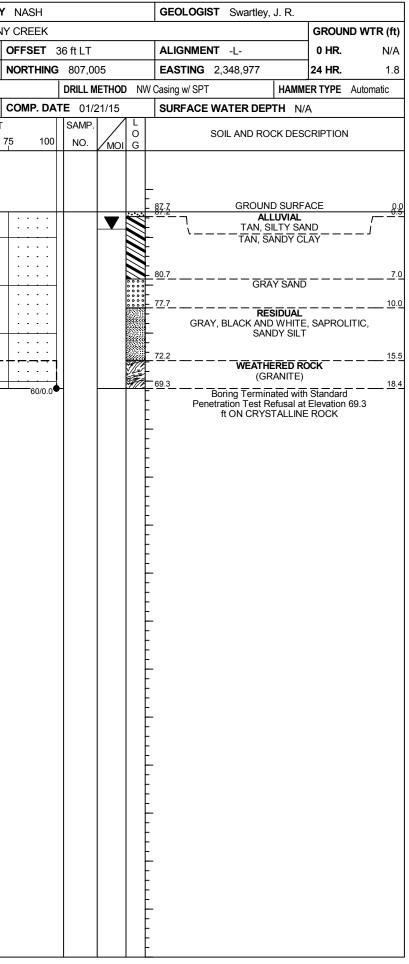
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	36596					P U-3330			Y NASH			GEC	LOGIST Swartley,	, J. R.	1		36596					D -3330		COUNT	
				DGE O		•	,	/ER STON	NY CREEK						GROUND WTR (ft)					DGE OI	`		YPASS) O\	ER STO	NY
	ing no.					TATION 5			OFFSET				SNMENT -L-		0 HR. N/A		ing no.					ATION :			<u> </u>
	LAR EL					OTAL DEP		ť	NORTHING				TING 2,348,943		24 HR. 12.2		LAR ELI						TH 28.5 f	t	N
DRIL	RIG/HAN	MMER EF	F./DAT	E RFC	00074 C	ME-55 92%	07/12/2011			DRILL N	NETHOD N	W Casing	w/ SPT	HAMM	ER TYPE Automatic	DRILI	L RIG/HAN	IMER EI	FF./DATE	E RFO			07/12/2011		
DRIL	LER P					TART DAT			COMP. DA			SUR	FACE WATER DEF	PTH N//	٩	DRIL	LER P					ART DAT	E 02/03/1		C
ELEV	DRIVE ELEV	DEPTH	·					PER FOOT		SAMP.	1 1/ 10		SOIL AND RO	CK DES	CRIPTION	ELEV	DRIVE	DEPTH	·	W COL				PER FOO	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI G	ELEV.			DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75
100		Ļ										L				100		Ļ							
		‡										97.7	GROUN	ID SURF	ACE 0.0			ŧ							
		f										96.2		VEMENT)	1.0			f							:
95	94.1	3.6				 							ROADWAY ORANGE,		CLAY	95	95.1	2.6	1	2	1	3 • • •	<u> </u>	<u> </u>	+
		ŧ	WOH	3	3	6						93.1		TAN, SI	LTY SAND4.6			ŧ							:
90		Ŧ										90.7			7.0	90		Ŧ							•
	89.1	8.6	1	2	2	<u> </u>				SS-2		5	ONANGL	., SILTT			88.8	8.9	WOH	WOH	WOH				•
		Ŧ				4				00-2					10.0			ŧ		WOIT	won	•0····			
85	0/1	+ + 13.6				<u> </u>						<u>- 85.7</u>	AL		<u> </u>	85		ŧ						+ • • •	·
	84.1	+ 13.0	2	5	5	- (- ● 10 -				SS-3]	∭- ∭-	GRAY,	SANDY S	SILT		83.8	<u>- 13.9</u> -	WOH	wон	wон				:
00		‡				: ; : :						80.7			17.0			ŧ				[<u>``</u>			:
80	79.1	18.6		_							0000	000-		OARSE S	SAND	80	78.8	- 18.9							:+
		ŧ	2	5	4	· • 9 · ·					00							ŧ	2	4	9	• • • 13			:
75		ŧ				· · · .						ō <u> </u>		SIDUAL	22.0	75		ł							•
	74.1	23.6	6	8	16		24						GRAY, BLACK AND	D WHITE	, SAPROLITIC,		73.8	23.9	15	30	61				:-
	71.1	T 26.6						+				71.1	SAN		26.6			Ŧ							.
	-	Ŧ	60/0.0						60/0.0			F	Boring Termin Penetration Test R	ated with Refusal at	Standard	70	69.3	28.4							
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NCDOT BORE DOUBLE U3330_GEO_BRDG_STONEY_CREEK_SPT_BORINGS.GPJ_NC_DOT.G		<u>†</u>										Ł					:	t							
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SHEET 7 OF 16



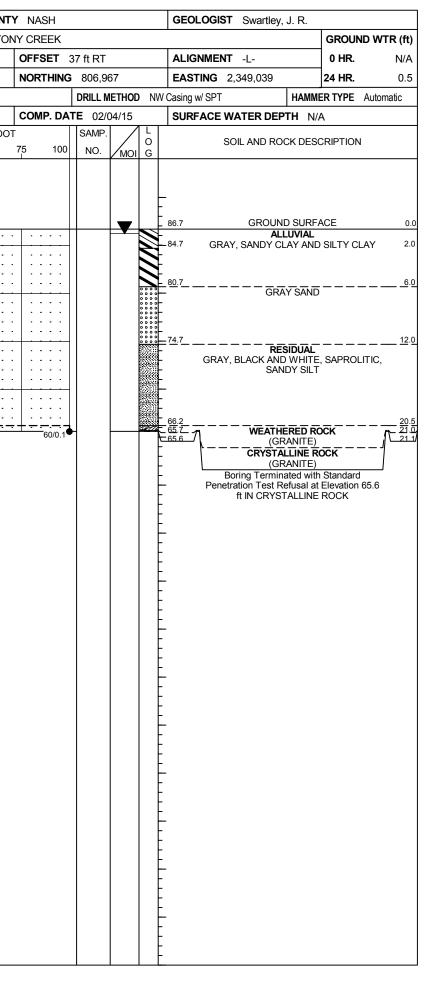
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	36596					P U-3330			Y NASH				GEOLOGIST Swartley, J. R.	1	_		36596.7					P U-3330		COUNTY	
SITE	DESCRI	PTION	BRID	DGE O	N -L-	(US 301 BY	PASS) O	/ER STO	NY CREEK					GROUND WTR (f)	SITE D	DESCRIF	PTION	BRID	GE OI	N-L- ((US 301 B)	YPASS) OV	ER STON	١Y
BOR	NG NO.	EB1-0	С		S	TATION 6	0+00		OFFSET 8	3 ft LT			ALIGNMENT -L-	0 HR. N//	۱ ۱	BORIN	ig no.	B1-A			SI	FATION 6	0+60		0
COL	AR ELE	IV . 97	7.5 ft		Т	OTAL DEP	FH 27.0 f	t	NORTHING	806,9	39		EASTING 2,348,970	24 HR. FIAI		COLL	AR ELE	/. 87	.7 ft		т	OTAL DEP	TH 18.4 ft	:	ľ
DRILL	RIG/HAM	MER EF	F./DATI	E RFC	00074 C	ME-55 92%	07/12/2011		•	DRILL N	IETHOD	NW	Casing w/ SPT HAMM	ER TYPE Automatic		DRILL F	RIG/HAMN	IER EF	F./DATE	RFO	0074 C	ME-55 92%	07/12/2011		
DRIL	LER Pi	nter, D.	. G.		S	TART DATI	E 01/27/1	5	COMP. DA	FE 01/2	27/15		SURFACE WATER DEPTH N/	A		DRILL	ER Pin	ter, D.	G.		ST	ART DAT	E 01/21/1	5	0
ELEV	DRIVE	DEPTH	BLC	W CO	UNT		BLOWS	PER FOO	Г	SAMP.		L				ELEV		DEPTH	BLO	w cou	UNT		BLOWS	PER FOOT	
(ft)	ELEV (ft)	(ft)		0.5ft	0.5ft	0	25	50	75 100	NO.	мог	O G	SOIL AND ROCK DESC	CRIPTION DEPTH		(ft)	ELEV [(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25 8	50	7
								•															•	•	
100																									
100		_										F	-			90									
	-	-					· · · · ·	1				-	97.5 GROUND SURF/ (PAVEMENT)		.0		87.7	0.0		0	1	1			_
95	-	-											95.7 ROADWAY EMBANI	<u>í</u> 1	.8	85	Ŧ			Ŭ					
	94.1	3.4	2	2	4								93.0 TAN, SANDY CL	AY	.5		84.3	3.4	2	2	3	<u> </u>			
1	-	-			-								TAN, SILTY SAI	ND	. <u>.</u>		‡					••••••••••••••••••••••••••••••••••••••			
90		-											-			80	+					· \			
	89.1	8.4	woн	2	98/0.4	<u> </u>	· · · ·	L					88.1	g	.4		79.3	8.4	2	3	13	· · · •16			- 1
	-	-				 	+====	+÷÷:-	100/0.9 FILL				87.5 86.0	10 11			Ŧ								.
85	- 84.1	- 13.4													-	75	74.3	13.4				· · · · · ·	· · · ·		_
		- 13.4	WOH	WOH	1	1		· · · ·	· · · · · · · · · ·	SS-8	1	St.	GRAY, SANDY S	SILI			/ <u></u>	10.4	6	8	12	· · · · ·	20		
	-	-]	<u>- 88</u>	81.0	16	.5		ŧ					.			- †
80	79.1	18.4											GRAY, COARSES	SAND		70	69.3 +	18.4					· · · · ·	· · · ·	_
	-	-	3	1	1	4 2 · · ·			.			000 000- 000					Ŧ		60/0.0						
75	-	-				í\								21	. <u>5</u>		Ŧ								
10	74.1	23.4	6	10	14							st.	GRAY, BLACK, AND	WHITE,			+								
	-	-		10	17		•24 · · · ·	 	· · · · · ·				SAPROLITIC, SAND	25	.5		1								
	70.5	27.0	60/0.0						<u> </u>			<u>76-</u>	70.5 (GRANITE)	OCK	.0		Ŧ								
	-	-	00/0.0						00,010			F	Boring Terminated with Penetration Test Refusal at	n Standard			Ŧ								
	-	-										F	ft ON CRYSTALLINE	E ROCK			Ŧ								
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SHEET 8 OF 16



	36596							3330			COUNT
SITE	DESCR	IPTION	BRID	DGE O	N -L	- (l	JS 3(01 B	YPAS	SS) OV	ER STO
BORI	NG NO.	B1-B				ST	ATIO	N 6	0+60)	
COLI	AR ELE	EV. 86	.7 ft			то	TAL	DEP	тн	21.1 ft	
DRILL	. RIG/HAN	IMER EF	F./DATI	E RFC	00074	CN	1E-55	92%	07/12	2/2011	
DRIL	LER Pi	inter, D.	G.			ST	ART	DAT	E 0	2/03/1	5
ELEV	DRIVE ELEV	DEPTH		W CO	-	┨					PER FOO
(ft)	 (ft)	(ft)	0.5ft	0.5ft	0.5	ft	0		25	ę	50
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05	86.7 -	- 0.0	wон	WOH	wo	н	0· ·				
85	84.1	2.6	1		1	`	<u>.</u>		+:		
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80		t					<i>⊢7</i>				
Î	79.1	7.6	3	4	8	\dashv	. \	•12 ·	:	 	· · ·
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75	74.1	12.6					<u> </u>		-		
	-	F	7	10	13				23.		
70	-	ŧ							N.		
	69.1	17.6	17	21	16	_			·	<u>.</u>	
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	65.7 -	<u>- 21.0</u>	60/0.1				• •		· ·	. – –	<u>+</u>
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SHEET 9 OF 16



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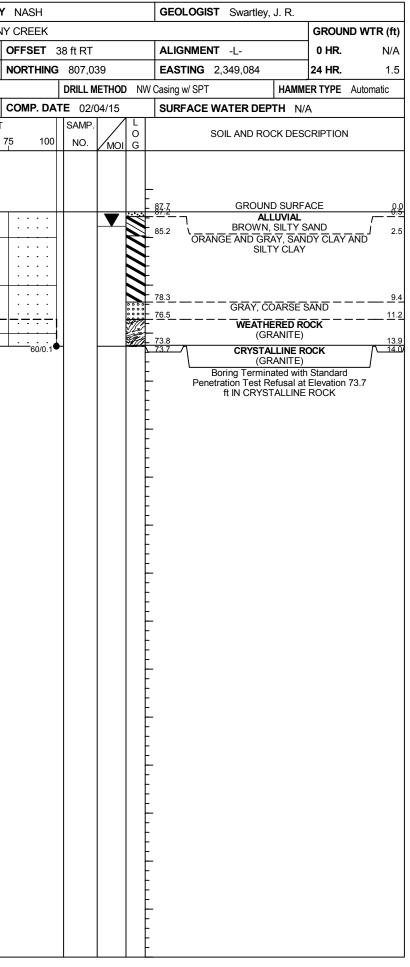
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WBS	36596	5.1.2			TI	P U-3330		COUNT	Y NASH				GEO	OGIST Swartley, J. R.			WBS	36596	6.1.2			TIP	U-333	0	C	OUNT	1
ΞC	ESCR	IPTION	BRI	DGE O	N -L- (US 301 B)	(PASS) OV	ER STON	NY CREEK						GROUND WTR (ft)		SITE I	DESCR	IPTION	BRI	DGE ON	-L- (U	5 301 E	BYPASS)	OVEF	R STON	ľ
RIN	G NO.	B1-C			ST	ATION 6	0+60		OFFSET	9 ft LT	2		ALIG	NMENT -L-	0 HR. N/A		BORIN	NG NO.	B1-C			STA	TION	60+60		1	
LL	AR ELI	E V. 84	l.1 ft		тс	TAL DEP	FH 26.7 ft		NORTHING	3 806,9	91		EAST	ING 2,349,000	24 HR. N/A		COLL	AR ELI	E V. 84	.1 ft	3	тот	AL DEI	PTH 26	.7 ft		
LLF	RIG/HAN	IMER EF	F./DAT	E RFC	00074 CI	ME-55 92%	07/12/2011			DRILL N	NETHOD	NW	Casing \	V/SPT & Core HAMM	ER TYPE Automatic		DRILL	RIG/HAN	IMER EF	F./DAT	E RFO0	74 CME	-55 92%	% 07/12/20	11		
ULL	ER P	inter, D	. G.		ST	ART DAT	E 01/28/1	5	COMP. DA	TE 01/	28/15		SURF	ACE WATER DEPTH 1.6	6ft		DRILL	ER P	inter, D.	G.		STA	RT DA	TE 01/2	28/15		Ī
	DRIVE ELEV			ow co				PER FOOT	Γ	SAMP.		L					CORE	SIZE	NWD3	2		тот	AL RUI	N 16.61	ť		_
	ELEV (ft)	(ft)		0.5ft	0.5ft	0	25 \$	50	75 100	NO.	моі	O G	ELEV. (SOIL AND ROCK DES	DEPTH (ft)		ELEV	RUN ELEV	DEPTH	RUN	DRILL RATE	REC		SAMP.	ST	RATA RQD (ft) %	
ſ																	(ft)	etev (ft)	(ft)	(ft)	(Min/ft)	(ft) %	RQD (ft) %	NO.	(ft) %	(ft) %	
																	73.96										
	83.6 -	0.5		<u> </u>		+	1	1					84.1 83.6	GROUND SURF	ACE 0.0			74.0 72:4 -	- 19:7	1.6	N=60/0.0 :32/0.6 :53/1.0	0 (1.6)	(1.5)		(13.7)) (12.4) 75%	18 14
		+	2	1	3	•4				SS-9	1			GRAY, SILTY SA			70	-	F ·	5.0	<u>:53/1.0</u> 1:14/1.0	(2.6)	(Z.3)			1070	· R / R
	-	ŧ										000	80.1	GRAY, SANDY S	4.0			-	F		1:14/1.0 1:13/1.0 1:13/1.0 1:11/1.0 :59/1.0 .34/1.0	52%	46%				· W / W
F	79.0	5.1	16	84/0.5		<u>i</u>	+====	╞╧╧╧			1		78.5		5.6		┝	67.4	- 16.7 -	5.0	34/1.0	(4.5)	(3.7)				· K /1
		ł						· · · · ·						(GRANITE)			65	-	‡		1:14/1.0 1:24/1.0 2:15/1.0	90%	74%	RS-2	1		-R/
L	74.0	10.1						<u> </u>		1			74.0		<u>10.1</u>			- 62.4 -	217		3:27/1.0						
ſ	-	t	60/0.0	"					60/0.0	T				GRAY, FRESH TO MOL	DERATELY					5.0	9:00/1.0	(5.0)	(4.9)				P.R.
ĺ		Ł											_	SEVERELY WEATHERE VERY HARD, MODERAT	D, SOFT TO	-	60		ŧ I		3:45/1.0		30%				
	-	É										F		FRACTURE SPACING,			L	57.4	26.7		4:15/1.0						1,2
		F												REC = 83%				-	F								
+	-	F								RS-2	7 6		-	RQD = 75% RMR = 81				-	F								
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F		<u> </u>						• • • •		I			57.4	Boring Terminated at Eleva	26.7 ation 57.4 ft IN			-	+						~		
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ICAL BORING REPORT CORE LOG

SHEET 10 OF 16

	/ NASH		GEOLOGIST Swartle	ey, J. R.	
VER STON				GROUND	WTR (ft)
×	OFFSET 9	9 ft LT	ALIGNMENT -L-	0 HR.	N/A
ft	NORTHING		EASTING 2,349,000		N/A
			Casing W/SPT & Core	HAMMER TYPE A	
'15	COMP. DAT	TE 01/28/15	SURFACE WATER DE		
				/	
STRATA REC. RQD (ff) (ff) % %	L				
(ft) (ft) % %	O G ELEV. (f		ESCRIPTION AND REMAI	RKS	DEPTH (f
		<u>-</u>	Begin Coring @ 10 1 f	t	
13.7) (12.4) 33% 75%		GRAY, FRESH TO M VERY HARD, MODE	Begin Coring @ 10.1 f CRYSTALINE ROCK ODERATELY SEVERELY RATELY CLOSE FRACTU	WEATHERED, SOFT	10.1 TO TE
	57.4				26.7
			ed at Elevation 57.4 ft IN C		

										.00														-	
	36596					P U-3330			/ NASH				GEOLOGIST Swartley,				S 3659					D -3330		COUN	
				DGE C		-	YPASS) OV	ER STON							GROUND WTR (ft)					GE OI			YPASS) O	VER STO)NY
BOR	ING NO	. B2-A			S	TATION 6	61+45		OFFSET	36 ft LT			ALIGNMENT -L-		0 HR. N/A	BOF	ring no	B2-B			ST	ATION (61+45		0
COL	LAR EL	EV. 87	7.1 ft		т е	OTAL DEP	TH 28.0 ft		NORTHING	3 807,0)78		EASTING 2,349,021	ľ	24 HR. 1.5	COL	LAR EL	EV. 87	7.7 ft		ТС	DTAL DEP	TH 14.0	ft	N
DRILL	. RIG/HAI	MMER EF	F./DAT	E RFO	20074 C	ME-55 92%	07/12/2011			DRILL	METHOD	NW Ca	asing w/ SPT	HAMME	R TYPE Automatic	DRIL	L RIG/HAI	MMER EF	F./DATE	RFO	0074 CI	ME-55 92%	07/12/2011		
DRIL	LER P	Pinter, D	. G.		S	TART DAT	E 01/21/1	5	COMP. DA	TE 01	/21/15	:	SURFACE WATER DEP	TH N/A	۱.	DRI	L LER F	inter, D	. G.		ST	ART DAT	E 02/04/	15	0
ELEV	DRIVE	DEPTH	BLC	ow co	UNT		BLOWS I	PER FOOT		SAMP						ELE\	/ DRIVE ELEV	DEPTH	BLO	w cou	лит		BLOWS	PER FO	т
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.		O G EI	SOIL AND ROO LEV. (ft)	JK DESC	RIPTION DEPTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7
													X 7/												
90																90									
_90		ŧ										F				90		ŧ							
	87.1	<u>+ 0.0</u>										87	GROUNE		CE 0.0		87.7	+ 0.0	1	2	1	• <u>3</u> · · ·			<u> </u>
85		Ŧ	IMOH	WOH	3							8		LUVIAL E, SAND	Y CLAY AND 2.0	85		Ŧ		-	·	9 ³ · · ·			
	84.2	2.9	3	4	5	<u>.</u>							SILT	YCLAY			83.8	3.9		1					•
		‡				.●9 . /												‡	2	1	2	• 3 : : :			
80		±										<u> </u>	0.6 GRAY, CC	DARSE S	6.5 AND	80		ŧ							•
	/9.2	7.9	2	1	2												78.8	8.9	WOH	4	6	·			
		Ŧ											5.1		11.0			Ŧ			Ĩ				
75	74 2	+ 12.9				``						T I	RES			75		ŧ				····			•
	14.2	+ '2.9	4	9	27	::::	. ●36 .		· · · · ·				GREEN AND GRAY	, SAFROI SILT	LITIC, SAIND I		73.8	<u>+ 13.9</u> +	60/0.1						•
		t										8£						ŧ							
70	69.2	17.9							<u> </u>								-	ł							
		Ŧ	10	15	19							8F						Ŧ							
65		‡										<u>60</u>			<u>ck</u> <u>21.0</u>			‡							
00	64.2	22.9	18	82/0.4										ANITE)	UK .		-	ŧ							
		ŧ	10	02/0.4					- 100/0.9									ŧ							
60		Ŧ										<u> </u>						Ŧ							
	59.2	<u>† 27.9</u>	60/0.1						60/0.1	H	<u> </u>	59			<u>ск</u> — — — <u>7.9</u> 28.0		-	Ŧ							
1		‡	<u> </u>	1								Ę	(GR	ANITE)				‡							
ĺ		t										E	Boring Termina Penetration Test Re	efusal at E	Elevation 59.1		.	t							
ĺ		+										ŀ	ft IN CRYST	ALLINE F	ROCK			ł							
ĺ		Ŧ										F						Ŧ							
	-	‡										F						‡							
		<u>†</u>										Ł						ŧ							
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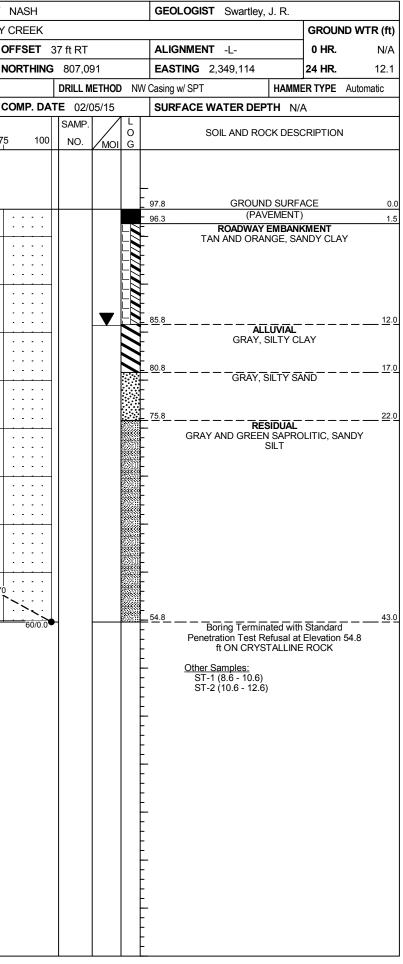
																-									
W	3S 3659	6.1.2			TI	P U-3330		COUNT	Y NASH			GEOLOGIST Swartley, J. R.					3659	6.1.2			TIP	U-333	0	C	COUNT
SI	E DESC	RIPTION	BRI	DGE O	N -L-	(US 301 BY	(PASS) OV	ER STON	NY CREEK						R (ft)	SITE	DESCR	RIPTION	BRID	DGE ON	-L- (US	S 301 E	BYPASS	OVE	₹ STO
BC	RING NO	. в2-с			S	TATION 6	1+45		OFFSET	9 ft LT			ALIGNMENT -L-	0 HR.	N/A		RING NO				STA	TION	61+45		
	LLAR E					OTAL DEPI		t	NORTHING				EASTING 2,349,044	24 HR.	3.2		LAR EL						PTH 50		
				E RFC		ME-55 92%						D NV		MER TYPE Automa	tic					E RFO00	Т				
			1						COMP. DA		1	1 1 1	SURFACE WATER DEPTH	I/A			LER F				<u> </u>		TE 01/2		
ELE (ft	L ELEV	DEPTH			0.5ft	0 2		PER FOO1 50	75 100	SAMP. NO.	17	Ō	SOIL AND ROCK DE				RE SIZE	1	1	DRILL	RI	IN I	N 15.31		RATA
-	(ft)		0.011	0.011	0.011		1	1		110.	/моі	G	ELEV. (ft)	DEP	TH (ft)	ELEV (ft)	ELEV (ft)	DEPTH (ft)	(ft)	RATE (Min/ft)	REC. (ft)	RQD (ft) %	SAMP. NO.	REC. (ft)	RATA RQD (ft) %
					8.:											53.96						%		<u>%</u>	%
90	88.9	+ 0.0									1		88.9 GROUND SUR		0.0	00.90	54.0 52.4	- 34.9	1.6	N=60/0.0 :47/0.6 \1:20/1.0	(1.5)	(0.9)		(15.1)) (14.0)
		‡	WOH	2	3	9 ⁵							ALLUVIAL TAN, SANDY			50		+	5.0	1:20/1.0 1:02/1.0	(4.9) 98%	(4.4)	RS-1	99%	92%
85		+ + + 4.9				-1							-				1.	Ŧ		1:02/1.0 1:47/1.0 1:23/1.0 1:47/1.0 1:47/1.0	98%	88%			
	84.0	+ 4.9	3	5	6					SS-10			-				47.4	<u>+ 41.5</u> +	5.0	1:48/1.0 1:37/1.0 1:55/1.0	(5.0)	(5.0)			
80		‡				: /: : :						000			8.0	45		Ŧ		2:04/1.0		100%			
	79.0	9.9	3	2	2	1							- GRAT, COARGE	SAND			42.4	46.5		2:15/1.0 3:00/1.0					
		Ŧ			-	4 • • •							-			40		Ŧ	3.7	3:10/1.0 5:00/1.0	(3.7)	(3.7) 100%			
75	74.0	+ + 14.9			5.						-				<u>13.9</u>		38.7	50.2		7:08/1.0 20:00/0.7					
	74.0	+ 14.3	7	11	15		26						GRAY, GREEN AN SAPROLITIC, SAN	D BLACK,				Ŧ				ι			
70		Ŧ					N						-				-	Ŧ				×			
	69.0	19.9	6	13	23		. \						-					Ŧ							
		Ŧ					- 36 -						-					Ŧ			~				
65	64.0	T 24.9					/						-					Ŧ							
		Ŧ	6	8	13	•	21						-					Ŧ							
60		Ŧ															-	Ŧ							
	59.0	<u> </u>	21	79/0.4		4	+	<u></u>				arra.	- <u>58.5</u> WEATHERED I		30.4			Ŧ							
		ł					::::						- (GRANITE					t							
55	54.0	34.9													34.9			t				-			
9		ŧ	60/0.0							RS-1	_		GRAY, FRESH TO	SLIGHTLY											
50		1									1		WEATHERED, VERY HA WIDE FRACTURE SPAC			8/26/16	-	+							
GDT 8		+		-			::::				2		- - REC = 99%	, D		-									
히		+		21 2			::::						- RQD = 929 - RMR = 84	0		D01.GD	· -								
0 45 22	-	+													9			‡							
GPJ		‡											-				-	‡							
		‡											-			168.0	-	‡							
SORINGS		+											- 38.7 - Boring Terminated at Ele	ation 38.7 ft IN	50.2	UNIXO2		‡							
SPT		‡											- CRYSTALLINE	ROCK	L L L L L L L L L L L L L L L L L L L		-	‡							
		+											-				-	‡							
CREEK		‡											- , , , , , , , , , , , , , , , , , , ,			Ϋ́	-	‡							
STONEY		‡											-		NLIVOTO			‡							
		‡													C HO		-	‡							
BRDG		‡									- N.		- -			2 2 2	-	‡							
GEO		+											-				-	ŧ							
30 G	20	ŧ											-				-	F	-						
U3330		‡											_		0001	0336	-	F							
DOUBLE		Ŧ											-		L Z	C L L	-	F							1
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BORE		Ŧ											-			YOO I	-	F							
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GEOTECHNICAL BORING REPORT CORE LOG

SHEET 12 OF 16

			.OG				
IT	YN	IASH		GEOLOGI	ST Swartle	y, J. R.	
٦N		REEK				GRO	UND WTR (ft)
			9 ft LT	ALIGNME		0 HF	₹. N/A
	NC	RTHING			2,349,044	24 HF	R. 3.2
				/ Casing W/SPT	& Core	HAMMER TYP	E Automatic
	СС	MP. DA	TE 01/29/15	SURFACE	WATER DE	PTH N/A	
D	L O		C	DESCRIPTION	AND REMAR	KS	
_	G	ELEV. (ft)				DEPTH (ft
0)	RE	_ 54.0		Begin Cori	ng @ 34.9 ft LLINE ROCK		34.9
0) %		-	GRAY, FRESH TO	SLIGHTLY WE	ATHERED. V	ERY HARD, CLC	OSE TO
		-					
		-					
		-					
		-					
		 - 38.7					
f	1	- 30.1	Boring Termina	ted at Elevatio	n 38.7 ft IN CF	RYSTALLINE ROO	50.2 CK
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	36596					IP U-3330		Y NASH				GEOLOGIST Swartley, J. R.	1	-	36596					P U-3330		COUNT	
SITE	DESCR	IPTION	BRID	DGE O	N -L-	(US 301 BYPASS) OV	ER STON	NY CREEK					GROUND WTR (ft)	SITE	DESCR	IPTION	BRID	GE O	N -L- ((US 301 BY	PASS) OV	ER STOP	VY C
BORI	NG NO.	EB2-/	A		S	TATION 62+10		OFFSET (36 ft LT			ALIGNMENT -L-	0 HR. N/A	BOR	ing no.	EB2-I	В		S	TATION 62	2+05		OF
COLL	AR ELE	EV. 97	7.7 ft		Т	OTAL DEPTH 55.3 f	:	NORTHING	807,1	33		EASTING 2,349,054	24 HR. FIAD	COL	LAR EL	EV. 97	7.8 ft		т	OTAL DEPT	H 43.0 ft		NO
DRILL	RIG/HAM	IMER EF	F./DATI	E RFC	00074 (CME-55 92% 07/12/2011			DRILL N	IETHOD	NW	Casing w/ SPT HAMM	NER TYPE Automatic	DRIL	RIG/HAN	IMER EF	F./DATE	E RFO	0074 C	ME-55 92%	07/12/2011		
DRILI	L ER Pi	nter, D.	. G.		S	TART DATE 01/20/1	5	COMP. DA	FE 01/2	20/15		SURFACE WATER DEPTH N	/A	DRIL	.LER P	inter, D	. G.		ST		02/05/1	5	СС
	DRIVE ELEV	DEPTH	BLC	w co	JNT	BLOWS	PER FOOT	r	SAMP.		L O	SOIL AND ROCK DES		ELEV	DRIVE ELEV	DEPTH	BLO	w col	JNT		BLOWS I	PER FOO	r
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	моі	G	ELEV. (ft)	DEPTH (ft	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 :	25 !	50	75
100														100									
	-	F									F	97.7 GROUND SURI	ACE 0.0			Ŧ							
	-	-										96.3 (PAVEMENT		1	96.3	1.5				1			. ,
95	- 94.5 -	- 3.2] 1] 1					-	ROADWAY EMBAN 94.2 TAN, SILTY S/		95	94.2	t	WOH	WOH	3	• · · · ·			<u> </u>
	-	-	3	3	3	1 1 6 1 1 1 1 1 1					8					1 0.0	WOH	2	2	∳ 4			. .
00	-															ŧ				<u> </u> :::::			· ·
90	89.5 -	8.2	WOH	1	2		<u> </u>		SS-1			89.7ALLUVIAL	8.0	90	89.2	8.6	WOL	WOH	1	$\left \begin{array}{c} 1 \\ 1 \\ 1 \\ 1 \\ \end{array} \right $.+
	-	L			-	$\left \begin{array}{c} \bullet_{3}^{3} \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{array}\right \cdot \cdot \cdot \cdot \cdot$			33-1		ł	GRAY, ORANGE AND YE CLAY				Ł		wоп	1	• 1			:
85		-									SF.	CLAT		85		Ŧ							
	84.5 -	<u>- 13.2</u> -	3	5	7						J				84.2	13.6	2	3	4	1			
	-	-														‡				••••••••••••••••••••••••••••••••••••••	· · · · ·		. .
80	- 79.5 -	- 18 2										79.3	18.4	80		‡				1			
ľ			3	4	3							GRAY, COARSE	SAND		79.1	[<u>18.7</u>	2	1	4	1 ●5	· · · ·		
	-															ł				X 			. .
75	74.5 -	23.2										74.3	23.4	75	74.1	237							
	-	F	3	3	2						Y	GRAY, SILTY CLAY W					4	7	9				
70	-	-									J	FRAGMENT	S	70		‡				I I I IX			· ·
_/0	69.5	28.2	5	7	8						N	68.7	29.0		69.1	28.7	9	11	15	· · · · ·			
	-				Ū	1 15					<u>e</u> t	GRAY, WHITE AND BLAC		1		ŧ	9	11	15		•26 · · ·		
65	-	-									2	SANDY SIL		65		ł							. .
	64.5 -	<u>- 33.2</u>	4	9	9						ØF				64.1	33.7	7	11	14				
	-	F									8F					ŧ					25		. .
60	- 59.5 -	- 38.2				· · · · · · · · · · · · · · · · · · ·					St.			60	59.1	38.7						× · · · ·	-
	-	-	9	15	35]	•50 · · ·	· · · · · ·								- 30./	44	45	25		· · · ·		, . ∎70
	-															ŧ							: [`
55	54.5	43.2	26	28	68		<u> </u>				8 L			55	54.8 -	43.0	60/0.0						
	-	Ł	20	20	00			99	6		∭F	51.7	46.0			ŧ							
50	-	L.						· · · · · · · · ·			MA-	WEATHERED R		1		f							
	49.5 -	F 48.2	100/0.4					100/0.4	•		10-	(GRANITE)		-	Ŧ							
	-	F									Ø.					ŧ							
50	44.5 -	- 53 2													-	ŧ							
ľ	42.5	-	100/0.4					100/0.4	·			42 5	55 3			t							
F	42.5		60/0.1					60/0.1		Ň	<u> </u>	42.5 42.4 (GRANITE				ł							
	_	-									┝	Boring Terminated with Penetration Test Refusal a	h Standard		-	ł							
	-	F									F	Penetration Test Refusal a ft IN CRYSTALLIN	t Elevation 42.4			Ŧ							
	-	1									Ę					ŧ							
	-										F				-	ŧ							
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WBS							• U-3330 COUNT	
				DGE O		-	US 301 BYPASS) OVER STOP	-
	NG NO.				_		ATION 62+05	OFF
	LAR ELI						TAL DEPTH 47.5 ft	NO
				E RFC			ME-55 92% 07/12/2011	
	LER P	1				T/	ART DATE 02/02/15	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	+	BLOWS PER FOO 0 25 50	I 75
. ,	(11)		0.010	0.010	0.011	╉		
100								
100		+						
	-	<u> </u>				╀	.	• •
95	-	ŧ						· ·
	93.7 -	- 3.7	1	0	1			· ·
90	-	+						: :
	88.7	8.7		woн	40		· · · · ` ` ` · · · · · · · · · · · · · · · · · · ·	. .
	-	+	WOH	WOH	42		· · · · · · · · · · · · · · · · · · ·	· ·
85	-	+						· ·
	83.7 -	<u>- 13.7</u>	2	4	5			· ·
80	-	+					$\left \begin{array}{c} \cdot \tilde{f} \cdot \cdot \cdot \\ \cdot f \cdot \cdot \cdot \\ \cdot f \cdot \cdot \cdot \end{array}\right \cdot \cdot \cdot \cdot \cdot \left \begin{array}{c} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{array}\right $: :
	78.7	18.7					<u> </u>	. .
	-	+	3	2	2			: :
75		ŧ						· ·
	73.7 -	- 23.7	6	6	11	1	$\begin{vmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \bullet \\ 17 \end{vmatrix} \cdot \cdot \cdot \cdot \begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \bullet \\ \cdot \cdot \cdot \bullet \end{vmatrix}$. .
70	-	ŧ						: :
10	68.7	28.7			10			. .
	-	+	6	9	12		$\begin{vmatrix} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix} = \begin{vmatrix} 21 \cdot \cdot \cdot \cdot \\ 1 \cdot \cdot \cdot \end{vmatrix} = \begin{vmatrix} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{vmatrix}$: :
65		+						· ·
	63.7 -	- 33.7	6	7	11	1		. .
60	-	+						: :
	58.7	- 38.7	22	23	55			
	-	+	22	23	55			• 71
55	-	+					· · · · · · · · · · · · · · · · · · ·	· ·
	53.7 -	43.7	8	13	21			· ·
50	50.0	47.4						·
	50.0	+ <u>++/.</u> +	60/0.1			t		
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SHEET 14 OF 16

T١	/ NAS	Н					GEOL	OGIS	ST Swartley,	J. R.		
DN	IY CRE	ΕK									GROUN	D WTR (ft)
	OFFS	ET :	9 1	ft LT			ALIGN	MEN	IT -L-		0 HR.	N/A
	NORT	HING	;	807,11	5		EASTI	NG	2,349,075		24 HR.	FIAD
				DRILL M	ETHOD	NV	V Casing w/	/ SPT		HAMME	RTYPE	Automatic
Τ	COMP	. DA	_	E 02/0					WATER DEP			
L TC			_	SAMP.		L	1					
	75	100		NO.	моі	O G			SOIL AND ROC	K DESC	RIPTION	I
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							97.4		GROUNE			0.0
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						N	-		GRAY, S	ILIYCL	AY	
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	6	0/0.1	Ч				<u>50.0</u> 49.9		CRYSTAL		<u>ск</u>	$\frac{47.4}{47.5}$
							-		(GR/ Boring Termina	ANITE) ited with	Standard	/
									etration Test Re ft IN CRYST	fusal at	Elevation	
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PROJ. NO. - 36596.1.2 ID NO. - U-3330 COUNTY - NASH

EB1-A

			S	OIL 1	E	ST ST	RE	SUL	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	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-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

			S	OIL 7	TE:	ST	RE	SUL	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	/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-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	-	•

<u>EB1-B</u>

			S	OIL 1	TE	ST	RE	SUL	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	-	-

<u>B1-C</u>															
			S	OIL 7	TE:	ST	RE	SUL	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-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

			S	OIL 7	TE.	ST	RE	SUL	LTS						
SAMPLE			DEPTH	AASHTO				% BY W	/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-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

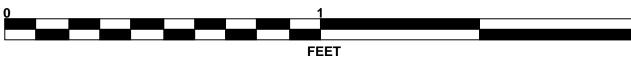
			S	OIL 7	TE:	ST	RE	SUL	LTS						
SAMPLE			DEPTH	AASHTO		%	BY WEIG	HT		% PAS	SING (S	IEVES)		%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-1	36'LT	62+10	8.2'-9.7'	A-6(13)	38	20	14.7	16.6	30.3	38.4	100	91	73	-	-

SHEET 15 OF 16

CORE PHOTOGRAPHS

B1-C BOXES 1 & 2: 10.1 - 26.7 FEET





B2-C BOXES 1 & 2: 34.9 - 50.2 FEET





SHEET 16 36596.1.2 (U-3330) BRIDGE NOS. 173 & 175



CONTENTS

SHEET NO. 2 3 4-15

330

(m)

REFERENCE

DESCRIPTION TITLE SHEET LEGEND SITE PLAN AND PROFILE BORING LOGS, CORE LOGS, AND CORE PHOTOS ROCK STRENGTH TEST RESULTS

STATE OF NORTH CAROLINA

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY <u>N</u>ASH

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

SITE DESCRIPTION NOISE WALL 2 ALONG US 301 BYPASS FROM -L- STA 30+81 TO STA 38+46

36591 PROIEC

STATE N.C

NO.

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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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICL ENGINEERING UNIT AT 1991 707-6860. THE SUBSIFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

CENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSUFFACE DATA AND MAY NOT INCESSARILY REFLECT THE ACTUAL SUBSUFFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DECREE OF RELIBULITY INHERENT IN THE SUBSUFFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES SUBJFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THES WATER LEVELS OR SOL MOSTURE CONDITIONS MAY VARY CONSDERABLY WITH THE ACCOMPING OL CUMUTIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CALITORIED 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 WARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPNION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTION STO 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 CONDENSATION OF FOR AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

- TES: THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR CUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR ISI CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. BY HAVING REDUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAVES 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

B. KEANEY

B. HOWEY

C. JONES

B. THOMPSON

D. TIGNOR

HDR ENGINEERING, INC. INVESTIGATED BY **F&R, INC.**

CHECKED BY _ECH

SUBMITTED BY HDR ENGINEERING, INC.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

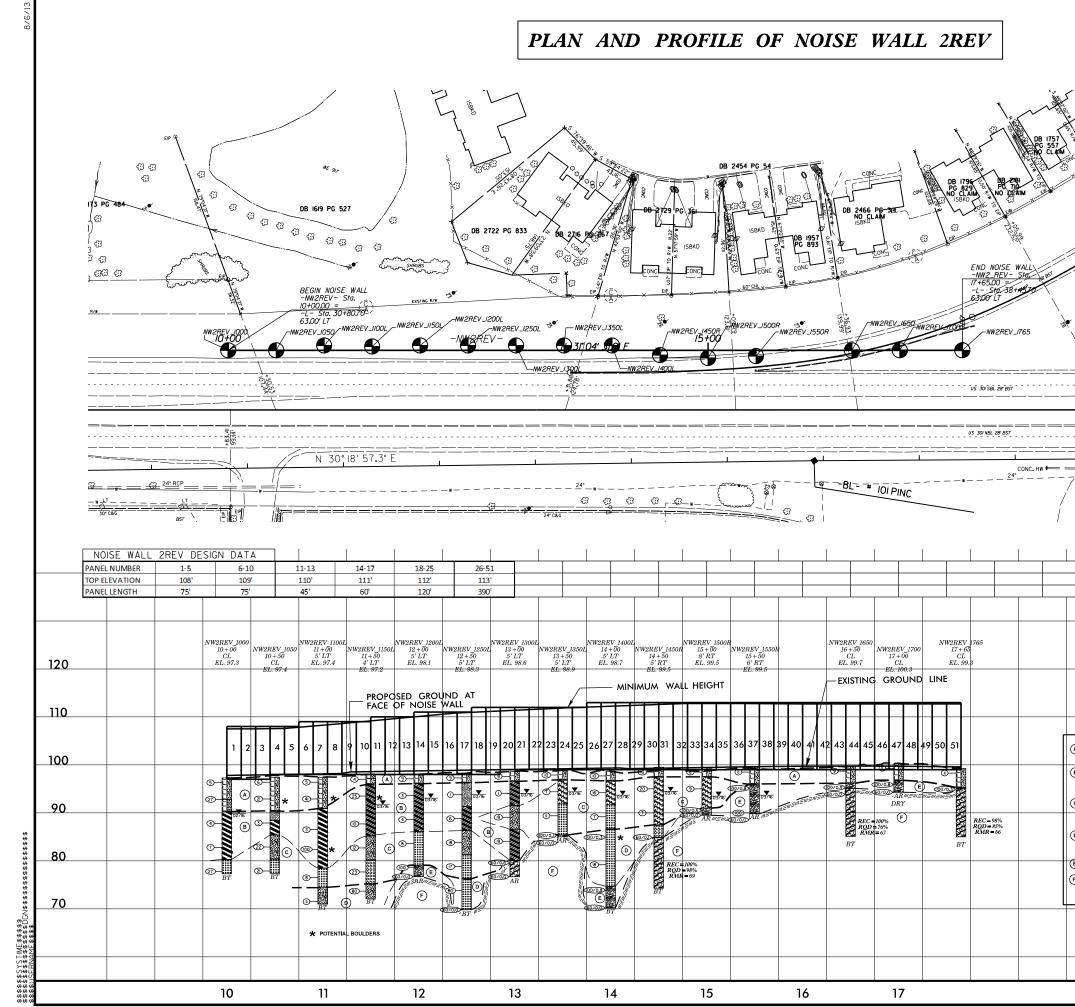
	SOIL D	ESCRIPTION			GRADATION				ROCK DESCR	
		SOLIDATED, OR WEATHERED E WER AUGER AND YIELD LESS			TES A GOOD REPRESENTATION OF PARTIC INDICATES THAT SOIL PARTICLES ARE AL					D YIELD SPT REFUSAL IF TESTE _ PLAIN MATERIAL WOULD YIELD
ACCORDING TO THE	STANDARD PENETRATION TES	ST (AASHTO T 206, ASTM DI DESCRIPTIONS GENERALLY IN	586). SOIL CLASSIFICATION		ES A MIXTURE OF UNIFORM PARTICLE SI					ER EQUAL TO OR LESS THAN 0.1 TION BETWEEN SOIL AND ROCK
CONSISTENCY, COLOR,	TEXTURE, MOISTURE, AASHTO	CLASSIFICATION, AND OTHER	R PERTINENT FACTORS SUCH		ANGULARITY OF GRAIN	NS	REPRESENTED BY	Y A ZONE OF WEATHER	RED ROCK.	
		RITY, STRUCTURE, PLASTICITY ERBEDDED FINE SAND LAYERS,			TY OR ROUNDNESS OF SOIL GRAINS IS DE	ESIGNATED BY THE TERMS:		S ARE TYPICALLY DIVID		
		AASHTO CLASSIFIC		ANGULAR, SUBA	NGULAR, SUBROUNDED, OR ROUNDED.	TION	WEATHERED ROCK (WR)		N-CUASTAL PLAIN M 9 BLOWS PER FOOT	ATERIAL THAT WOULD YIELD SP1 IF TESTED.
	GRANULAR MATERIALS	SILT-CLAY MATERIALS	ORGANIC MATERIALS		MINERALOGICAL COMPOSI		CRYSTALLINE			N IGNEOUS AND METAMORPHIC RC
	≤ 35% PASSING #200)	(> 35% PASSING *200) A-4 A-5 A-6 A-7			AMES SUCH AS QUARTZ,FELDSPAR,MICA,T IN DESCRIPTIONS WHEN THEY ARE CONSID		ROCK (CR)	JU JU GNE	EISS, GABBRO, SCHIS	
GROUP A-1 CLASS. A-1-a A-1-b	A-2-4 A-2-5 A-2-6 A-2-		A-1, A-2 A-4, A-5 A-3 A-6, A-7		COMPRESSIBILITY		NON-CRYSTALLIN			N METAMORPHIC AND NON-COASTA AT WOULD YEILD SPT REFUSAL
SYMBOL 000000000000000000000000000000000000					GHTLY COMPRESSIBLE	LL < 31	ROCK (NCR)	ROC	CK TYPE INCLUDES	PHYLLITE, SLATE, SANDSTONE, ET ENTS CEMENTED INTO ROCK, BUT
X PASSING					ERATELY COMPRESSIBLE HLY COMPRESSIBLE	LL = 31 - 50 LL > 50	COASTAL PLAIN SEDIMENTARY RO	ОСК ЦАЛ SPT	T REFUSAL. ROCK T	YPE INCLUDES LIMESTONE, SANDS
*10 50 MX			GRANULAR SILT- MUCK,		PERCENTAGE OF MATER	RIAL	(CP)	SHE	ELL BEDS, ETC. WEATHEF	
*40 30 MX 50 MX 5 *200 15 MX 25 MX 1	51 MN 10 MX 35 MX 35 MX 35 MX 35 M	1X 36 MN 36 MN 36 MN 36 MN	SOILS SOILS PEAT	ORGANIC MATERIA	GRANULAR SILT - CLAY <u>SOILS</u> <u>SOILS</u>	OTHER MATERIAL	FRESH RO			AY SHOW SLIGHT STAINING. ROCK
MATERIAL				TRACE OF ORGANIC	MATTER 2 - 3% 3 - 5%	TRACE 1 - 10%		AMMER IF CRYSTALLINE.		HI SHOW SEIGHT STHINING, NOCK
PASSING #40			SOILS WITH	LITTLE ORGANIC MA MODERATELY ORGANI		LITTLE 10 - 20% SOME 20 - 35%				E JOINTS MAY SHOW THIN CLAY C
LL – PI 6 MX		IN 40 MX 41 MN 40 MX 41 MN N 10 MX 10 MX 11 MN 11 MN	LITTLE OR HIGHL	UTOUR V. ODCANTO	> 10% > 20%	HIGHLY 35% AND ABOVE		RYSTALS ON A BROKEN S F A CRYSTALLINE NATUR		E BRIGHTLY. ROCK RINGS UNDER H
GROUP INDEX Ø	0 0 4 MX	8 MX 12 MX 16 MX NO MX	AMOUNTS OF SOILS		GROUND WATER					DISCOLORATION EXTENDS INTO RO
USUAL TYPES STONE FRAGS.	FINE SILTY OR CLAYEY	SILTY CLAYEY	ORGANIC SOLES MATTER	∇	WATER LEVEL IN BORE HOLE IMMEDIA	ATELY AFTER DRILLING				GRANITOID ROCKS SOME OCCASIONA ALLINE ROCKS RING UNDER HAMMEF
	SAND GRAVEL AND SAND	SOILS SOILS		▼	STATIC WATER LEVEL AFTER 24	HOURS				ORATION AND WEATHERING EFFECT
GEN BATING			FAIR TO		PERCHED WATER, SATURATED ZONE, OR	WATER BEARING STRATA	(MOD.) GR	RANITOID ROCKS, MOST FE	ELDSPARS ARE DULL	AND DISCOLORED, SOME SHOW CLA
AS SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	POOR POOR UNSUITAI		SPRING OR SEEP			JLL SOUND UNDER HAMME [TH FRESH ROCK.	ER BLOWS AND SHOW	S SIGNIFICANT LOSS OF STRENGTH
Р		- 30 ; PI OF A-7-6 SUBGROUP IS >	≻LL - 30	000-					Z DISCOLORED OR ST	AINED. IN GRANITOID ROCKS, ALL F
	CONSISTENC	Y OR DENSENESS			MISCELLANEOUS SYMBO	DLS				INIZATION. ROCK SHOWS SEVERE L PICK. ROCK GIVES "CLUNK" SOUND
PRIMARY SOIL TYPE	COMPACTNESS OR	RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH		BANKMENT (RE) 25/025 DIP & DIP DIR	ECTION		TESTED, WOULD YIELD S		FICK, NUCK DIVES CEUNK SUUND
	CONSISTENCY	(N-VALUE)	(TONS/FT ²)	WITH SOIL C						AINED. ROCK FABRIC CLEAR AND E
GENERALLY	VERY LOOSE LOOSE	< 4 4 TO 10		SOIL SYMBOL	- SPT DAT TEST BOP	RING SLOPE INDICATOR INSTALLATION				RANITOID ROCKS ALL FELDSPARS 4 NG ROCK USUALLY REMAIN.
GRANULAR MATERIAL	MEDIUM DENSE	10 TO 30	N/A				<u>IF</u>	TESTED, WOULD YIELD S	SPT N VALUES > 100	BPF
(NON-COHESIVE)	DENSE VERY DENSE	30 TO 50 > 50		THAN ROADW	AY EMBANKMENT AUGER BORING	TEST	VERY AL			AINED. ROCK FABRIC ELEMENTS AF STATUS, WITH ONLY FRAGMENTS O
	VERY SOFT	< 2	< 0.25	INFERRED SC	DIL BOUNDARY - CORE BORING	SOUNDING ROD	(V SEV.) RE	EMAINING. SAPROLITE IS	AN EXAMPLE OF RO	CK WEATHERED TO A DEGREE THAT
GENERALLY	SOFT	2 TO 4	Ø.25 TO Ø.5							IF TESTED, WOULD YIELD SPT N V
SILT-CLAY MATERIAL	MEDIUM STIFF STIFF	4 TO 8 8 TO 15	0.5 TO 1.0 1 TO 2	INFERRED RO	Ģ	WITH CORE	COMPLETE RO SC	CK REDUCED TO SOIL, R	RUCK FABRIC NUT DI DNS. QUARTZ MAY BE	SCERNIBLE, OR DISCERNIBLE ONLY PRESENT AS DIKES OR STRINGERS
(COHESIVE)	VERY STIFF HARD	15 TO 30 > 30	2 TO 4	TTTTT ALLUVIAL SC	DIL BOUNDARY A PIEZOMETER INSTALLATION	- SPT N-VALUE		SO AN EXAMPLE.		
		OR GRAIN SIZE			RECOMMENDATION SYMB	n s			ROCK HAR	DNESS
U.S. STD. SIEVE SIZE	4 10	40 60 200	270					ANNOT BE SCRATCHED BY EVERAL HARD BLOWS OF		ICK. BREAKING OF HAND SPECIMEN
OPENING (MM)	4.76 2.00	0.42 0.25 0.075		EXCAVATION	UNSUITABLE WASTE	ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF				WITH DIFFICULTY. HARD HAMMER B
BOULDER COB	BLE GRAVEL	COARSE FINE	SILT CLAY	SHALLOW	UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK	EMBANKMENT OR BACKFILL		D DETACH HAND SPECIME		
	0B.) (GR.)	SAND SAND (CSE. SD.) (F SD.)	(SL.) (CL.)		ABBREVIATIONS					S OR GROOVES TO 0.25 INCHES DE PICK. HAND SPECIMENS CAN BE D
GRAIN MM 305	75 2.0	0.25	0.05 0.005	AR - AUGER REFUSAL	MED MEDIUM	VST - VANE SHEAR TEST		MODERATE BLOWS.	V OF H GEOEDGISTS	FICK, HAND SPECIMENS CAN BE D
SIZE IN. 12	3	0.20	0.000 0.0000	BT - BORING TERMINATE	D MICA MICACEOUS	WEA WEATHERED				P BY FIRM PRESSURE OF KNIFE C
S	OIL MOISTURE - (CORRELATION OF	TERMS	CL CLAY CPT - CONE PENETRATI	MOD MODERATELY ON TEST NP - NON PLASTIC	γ - UNIT WEIGHT $\gamma_{\rm d}$ - DRY UNIT WEIGHT		AN BE EXCAVATED IN SMA DINT OF A GEOLOGIST'S I		S 1 INCH MAXIMUM SIZE BY HARD
SOIL MOISTURE S			IELD MOISTURE DESCRIPTIO	CSE COARSE	ORG ORGANIC					E OR PICK. CAN BE EXCAVATED IN
(ATTERBERG LIM	ITS) DESCRI	PTION		DMT - DILATOMETER TE DPT - DYNAMIC PENETR		EST <u>SAMPLE ABBREVIATIONS</u> S - BULK		ROM CHIPS TO SEVERAL : ECES CAN BE BROKEN B		MODERATE BLOWS OF A PICK POIN
	- SATURA		UID; VERY WET, USUALLY	e - VOID RATIO	SD SAND, SANDY	SS - SPLIT SPOON				ED READILY WITH POINT OF PICK.
	LIMIT	FROM BELOW	THE GROUND WATER TABLE	F - FINE FOSS FOSSILIFEROUS	SL SILT, SILTY SLI SLIGHTLY	ST - SHELBY TUBE RS - ROCK	SOFT OR	R MORE IN THICKNESS C4		INGER PRESSURE. CAN BE SCRATCH
PLASTIC RANGE <		SEMISOLID; R	EQUIRES DRYING TO	FRAC FRACTURED, FRA	CTURES TCR - TRICONE REFUSAL	RT - RECOMPACTED TRIAXIAL		NGERNAIL.		
	- WEI -	ATTAIN OPTIM	MUM MOISTURE	FRAGS FRAGMENTS HI HIGHLY	ω - MOISTURE CONTENT V - VERY	CBR - CALIFORNIA BEARING RATIO		ACTURE SPACINO SPAC		BEDDING
					UIPMENT USED ON SUBJECT		VERY WIDE	MORE THAN		VERY THICKLY BEDDED
OM OPTIMUN		- (M) SOLID; AT OR	NEAR OPTIMUM MOISTURE	DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	WIDE MODERATELY	3 TO 10 CLOSE 1 TO 3		THICKLY BEDDED 1 THINLY BEDDED 0.1
SL SHRINKA	AGE LIMIT			CME-45C	CLAY BITS	X AUTOMATIC _ MANUAL	CLOSE	Ø.16 TO	1 F00T	VERY THINLY BEDDED 0.0
	- DRY - 1		DITIONAL WATER TO MUM MOISTURE		6' CONTINUOUS FLIGHT AUGER	CORE SIZE:	VERY CLOSE	LESS THAN	0.16 FEET	THICKLY LAMINATED 0.00 THINLY LAMINATED <
		ASTICITY	-	X CME-55	8" HOLLOW AUGERS				INDURAT	
			DRY STRENGTH	CME-550	HARD FACED FINGER BITS		FOR SEDIMENTAF	ROCKS, INDURATION		OF MATERIAL BY CEMENTING, HE
NON PLASTIC	PLASTI	0-5	VERY LOW		TUNGCARBIDE INSERTS	X-N <u>Q-3</u>	FRIABLE			GER FREES NUMEROUS GRAINS;
SLIGHTLY PLAS		6-15	SLIGHT	VANE SHEAR TEST		HAND TOOLS:	FRINDLE		GENTLE BLOW BY	HAMMER DISINTEGRATES SAMPLE.
MODERATELY PL HIGHLY PLASTIC		16-25 6 OR MORE	MEDIUM HIGH		TRICONE 'STEEL TEETH	POST HOLE DIGGER	MODERATE			PARATED FROM SAMPLE WITH ST NEN HIT WITH HAMMER.
		COLOR		PORTABLE HOIST		HAND AUGER				CULT TO SEPARATE WITH STEEL
					TRICONE TUNGCARB.	SOUNDING ROD	INDURATE		DIFFICULT TO BRE	
		COMBINATIONS (TAN, RED,) KED, ETC, ARE USED TO DE	(ELLOW-BROWN, BLUE-GRAY). SCRIBE APPEARANCE.		CORE BIT	VANE SHEAR TEST	FYTREMEI			DWS REQUIRED TO BREAK SAMPLE
					X 2- 1/4" HSA				SAMPLE BREAKS AN	POSS GRAINS

SHEET NO.

DATE: 8-15-1-

U-3330

TERMS AND DEFINITIONS D AN INFERRED ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. ED. AN INFERRED) SPT REFUSAL. 1 FOOT PER 60 IS OFTEN 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. N VALUES > 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. СК ТНАТ CLUDES GRANITE, 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. AL PLAIN IF TESTED. MAY NOT YIELD 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. STONE, CEMENTED DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. RINGS UNDER DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DATINGS IF OPEN. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE СК ИР ТО SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. BLOWS. $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. IN ROCK HAS AS COMPARED 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. FELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. 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 VIDENT BUT ITS LATERAL EXTENT. ARE KAOLINIZED 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. E DISCERNIBLE STRONG ROCK PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE ONLY MINOR OF AN INTERVENING IMPERVIOUS STRATUM. ALUES < 100 BPF 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 IN SMALL AND SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. REQUIRES <u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO LOWS REQUIRED THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. $\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. EEP CAN BE TACHED 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 B PICK POINT. WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL BLOWS OF THE 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. FRAGMENTS IT. SMALL, THIN 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. PIECES 1 INCH ED READILY BY TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. BENCH MARK: * SEE NOTE THICKNESS 4 FEET 1.5 - 4 FEET FEET ELEVATION: 16 - 1.5 FEET NOTES: 3 - Ø.16 FEET 98 - Ø.Ø3 FEET 0.008 FEET BORING AND GROUND SURFACE ELEVATIONS DERIVED FROM GEOPAK AND TIN FILE "U3330_Is_tin_tin" DATED 10/10/14 FIAD - FILLED IN AFTER DRILLING AT. PRESSURE. ETC. EEL PROBE; PROBE:

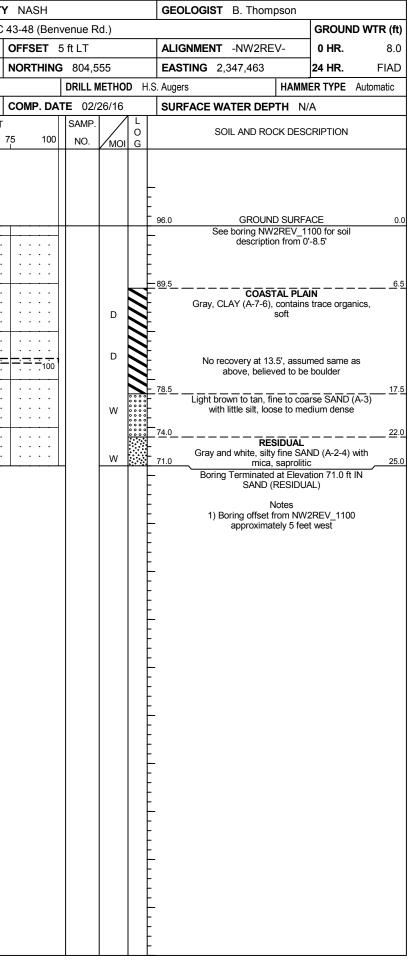


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ROADWAY EMBANKMENT LIGHT BROWN TO GRAY, FINE TO COARSE SAND (A-24,A-1-b) LITTLE SIL, TRACE GRAVEL AND CLAY, LOSSE TO DENSE COASTAL FLAIN TAN AND CLAY ENFET COASTAL FLAIN TANAND CLAYEY SAND (A-1-b, A-3, A-2-6), STRACE GRAYEL LOBERSE		110 100
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COASTAL PLAN CLAY TO FINE SANDY CLAY (A& TO A.7-6) AND FINE SANDY AND ARED, FINE TO COARSE SAND (A-2-4A-1-4)) LITTLE SILT, TRACE GRAVEL AND CLAY, LOOSET O DENSE COASTAL PLAN GRAY WITH YELLOW, CLAY TO FINE SANDY CLAY (A& TO A.7-6) AND FINE SANDY SILTY SAND AND CRAY WITH YELLOW, AND RED, FINE TO COARSE, TRACE GRAVEL LOOSE TO MEDIUM DENSE GRAY AND WHITE RED AND BROWN, SILTY SAND AND FINE TO COARSE SAND (A-2-4, A-3, A-2-4), TRACE GRAVEL LOOSE TO MEDIUM DENSE GRAY AND WHITE RED AND BROWN, SILTY SAND AND FINE TO COARSE SAND (A-2-4, A-3, A-2-4), MEDIUM DENSE TRACE GRAVEL LOOSE TO MEDIUM DENSE GRAY AND WHITE RED AND BROWN, SILTY SAND AND FINE TO COARSE SAND (A-2-4, A-3, A-2-4), MEDIUM DENSE TO VERY DENSE E WEATHERED ROCK (GRANTEE		110 100 90
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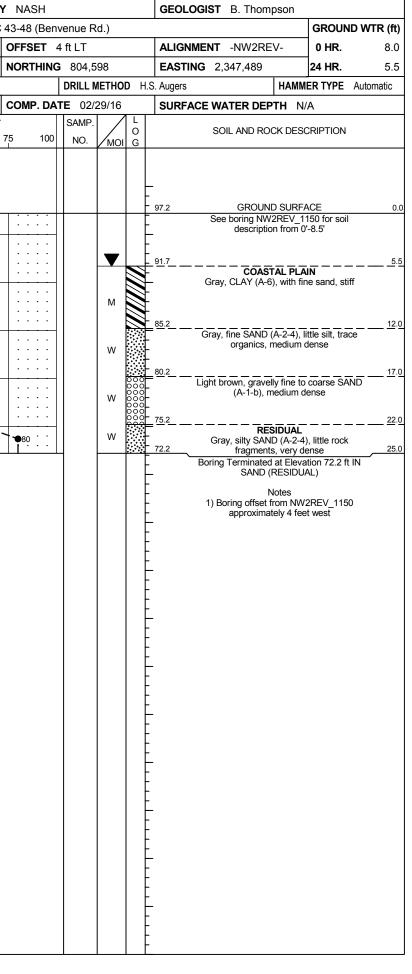
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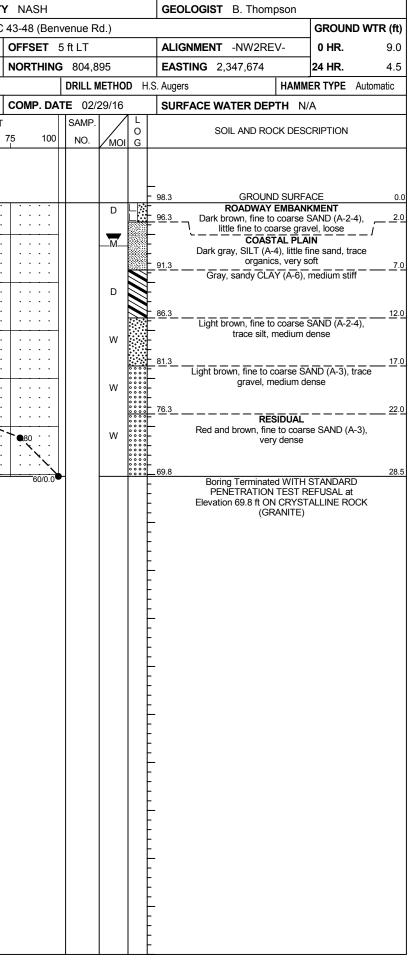
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	36591					P U-333				Y NASH				GEO	LOGIST	B. Thompson				S 3659 ⁻					P U-33		COUNTY
								lay Dr.) to NC	43-48 (Be		Rd.)						OUND WTR (ft)									Dr.) to NC
BOR	ing no.	NW2	2REV_	1100	SI	TATION	11+00			OFFSET	CL			ALIG	SNMENT	-NW2REV-	0 HI	R. FIAD	BOF	RING NO	. NW2	2REV_	_1100L	. S	TATION	11+00	
COL	LAR ELE	EV. 9	7.4 ft		т	OTAL DE	PTH 6.	.5 ft		NORTHI	IG 804	553		EAS	TING 2,3	47,468	24 HI	R. N/A	COL	LAR EL	EV . 9	6.0 ft		т	OTAL DE	PTH 25.0	ft
DRILI	L RIG/HAI	MMER E	EFF./DA	TE F8	R3495	CME-55 7	3% 02/15	5/2015			DRILL	METHO	DD H	H.S. Auger	rs	HAM	MER TY	PE Automatic	DRIL	.L RIG/HA	MMER E	EFF./DA	TE F	&R3495	CME-55	73% 02/15/20	15
DRIL	.LER D	. Tigno	or		ST		TE 02/	26/16		COMP. D	ATE 02	2/26/16	6	SUR	FACE WA	TER DEPTH	N/A		DRII	LLER D). Tigno	or		S	TART DA	TE 02/26	/16
ELEV	DRIVE ELEV	DEPTH	H BLC	ow col	JNT		BLO	WS PE	R FOOT		SAMF	P. 💙/			SOI	_ AND ROCK DE		ON	ELEV	, DRIVE ELEV	DEPTH	H BLO	on wc	UNT		BLOWS	S PER FOOT
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50		75 10	0 NO.	Имо						DEPTH (ft)	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50 7
100																			100								
	-	+												- 97.4		GROUND SUF		0.0			ł						
	97.4 -	<u> </u>	3	3	2	6 5 ^{•••}	• • • •	• •	• • • •	· · · ·			L	<u>- 97.4</u>		OADWAY EMBA	ANKMENT				Ŧ						
95	93.9	3.5					•	•••	· · · ·	· · · ·	_			Ļ	SAND (A-2	rown to dark gray 2-4), trace fine to	o coarse q	ravel, silt	95		ŧ						
	93.9	- 3.5	7	28	13			• • • •						1	ar	nd organics, loos	e to dense	e			ŧ						· · · · · ·
	-	<u> </u>				•••	· · · - · ·	•••		· : : : : : :				90.9		terminated due t		0.0	00		‡				· · · · · ·	· · · · ·	· · · · · ·
		ŧ												F	Boring Te Elevatio	rminated BY AU on 90.9 ft IN SAN	ND (ROAE	USAL at DWAY	90		ŧ				 		
	-	ł												F		EMBANKME	ENT)			87.5	8.5		WOH	3			
	-	F												F					85		Ŧ				 ∮ ³		
		F												F							Ŧ						
	-	ŧ												Ę						82.5	+ 13.5 +	100	-		<u>`</u>	· · · · ·	
		ŧ												È.					80		‡				<u>i</u>		· · · · ·
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	-	ł												F						11.5	10.5	4	3	5			
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	-	ŧ												F						72.5	23.5						
	-	ŧ												Ę							‡	5	5	6	<u> </u>		
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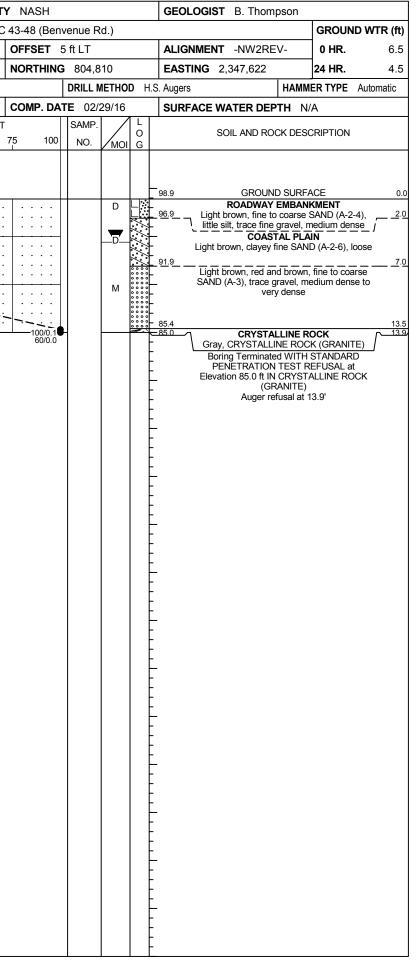
	Ľ	ORE LOG	1		
WBS 36591.1.1	TIP U-3330 COUN	Y NASH	GEOLOGIST B. Thompson	WBS 36591.1.1	TIP U-3330 COUNT
SITE DESCRIPTION US 301 Byp	ass from SR 1836 (May Dr.) to N	C 43-48 (Benvenue Rd.)	GROUND WTR (ft	SITE DESCRIPTION US 301 B	ypass from SR 1836 (May Dr.) to NC
BORING NO. NW2REV_1150	STATION 11+50	OFFSET CL	ALIGNMENT -NW2REV- 0 HR. FIAD	BORING NO. NW2REV_1150L	STATION 11+50
COLLAR ELEV. 98.0 ft	TOTAL DEPTH 5.5 ft	NORTHING 804,981	EASTING 2,347,726 24 HR. N/A	COLLAR ELEV. 97.2 ft	TOTAL DEPTH 25.0 ft
DRILL RIG/HAMMER EFF./DATE F&R	3495 CME-55 73% 02/15/2015	DRILL METHOD H.	Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE F&	&R3495 CME-55 73% 02/15/2015
DRILLER D. Tignor	START DATE 02/29/16	COMP. DATE 02/29/16	SURFACE WATER DEPTH N/A	DRILLER D. Tignor	START DATE 02/29/16
LEV DRIVE DEPTH BLOW COUN	IT BLOWS PER FOO	Г SAMP. V		ELEV DRIVE DEPTH BLOW CO	UNT BLOWS PER FOOT
(ft) ELEV (ft) 0.5ft 0.5ft (0.5ft 0 25 50				0.5ft 0 25 50
ELEV DRIVE ELEV (ft) DEPTH (ft) BLOW COUN (ft) 0.5ft 0.5ft (ft) 0.5ft 0.	IT BLOWS PER FOO	SAMP. L 75 100 NO. MOI G . . . D L O	SOLVACE WATER DEPTH 10/A SOL AND ROCK DESCRIPTION ELEV. (t) DEPTH (98.0 GROUND SURFACE 0 98.0 GROUND SURFACE	ELEV (ft) DRIVE ELEV (ft) DEPTH (ft) BLOW CO 0 0.5ft 0.5ft 0.5ft 100 - - - 0 - - - 0 - - - 0 - - - 0 - - - 0 - - -	UNT BLOWS PER FOOT 0.5ft 0 25 50



													UG																
VBS 36	6591.1.	1			TIF	P U-33	330		С	OUNT	Y NA	SH				GE	DLOGIST B. Thompson	1		WBS	36591	1.1.1			T	I P U-333	30	C	OUNTY
ITE DES					pass f	from SF	R 183	6 (Ma	y Dr.)) to NC	43-48	B (Ben	venue F	Rd.)					rr (ft)							from SR	1836 (Ma	ay Dr.)	to NC 4
ORING	NO. N	IW2RE	EV_12	200L	ST	ATION	12+	-00			OFFS	SET (5 ft LT			ALI	GNMENT -NW2REV-	0 HR.	9.0	BOR	ING NO.	. NW	2REV_	_1250L	_ S	TATION	12+50		0
OLLAR	ELEV.	98.1	ft		тс	DTAL DI	EPTH	I 21.4	4 ft		NOR	THING	804,9	938		EAS	TING 2,347,700	24 HR.	5.0	COL	LAR ELI	EV. 9	8.3 ft		Т	OTAL DE	PTH 28	.5 ft	1
RILL RIG	HAMME	R EFF.	/DATE	F&F	R3495	CME-55	73%	02/15/2	015		1		DRILL	METHO	DD H	I.S. Aug	rs HAMM	IER TYPE Autor	natic	DRIL	RIG/HA	MMER E	EFF./DA	ATE Fa	kR3495	CME-55	73% 02/15/2	2015	1
RILLER	D. Ti	anor			ST	ART D	ATE	02/29	9/16		сом	P. DA	TE 02	/29/16	;	SU	RFACE WATER DEPTH N	/A		DRIL	.LER D	. Tiana	or		S	TART DA	TE 02/2	9/16	(
		- -	BLOW	/ COU	_					R FOOT			SAMP		/ L					ELEV	DRIVE		1	ow co					RFOOT
(ft) ELI	EV 102	· · · · -		0.5ft		0	25		50		75	100	NO.	Имо	O I G	ELEV.	SOIL AND ROCK DES		EPTH (ft)	(ft)	ELEV (ft)	(ft)	· —	0.5ft	1	0	25	50	7
	<u>,</u>												-				(ii)	DL	_F 111 (II.)		(11)								
00																-				100		╞							
98	3.1 + 0	.0	1	5	4	+r.			· _ ·		·			D		98.1	GROUND SURF		0.0		98.3	<u> </u>	2	6	3	· .	• • • •	• • •	
95	‡			Ĩ		. P ⁹		· · · · · ·		 		•••				96.1	Brown, fine to coarse SANE) (A-2-4), trace		95	-	‡					· · · · ·		
95 94	L <u>6 +</u> 3	.5	1	2	1		.				+ : :						Letter Silt and fine gravel, COASTAL PLA	<u>лп — — — — (</u>		95	94.8 -	- 3.5	WOH	I WOH	1				
	Ŧ					\P^3 · ·	•			 		· ·		<u> </u>		Ł	Gray with light brown marblin trace fine sand,	ng, CLAY (A-6),			-	Ł							
90	Ŧ	_					•	• • •				••					trace fine sand,	3011		90	89.8	8.5							
	9.6 + 8 +	1.5 W	юн	2	2	4.								м							- 09.0 -	- 0.0 -	1	2	4				
	‡					$\left \begin{array}{c} \mathbf{T} & \cdot \\ \mathbf{V} & \cdot \end{array} \right $		· · · · · ·		 						- 06 1			12.0		-	ŧ				:`X :	· · · · ·		
85 84	+ 1.6 + 1:	35				<u>i</u> · ·	•		• •							<u>86.1</u>	Gray, red, and brown, fine to	coarse SAND	<u> <u> </u></u>	85	84.8 -	- 13.5						• •	
-04			3	4	4				. .			· ·		w	0000	-	(A-3), trace silt, loose to m	edium dense				+	3	6	12])	18 • • •		
	Ŧ														0000	F						Ŧ							
80 79	<u>9.6 ⁺ 18</u>	3.5									<u> </u>					79.1			19.0	80	- 79.8 -	18.5							
	‡		15	59	52			· · · · · ·		 		100	,		97	ſ	WEATHERED R	рск			-	ŧ	5	8	9	:::•			
76	<u>).7 + 2</u>		/0.0				•					60/0.0	Н		S.	- 76.7 -	Gray, GRANIT	E 5'to 21.4' /	21.4		-	t						<u> </u>	
	+															╞	Boring Terminated WITH PENETRATION TEST R			75	74.8 -	23.5	17	36	44				<u> </u>
	Ŧ															F	Elevation 76.7 ft ON CRYST	ALLINE ROCK			-	Ŧ							
	‡															F	(GRANITE)			70	- - - 69.8 -	28.5							



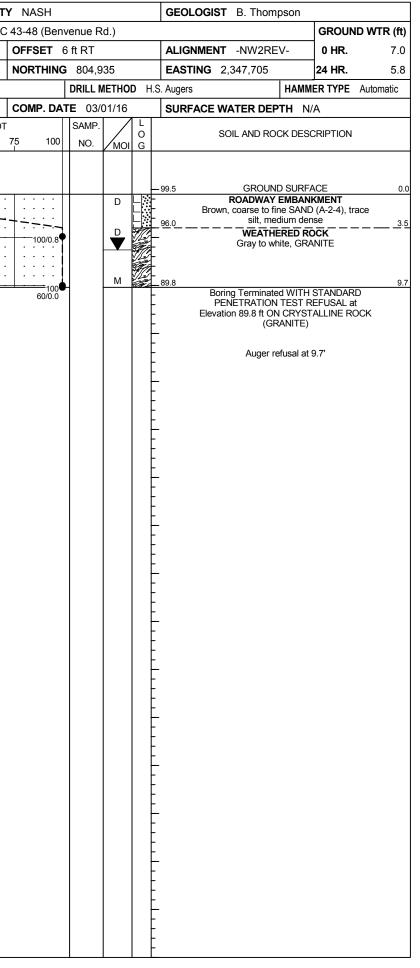
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	3 659					P U-333			Y NASH				GEOLOGIST B. Thompson	-	WB	3 6591	1.1.1			TIF	• U-3330		COUNTY
SITE	DESCR	RIPTION	US	301 B	ypass	from SR 1	1836 (May	Dr.) to NO	C 43-48 (Ber	nvenue F	Rd.)			GROUND WTR (ft)	SITE		RIPTION	US	301 B	ypass f	rom SR 18	36 (May Di	r.) to NC
BOR	ING NO	. NW2	2REV_	_1300L	. S	TATION	13+00		OFFSET	5 ft LT			ALIGNMENT -NW2REV-	0 HR. 17.0	BOF	RING NO	. NW2	2REV_	1350L	ST	ATION 13	8+50	
COL	LAR EL	EV . 98	8.6 ft		т	OTAL DEF	TH 21.9	ft	NORTHIN	G 805, ²	122		EASTING 2,347,811	24 HR. 4.5	COL	LAR EL	EV . 98	3.9 ft		то	TAL DEPT	H 13.9 ft	
DRIL	L RIG/HA	MMER E	EFF./DA	TE F8	R3495	CME-55 73	3% 02/15/202	15	1	DRILL	METHO	D ⊢	H.S. Augers HAMN	IER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE F8	R3495	CME-55 73%	02/15/2015	I
DRIL	LER [). Tianc	or		S		E 02/29/	16	COMP. DA	TE 02/	/29/16		SURFACE WATER DEPTH N	I/A	DRI	LER D). Tiana	or		ST	ART DATE	02/29/16	3
ELEV	DRIVE	-	1	OW CO				PER FOO		SAMP.	-	1 L			ELEV	DRIVE		1	W COL			BLOWS PE	
(ft)	ELEV (ft)	(ft)	' 	0.5ft		0	25	50	75 100		мо	0		CRIPTION DEPTH (ft)	(ft)	ELEV (ft)	(ft)	0.5ft			0 2	5 50	
	(,															(,							
															100								
100	98.6	+ 0.0											- 98.6 GROUND SURF.	ACE 0.0	100	98.9	± 0.0						
1	96.0	<u>+ 0.0</u> +	2	4	5	· • 9 · ·					D		ROADWAY EMBAN	IKMENT			+	2	5	5	· • 10 ·		
95	95.1	T 3.5				/							<u>96.6</u> Light brown, fine to coarse trace fine gravel and silt, n	SAND (A-2-4), <u>2.0</u> medium dense	95	95.4 ·	3.5				. j	· · · · ·	· · · · · · · ·
		+ 0.0	3	1	WOH					1			COASTAL PLA Yellow and light brown, san			1 -	ŧ	1	3	4			
ł		‡					· · · · · ·		· · · · · ·				91.6 very soft	7.0			‡					· · · ·	
90	90.1	8.5				· · · · ·							Light yellow and brown, fine (A-2-4), little silt, trace gravel	to coarse SAND	90	90.4	8.5	5	6	5			
		ł	4	8	11		19				D						ł		Ū		. •11		
		Ŧ												<u>12.0</u>			Ŧ						·
85	85.1	13.5	7	8	11		· · · · · ·		· · · · ·	41			Gray, CLAY (A-6), little fine	e sand, very stiff	85	<u>85.4</u> ·	+ <u>13.5</u> + <u>13.9</u>	100/0.1			••••		· · · ·
		‡	'			· · ·● · · · ·	19		· · · · · ·		W						‡	60/0.0					
		t						Ĩ <u>Ţ</u> ŢŢŢ									ŧ						
80	80.1	18.5	34	60/0.0					60/0.0	•	w			<u>19.0</u>			+						
	70.7	T 21.9								!			Gray, CRYSTALLINE ROC	CK (GRANITE) 21.9			Ŧ						
	76.7	<u>+ 21.9</u> +	60/0.0)					60/0.0	●┤		12	 Boring Terminated WITH 	I STANDARD			Ŧ						
	-	ŧ											PENETRATION TEST F Elevation 76.7 ft IN CRYST	REFUSAL at TALLINE ROCK		-	ŧ						
		‡											GRANITE)				‡						
	_	ŧ											– Auger refusal at 2	21 9'			t						
		ł												21.5			ł						
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WBS	36591	.1.1			TI	IP U	-3330		C	COUNT	TY N	IASH					GEOLOGIST B. Thompson	
SITE	DESCR	IPTION	US	301 B	ypass	from	SR 18	36 (Ma	ay Dr	.) to N	C 43-	48 (Be	nven	ue R	d.)			GROUND WTR (f
BORI	NG NO.	NW2	REV	1400L	S	ΤΑΤΙΟ	DN 14	+00			OF	FSET	5 ft	LT			ALIGNMENT -NW2REV-	0 HR. 7.0
	AR ELE			-	_		DEPT		5 ft		-	RTHIN			67		EASTING 2,347,597	
	RIG/HAN			TE E							1					пц	I	IMER TYPE Automatic
																υп.		
	LER D	-				TART	DATE					MP. D			29/16	1	SURFACE WATER DEPTH	N/A
ELEV	DRIVE ELEV	DEPTH			1					R FOO		100		AMP.	▼∕		SOIL AND ROCK DE	SCRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	2	5	50		75 I	100		NO.	Иоі	G	ELEV. (ft)	DEPTH
100																		
ŀ	98.7 -	- 0.0	3	5	5	_	ı —	1									98.7 GROUND SUF	
	-	-			5	:•	10			· · · · · ·		· · · ·			D		96.7 Brown, fine to coarse SA	ND (A-2-4), trace2
95	95.2	3.5	5	5	11	L.	· \· ·		• •		· ·				-			
	-	_		5	''	·	- 16		•••	· · ·	: :				₽		Light brown, clayey SAN	D (A-2-6), trace
	-	-															91.7 gravel, medium	1
90	90.2	8.5	3	4	3				•••		· ·					0 0 0 0 0 0 0 0 0 0 0 0	Light brown, fine SAN	J (A-3), loose
	-	_		⁻		•	⁷			· · ·	: :	· · ·			M	0 0 0 0 0 0 0 0		
	-	-				.			. – . – .		. ·					0 0 0 0 0 0 0 0 0 0 0 0	- 86.7 RESIDUA	12
85	85.2	13.5	100/0.3	3			· · ·		•••			100/0.3			D	0000	 Light brown, fine to coarse 	
	-	-		1			· · ·			· · ·	ببليز						dense	
	-	_						•••			• •					0 0 0 0 0 0 0 0 0 0 0 0		
80	80.2	18.5	5	8	10	1									D	0000	-	
	-	_				:				· · · ·	: :					0 0 0 0 0 0 0 0 0 0 0 0		
		-					· · ·		::``	·	÷Ļ.	· · ·				0 0 0 0 0 0 0 0 0 0 0 0		
75	75.2	23.5	12	36	64/0.3					· · · ·					D	0000 0000	<u></u>	POCK2
	-	-										100/0.8					Light gray and light bro	
	70.0	-					· · · · · ·			· · · · · ·	: :	· · · · · ·	!				70.2	28
F	70.2	28.5	60/0.0									60/0.0	•			52112	Boring Terminated WIT	H STANDARD
	-	-														F	PENETRATION TEST Elevation 70.2 ft ON CRY	
	-	_															(GRANITE	
		_															-	
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SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.) GROUND WTR (ft) SITE DESCRIPTION US 301 Bypass from SR 1836 (May Dr.)	OUNTY NASH GEOLOGIST B. Thompson to NC 43-48 (Benvenue Rd.) GROUND WTR (ft)
	to NC 43-48 (Benvenue Rd.)
BORING NO. NW2REV_1450R STATION 14+50 OFFSET 5 ft RT ALIGNMENT NW2REV_ 0 HR. 12.0 BORING NO. NW2REV_1450R STATION 14+50	OFFSET 5 ft RT ALIGNMENT -NW2REV- 0 HR. 12.0
COLLAR ELEV. 99.5 ft TOTAL DEPTH 25.2 ft NORTHING 804,850 EASTING 2,347,653 24 HR. 5.0 COLLAR ELEV. 99.5 ft TOTAL DEPTH 25.2 ft	NORTHING 804,850 EASTING 2,347,653 24 HR. 5.0
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015 DRILL METHOD H.S. Augers HAMMER TYPE Automatic DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 73% 02/15/2015	DRILL METHOD H.S. Augers HAMMER TYPE Automatic
DRILLER D. Tignor START DATE 03/01/16 COMP. DATE 03/01/16 SURFACE WATER DEPTH N/A	COMP. DATE 03/01/16 SURFACE WATER DEPTH N/A
ELEV DRIVE ELEV DEPTH BLOW COUNT BLOWS PER FOOT SAMP. L 0 L 0 SOIL AND ROCK DESCRIPTION (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0 25 50 75 100 NO VIOI C FLEV (#) DEDUL(#) DE	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	RATA L RQD O (ft) G % G ELEV. (ft) DESCRIPTION AND REMARKS
$(ft) \stackrel{ELEV}{(ft)} (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)$	
100 99.5 GROUND SURFACE 0.0 84.3 15.2 5.0 3.50/1.0 (5.0) (4.8)	Begin Coring @ 15.2 ft CRYSTALLINE ROCK
$\begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 $	Gray, black, and white, very slight to fresh weathering, hard, closely to widely fractured, CRYSTALLINE ROCK (GRANITE) RMR = 69 (continued)
96.0 3.5 10 10	
Light brown to yellow-brown, coarse to fine	RMR = 69 (continued)
dense to loose	
90 91.0 8.5 4.00/1.0 75 74.3 25.2 7.50/1.0 D	
	Boring Terminated at Elevation 74.3 ft IN CRYSTALLINE ROCK (GRANITE)
84.3 15.2 1 0 00/0.1	
Grav, black, and white, CRVSTALLINE	
80 I Hard drilling from 14.6' to 15.2'	
Boring Terminated at Elevation 74.3 ft IN CRYSTALLINE ROCK (GRANITE)	
Auger refusal at 15.2'	

(0) (JREL	.00								- —								
BORNE ON. NV2PCPL_15002 TATION 15-00 OPFREF 0.01001100 DORM MADE SPECIAL DORM MADE SPECIAL <thdorm made="" special<="" th=""> <thdorm made="" special<="" th=""></thdorm></thdorm>															G	EOLOGI	ST B. Thomp	oson	1									
OCLUBELEV 05.1 TOTAL DEPTH 10.1 NORTHWEI 20.473 Jahr Her. 6.0 Columber PLANCE TOTAL DEPTH 7.1 Deall.com/metric/article/artit/article/article/article/artit/article/article/artit	SITE	DESCR	RIPTION	N US	301 B	ypass	from SR 1	1836 (Ma	ay Dr.) to				Rd.)						GROUND WTR (ft	SIT	E DESCI	RIPTIO	N US	301 B	ypass	from SR 1	836 (May	Dr.) to NC
Della Londonameter produce (xe-s) 73 (2003) Della Conventional della	BOR	ING NO). NW2	2REV_	1500F	ং ऽ ⊺	TATION	15+00			OFFSET	8 ft RT			AL		NW2RE	V-	0 HR. 8.0	во	RING NC). NW:	2REV_	1550F	२ ऽ ।	TATION	15+50	
DelLLER 0. Topor START DATE: 000/1/16 Course Date: 000/1/16 SuperAct: waters DerTH 19/0 Disport Formation Disport Form	COLI	LAR EL	EV. 99	9.5 ft		т	OTAL DEF	TH 10.	.0 ft		NORTHING	3 804,8	393		EA	ASTING	2,347,678		24 HR. 6.0	со	LLAR EL	EV . 9	9.5 ft		т	OTAL DEF	TH 9.7 ft	
Intelligence BLOW DEAR TOOT BLOW PERFORT DATE	DRILL	RIG/HA	MMER E	EFF./DA	TE F8	R3495	CME-55 73	3% 02/15/2	2015			DRILL	METHO	OD H	H.S. Au	gers		HAMM	ER TYPE Automatic	DRI	LL RIG/HA	MMER E	EFF./DA	TE F	&R3495	CME-55 73	3% 02/15/201	15
00 m	DRIL	LER [D. Tigno	or		S	FART DAT	E 03/0	1/16		COMP. DA	TE 03/	01/16	3	รเ	JRFACE	WATER DEP	TH N/	Ά	DR	ILLER [D. Tigno	or		ST	FART DAT	E 03/01/	16
00 00 <td< td=""><td>ELEV</td><td>DRIVE</td><td></td><td>·</td><td></td><td></td><td></td><td>BLOW</td><td>VS PER F</td><td>ООТ</td><td></td><td>SAMP.</td><td>\mathbf{V}</td><td></td><td></td><td></td><td></td><td></td><td></td><td>ELE</td><td></td><td>DEPTH</td><td>·</td><td></td><td></td><td></td><td>BLOWS</td><td>PER FOOT</td></td<>	ELEV	DRIVE		·				BLOW	VS PER F	ООТ		SAMP.	\mathbf{V}							ELE		DEPTH	·				BLOWS	PER FOOT
00 3.6 4 7 4.7 7.7 <th7.7< th=""> <th7.7< th=""> <th7.7< th=""></th7.7<></th7.7<></th7.7<>	(ft)		(ft)	0.5ft	0.5ft	0.5ft	0	25	50	7	75 100	NO.	Имс		ELE					(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50
00.0 3.6 2.3 4 7 4.7																												
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	95		Ŧ	2	3	6				· ·					F.	Redo	COAST dish-brown, claye	CAL PLA	IN), (A-2-6), loose	95		Ŧ	33	67/0.3			+	
Unit Line			Ŧ										┢		\$ {		, ,					Ŧ						
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		89.5	+ 10.0 +							• •		5		<u>ن</u> کرک	<u>]— 89.5</u> -	_	Dark brow	/n, GRAN	NITE / 10.		89.8 -	+ 9.7 +						
Elevation 8.9.1 MO RYYTALLINE ROCK (GUARD 1) Auger relucal at 10.0"			‡												Ę	I	PENETRATION	TEST R	EFUSAL at			‡						
Auger refaal at 10.0* Auger refaal at 10.0* Auger refaal at 10.0* Auger refaal at 10.0* <td></td> <td></td> <td>ŧ</td> <td></td> <td>Ł</td> <td>Elev</td> <td>ation 89.5 ft ON</td> <td>CRYST</td> <td>ALLINE ROCK</td> <td></td> <td></td> <td>ŧ</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			ŧ												Ł	Elev	ation 89.5 ft ON	CRYST	ALLINE ROCK			ŧ						
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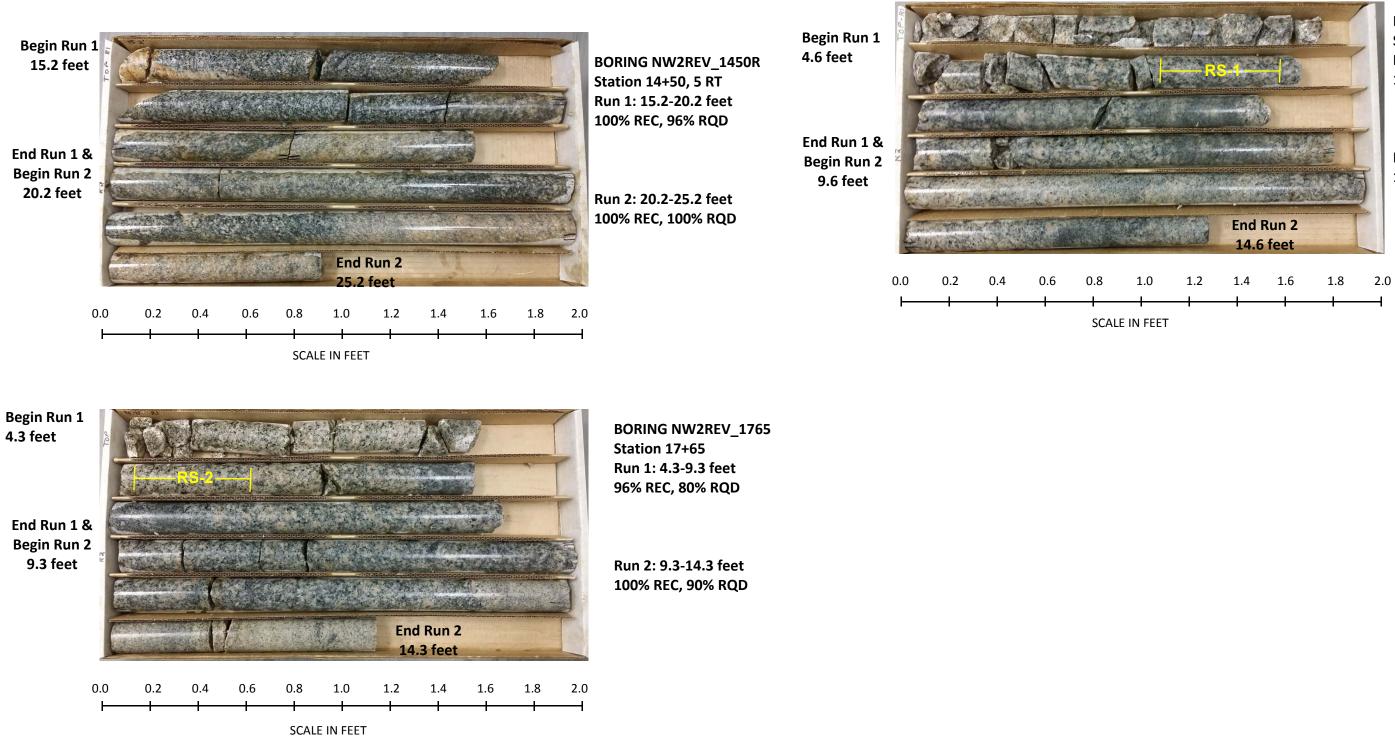
WF	S 365	9111		TIF	U-3330)	CC		/ NASH					GEOLOGIST B. Thompson		WB	S 365	91 1 1			ТІР	U-33	330	С	OUNT	TY N	IASH	GEOLOGIST B. Thompson	
			US 301								nue Ro	d.)			GROUND WTR (ft)				DN US	5 301 Bv							48 (Benvenue Rd.)		GROUND WTR (ft)
			2REV_1650		ATION 1				OFFSE			,		ALIGNMENT -NW2REV-	0 HR. Dry		RING N						16+50	- ,			FSET CL	ALIGNMENT -NW2REV-	0 HR. Dry
		LEV. 99			TAL DEP		6 ft		NORTH			24		EASTING 2,347,751	24 HR. FIAD		LAR E				_		EPTH 14	.6 ft		-	RTHING 805,024	EASTING 2,347,751	24 HR. FIAD
			FF./DATE										DH.		 IER TYPE Automatic								73% 02/15/				DRILL METHOD	1	IER TYPE Automatic
		D. Tigno			ART DAT				COMP.								LLER				-		ATE 03/0			со	MP. DATE 03/01/16	SURFACE WATER DEPTH N	
						BLOWS					SAMP.		L				RE SIZE				тот		UN 10.01						
(ft)	ELEV (ft)	(ft)	0.5ft 0.5f	t 0.5ft	0	25	50	7	75 1	100	NO.	моі	O G	SOIL AND ROCK DES	DEPTH (ft)	ELEV					(ft) (ft)		SAMP.	STF		L			
																(ft)	ELE\ (ft)	/(ft)	(ft)	RATE (Min/ft	(ft) (ft)	(ft)	NO.	STF REC. (ft) %	(ft) %	G	ELEV. (ft)	DESCRIPTION AND REMARKS	DEPTH (ft
100		\perp												_99.7 GROUND SURI	ACE 0.0	99551												Begin Coring @ 4.6 ft	
	99.7	<u> </u>	2 4	5	:•9-::		· ·					D		ROADWAY EMBAI	KMENT clavev SAND		95.1	T 4.6	5.0	3.00/1.	0 (5.0) 0 100%)) (2.6 % 52%)				95.1 Gray, black, and w	CRYSTALLINE ROCK nite, very slight to fresh weathering, har ely fractured, CRYSTALLINE ROCK (GI	4.6 d to very hard,
	96.2	3.5	57 43/0.	4				· · ·		÷		D		96.2 (A-2-4), loos	e 3.5			+		4.00/1. 6.25/1.	0		RS-1				_ closely to wic		RANITE),
95	95.1	4.6	60/0.0	4		<u> </u>	<u> </u>		100/	0.9				Light brown, gray, and w	iite, GRANITE	90	90.1	9.6	5.0	<u>5.00/1.</u> 3.00/1.	0 (5.0)) (5.0)	´			_	RMR=67	
		ţ					: :	· · ·		. i L				CRYSTALLINE Gray, black, and white, C ROCK (GRAN	R OCK RYSTALLINE			ŧ		2.25/1. 2.50/1. 3.00/1.	0 100% 0	% 100%	6				-		
90	_	‡					· ·			·	RS-1 /			ROCK (GRAN	TE)		85.1	14.6	3	3.00/1. 3.00/1.	0	_	_			K			14.6
		‡						· · · · · ·										ŧ									Boring Terminated a	t Elevation 85.1 ft IN CRYSTALLINE RC	JCK (GRANITE)
		‡						· · ·	· · · ·					9E 1	14.6			ţ									-		
		+			1				1					BUTTING TETTITIALEU AL EIEV				+									-		
		‡												CRYSTALLINE ROCK	(GRANITE)			‡									-		
		‡												- Auger refusal a	4.6'			‡									-		
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WBS	36591	.1.1			ד	P U-33	30		COUN	TY NA	ASH				GEOLOGIST B. Thompson	
SITE	DESCR	IPTION	US	301 By	ypass	from SF	1836	6 (May I	Dr.) to N	C 43-4	8 (Ben	venue R	d.)			GROUND WTR (ff
ORI	NG NO.	NW2	REV	1700	S	TATION	17+(00		OFF	SET (CL			ALIGNMENT -NW2REV-	0 HR. Dr
	AR ELE					OTAL DI				-		805,0	66		EASTING 2,347,777	24 HR. Dr
				TE F8		CME-55				1				р на	1	ER TYPE Automatic
	ER D									CON		TE 03/				
LEV (ft)		DEPTH (ft)		W COU 0.5ft	JNT	0		BLOWS	PER FOO		100	SAMP. NO.		L O G	SOIL AND ROCK DESC	
<u>105</u> 100 - 95	- - - - - - - - - - - - - - - - - - -	- - <u>3.5</u>	2	4	7	. • 11 . • •				· · ·	100/0.8	,	D		GROUND SURFA ROADWAY EMBANI Light brown, coarse to fine 1 trace silt, little organics (gra medium dense WEATHERED RC	KMENT SAND (A-2-4), ss and roots),3
-	<u>94.3</u> - - - - - - -	- 6.0 	60/0.0								-60/0.0	-			-94.3 White to gray, GRA Boring Terminated WITH PENETRATION TEST R Elevation 94.3 ft ON CRYST - (GRANITE) Auger refusal at	NITE STANDARD STANDARD EFUSAL at ALLINE ROCK
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WB	S 3659	111			TIP	U-3330)	C	COUNTY	NASH	4			0	GEOLOGIS	T B Th	ompson			WBS	S 3659	111			TIP	U-333	30	С	OUNTY	' NA	ASH	GEOLOGIST B. Thompson		
				301 Bv		rom SR 1						nue Rd.)				empeen	GROU	ND WTR (ft)				N US	301 Bvp	_						B (Benvenue Rd.)		GROUND	WTR (ft)
) . NW2		-		ATION		.,		OFFSE			,	4		T -NW2	2REV-	0 HR.	• • •						_		17+65	,)			SET CL	ALIGNMENT -NW2REV-	0 HR.	Dry
		EV. 99			_	TAL DEP		1.3.ft		NORTH			2		ASTING			24 HR.	,		LAR EL			1700	-		PTH 14	1.3.ft			THING 805,122	EASTING 2,347,811	24 HR.	FIAD
				TE ESI		CME-55 73						-) H.S. A		-,077,01			Automatic					TE F&R					'		DRILL METHOD H.	· · ·	MER TYPE AU	
		D. Tignor			_					COMP.										-	LLER [TE 03/			COM	IP. DATE 03/01/16	SURFACE WATER DEPTH		ulumalic
		DEPTH		W COU	_				R FOOT	CONF.		SAMP.						N/A				-			-		N 10.0			CON	IF. DATE 03/01/10	SURFACE WATER DEPTH	N/A	
ELE (ft)	ELEV (ft)	(ft)	0.5ft	0.5ft		0	25	50		75 1			моі	0	.EV. (ft)	SOIL AND	ROCK DE	SCRIPTION	N DEPTH (ft	I		_	-	DRILL	R		N 10.0		RATA					
	(11)									1			NO		EV. (II)				DEPTH (IL	ELEV (ft)	RUN ELEV (ft)	DEPTI (ft)	H RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft)	SAMP. NO.	REC. (ft)	RATA RQD (ft) %	õ		DESCRIPTION AND REMARKS		DEDTU
100																					(11)			(10111711)	%	%		%	%		ELEV. (ft)	Desig Caring @ 1.2 ft		DEPTH (ft)
100	99.3	+ 0.0	4	4						1			_ 1	99	.3		UND SUR		0.0	95	95.0	4.3	5.0	3.00/1.0) (4.8)	(4.0)		_				Begin Coring @ 4.3 ft CRYSTALLINE ROCK		
		±	-	4	<i>'</i>	. •11 . 		· ·	 				D			t brown, co	parse to fin	e SAND (A-				Ŧ		4.00/1.0 3.25/1.0)	80%	RS-2				Gray, black, and v	vhite, very slight weathering, hard, clo CRYSTALLINE ROCK (GRANITE)	sely fractured,	
95	95.8	3.5	6	100/0.3				•••		+	.		D	95	.3	-		medium de	ense 4.0		90.0	9.3		3.50/1.0 5.25/1.0								RMR=66		
		ŦI								100/	. 1				<u> </u>	Light	THERED	ANITE	4.3	1		Ŧ	5.0	5.25/1.0 4.75/1.0	(5.0)	(4.5)								
		Ŧ									· []	<u>RS-2</u> /			Gra	ay, black, a	STALLINE and white, (CRYSTALL	INE			Ŧ		7.25/1.0 3.25/1.0)					F				
90	-	Ŧ					· ·		· · · ·					RF-		RO	CK (GRAN	IITE)		85	85.0	14.3		3.00/1.0							85.0 Boring Terminated at	Elevation 85.0 ft IN CRYSTALLINE F	OCK (GRANIT	14.3 E)
		‡							· · · · ·		·											Ŧ								F	Lonny reminated a			-/
85		‡							· · · · · · · ·					85	0				14.3			‡								Ę				
		+											<i>.</i>	<u>, 2 00</u> -	Bori	ng Termina	ated at Ele	vation 85.0	ft IN			‡								F				
		‡												F	Ĺ		INE ROCH	K (GRANITE at 4.3'	-)			‡								þ				
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CORE PHOTOGRAPHS: NW2REV_1450R, NW2REV_1650, and NW2REV_1765: Station 14+50 to 17+65



BORING NW2REV_1650 Station 16+50 Run 1: 4.6-9.6 feet 100% REC, 52% RQD

Run 2: 9.6-14.6 feet 100% REC, 100% RQD

LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO .:

TIP NO.: U-3330

COUNTY: Nash

DESCRIPTION: Noise Wall 2 - US 301 Bypass from SR 1836 (May Dr.) to NC 43-48 (Benvenue Rd.)

												Unconfined	
							Geologic			Diameter	Unit Weight	Compressive	
Sample #	Boring #	Alignment	Station	Offset	Depth (ft)	Rock Type	Map Unit	Run RQD	Length (in)	(in)	(pcf)	Strength (psi)	RMR
RS-1	NW2REV_1650	-NW2REV-	16+50	CL	7.8-8.2	Granite	PPmg	52%	4.05	1.78	163.9	16,080	67
RS-2	NW2REV_1765	-NW2REV-	17+65	CL	6.1-6.5	Granite	PPmg	80%	3.75	1.78	164.9	11,490	66

CONTENTS SHEET NO.

2

3

DESCRIPTION

SITE PLAN & PROFILE(S)

SOIL TEST RESULTS

TITLE SHEET LEGEND

330 \mathbf{c})) REFERENCE

> 36596 PROJEC

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 <u>RETAINING WALL ONE</u> LEFT OF -L-STA.59+00

STATE N.C.

STATE PROJECT REFERENCE NO. U-3330

1

SHEETS

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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 SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATIO GEOTECHNICL ENGINEERING UNIT AT 1991 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

GENERAL SOLE 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 (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 INVESTIGATIONS ARE AS RECORDED AT HE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INVESTIGATION AND AS AND 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 CALIDIANE THAT TO FIAL 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 GUARANTE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION WADE, NOR THE INTERPRETATIONS MADE, OR OPNION 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 INVESTIGATION AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO DE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE INCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:

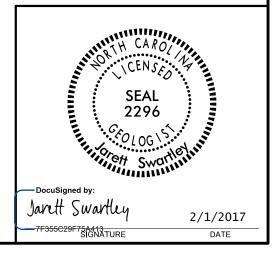
- TES: THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. BY HAVING REDUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.
- 2.

PERSONNEL

D.G. PINTER

J.R. SWARTLEY

- O.B. OTI
- INVESTIGATED BY _J.R. SWARTLEY
- DRAWN BY _____ WALKER
- CHECKED BY <u>N.T. ROBERSON</u>
- SUBMITTED BY ______ N.T. ROBERSON
- DATE **JANUARY** 2017



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT** SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK 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 DI586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING; CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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 - Grains	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:
AS MINERALOUIDAL COMPOSITION, ANOULARIT, STRUCTORE, PLASTICTIT, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED WILL NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.
$ \begin{array}{c c} \mbox{General} & \mbox{GranuLar Materials} & \mbox{Silt-Clay Materials} \\ \mbox{Class.} & \mbox{(\leq35\%$, passing *200)} & \mbox{($>35\%$, passing *200)} \\ \end{array} $	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
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-a A-2-4 A-2-5 A-2-6 A-2-7 A-7/5 A-3 A-6, A-7	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-COVETALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN
CLASS. A-1-b A-2-4 A-2-6 A-2-6 A-2-6 A-3 A-6, A-7 SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)
31PDUL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED
*10 50 MX GRANULAR SIL1- MUCK	PERCENTAGE OF MATERIAL	
*40 30 MX 50 MX 51 MN *200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 56 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL <u>SOILS</u> <u>OTHER MATERIAL</u>	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER
MATERIAL PASSING *40 LL 40 MX 41 MN 501LS WITH PI 6 MX NP 10 MX 10 MX 11 MN 10 MX 11 MN 10 MX 11 MN 11 MN LITTLE OR HIGHL	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	HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF
		OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL, AND CRAVEL AND SAND SOLIS SOLIS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ✓ STATIC WATER LEVEL AFTER <u>24</u> HOURS	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MALEKIALS SANU	∇ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHENING EFFECTS. IN (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
AS SUBGRADE EACELLENT TO GOOD FAIR TO POUR POOR POOR UNSUTA		DUCL SUDAD UNDER HAMMER BLUWS AND SHUWS SIGNIFICANT LUSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
PI OF A-7-5 SUBGROUP IS \leq LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30 CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	I∏ ⊃5 <i>/0</i> 25	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL
PRIMARY SULL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENDT (N-VALUE) (TONS/FT ²) CENERALLY VERY LOOSE < 4		SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.
GRANULAR LUUSE 4 10 10 MATERIAL MEDIUM DENSE 10 TO 30 N/A	R T	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF
(NDN-COHESIVE) DENSE 30 TO 50 (NDN-COHESIVE) VERY DENSE >50 VERY SOFT < 2 < 0.25	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST INFERRED SOIL BOUNDARY	VERY ALL ROCK EXCEPT OUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND
MATERIAL STIFF 8 T0 15 1 T0 2 (COHESIVE) VERY STIFF 15 T0 30 2 T0 4 HARD > 30 > 4		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.
	RECOMMENDATION SYMBOLS	ROCK HARDNESS
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT UNCLASSIFIED EXCAVATION - CALL UNCLASSIFIED EXCAVATION - CALL UNCLASSIFIED EXCAVATION - CALL UNCLASSIFIED EXCAVATION TO BE	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053 DOW 050 COARSE FINE 0.075 0.053	LICED IN THE TOP 3 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
BOULDER COBBLE GRAVEL SAND SAND SLT CLAY (BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	SHALLOW UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.
SIZE IN. 12 3 SOIL MOISTURE - CORRELATION OF TERMS	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 2 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE
SOIL MOISTURE SCALE FIELD MOISTURE CHURE FOR FIELD MOISTURE DESCRIPTION	_ CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS
(ATTERBERG LIMITS) DESCRIPTION OUDE FOR FIELD MOISTORE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
- 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, SILT, SILT, SILT, SILT, SLEWELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY
PLASTIC SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	
	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING HI HIGHLY V - VERY RATIO	FRACTURE SPACING BEDDING
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET
OM _ OPTIMUM MOISTURE - MUIST - (M) SULU; HI OK NEHK OPTIMUM MUISTURE SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET
- DRY - (D) REQUIRES ADDITIONAL WATER TO	CME-45C	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET
	Х сме-55 Х в* ноцьом чидеях Соле size;	THINLY LAMINATED < 0.008 FEET
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH	CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ET
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT		FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS: GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH		MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.
COLOR		GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;
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.	CORE BIT VANE SHEAR TEST	EXTREMELY INDURATED DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SAMPLE BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

SHEET NO.

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ROCK. S REQUIRES LOWS REQUIRED EEP CAN BE OR SLIP PLANE. OR PICK POINT. BLOWS OF THE FRAGMENTS IT. SMALL, THIN PIECES 1 INCH ED READILY BY BENCH MARK: GPS-3

NOTES:

THICKNESS 4 FEET 1.5 - 4 FEET 16 - 1.5 FEET 13 - 0.16 FEET 18 - 0.03 FEET 0.008 FEET

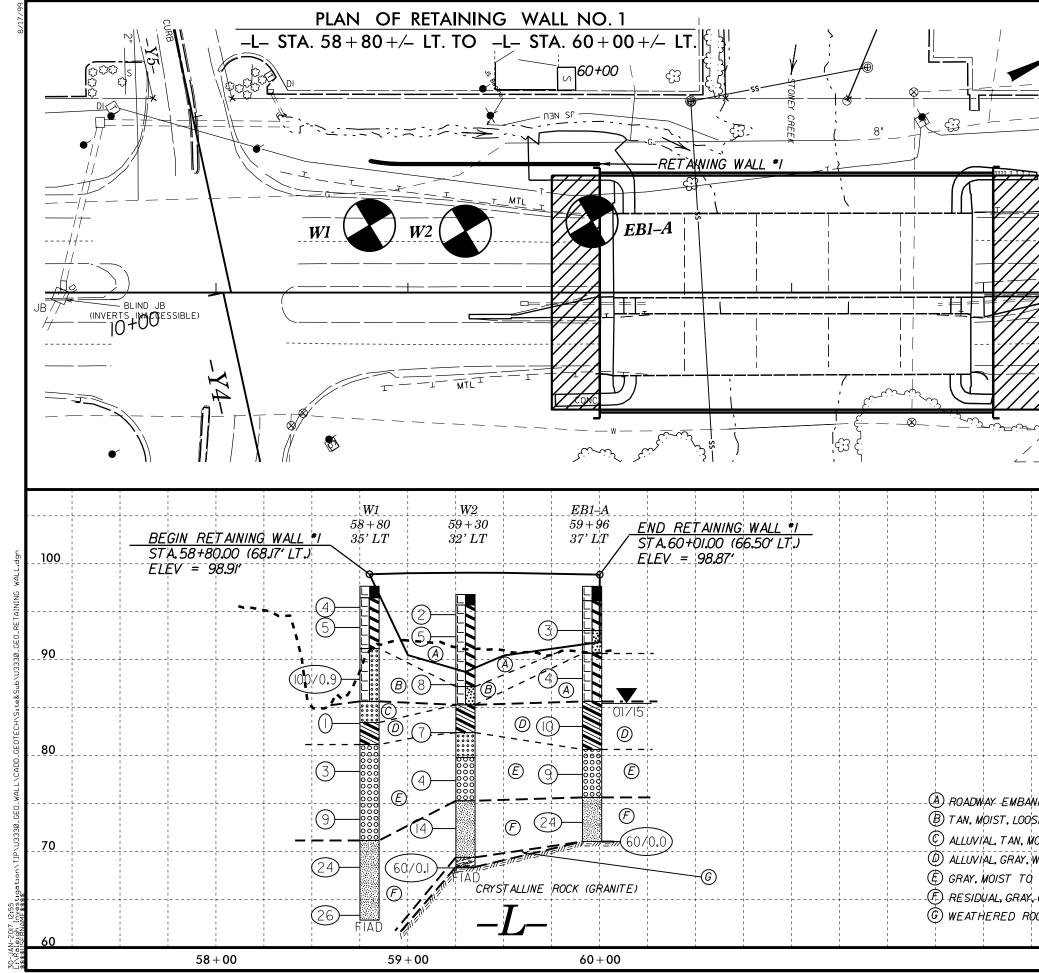
AT. PRESSURE, ETC.

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.

 $\frac{\text{Argillaceous}}{\text{A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.}$ N VALUES > 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 CK THAT SURFACE. CLUDES GRANITE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. AL PLAIN IF TESTED. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. MAY NOT YIELD 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. STONE, CEMENTED DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT BOCKS OR CUTS MASSIVE ROCK. RINGS UNDER $\underline{\text{DIP}}$ - The angle at which a stratum or any planar feature is inclined from the horizontal. OATINGS IF OPEN. <u>DIP DIRECTION (DIP AZIMUTH)</u> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. AMMER BLOWS IF FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE ICK UP TO SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FELDSPAR BLOWS. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. $\underline{\mathsf{FLOAT}}$ - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. Y. ROCK HAS AS COMPARED 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. FELDSPARS DULL OSS OF STRENGTH WHEN STRUCK. 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. VIDENT BUT ARE KAOLINIZED 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. RE DISCERNIBLE PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. ONLY MINOR ALUES < 100 BPF RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. IN SMALL AND 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 S. SAPROLITE IS RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT <u>SILL</u> - 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 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.

ELEVATION: 98.21 FEET



	PROJECT REFERENCE NO. $U-3330$	SHEET NO.		
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NAD 63+00				
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IKMENT, TAN - AND -RED, MOIST, SOI	-T-TO-MEDSTIFF, SILT	Y-CLAY		
SE, SAND				
OIST. LOOSE. SAND		70		
NET. VERY SOFT TO STIFF. SAND SATURATED. VERY LOOSE TO LOC	i i i			
-GREEN-AND-BLACK,-WET,-STIFF, S	I I I			
DCK (GRANITE)				
		60		

PROJ. NO. - 36596.1.2 ID NO. - U-3330 COUNTY - NASH

W-1

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-7	35'LT	58+80	3.3-4.8	A-7-6(16)	50	31	14.9	27.3	19.4	38.4	99	89	61	-	-

<i>W-2</i>															
SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO		%	BY WEIG	HT		% PASSING (SIEVES)				%	%
NO.	OFFSET	STATION	INTERVAL	CLASS.	L.L.	P.I.	C.SAND	F.SAND	SILT	CLAY	10	40	200	MOISTURE	ORGANIC
SS-4	32'LT	59+30	3.4-4.9	A-7-6(14)	48	29	26.1	19.6	20.0	34.3	100	81	59	-	-
SS-5	32'LT	59+30	18.4-19.9	A-1-b(0)	20	NP	83.9	12.6	1.4	2.0	78	21	4	-	-
SS-6	32'LT	59+30	23.4-24.9	A-4(0)	32	NP	36.2	26.3	27.5	10.1	98	76	42	•	-

EB1-A

SOIL TEST RESULTS															
SAMPLE			DEPTH	AASHTO					% PASSING (SIEVES)			%	%		
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	8.6-9.1	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	•	-

SHEET 4 OF 4