CONTENTS

202339

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34499.1.1 R-2710

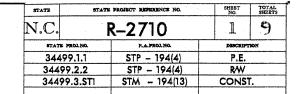
___ F.A. PROJ. *STP-194(4)*

COUNTY WATAUGA

PROJECT DESCRIPTION NC 194 FROM BANNER ELK IN AVERY

COUNTY TO VALLE CRUCIS IN WATAUGA COUNTY

INVENTORY

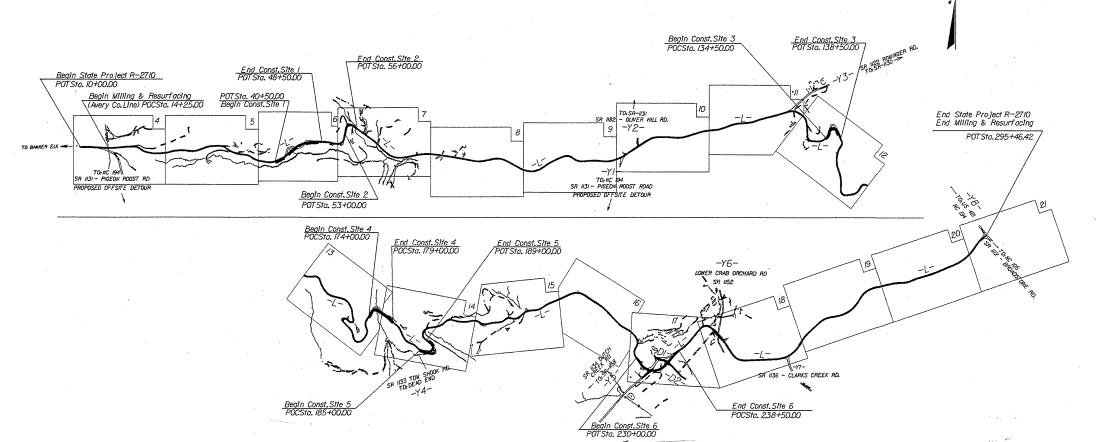


CAUTION NOTICE

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. A THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, COTECNING. ENGINEERING LUNT AT 1919-920-0408, RETHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 ACTULAL SUBSURFACE CONDITIONS BETWEEN BORNES OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU UN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIBBLITY INNESTRY IN THE STRANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS ONLY ANY CONSIDERABLY WINH THE ACCORDING TO CLIMATIC CONDITIONS INDICATED IN THE SUBSURFACE INVESTICATION. AND WIND, AS WELL AS OTHER NON-CLIMATIC FOONTIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR QUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR DINNON OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HUMBELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.



INVESTIGATED BY J.C. KUHNE

CHECKED BY W.D. FRYE

SUBMITTED BY W.D. FRYE

DATE OCTOBER 24, 2007

SEAL 25521

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT: R-2710 COUNTY: Watauga

DATE: 7/14/2010

COMPILED BY:

PJS

SHEET 1 OF 1 SHEETS

]	EXCAVATION	I			EMBAN	KMENT				WA	STE	
STATION	STATION	TOTAL UNCLASS.	ROCK	UNDERCUT	UNSUIT. UNCLASS.	l	TOTAL	ROCK	EARTH	EMBANK. +15%	BORROW	ROCK	SUITABLE	UNSUIT.	TOTAL
-L- 40+00	-L- 49+00	12,347				12,347	4,535		4,535	5,215			7,132		7,132
-L- 53+00	-L- 56+00	1,181				1,181	195		195	224			957		957
	SUBTOTAL	13,528				13,528	4,730		4,730	5,440			8,089		8,089
															0,009
-L- 134+00	-L- 138+50	5,138				5,138	2,101		2,101	2,416			2,722		2,722
	SUBTOTAL	5,138				5,138	2,101		2,101	2,416			2,722		2,722
-L- 174+00	-L- 179+00	9,759				9,759	2,201		2,201	2,531			7,228		7,228
-L- 185+00	-L- 189+00	8,250				8,250	299		299	344			7,906		7,906
	SUBTOTAL	18,009				18,009	2,500		2,500	2,875			15,134		15,134
-L- 231+50	-L- 238+50	292				292	10.064		10.064	11.554					
-D1- 11+00	-D1- 12+00	67				67	10,064 284		10,064 284	11,574 327	11,282 260				
-D2- 10+50	-D2- 13+00						4,250		4,250	4,888	4,888				
-Y5- 10+50	-Y5- 10+75	5				5	49		49	56	51				
	SUBTOTAL	364				364	14,647		14,647	16,844	16,480				
TOTAL		37,039				37,039	23,978		23,978	27,575	16,480		25,944		25,944
MATERIAL FOR SHOULDE	T									, , , , , , , , , , , , , , , , , , ,			20,3		23,711
LOSS DUE TO CLEARING &	c GRUBBING	-200				-200							-200		-200
ROCK WASTE TO REPLACE									· · · · · · · · · · · · · · · · · · ·						
ADJUST FOR ROCK WASTE WASTE IN LIEU OF BORRO		1	· · · · · · · · · · · · · · · · · · ·								-16,480		16 490		16.400
PROJECT TOTAL		36,839		-		36,839	23,978		23,978	27,575	-10,400		-16,480 9,264		-16,480 9,264
EST. 5% TO REPLACE TOP	SOIL ON BORROW PIT					·									
GRAND TOTAL		36,839				36,839	23,978		23,978	27,575			9,264		9,264
SAY		36,900	•							27,600			9,300		
SHALLOW UNDERCUT CO	NTINGENCY	200 CY								, -			7,500		

NOTE: EARTHWORK QUANTITIES ARE CALCULATED BY THE DIVISION DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

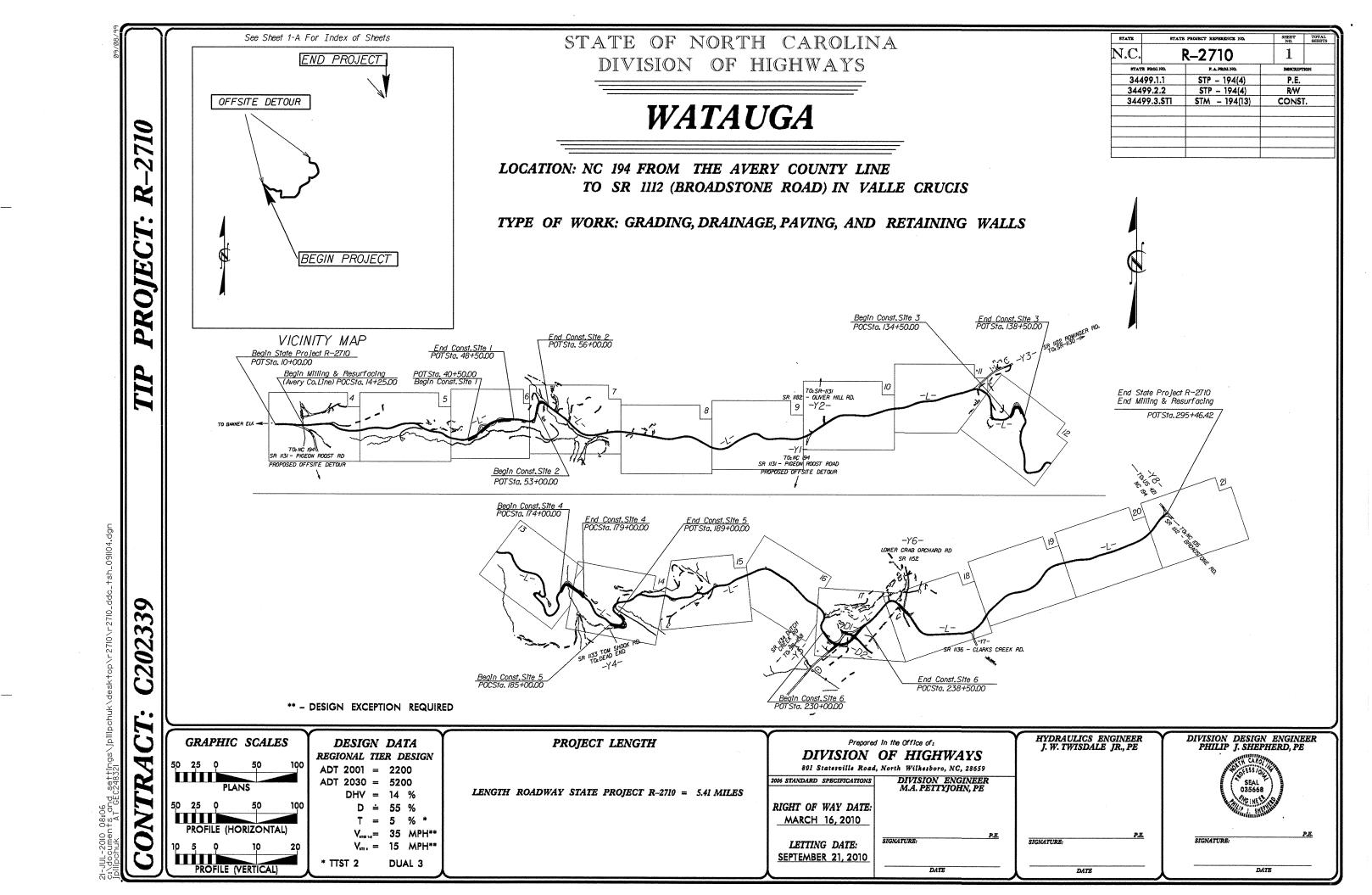
						SOIL AND RO	CK LEGEND, TERM	IS, SYMBOL	S, AND ABBREV	IATIONS		
		SOIL DESC	RIPTION			GRADATION				DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS O	CONSIDERED TO BE THE U	UNCONSOLIDATED, SEMI-CO A CONTINUOUS FLIGHT POY	ONSOLIDATED, OR WEA	THERED EARTH MATERIALS	WELL GRADED - INDICATES A UNIFORM - INDICATES THAT	GODD REPRESENTATION OF PARTICLE SIZES SOIL PARTICLES ARE ALL APPROXIMATELY TH	FROM FINE TO COARSE. IE SAME SIZE.(ALSO	ROCK LINE INDIC	CATES THE LEVEL AT WHICH NON	HAT IF TESTED, WOULD YIELD SPT F N-COASTAL PLAIN MATERIAL WOULD	YIFI D SPT BEFLISAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
100 BLOW	S PER FOOT ACCORDING	TO STANDARD PENETRATIO	ON TEST (AASHTO T2	206, ASTM D-1586). SDIL	PODRLY GRADED). GAP-GRADED - INDICATES A I	MIXTURE OF UNIFORM PARTICLES OF TWO OR	MORE SIZES.	SPT REFUSAL IS	PENETRATION BY A SPLIT SPOO	ON SAMPLER EQUAL TO OR LESS TH FION BETWEEN SOIL AND ROCK IS O	IAN Ø1 FOOT PER 6Ø BLOWS.	ADUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTE	NCY, COLOR, TEXTURE, MOI	E AASHTO SYSTEM. BASIC ISTURE, AASHTO CLASSIFIC	CATION, AND OTHER P	PERTINENT FACTORS SUCH		ANGULARITY OF GRAINS		OF WEATHERED F	ROCK. S ARE TYPICALLY DIVIDED AS FO			ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINER		ANGULARITY, STRUCTURE, P Y,SIJY CLAY, WOST WITH WITERBEDDE			THE ANGULARITY OR ROUNDN SUBANGULAR, SUBROUNDED, O	ESS OF SOIL GRAINS IS DESIGNATED BY THE	TERMS: ANGULAR,	WEATHERED	DIMBIMA	PLAIN MATERIAL THAT WOULD YIEL	D SPT N VALUES > 100	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
		GEND AND AASH				MINERALOGICAL COMPOSITI	ON .	ROCK (WR)	BLOWS PER FO	OOT IF TESTED.		ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
GENERAL	GRANULAR MA	MATERIALS SIL	LT-CLAY MATERIALS	OPCANIC MATERIALS	MINERAL NAMES SUCH AS QUA	ARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE		CRYSTALLINE ROCK (CR)	WOULD YIELD	SE GRAIN IGNEOUS AND METAMORPH SPT REFUSAL IF TESTED. ROCK TY		AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS.			35% PASSING #200)		WHENEVER THEY ARE CONSIDE				GNEISS, GABBRI	O, SCHIST, ETC. SE GRAIN METAMORPHIC AND NON-CI	NASTAL PLATN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP CLASS.	A-1 A-3 A-1-b A-2	A-2 A- 2-4 A-2-5 A-2-6 A-2-7	-4 A-5 A-6 A-7-	5 43 4-6 4-7	SLIGHTLY COMPRES	COMPRESSIBILITY	LESS THAN 31	NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY I	RDCK THAT WOULD YEILD SPT REFU LLITE, SLATE, SANDSTONE, ETC.		COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.
SYMBOL	0000000000				MODERATELY COMP HIGHLY COMPRESSI	RESSIBLE LIQUID LIMIT	F EQUAL TO 31-50	COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN	N SEDIMENTS CEMENTED INTO ROCK,	BUT MAY NOT YIELD	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL
% PASSIN	1G				HIGHLY COMPRESSI	PERCENTAGE OF MATERIA	GREATER THAN 50	(CP)	SHELL BEDS, E		SANDSTONE, CEMENTED	LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
* 10 * 40	50 MX 30 MX 50 MX 51 MN			GRANULAR CLAY MUCK, SDILS PEAT	ORGANIC MATERIAL	GRANULAR SILT - CLAY	OTHER MATERIAL		WE	EATHERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
* 200		MX 35 MX 35 MX 35 MX 36	MIN 36 MIN 36 MIN 36 M		TRACE OF ORGANIC MATTER	SOILS SOILS 2 - 3% 3 - 5% TR	RACE 1 - 10%		K FRESH, CRYSTALS BRIGHT, FEW MER IF CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAININ	G. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIOUID LIMIT	1 170	MX 41 MN 48 MX 41 MN 48			LITTLE ORGANIC MATTER MODERATELY ORGANIC		TTLE 10 - 20% DME 20 - 35%	1		NINED, SOME JOINTS MAY SHOW THIN	CLAY COATINGS IF OPEN.	HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
PLASTIC INDE		MX 18 MX 11 MN 11 MN 10 I		LITTLE OR HIGHLY	HIGHLY ORGANIC		GHLY 35% AND ABOVE		STALS ON A BROKEN SPECIMEN F	ACE SHINE BRIGHTLY. ROCK RINGS	UNDER HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDE		9 4 MX 8 I	MX 12 MX 16 MX No M	MX MODERATE ORGANIC SOILS		GROUND WATER		1		NINED AND DISCOLORATION EXTENDS	INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO DNE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR	BRAYEL, AND		SILTY CLAYEY SOILS SOILS	ORGANIC MATTER	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING				CLAY. IN GRANITOID ROCKS SOME OC D. CRYSTALLINE ROCKS RING UNDER		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.	
MATERIALS GEN. RATING	SANU	STAVEL HID SHID	30123 30123	1 1111111111111111111111111111111111111	STATIC WATER LEVEL AFTER 24 HOURS		MODERATE SIGN	IFICANT PORTIONS OF ROCK SHOP	W DISCOLORATION AND WEATHERING	EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM	
AS A	EXCELLENT 1	TO 600D	FAIR TO POOR	FAIR TO POOR UNSUITABLE	PERCHEI	WATER, SATURATED ZONE, OR WATER BEAR	ING STRATA			ARE DULL AND DISCOLORED, SOME S AND SHOWS SIGNIFICANT LOSS OF S		PARENT MATERIAL.
SUBGRADE			TOF A-7-6 SURG		O-MING SPRING	OR SEEP		WITH	FRESH ROCK.			FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
		CONSISTENCY OF				MISCELLANEOUS SYMBOL	S			ED OR STAINED. IN GRANITOID ROCK HOW KAOLINIZATION. ROCK SHOWS S		FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
PRIMAR		MACINESS OR DENET	ANGE OF STANDARD TRATION RESISTENCE	RANGE OF UNCONFINED COMPRESSIVE STRENGTH	ROADWAY EMBAN	KMENT (RE) SPI DMT TEST BORI	ING SPT N-VALUE	(MOD. SEV.) AND		LOGIST'S PICK. ROCK GIVES *CLUNK		THE FIELD.
	U	CUNSISTENCT	(N-VALUE)	(TONS/FT ²)	WITH SOIL DESC			1		ED OR STAINED. ROCK FABRIC CLEA	R AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
	KERALLY ,	ERY LOOSE LOOSE	<4 4 TO 10		SOIL SYMBOL	AUGER BORING	REF SPT REFUSAL	(SEV.) IN S	TRENGTH TO STRONG SOIL. IN GRENT. SOME FRAGMENTS OF STRON	RANITOID ROCKS ALL FELDSPARS AF	RE KAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
MAT	IERIAL } ,	DIUM DENSE DENSE	10 TO 30 30 TO 50	N/A	ARTIFICIAL FILL		TEST W/ CORE		ESTED. YIELDS SPT N VALUES >			LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
(NO		ERY DENSE	>50		THAN ROADWAY	HV	BORING			ED OR STAINED. ROCK FABRIC ELEM TO SOIL STATUS, WITH ONLY FRAGE		MOTILED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTILING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
CEN	1	ERY SOFT SOFT	(2 2 TO 4	⟨∅.25	- INFERRED SOIL	niezoezen	:LL	REMA	AINING. SAPROLITE IS AN EXAMPL	LE OF ROCK WEATHERED TO A DEGR	EE SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
SIL	T-CLAY ME	EDIUM STIFF	4 TD 8	0.25 TO 0.50 0.5 TO 1.0	INFERRED ROCK	LINE A PIEZOMETER INSTALLATION		l .		BRIC REMAIN. <i>IF TESTED, YIELDS</i> C NOT DISCERNIBLE, OR DISCERNIBLE		INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
		STIFF ERY STIFF	8 TO 15 15 TO 30	1 TO 2 2 TO 4	₹₹₽₽₹ ALLUVIAL SOIL	()	OR	SCAT	TERED CONCENTRATIONS. QUARTZ	! MAY BE PRESENT AS DIKES OR ST	TRINGERS. SAPROLITE IS	ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
		HARD	>30	>4	25/025 DIP & DIP DIREC			ALSO	AN EXAMPLE.	K HARDNESS		ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND
		TEXTURE OR (GRAIN SIZE		ROCK STRUCTURI	ES ONE PENETROI	METER TEST					EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. OPENING	SIEVE SIZE		40 60 20			SOUNDING ROD			ERAL HARD BLOWS OF THE GEOL	R SHARP PICK, BREAKING OF HAND . .OGIST'S PICK.	SPECIMENS REQUIRES	PARENT ROCK.
			0.42 0.25 0.0 DARSE FIN			ABBREVIATIONS		HARD CAN	BE SCRATCHED BY KNIFE OR PI	ICK ONLY WITH DIFFICULTY. HARD H	HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOUL (BLI		GRAVEL	SAND SAN	ND SILI CLAY	AR - AUGER REFUSAL BT - BORING TERMINATED	MED MEDIUM MICA MICACEOUS	VST - VANE SHEAR TEST WEA WEATHERED			ICK. GOUGES OR GROOVES TO 0.25	INCHES DEED CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
GRAIN			SE. SD.) (F : 0.25	SD.) (SL.) (CL.)	CL CLAY	MOD MODERATELY	7 - UNIT WEIGHT	HARD EXC	CAVATED BY HARD BLOW OF A GE MODERATE BLOWS.	EOLOGIST'S PICK. HAND SPECIMENS	CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
	IN. 12 3	3	O.C.O	0.000	CPT - CONE PENETRATION CSE COARSE	I TEST NP - NON PLASTIC ORG ORGANIC	7d- DRY UNIT WEIGHT	MEDIUM CAN	BE GROOVED OR GOUGED 0.05 1	INCHES DEEP BY FIRM PRESSURE OF		STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
		DISTURE - CORR		TERMS	DMT - DILATOMETER TEST DPT - DYNAMIC PENETRAT		SAMPLE ABBREVIATIONS S - BULK		N BE EXCAVATED IN SMALL CHIPS NT OF A GEOLOGIST'S PICK.	S TO PEICES 1 INCH MAXIMUM SIZE	BY HARD BLOWS OF THE	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
	IL MOISTURE SCALE TERBERG LIMITS)	FIELD MOISTU	GUIDE FOR	R FIELD MOISTURE DESCRIPTION	e - VOID RATIO	SD SAND, SANDY	SS - SPLIT SPOON	SOFT CAN	BE GROVED OR GOUGED READILY	Y BY KNIFE OR PICK. CAN BE EXCA		THAN 0.1 FOOT PER 60 BLOWS.
		- SATURATED	- USUALLY	LIQUID; VERY WET, USUALLY	F - FINE FOSS FOSSILIFEROUS	SL SILT, SILTY SLI SLIGHTLY	ST - SHELBY TUBE RS - ROCK	FR0 PIE	IM CHIPS TO SEVERAL INCHES IN CES CAN BE BROKEN BY FINGER	N SIZE BY MODERATE BLOWS OF A I PRESSURE.	PICK POINT. SMALL, THIN	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
·	LIQUID LIMIT	(SAT.)		LOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACT FRAGS FRAGMENTS	FURES TCR - TRICONE REFUSAL # - MOISTURE CONTENT	RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING	TENT CAN		E EXCAVATED READILY WITH POINT		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
PLASTIC			CEMICOI I	ID: REQUIRES DRYING TO	HI HIGHLY	V - VERY	RATIO		MORE IN THICKNESS CAN BE BRO GERNAIL.	OKEN BY FINGER PRESSURE. CAN BE	SCRATCHED READILY BY	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE <	PLASTIC LIMIT	- WET - (W)		OPTIMUM MOISTURE	EQ	UIPMENT USED ON SUBJECT I	PROJECT	, FRACT	TURE SPACING	BEDD		IDPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PL	L T PEHSITE LIMIT		······································		DRILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	TERM	SPACING	TERM VERY THICKLY BEDDED	THICKNESS > 4 FEET	BENCH MARK:
	OM OPTIMUM MOISTL		4) SOLID: A	AT OR NEAR OPTIMUM MOISTURE	MOBILE B-	CLAY BITS	X AUTOMATIC MANUAL	VERY WIDE WIDE	MORE THAN 10 FEET 3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	FLEVATION FT
1	SL _ SHRINKAGE LIMI		BEULIBES	S ADDITIONAL WATER TO	MORITE R-	6 CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CL CLOSE	.OSE 1 TO 3 FEET 0.16 TO 1 FEET	THINLY BEDDED VERY THINLY BEDDED	0.16 - 1.5 FEET 0.03 - 0.16 FEET	ELEVATION: FT.
		- DRY - (D)	ATTAIN D	OPTIMUM MOISTURE	BK-51	8* HOLLOW AUGERS		VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED THINLY LAMINATED	0.008 - 0.03 FEET < 0.008 FEET	NOTES:
		PLASTI	CITY		CME-450	HARD FACED FINGER BITS			INI	DURATION		<u>'</u>
		PLASTICITY IN	DEX (PI)	DRY STRENGTH		TUNGCARBIDE INSERTS		FOR SEDIMENTARY F	ROCKS, INDURATION IS THE HARDE	NING OF THE MATERIAL BY CEMENT	TING, HEAT, PRESSURE, ETC.	
NONPLAS		Ø-5 6-15		VERY LOW SLIGHT	X CME-550	X CASING X W/ ADVANCER	н	FRIABLE		IG WITH FINGER FREES NUMEROUS G		
MED. PLA	ASTICITY	16-25		MEDIUM	PORTABLE HOIST	TRICONE STEEL TEETH	HAND TOOLS: POST HOLE DIGGER			: BLUW BY HAMMER DISINTEGRATES CAN BE SEPARATED FROM SAMPLE		
HIGH PLA	HSTICITY	26 DR M		HIGH	1	TRICONE TUNGCARB.	HAND AUGER	MODERATI		EASILY WHEN HIT WITH HAMMER.	WITH STEEL TRUBE;	
		COLO			-	CORE BIT	SOUNDING ROD	INDURATE		ARE DIFFICULT TO SEPARATE WITH	H STEEL PROBE;	
		COLOR OR COLOR COMBI , DARK, STREAKED, ETC.		, YELLOW-BROWN, BLUE-GRAY). CRIBE APPEARANCE.		CONE BIT	VANE SHEAR TEST			ULT TO BREAK WITH HAMMER. HAMMER BLOWS REQUIRED TO BREA	V CAMBIE.	
								EXTREME		E BREAKS ACROSS GRAINS.	m OHITELE;	

PROJECT REFERENCE NO.

R-2710

SHEET NO.

2





STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett

SECRETARY

September 16, 2007

MEMORANDUM TO:

Kevin Whittington, District Maintenance Engineer, Div. 11

FROM:

' John Pilipchuk, PG, PE

Western Region Geotechnical Engineer

STATE PROJECT:

34499.1.1, R-2710

FEDERAL PROJECT: COUNTY:

STP – 194(4) Watauga

DESCRIPTION:

NC 194 from Avery/Watauga County line East 5.41 miles to

Broadstone Road (SR 1112)

SUBJECT:

Geotechnical Report – Additional Inventory information

The majority of subsurface investigation conducted at the six Sites on this project concerns information applicable to retaining wall design and construction.

In addition, five borings were taken at areas that were perceived to have Geotechnical interest. Attached to this cover letter are the five boring logs. They pertain to the following two sites:

SITE TWO

Three borings were taken at Site 2; S2-B1, S2-B2 and S2-B3. These are showing stable material for the small fill section with B2 and B3 showing subsurface material related to extending the existing culvert at that location.

SITE SIX

Borings S6-B1 and S6-B2 were done to show that decent intact soil was present to construct the requested 1.5:1.0 fill slope proposed for this location.

Respectfully submitted,

Jody C. Kuhne



	CT NO.	34499		ÍI). R-	2710	,			COUNT					6	SEOLOGIST Ku	hne, J.
SITE D	ESCRIP	TION	NC 194	4 FRO	M AVE	RYM	/ATAU	GA LI	NE TO	SR 1112	BROAL	STON	E ROA	D)	_		GRO
BORIN	G NO.	SITE2-	B1		STAT	ION	54+50			OFFSE	5ft R	T		ALIGNME	NT	-L-	0
COLLA	R ELEV	. N/A			TOTA	L DEF	PTH '	18.9 ft		NORTH	NG N	/A		EASTING	N	/A	24
DRILL	MACHIN	IE N/A	١		DRIL	L MET	HOD	NW C	asing w	// SPT						HAMMER TYPE	Man
START	DATE	08/01/	07		COM	P. DAT	E 08	/01/07	. :	SURFA	CE WA	TER DE	PTH -	N/A		DEPTH TO ROO	CK N/
ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft		2	BLOV	VS PER	R FOOT	75 100	SAM NO		L 0 G	ELEV. (ft)	SOI	L AND ROCK DESC	RIPTIO
	1.0	5	5	6		11								BF	F RN S	GROUND SURFAROADWAY EMBANI	KMENT
	3.5 6.0	19	22	21		`.		43						MARKATA AND AND AND AND AND AND AND AND AND AN	TA	RESIDUAL N/BRN DENSE SIL	TY SAN
	8.5	55	45	,					,	100						WEATHERED RO WHITE/TAN/BRN	OCK SAND
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	18.5	100/0.4			╢_	-				100/0.4	!				Bori	ng Terminated at De	epth 18
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	CT NO.	34499	9.1.1	II	D. R-27					WATA			GEOLOGIST Kuhne, J
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	G NO.		B2		ļ	N 55+40				10ft LT			ALIGNMENT -L- 0
·····	R ELEV					DEPTH		l		G N/A			EASTING N/A 24
	MACHIN				ļ		NW Casing						HAMMER TYPE Mar
TART	DATE	,			COMP.	DATE 0			FACE	WATE	R DEI		N/A DEPTH TO ROCK N
(ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	 •	25 1	WS PER FOO		100	SAMP. NO.	моі	L O G	SOIL AND ROCK DESCRIPTION ELEV. (ft)
													GROUND SURFACE
	1.0 3.5 6.0 8.5	5 16 5	7	3 4	- 6	11							ROADWAY EMBANKMENT GRAY/BRN SANDY SILT W/ GR.
		4	7	18		25							SAPROLITE WHITE/TAN/BRN SILTY SAN
30	13.5	50	50/.2	•					50/.2				WEATHERED ROCK GRAY/TAN SILTY SAND W/ SAPF SEAMS
	18.5	25	9	17	1]	26							
	23.5	60/.1							50/.1				WEATHERED ROCK VERY HARD WEATHERED RO
	28.5	·	·										
		60/.1			1				60/.1 [©]				Boring Terminated with Standard Pe Test Refusal at Depth 28.6 ft CRYST
													GRANTITC GNEISS



	LD/	B	ORI	ELC	G RE	EPO	RT							
PROJE	CT NO.				D. R-2710			COUNTY	WAT	AUGA			GEOLOGIST Kuh	ne, J. C
SITE D	ESCRIP	TION	NC 194	FRO	M AVERY	WATAU	JGA LINE TO	SR 1112 (E	ROAD	STONE	RO	AD)		GROU
BORIN	G NO.	SITE2-	B3	·	STATION	55+8	5	OFFSET				ALIGNMENT	Γ -L-	ОН
COLLA	R ELEV	. N/A			TOTAL D	EPTH	34.3 ft	NORTHIN	IG N/A	4	-, 	EASTING I	N/A	24 H
DRILL	MACHIN	IE N/A	\		DRILL MI	ETHOD	NW Casing v	v/ SPT					HAMMER TYPE	Manue
START	DATE	08/02/	07		COMP. D	ATE 0	8/02/07	SURFAC	E WAT	ER DE	PTH	N/A	DEPTH TO ROC	K N/A
ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft	O.5ft		BLO 25	WS PER FOOT	75 100	SAMP.	MOI	L O G	SC ELEV. (ft)	IL AND ROCK DESCR	RIPTION
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													GROUND SURFA	CE
ļ	1.0	5	7	44		T			1	1	H	\A(! U\T	ROADWAY EMBANK	MENT
	3.5			11	<u> </u> •	118						White	/TAN/BRN SANDY CL GRAVEL	AYEY SIL
	6.0	7	20	25			45			1				
		10	11	11	11	9 22				V	F			
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START DATE 08/03/07	LOGIST Kuh	
COLLAR ELEV. N/A TOTAL DEPTH 15.0 ft NORTHING N/A EASTING N/A		GROU
DRILL MACHINE N/A START DATE 08/03/07 COMP. DATE 08/03/07 SURFACE WATER DEPTH N/A DEPTH (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0.25 50 75 100 NO. MOI G ELEV. (ft) 1.0	-	0 H
START DATE		24 H
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(ft) (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0 25 50 75 100 NO. MOI G ELEV. (ft) G TAN/BRN 13.5 2 2 3 3 5 5 5 7 9 16 16 13.5 4 5 7	PTH TO ROC	K N/A
TAN/BRN 1.0 3.5 2 2 3 6.0 2 2 3 8.5 5 7 9 113.5 4 5 7	ND ROCK DESCR	RIPTION
1.0 3.5 3.5 2 2 3 6.0 2 2 3 8.5 5 7 9 116 13.5 4 5 7		
3.5 2 2 3 6.0 2 2 3 6.5 5 7 9 16 13.5 4 5 7	ROUND SURFA	CE
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PROJE	CT NO.	34499	9.1.1	<u> </u>	D.	R-2710				1	COUNTY	_	WATA	UGA					G	EOLOGIST Ku	hne, J. C
SITE D	ESCRIP	TION	NC 194	4 FRO	M A	VERY/	VATA	AUGA I	LINE TO) SF	R 1112 (F	BF	ROADS	TONE	RO	AD)					GROU
BORIN	G NO.	SITE6-	B2		SI	TATION	235	+90			OFFSET		11ft LT	•			ALIC	SNME	NT	-L-	Он
COLLA	R ELEV	. N/A			TC	OTAL DE	PTH	15.0	ft		NORTHI	NC	N/A		٠.		EAS	TING	N	/A	24 H
	MACHIN				DF	RILL ME	THOE	WA C	Casing	w/	SPT									HAMMER TYPE	Manus
START	DATE				CC	OMP. DA					SURFAC	_		R DEI		N/	Α .			DEPTH TO ROO	K N/A
ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	11	0	BL 25	OWS PI	ER FOOT	75 -	100	1 1	SAMP. NO.	моі	С О С	EL	EV. (ft)		son	L AND ROCK DESC	RIPTION
	1.0													V						GROUND SURF	ACE
		3	5	5	11	10												ORA	NG	E/BRN STIFF SAND	Y, SILTY (
	3.5	9	9	12	$\parallel \parallel$	``.	21	l											BR	SAPROLITE N/TAN CLAYEY SA	NDV SILT
	6.0	6	9	16	-	٦	V												D	WINN OBTIET OF	NOT SILT
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Michael F. Easley

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett SECRETARY

GOVERNOR

3 April, 2007

MEMO TO:

John Twisdale, Jr., PE, Project Engineer, Hydraulics

FROM:

Jody Kuhne, PG, PE, Project Geological Engineer

STATE PROJECT:

34499.1.1, R-2710

COUNTY:

Watauga

DESCRIPTION:

NC 194 from Banner Elk to Valle Crucis

SUBJECT:

Culvert investigation, Sta. 17+50

Two boring logs are attached for Stations 70+17 and 70+88 on the subject project. The proposed culvert does not have bedrock with 5' of the ground surface in the footprint.

Please contact me if I may be of further assistance.

NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET OF 2

	U	J B	ORI	ELC	G F	REP	ORT	T								
PROJE	CT NO.). R27				COUNTY	WATA	NUGA		6	SEOLOGIST Dan	iel, T. B.	
SITE D	ESCRIP	TION	NC 194	FRO	И BAN	NER E	LK TO \	ALLE CR	JCIS	**************				· · · · · · · · · · · · · · · · · · ·	GROUND W	TR (ft)
BORIN	G NO.	R2710-	-1		STATI	ON 70	0+88		OFFSET	40 ft L	Т		ALIGNMENT	-L-	0 HR.	3.8
	R ELEV				TOTAL	DEPT	TH 25.2	2 ft	NORTHIN	G N/A			EASTING N	/A	24 HR.	4.2
DRILL	MACHIN	IE CM	E-550	·	DRILL	METH	OD NV	V Casing v	// SPT				-,	HAMMER TYPE	Automatic	
	DATE				COMP	DATE	03/29	/07	SURFACI	E WATE	R DE	PTH I	N/A	DEPTH TO ROCI	K N/A	
ELEV.	ELEV. DEPTH		W COU					PER FOOT		SAMP.	lacktriangledown/	0	SOII	L AND ROCK DESCR	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	H°	25		50 7	5 100	NO.	MOI	G	ELEV. (ft)		DE	EPTH (ft)
					H	1		T	r	 		3/2		GROUND SURFAC	CE	0.0
										l				Y COARSE SAND AN		.
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	8.8	1	7	5		. المر	3 31						•			
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SHEET OF 2



	W	y B	ORI	ELC)(3 REF	PORT	Ē.					•			
PROJE	CT NO.	3449	9.1.1	11	D.	R2710			COUNTY	WAT	AUGA			GEOLOGIST Dar	niel, T. B.	
SITE D	ESCRIP	TION	NC 194	4 FRO	МВ	BANNER	ELK TO V	ALLE CR	ucis						GROUND V	VTR (ft)
BORING	G NO.	R2710	-2		ST	TATION T	70+17		OFFSET	17 ft F	RT		ALIGNMEN	IT -L-	0 HR.	7.7
COLLA	R ELEV	. N/A			TC	OTAL DEP	TH 25.1	ft	NORTHIN	NG N/A	١		EASTING	N/A	24 HR.	N/A
DRILL	MACHIN	IE CN	1E-550		DF	RILL METI	HOD NV	V Casing v	v/ SPT					HAMMER TYPE	Automatic	
START	DATE	03/30/	07		CC	OMP. DAT	E 03/30	/07	SURFAC	E WATE	ER DEI	PTH	N/A	DEPTH TO ROC		
ELEV.	ELEV. DEPTH	BL	ow cor	JNT	π	-	BLOWS F	PER FOOT		SAMP.	V /	L			·····	
(ft)	(ft)	0.5ft	0.5ft	0.5ft		0 2	5 5	50 7	75 100	NO.	MOI	O G	S ELEV. (ft)	OIL AND ROCK DESC		DEPTH (ft)
(ft)		0.5ft 1 1 8 13 12 3 8	0.5ft 1 1 10 16 2 6 18	0.5ft 1 2 4 15 2 11 21		2 2 3 3 3 14 17	37		75 100	NO.	MOI W Sat. Sat. M M M	G	GR	GROUND SURFA ALLUVIAL AY/BRN SILTY COARS GRAVEL SAPROLITE LL/BRN SILTY SAND/S Dring Terminated at Dep SAPROLITE	CE SE SAND W/	14.0 25.1
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R-2710

202339

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STATE	STATE	PROJECT REFERENCE NO.	SHEBT NO.	TOTAL SHEETS
N.C.	·	R-2 <i>7</i> 10	1	11
8TAT	TE PROLNO.	R.A.PROJ.NO.	DESCRIP	LION
34	499.1.1	STP - 194(4)	P.E.	
344	99.2.2	STP - 194(4)	RW	
344	99.3.STI	STM - 194(13)	CONS	T.
				
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STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34499.I.I I.D. NO. R-2710
F.A. PROJECTSTP-194(4)
COUNTYWATAUGA
PROJECT DESCRIPTION NC 194 FROM BANNER
ELK IN AVERY COUNTY TO VALLE CRUCIS IN
WATAUGA COUNTY .
SITE DESCRIPTION SITE 5: TWO RETAINING WALLS
FROM -L- STATIONS 185+00 TO 189+00

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORNING LOGS, ROCK CORES, AND SOUL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT O (919) 250-408B. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOOS, ROCK CORES, OR SOUL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOLINDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS 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 INHERITY 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 MOICTORY OF CONDITIONS MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS,

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IM 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 WYESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HUSSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE WEPORMATION.

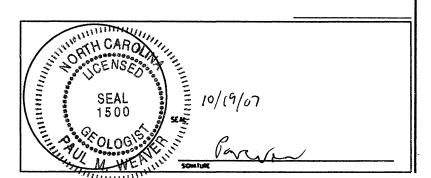
CONTENTS:

- 1)	NCDOT LEGEND SHEET(SHEET 2)	
2)	SITE VICINITY MAP (DRAWING NO. I, SHEET 3)	
3)	BORÎNG ÎNDENTIFICATION DIAGRAM (DRAWING No. 2. SHEET 4	I)
4)	SUBSURFACE PROFILE (DRAWING No. 3. SHEET 5)	
	FINAL BORING LOGS (SHEETS 6-9)	
	SUMMARY OF SOIL LABORATORY TEST DATA (SHEET 10)	
	SITE PHOTOGRAPHS (SHEET II)	
. /	SILE I HO I CONNI HO NOTICE I III	

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

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

INVESTIGATED BY_	T WELLS	PERSONNEL_	_0	KITCHEN
CHECKED BY	J VINSON		A	HAYES
SUBMITTED BY	P WEAVER		T	WELLS
DATE	9/12/07			TOOTHMAN
			В	DUNCAN



DRAWN BY: DRK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

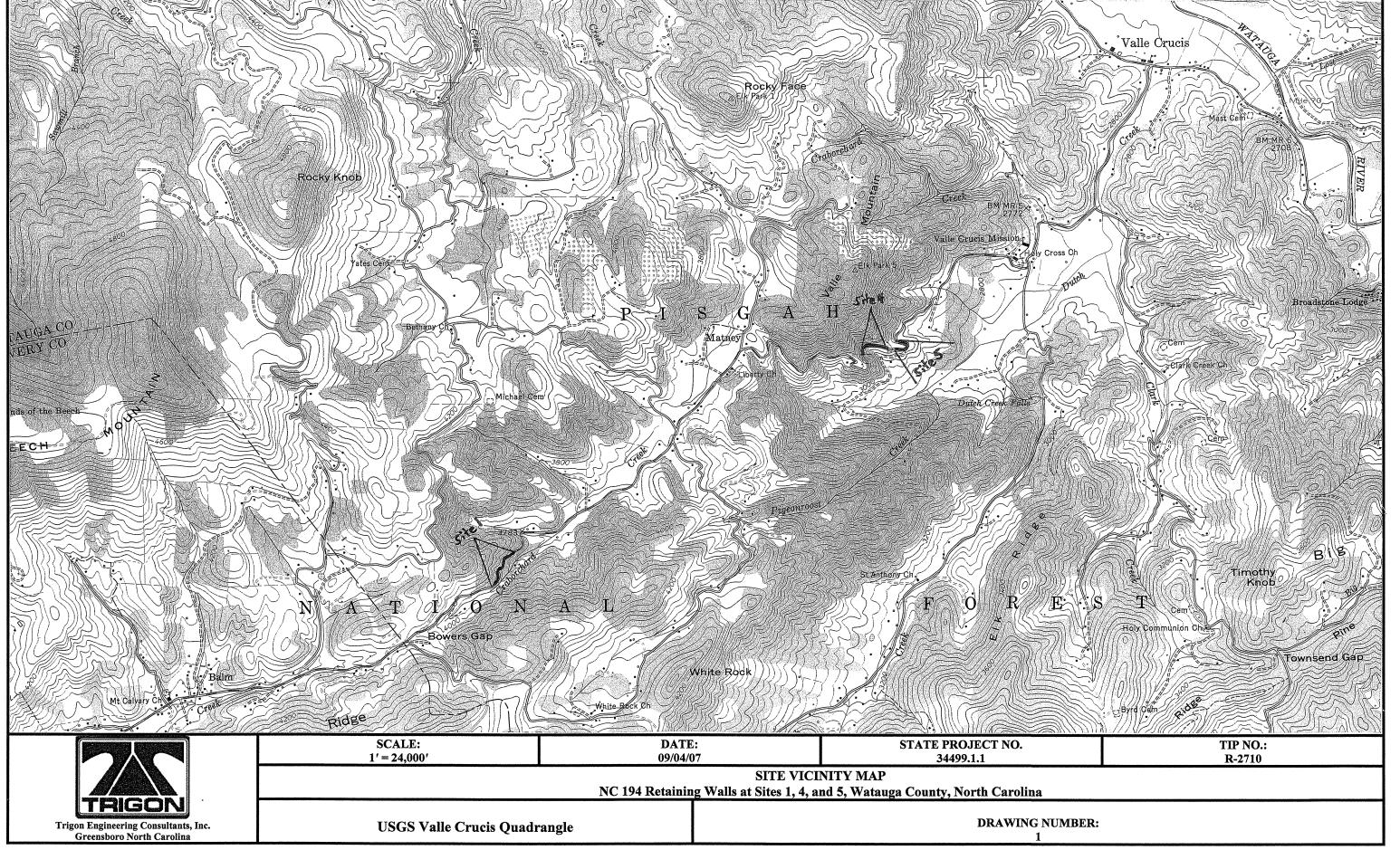
DIVISION OF HIGHWAYS

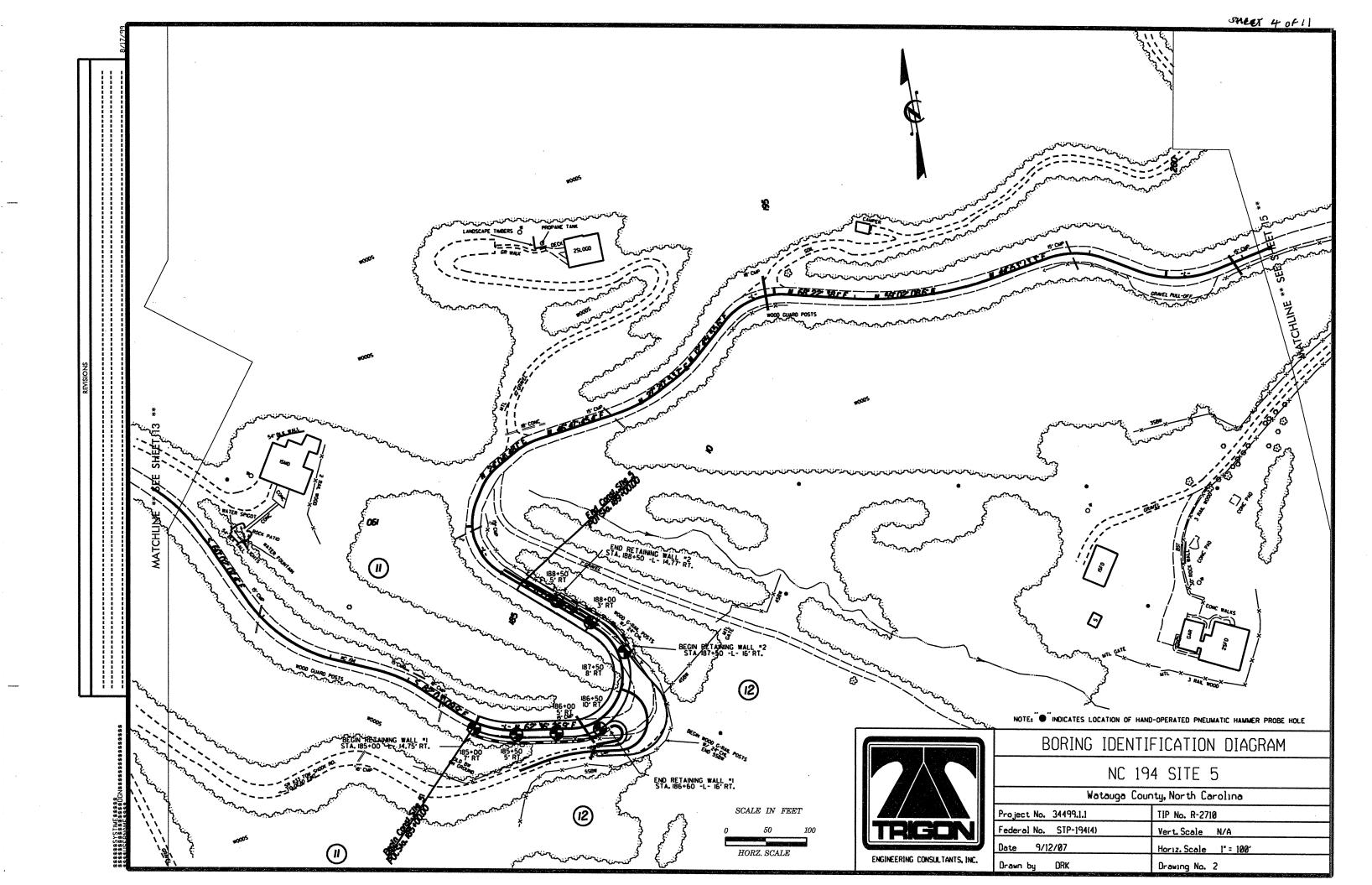
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

				SOIL AND RO	CK LEGEND, TERM	is, symbols, <i>a</i>	ND ABBREV	IATIONS		
SOIL DE	SCRIPTION			GRADATION		<u> </u>	ROCK	DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEN			UNIFORM- INDICATES THAT SO	000 REPRESENTATION OF PARTICLE SIZES F IL PARTICLES ARE ALL APPROXIMATELY THE	rom fine to coarse same size. (ALSO	I RUCK LINE INDICATES	ASTAL PLAIN MATERIAL THE	AT WHEN TESTED, WOULD YIELD SPT	ELD COT OCCUCA:	ALLUVIUM (ALLUVJ - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGH 188 BLOWS PER FOOT ACCORDING TO STANDARD PENETF	RATION TEST MASHTO TO	96, ASTM D-15861, SOIL	POORLY GRADEDI GAP-GRADED- INDICATES A MIX	TURE OF UNIFORM PARTICLES OF TWO OR M	ORE SIZES.	I SPI REFUSAL IS PENE	TRATION BY A SPITE SPOO	N SAMPLER EQUAL TO OR LESS THAN TON BETWEEN SOIL AND ROCK IS OFT	0 1 CORY OCO DO DO DO DO	ADUIFER - A WATER BEARING FORMATION OR STRATA,
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AN CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASS	SIFICATION, AND OTHER P	ERTINENT FACTORS SUCH		ANGULARITY OF GRAINS		I DE MENTERED HOCK	TYPICALLY DIVIDED AS FOR		TH MELMEDENIER BY A SOME	AND MACHINE - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTU VER STIFF, GRIF SUTY CUR, MOST WITH WITER			THE ANGULARITY OR ROUNDNE SUBANGULAR, SUBROUNDED, OR	SS OF SOIL GRAINS ARE DESIGNATED BY THE	TERMS: ANGULAR.	WEATHERED E	252	PLAIN MATERIAL THAT YIELDS SPT N		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SMALE, SLATE, ETC.
SOIL LEGEND AND AA				MINERALOGICAL COMPOSITION	n n	ROCK (WR)	PER FOOT.			ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
GENERAL GRANULAR MATERIALS	SILT-CLAY MATERIALS	ORGANIC MATERIALS	MINERAL NAMES SUCH AS DUA	RTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE		CRYSTALLINE ROCK (CR)	FINE TO COARS	SE GRAIN IGNEOUS AND METAMORPHIC SPT REFUSAL IF TESTED, ROCK TYPE	ROCK THAT	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (.95% PASSING *200)	C-95% PASSING *299)		WHENEVER THEY ARE CONSIDER				CHEISS, DABBRO	O, SCHIST, ETC. SE GRAIN METAMORPHIC AND NON-COA		CALCAREOUS ICALCU - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CROUP A-1 A-3 A-2 CLASS. A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-		7 A-1, A-2 A-4, A-5 3 A-3 A-6, A-7	SLIGHTLY COMPRES	COMPRESSIBILITY	LESS THAN 30	— I DOCV NJCD1	SEDIMENTARY F	ROCK THAT WOULD YEILD SPT REFUSA	N. IF TESTED, ROCK TYPE	COLLUVIUM - ROCK FRACHENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL DOCCOOCC		\$ 100000	MODERATELY COMPRESSIE	ESSIBLE LIQUID LIMIT		COASTAL PLAIN	COASTAL PLAIN	LITE, SLATE, SANDSTONE, ETC. I SEDIMENTS CEMENTED INTO ROCK, B	UT MAY NOT YIELD	OF SLOPE.
z PASSING		7.5555	MIDNET LUTTRESSIE	PERCENTAGE OF MATERIA		SEDIMENTARY ROCK (CP)	SPT REFUSAL.	ROCK TYPE INCLUDES LIMESTONE, SAI	NOSTONE, CEMENTED	<u>CORE RECOVERY IREC.)</u> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
" 18 58 MX " 48 38 MX58 MX51 MN		CON C CLAY	CK. ORGANIC MATERIAL	GRANULAR SILT- CLAY	OTHER MATERIAL			ATHERING		<u>DIKE</u> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
* 299 15 MX 25 MX98 MX 35 MX35 MX35 MX35 M	D36 HN 36 HN 36 HN 36 H		TRACE OF ORGANIC MATTER		ACE 1 - 182	FRESH ROCK FRES	SH, CRYSTALS BRIGHT, FEW . F CRYSTALLINE.	JOINTS MAY SHOW SLIGHT STAINING.	ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
	N 48 HX 41 HW 48 HX 41 H		LITTLE ORGANIC MATTER MODERATELY ORGANIC		TTLE 18 - 29% ME 28 - 35%			INEO, SOME JOINTS HAY SHOW THIN C	TAY COATINGS IF OPEN	HORIZONTAL.
PLASTIC MOEX 6 MX N.P. 18 MX 18 MX 11 MN 11 MN		LITTLE OR HIC		>18% >28% HI	GHLY 35% AND ABOVE	IV. SLIJ CRYSTALS	ON A BROKEN SPECIMEN FA	ACE SHINE BRIGHTLY, ROCK RINGS UN	DER 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,
USUML TYPES STONE FRAGS.	8 HX 12 HX 15 HX No P	AMOUNTS OF SO	ANIC S VATER	GROUND WATER		SLIGHT ROCK GENE	ERALLY FRESH, JOINTS STAI	INEO AND DISCOLORATION EXTENDS IN	ITO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
OF MAJOR GRAVEL AND CAME CHAVEL AND CAME	SILTY CLAYEY	ORGANIC MATTER	_	LEVEL IN BORE HOLE IMMEDIATELY AFTER	R DRILLING.	ISLL) I INCH. OP	EN JOINTS MAY CONTAIN C ARE DULL AND DISCOLORED	LAY, IN GRANITOID ROCKS SOME OCCU D. CRYSTALLINE ROCKS RING UNDER H	ASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SHAND GROVEL FIND SHAND GROVEL FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND GROVE FIND SHAND			— ₇₂	WATER LEVEL AFTER 24 HOURS.		MODERATE SIGNIFICAN	NT PORTIONS OF ROCK SHOW	M DISCOLORATION AND WEATHERING E	FFECTS. IN	FLOAT - ROCK FRACHENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGED FROM
AS A EXCELLENT TO GOOD SUBGRADE	FAIR TO POOR	FAIR TO POOR UMS	TABLE	WATER, SATURATED ZONE OR WATER BEAL	RING STRATA	(MOD.) GRANITOID DULL SOUN	: ROCKS, MOST FELDSPARS A NO UNDER HAMMER BLOWS A	ARE DULL AND DISCOLORED, SOME SHO NAO SHOWS SIGNIFICANT LOSS OF STE	M CLAY, ROCK HAS RENGTH AS COMPARED	PARENT MATERIAL.
P.I. OF A-7-5 ≤ L.L 38	1 : P.I. OF A-7-6 > L.	L 30	OMF SPRING (OR SEEPAGE		WITH FRES	SH ROCK.			FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
CONSISTENCY	OR DENSENESS			MISCELLANEOUS SYMBOL	\$	SEVERE AND DISCO	LORED AND A MAJORITY SH	ed or stained, in granitoid rocks, How Kaolinization, rock shows sev	ERE LOSS OF STRENGTH	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE	COMPRESSIVE STRENG			NG SAMPLE	(MOD. SEV.) AND CAN 8	SE EXCAVATED WITH A GEOL S. WOULD YIELD SPT REFUSA	LOGIST'S PICK. ROCK GIVES CLUNK'S	OUND WHEN STRUCK.	THE FIELD.
VERY LOOSE	(N-VALUE)	(T0NS/FT ²)	WITH SOIL DESC	_	DESIGNATIONS	SEVERE ALL ROCKS	S EXCEPT QUARTZ DISCOLOR	 RED OR STAINED, ROCK FABRIC CLEAR	AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
COALE AD LOOSE	4 TO 18	N/A	SOIL SYMBOL	AUGER BORING	S- BULK SAMPLE	(SEV.) IN STRENG EXTENT. S	ITH TO STRONG SOIL. IN GR IOME FRAGMENTS OF STRONG	RANITOID ROCKS ALL FELDSPARS ARE G ROCK USUALLY REMAIN.	KAOLINIZED TO SOME	LECCE - A SHELF-LIKE RICCE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
MATERIAL MEDIUM DENSE	18 TO 38 38 TO 58	N/A	ARTIFICIAL FILL ROADWAY EMBAN		SS- SPLIT SPOON SAMPLE	IF TESTED	L YIELDS SPT N VALUES >	IMM SPF		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
VERY DENSE	>50		INFERRED SOIL	Y	ST- SHELBY TUBE	VERY SEVERE ALL ROCK (V. SEV.) THE MASS	EXCEPT QUARTZ DISCOLORE IS EFFECTIVELY REDUCED	ED OR STAINED, ROCK FABRIC ELEMEN TO SOIL STATUS, WITH ONLY FRAGME	NTS ARE DISCERNIBLE BUT	<u>MOTTLED (MOT.)</u> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
VERY SOFT GENERALLY SOFT	(2 2 TO 4	(9.25 9.25 TO 9.5		MONITORING WE		REMAINING.	. SAPROLITE IS AN EXAMPL	E OF ROCK WEATHERED TO A DEGREE	SUCH THAT ONLY MINOR	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL CROWND WATER LEVEL BY THE PRESENCE OF AN
SILT-CLAY MEDIUM STIFF	4 TO 8 8 TO 15	8.5 TO 1	INFERRED ROCK	A PIEZUMETER	RS- ROCK SAMPLE	3		BRIC REMAIN. <u>IF TESTED, YIELDS SE</u> C NOT DISCERNIBLE, OR DISCERNIBLE		INTERVENING IMPERVIOUS STRATUM,
(COHESIVE) VERY STIFF	15 TO 30	1 TO 2 2 TO 4	TTTTT ALLUVIAL SOIL 6	OUNDARY INSTALLATION SLOPE INDICAT		SCATTERED	CONCENTRATIONS, QUARTZ	MAY BE PRESENT AS DIKES OR STRI	INGERS. SAPROLITE IS	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARD	>30	>4	25/825 DIP/DIP DIRECTION	ON OF INSTALLATION	G.	ALSO AN E		K HARDNESS		rock segments equal to or greater than 4 inches divided by the total length of core run and
TEXTURE 0	OR GRAIN SIZE		• - SOUNDING R	COT NAVALUE		VERY HARD CANNOT B		r sharp pick, breaking of hand sp		EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STD. SIEVE SIZE 4 18 OPENING (MM) 4.76 2.8		00 270 875 0.053		REF — SPT REFUSAL			HARD BLOWS OF THE GEOLI		TEIMENS REQUIRES	PARENT ROCK.
	COARSE FI	ve I		ABBREVIATIONS			SCRATCHED BY KNIFE OR PIC CH HAND SPECIMEN.	CK ONLY WITH DIFFICULTY, HARD HAV	HER BLOWS REQUIRED	<u>SILL</u> - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL (BLDRJ (CDBJ (GRJ	SANO SA					1		ICK. COUCES OR GROOVES TO 8,25 IN	THES DEED PAN DE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
GRAIN MM 385 75 2.8	9.25	8.05 9.005	CI CAVE IN	M/A - NOT AP		HARD EXCAVATE	ED BY HARD BLOW OF A GE	OLOGISTS PICK, HAND SPECIMENS CAN	N BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SIZE IN. 12" 3"			CL CLAY CPT - CONE PEN	SD SAND, S	ANDY	MEDIUM CAN BE O	GROOVED OR GOUGED 8.85 II	NCHES DEEP BY FIRM PRESSURE OF I	KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR B.P.F.J OF
SOIL MOISTURE - CI		TERMS	CSE COARSE C.T CORING TE	SL SILI, SI SLI SLIGHT	LY	HARD CAN BE E	EXCAVATED IN SHALL CHIPS A GEOLOGISTS PICK.	TO PEICES I INCH MAXIMUM SIZE B	Y HARD BLOWS OF THE	A 148 LB. HAMMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 8,1 FOOT PENETRATION
SOIL MOISTURE SCALE FIELD MO (ATTERBERG LIMITS) DESCRIP		OR FIELD MOISTURE DESCRI	TION DMT - DILATOME	IFR TEST		SOFT CAN BE O	GROVED OR GOUGED READILY	Y BY KNIFE OR PICK, CAN BE EXCAVA	TED IN FRAGMENTS	WITH 68 BLOWS.
- SATURA	ATED - USUALLY	LIQUID: VERY WET. USUALL	VOID RATIO	ENETRATION TEST 7 - UNIT 1 7d - DRY U	VEIGHT N)T VEIGHT	FROM CHI PIECES C	ips to several inches in An be broken by finger :	I SIZE BY MODERATE BLOWS OF A PIC PRESSURE.	CK POINT, SMALL, THIN	STRATA CORE RECOVERY ISRECJ - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
LL LIQUID LIMIT (SAT.		LOW THE GROUND WATER T		FROMS W - MOISTUR		VERY CAN BE C	CARVED WITH KNIFE. CAN BE	E EXCAVATED READILY WITH POINT OF	F PICK. PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
PLASTIC	SENISO	ID: REQUIRES DRYING TO	FRAC FRACTUR	D V VERY	SHEAR TEST	SOFT OR MORE FINGERNAL		KEN BY FINGER PRESSURE, CAN BE S	CRATCHED READILY BY	TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE - WET		OPTIMUM MOISTURE	EOL	IPMENT USED ON SUBJECT	PROJECT	FRACTURE	SPACING	BEDOIN	KG .	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLL TRASIL CIAI			ORILL UNITS:	ADVANCING TOOLS:	HAMMER TYPE:	TERM USDR USDR	SPACING	TERM VERY THICKLY BEDOED	THICKNESS > 4 FEET	BENCH MARK: BM *1: 8" SPIKE IN BASE OF 18" BIRCH TREE -BL- STA, 34+33, 147' RT
ON OPTIMUM MOISTURE - MOIST	r-mo SOLIDa	AT OR NEAR OPTIMUM MOIS	WRE X MOBILE 8- 57	CLAY BITS	AUTOMATIC X MANUAL	VERY VIDE VIDE	MORE THAN 18 FEET 3 TO 18 FEET	THICKLY BEDDED	1.5 - 4 FEET	
	REQUIRES	S ADDITIONAL WATER TO		X 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CLOSE CLOSE	1 TO 3 FEET BUG TO 1 FEET	THINLY BEDDED VERY THINLY BEDDED	8.16 - 1.5 FEET 8.83 - 8.16 FEET	ELEVATION: 3905.36'
- DRY		OPTIMUM MOISTURE	☐ 8K-51	8" HOLLOW AUGERS	☐-8	VERY CLOSE	LESS THAN 8.16 FEET	THICKLY LAMINATED THINLY LAMINATED	8.898 - 8.83 FEET < 8.808 FEET	NOTES:
	STICITY		CNE-45	HARD FACED FINGER BITS	X-N_0			DURATION		
PLASTICIT 9-	TY INDEX (PI)	DRY STRENGTH VERY LOW	In	TUNGCARBIDE INSERTS	☐-H_ <u>o</u>	FOR SEDIMENTARY ROCKS.		NING OF THE MATERIAL BY CEMENTIN		
LOW PLASTICITY 6-	15	SLIGHT	☐ CHE-55	X CASING W/ ADVANCER	HAND TOOLS:	FRIABLE		G WITH FINGER FREES NUMEROUS GRA BLOW BY HAMMER DISINTEGRATES S		
MED. PLASTICITY 16-3 HIGH PLASTICITY 26	25 OR HORE	MEDIUM HIGH	PORTABLE HOIST	TRICONESTEEL TEETH	POST HOLE DIGGER	MODERATELY II		CAN BE SEPARATED FROM SAMPLE W	ITH STEEL PROBE:	
	COLOR		OTHER CHE 859	X TRICONE 3% TUNGCARB.	HAND AUGER		BREAKS	EASILY WHEN HIT WITH HAMMER.		
DESCRIPTIONS MAY INCLUDE COLOR OR COLO	OR COMBINATIONS (TAN.	RED, YEL-BRN, BLUE-GRAY)	l	X CORE BIT	SOUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH ULT TO BREAK WITH HAMMER.	STEEL PROBE;	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED,	ETC. ARE USED TO DES	SCRIBE APPEARANCE.	X OTHER ACKER MARK II	OTHER	VANE SHEAR TEST	EXTREMELY INC	DURATED SHARP	HAMMER BLOWS REQUIRED TO BREAK	SAMPLE:	
<u> </u>					U 017En	1	SAMPLE	E BREAKS ACROSS GRAINS.		
										OFFICER DO ME MA







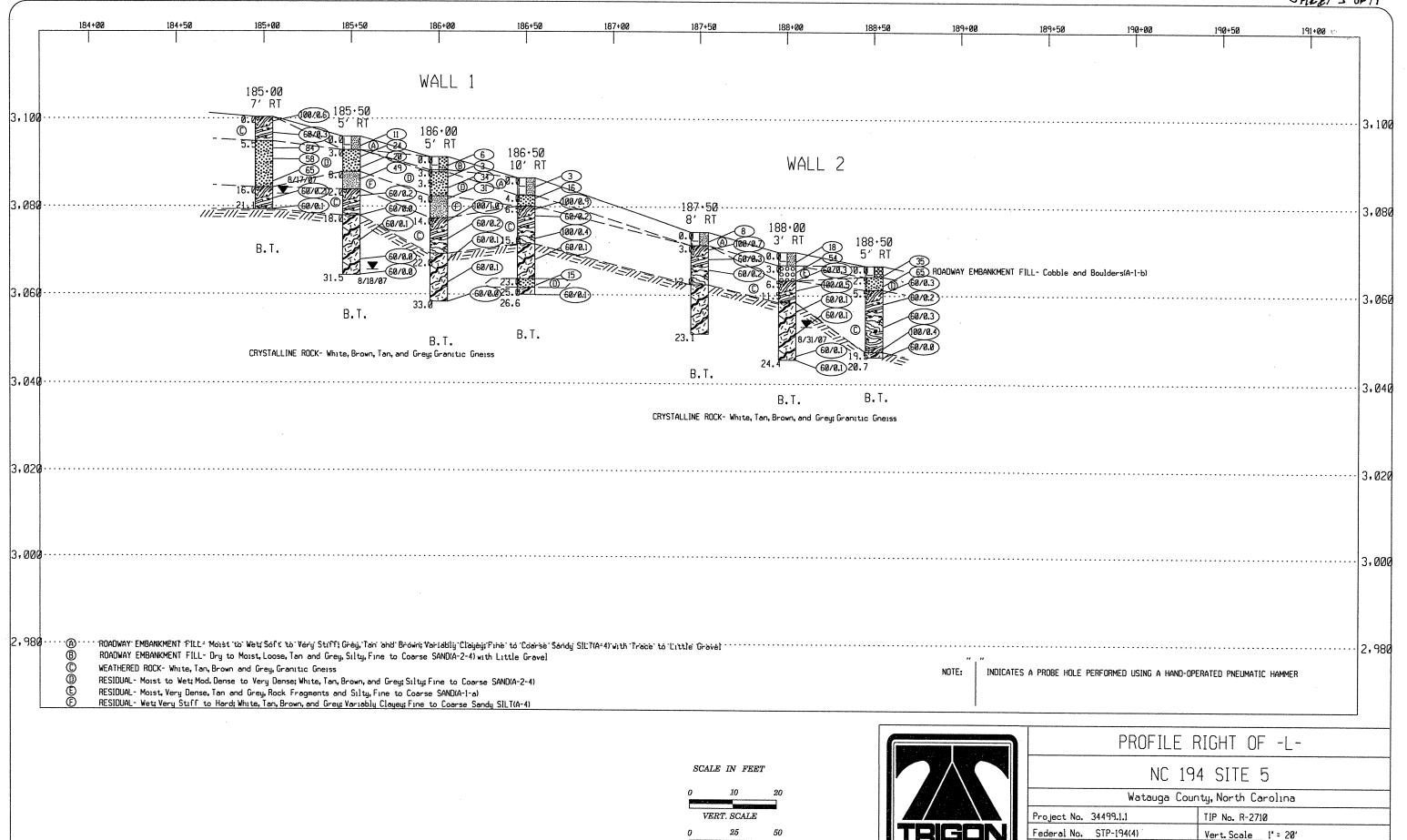
Date 9/12/07

Drawn by DRK

ENGINEERING CONSULTANTS, INC.

Horiz. Scale 1' = 50'

Drawing No. 3





SHEET 6 OF 11

	. 3449	9.1.1	10). R-	2/10				COUN	ΤY	Watau	ıga -			_ (SEOLOGIST T.W	ells/P.Wea	ver
TE DESCRI	PTION	NC 194	Site 5	5													GROUND	WTR (
ORING NO.	185+0)		STAT	ION	185+	00		OFFS	ΞT	7ft RT			ALIGNME	NT	-L-	0 HR.	10
DLLAR ELE	V. 3,10	0.4 ft		TOTA	AL DE	PTH	21.1	ft	NORT	HIN	3 900	,154		EASTING	1	,174,397	24 HR.	17
RILL MACH	NE Ac	ker ADI		DRIL	L ME	THOD	Was	sh Rotary								HAMMER TYPE	140 lb. Ma	nual
ART DATE	08/16/	07		COM	P. DA	TE 0	8/16/0)7	SURF	ACE	WATE	R DEI	PTH	N/A		DEPTH TO ROCI	K N/A	
EV DEPTI	H BL	ow cou	NT			BLO	WS PI	ER FOOT			SAMP.	$\mathbf{V}/$	LO		901	L AND ROCK DESCR	PIDTION	
ft) (ft)	0.5ft	0.5ft	0.5ft	0		25	50) 7	75 1 L	00	NO.	MOI		ELEV. (ft)	301	E AND ROCK DESCR	AIF HON	DEPT
105																		
99.4 1.0	69	31/0.1		1		1			- 100/0					- WEA	THE	RED ROCK: Tan and Gneiss	l Grey, Granit	ic
96.9 3.5	00/0.0					: :	: :			. I				- -		2		
94.4 6.0	60/0.3			<u> </u>	• • •	1			60/0	0.3				3,094.9				·····
Ī	24	38	46	11:		1::			84			М		L RE	SID Bro	UAL: Very Dense; Wh wn; Silty, Fine to Coar	ite, Grey and se SAND	
91.9 8.5	5	14	44	1 :		: :		€58.	[:::			w,		_				
+						+				\exists		V		_				
86.9 13.5								: :\: :		:		w		_				
<u> </u>	22	30	35					65				"		- 0.004.4				
ł						: :		:				_	110	3,084.4 	/EA1	HERED ROCK: Brow		
81.9 <u> </u>	60/0.2	-		:		: :				2						Granitic Gneiss		
79.4 21.0	60/0.1			Ш		<u> </u>			60/6	-			9	- 		Terminated at Elevati		
+++++++++++++++++++++++++++++++++++++++																		

NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 6 OF 11

ROJECT NO.	34499).1.1	IE). R-2710			COUNTY	Watau	ga			GEOLOGIST T.W	ells/P.Weav	er
SITE DESCRIP	TION	NC 194	Site 5	5									GROUND \	NTR (ft)
ORING NO.	185+50			STATION 1	85+50		OFFSET	5ft RT			ALIGNMENT	「 -L-	0 HR.	NM
OLLAR ELEV	3,09	5.9 ft		TOTAL DEP	TH 31.5	ft	NORTHIN	G 900	170		EASTING		24 HR.	30.3
RILL MACHIN	IE Ack	er ADII		DRILL METH	IOD Wa	sh Rotary						HAMMER TYPE	140 lb. Ma	nual
START DATE	08/16/0)7		COMP. DATE			SURFACI		R DEF		N/A	DEPTH TO ROCI	K 18.0 ft	
ELEV DEPTH (ft)	0.5ft	0.5ft	NT 0.5ft	0 25	BLOWS P		5 100	SAMP.	MOI	L 0 G	SC ELEV. (ft)	IL AND ROCK DESCR	RIPTION	DEPTH (f
3100	47 6 7 21	5 10 6 25	6 14 14 24		24	49		SS-11	16.5% W W	- 100	3,095.9 ROA Tannish 3,092.9 RESID Silty, Fi 3,087.9 Hard; V	DWAY EMBANKMENT Brown, Clayey, Fine to SILT with Trace Gra UAL: Medium Dense, (ne to Coarse SAND wi Fragments White, Tan and Grey; F Sandy SILT	o Coarse Sand avel Grey and Tan, th Trace Rock Fine to Coarse	<u>3.</u>
077.4 18.5	60/0.2 60/0.0 60/0.1						60/0.2				- 3,077.9 CRY -	STALLINE ROCK: Gra	initic Gneiss	18.
3,064.4 31.5	80/0.0								V		-3,064.4			31
	60/0.0						60/0.0				Borin	g Terminated at Elevat	ion 3,064.4 ft	



SHEET 7 OF 11

ROJECT NO.	. 34499.1.1	11	D . R-2710	COUNTY Watauga		GEOLOGIST T.W	/ells/P.Weaver	
TE DESCRIF	PTION NC 19	4 Site	5				GROUND WT	R (
ORING NO.	186+00		STATION 186+00	OFFSET 5ft RT	ALIGNMEN	Γ -L-	0 HR.	D
OLLAR ELEV	/. 3,091.4 ft		TOTAL DEPTH 33.0 ft	NORTHING 900,193	EASTING	1,174,493	24 HR.	D
RILL MACHI	NE B-57		DRILL METHOD Wash Rota	y		HAMMER TYPE	140 lb. Manua	al
TART DATE	08/23/07		COMP. DATE 08/24/07	SURFACE WATER DEPT	H N/A	DEPTH TO ROC	K 22.0 ft	
LEV DEPTH	BLOW CO	UNT	BLOWS PER FOOT	[OAWI . \ \ /	-			
(ft) (ft)	0.5ft 0.5ft	0.5ft	0 25 50		SC S ELEV. (ft)	OIL AND ROCK DESCR	RIPTION DEF	PT
095	4 3 1 1 2 19 22 20 8 20 60/0.2	3 2 15 11	6. 3.	M W W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-4 W SS-	and Grey 3,088.4 ROA Tannis RESIDU/ 7,082.4 Very Sti	JAY EMBANKMENT FI To Silty, Fine to Coarse Gravel DWAY EMBANKMEN' The Brown, Fine to Coarse with Trace Grave AL: Dense, Tan and Gr Coarse SAND To Coarse Sandy S HERED ROCK: White, Granitic Gneiss ALLINE ROCK: Tan an Gneiss	SAND with Little T FILL: Soft, se Sandy SILT el rey, Silty, Fine to rn, Clayey, Fine silLT Tan and Grey,	
062.9 28.5	60/0.1			60/0.1	3,058.4			
33.0	60/0.0			60/0.0		g Terminated at Elevat	ion 3,058.4 ft	
+++++++++++++++++++++++++++++++++++++++								

NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 7 OF 11

PROJECT NO. 34499.1.1	D. R-2710	COUNTY Watauga	GEOLOGIST T.We	
SITE DESCRIPTION NC 194 Site 5				GROUND WTR (ft)
	STATION 186+50	OFFSET 10ft RT	ALIGNMENT -L-	0 HR. 23.4
• • • • • • • • • • • • • • • • • • • •	TOTAL DEPTH 26.6 ft	NORTHING 900,221	EASTING 1,174,540	24 HR. Dry
DRILL MACHINE B-57	DRILL METHOD Wash Rotary		HAMMER TYPE	140 lb. Manual
	COMP. DATE 08/28/07	SURFACE WATER DEPTH N/	A DEPTH TO ROCK	(15.0 ft
ELEV DEPTH BLOW COUNT	BLOWS PER FOOT	SAMP. L	SOIL AND ROCK DESCR	IPTION
(ft) (ft) 0.5ft 0.5ft 0.5ft	0 25 50 7	- 400 /	_EV. (ft)	DEPTH (f
3090 3,085.6 1.0 4 1 2 3,083.1 3.5 1 6 10 3,080.6 6.0 10 20 80/0.4 3,078.1 8.5 60/0.2	4	M L - 3	ROADWAY EMBANKMENT F and Brown, Fine to Coarse Sa Trace Gravel RESIDUAL: Medium Dense, T Silty, Fine to Coarse S WEATHERED ROCK: Tan and Gneiss	andy SILT with 4 an and Brown, SAND 6
3,073.1 13.5 100/0.4 3,068.1 18.5 60/0.1		100/0.4 	CRYSTALLINE ROCK: Grey, (15 Granitic Gneiss
3,063.1 23.5			3,063.6 RESIDUAL: Medium Dense,	Tan and Grev.
3,063.1 23.5 20 8 7	• • • • • • • • • • • • • • • • • • •		3,061.6 Silty, Fine to Coarse CRYSTALLINE ROCK: Gre	SAND 2
3,060.1		60/0.1	Granitic Gneis: Boring Terminated at Eleva	

NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 8 OF 11

PROJE	CT NO.	34499	9.1.1	10	Ο.	R-2710			COUNTY	W	atau	ga			GEOLOGIST T.W	/ells/P.Weaver
SITE D	ESCRIP	TION	NC 194	Site 5	5										·	GROUND WTR (fi
BORIN	G NO.	187+50)		ST	TATION 1	87+50		OFFSET	8ft	RT			ALIGNMENT	· -L-	0 HR.C.I.@ 6.0
COLLA	R ELEV	7. 3,07	4.4 ft		то	TAL DEP	TH 23.1	ft	NORTHIN	IG	900,	319		EASTING 1	,174,528	24 HR. C.I.@ 6.0
DRILL	MACHI	NE B-5	57		DR	RILL METH	IOD Wa	sh Rotary							HAMMER TYPE	140 lb. Manual
START	DATE	08/28/	07		СО	OMP. DATE	E 08/29/	07	SURFAC	E W	ATE	R DEP	тн	N/A	DEPTH TO ROC	K 12.0 ft
ELEV	DEPTH	BLO	OW COL	INT	П		BLOWS F	ER FOOT		SA	MP.	$\overline{\mathbf{V}}$	L		L AND BOOK DESCI	DIDTION
(ft)	(ft)	0.5ft	0.5ft	0.5ft	7 0	0 25	5	0 7	75 100	N	10.	MOI	0 G	ELEV. (ft)	IL AND ROCK DESCI	DEPTH
					П											
3075														_		
3,073.4	- 1.0				╫	-1		· · · · ·	T	+		22.5%			WAY EMBANKMENT	
3,070.9	3.5	18	6	2		. 8	<u> </u>	L: :: :		SS	S-12	22.070		Stiff, Ta - 3,071.4	nnish Brown, Clayey, Sandy SILT with Little	Fine to Coarse Gravel
-	-	60	40/0.2		$\ \cdot\ $				100/0.7					WEATH	HERED ROCK: White, Granitic Gneiss	Tan and Grey,
3,068.4	6.0	60/0.3							60/0.3	•				- -	Granito Gridio	•
3,065.9	8.5								60/0.2					- -		
-	<u> </u>	60/0.2			\parallel									 -		
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3,060.9	13.5	60/0.1	1					<u> </u>	60/0.1					<u>.</u>	Granitic Gneiss	5
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3,055.9	18.5							1::::						<u>-</u> -		
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3,051.4	23.0	60/0.1	 		╫			1	60/0.1	-			1	3,051.3 Boring	Terminated at Eleva	tion 3,051.3 ft
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SHEET 8 OF 11

PROJEC	T NO.	34499).1.1	II	ο.	R-2710			COUNTY	Watau	uga			GEOLOGIST T.V	vells/P.Weave	er
SITE DE	SCRIP	TION	NC 194	Site !	5										GROUND W	VTR (ft)
BORING	NO.	188+00			S	TATION	188+00		OFFSET	3ft RT			ALIGNMEI	NT -L-	0 HR.	15.1
COLLAF	RELEV	. 3,06	9.9 ft		T	OTAL DEF	PTH 24.4	↓ ft	NORTHIN	I G 900	,319		EASTING	1,174,528	24 HR.	16.9
DRILL N	IACHIN	E B-5	7		DI	RILL MET	HOD W	ash Rotary						HAMMER TYPE	140 lb. Man	nual
START	DATE	08/29/	07		C	OMP. DAT	E 08/30	/07	SURFAC	E WATE	R DE	PTH	N/A	DEPTH TO ROC	K 11.5 ft	
	DEPTH	BLC	w cou	INT			BLOWS	PER FOOT		SAMP.	V /	L		SOIL AND ROCK DESC	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	Ш	0 2	5 I	50 7	75 100	NO.	MO		ELEV. (ft)			DEPTH (fi
3070																
3,068.9	1.0	13	7	11	+						М	L	_ Grey a	DWAY EMBANKMENT I nd Tan, Fine to Coarse		1
3,066.4	3.5	7	15	39	41		77.4				М	000	3.066.9	Little Gravel DUAL: Very Dense, Tan		3.0
3,063.9	6.0	′	15	39				● 54		SS-13	-	0000	- Frag	ments and Silty, Fine to	Coarse SAND	
Ŧ		17	60/0.3						60/0.3	1				THERED ROCK: White,		6.5
3,061.4+	8.5	100/0.5							100/0.5	,			-	Granitic Gneis	5	
Ŧ									::::				- 3,058.4			11.
3,056.4	13.5]				CR	YSTALLINE ROCK: Wh Granitic Gneis		
+		60/0.1							60/0.1		$ \nabla$		<u>-</u>			
Ŧ							: : : :						-			
3,051.4+	18.5	60/0.1							· · 60/0.1)			-			
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3,046.4	23.5						: : : :			,			- 0.045.5			24.
3.045.6	24.3	60/0.1			+	l · · · ·	1	1	60/0.1	i	 		- 3,045.5 Bor	ing Terminated at Eleva	tion 3,045.5 ft	24.
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SHEET 9 OF 11

BORELO BORELO	······································			
	D. R-2710	COUNTY Watauga	GEOLOGIST T.W	·
SITE DESCRIPTION NC 194 Site		OFFORT CORT	ALIONISENT !	GROUND WTR (ft)
BORING NO. 188+50	STATION 188+50	OFFSET 5ft RT	ALIGNMENT -L-	0 HR. 18.3
COLLAR ELEV. 3,066.8 ft	TOTAL DEPTH 20.7 ft	NORTHING 900,340	EASTING 1,174,424	24 HR. NM
DRILL MACHINE B-57	DRILL METHOD Wash Rotary	OUR DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTION AND DESCRIPTIO	HAMMER TYPE	
START DATE 08/30/07	COMP. DATE 08/31/07	SURFACE WATER DEPTH N/	A DEPTH TO ROCI	Κ 19.5 π
	-1 1		SOIL AND ROCK DESCR	
ELEV (ft) (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5	BLOWS PER FOOT 0 25 50 7	5 100 NO. MOI G EL 3,1	SOIL AND ROCK DESCRIBE. SOIL AND ROCK DESCRIBE. ROADWAY EMBANKMENT FILE Boulders 1.0'-2.5 RESIDUAL: Very Dense, Tan a Fine to Coarse SA WEATHERED ROCK: Tan to B Granitic Gneiss O47.3 O47.3 D46.1 CRYSTALLINE ROCK: Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Granitic Graniti	DEPTH (f

State Project No. 34499.1.1

TIP No. R-2710

F.A. No. STP-194(4)

NC 194 from Banner Elk in Avery County to Valle Crucis in Watauga County

Site 5: Two Retaining Walls from -L- Stations 185+00 to 189+00

Watauga County, North Carolina SUMMARY OF LABORATORY TEST DATA

						Atte	rberg Li	mits				Gradation R	esults			
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
185+50	1.0-2.5	SS-11	16.5	A-4 (0)	11	25	21	4	90	69	51	53	30	18	28	24
187+50	1.0-2.5	SS-12	22.5	A-4 (2)	8	33	23	10	89	70	51	53	29	18	42	11

NP

25 NP

* SS = Split-Barrel Sample (ASTM-D-1586)

** G = Grab Sample

***ST=Shelby Tube (Undisturbed) Sample

NP -- Non Plastic

NA-- Non Applicable

A-1-a (0)

TRIGON ENGINEERING CONSULTANTS, INC.

GREENSBORO, NORTH CAROLINA

Trigon Job Number: <u>071-07-036</u>

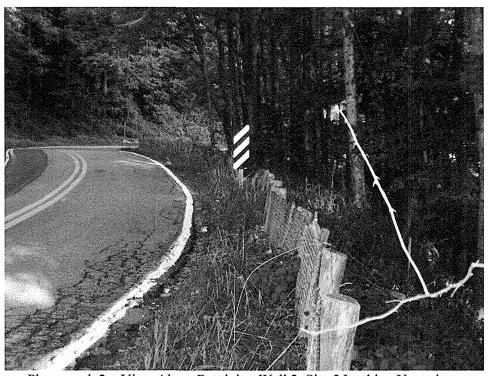
Page: <u>1 of 1</u>

SHEET 11 OF 11

SITE PHOTOGRAPHS State Project No. 34499.1.1 TIP No. R-2710 NC 194 from Banner Elk to Valle Crucis Site 5: Two Retaining Walls from -L- Sta. 185+00 to 189+00 Watauga County, North Carolina Page 1 of 1



Photograph 1 – View Along Retaining Wall 1, Site 5 Looking Upstation



Photograph 2 – View Along Retaining Wall 2, Site 5 Looking Upstation

R - 2710

2202339

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

STAT2	STATE	PROJECT REFERENCE NO.	SHBBT NO.	TOTAL SHEETS
N.C.	·	R-2710	1	12
TATS	E PROLNO.	P.A.PROJ.NO.	DESCRIP	TION
344	99.1.1	STP - 194(4)	P.E.	
344	99.2.2	STP - 194(4)	RW	
344	99.3.ST1	STM - 194(13)	CONS	T.
			,	

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 34499.I.I I.D. NO. R-27IO

F.A. PROJECT STP-I94(4)

COUNTY WATAUGA

PROJECT DESCRIPTION NC 194 FROM BANNER

ELK IN AVERY COUNTY TO VALLE CRUCIS IN

WATAUGA COUNTY

SITE DESCRIPTION SITE 4: ONE RETAINING WALL

FROM -L- STATIONS 174+00 TO 179+00

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FELD BORNING LOCS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL UNIT 0 (99) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORNING LOGS, ROCK CORES, OR SOIL TEST DATA IS PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUSSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNINGS 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 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 PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT, THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OF POINDON OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE TOWN THAT PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE DIDICATED IN THE SUBSURFACE INFORMATION.

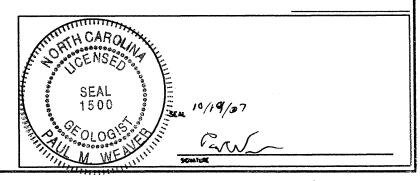
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NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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

INVESTIGATED BY_	T WELLS	PERSONNEL D KITCHEN
CHECKED BY	J VINSON	A HAYES
SUBMITTED BY	P WEAVER	T WELLS
DATE	9/12/07	R TOOTHMAN
		B DUNCAN



DRAWN BY: DRK

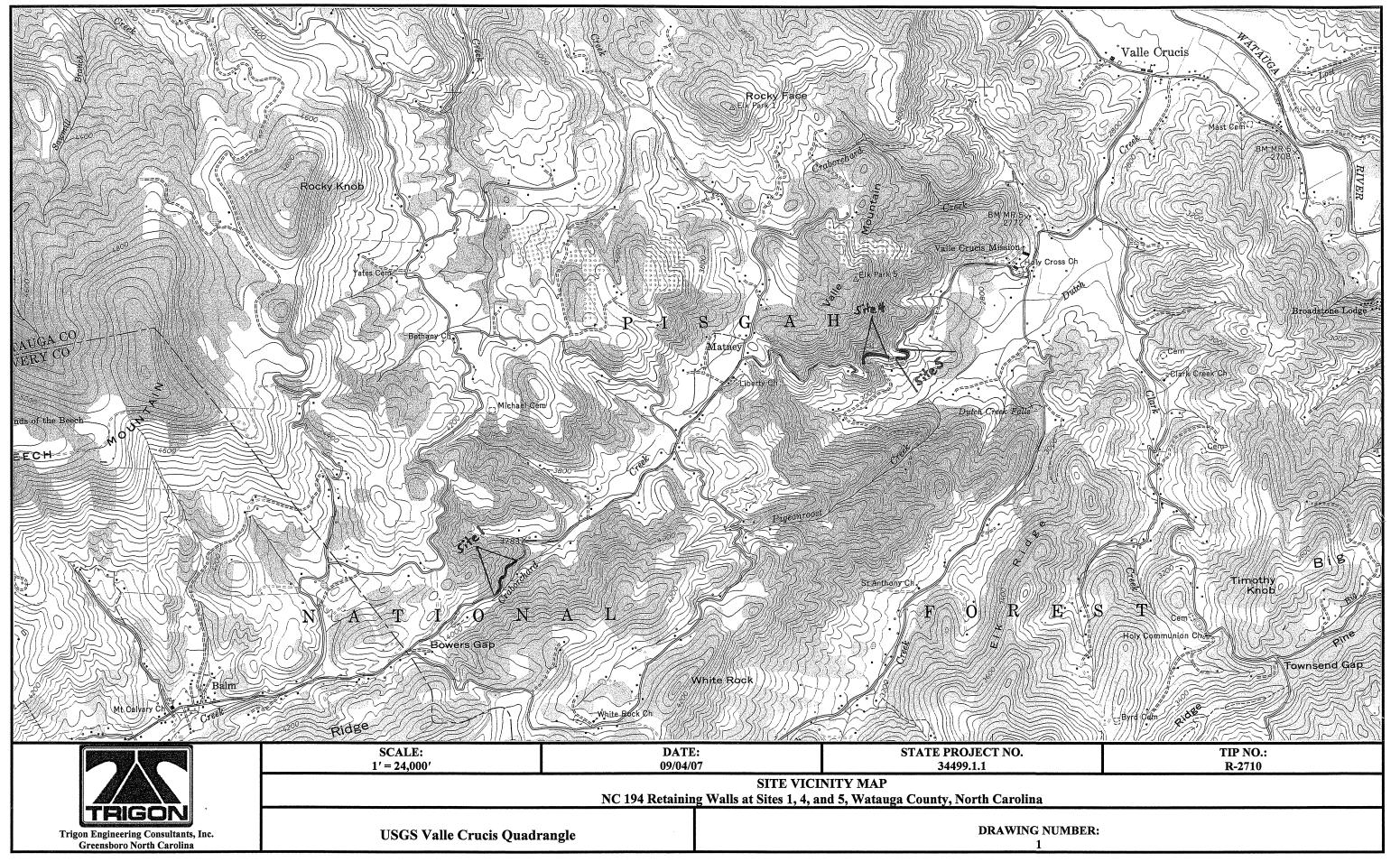
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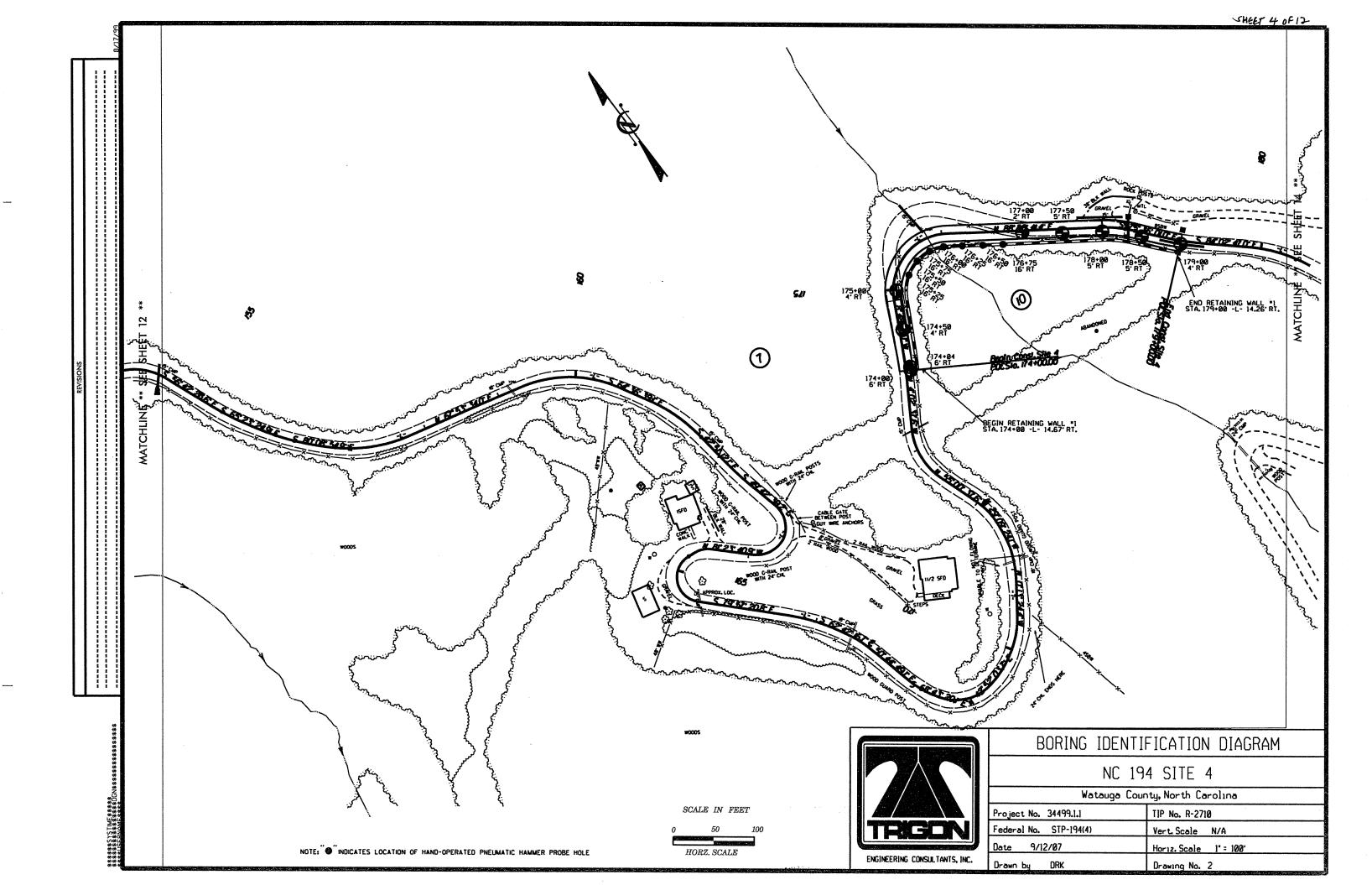
DIVISION OF HIGHWAYS

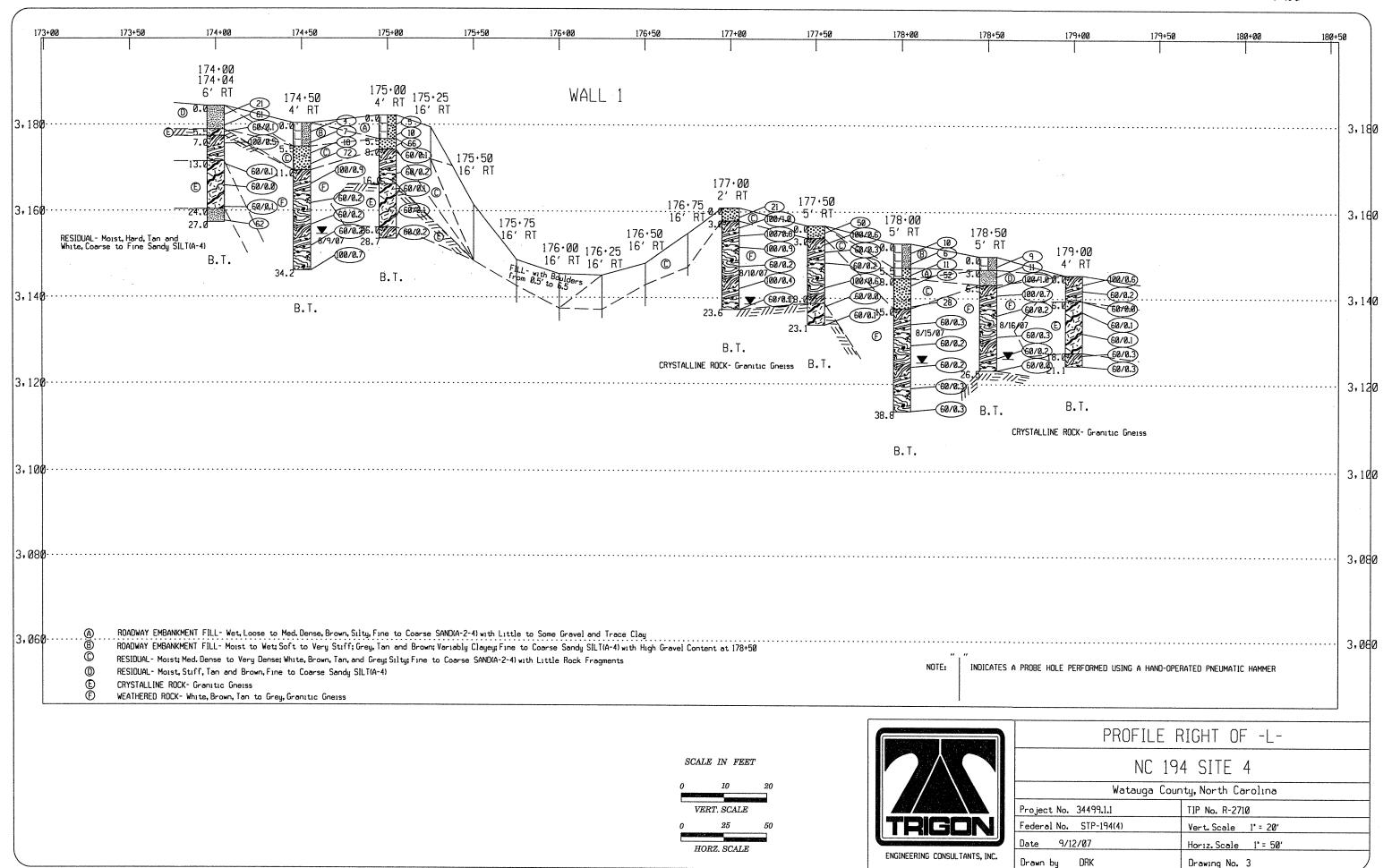
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

				SOIL AND ROC	ck legend, term	S, SYMBOLS,	AND ABBREVI	ATIONS		
	SOIL DESCRIPTION			GRADATION				DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONS	SOLIDATED, SEMI-CONSOLIDATED OR WEA	THERED EARTH MATERIALS	UNIFORM- INDICATES THAT SOIL	OD REPRESENTATION OF PARTICLE SIZES FRO PARTICLES ARE ALL APPROXIMATELY THE S	OM FINE TO COARSE SAME SIZE. (ALSO	ROCK LINE INDICATE	S THE LEVEL AT WHICH NON-C	t when tested, would yield spt re Coastal Plain Material would yiel	O SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.
WHICH CAN BE PENETRATED WITH A CON	ntinuous flight power auger, and whi Tandard Penetration Test (Aashto T2	ich yields less than 196, asth D-15861, soil	POORLY GRADEDI GAP-GRADED- INDICATES A MIXT	URE OF UNIFORM PARTICLES OF TWO OR MO	RE SIZES.	SPT REFUSAL IS PE	NETRATION BY A SPLIT SPOON	SAMPLER EDUAL TO OR LESS THAN 6 ON BETWEEN SOIL AND ROCK IS OFTEN	AJ FOOT PER 68 BLOWS.	ADUIFER - A WATER BEARING FORMATION OR STRATA.
CLASSIFICATION IS BASED ON THE AASH CONSISTENCY, COLOR, TEXTURE, MOISTURE	HTO SYSTEM AND BASIC DESCRIPTIONS O	ENERALLY SHALL INCLUDE:		ANGULARITY OF GRAINS		OF WEATHERED ROCK	K. RE TYPICALLY DIVIDED AS FOLO		NEFRESENTED BY A ZUNE	<u>ARENACEOUS</u> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULA	arity, structure, plasticity, etc. exa-	4PLE:		S OF SOIL GRAINS ARE DESIGNATED BY THE	TERMS; ANGLEAR,		555	······		ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
	CLIK, HOST WITH INTERBEDDED FINE SAMD LIKERS,HIGHE		SUBANGULAR, SUBROUNDED, OR 1			Weathered Rock (WR)	PER FOOT.	LAIN MATERIAL THAT YIELDS SPT N 1	VALUES > 188 BLOWS	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL
	O AND AASHTO CLASSIFI	ICATION	MINEDAL MANES CITY AS GIAD	MINERALOGICAL COMPOSITIO 12, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE US		CRYSTALLINE	FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC R	OCK THAT	AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
GENERAL GRANULAR MATERI CLASS. 1.35% PASSING *28		ORGANIC MATERIALS	WHENEVER THEY ARE CONSIDERS		SCD IN DESCRIPTIONS	ROCK (CR)	CAEISS, CABBRO,	PT REFUSAL IF TESTED, ROCK TYPE I SCHIST, ETC.	NCLUDES GRANITE,	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3	A-2 A-4 A-5 A-6 A-			COMPRESSIBILITY		NON-CRYSTALLINE		: Grain Metamorphic and Non-Coast OCK That Would Yeild SPT Refusal		COLLUVIUM - ROCK FRACHENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
	-2-5 A-2-6 A-2-7	A-3 A-6, A-7	SLIGHTLY COMPRESSI MODERATELY COMPRE		LESS THAN 30	COASTAL PLAIN	INCLUDES PHYLL	ITE, SLATE, SANDSTONE, ETC.		OF SLOPE.
SYMBOL DODGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG		7:::::	HIGHLY COMPRESSIBL	E LIQUID LIMIT	GREATER THAN 58	SEDIMENTARY ROCK	SPT REFUSAL. R	SEDIMENTS CEMENTED INTO ROCK, BUT OCK TYPE INCLUDES LIMESTONE, SAND	STONE, CEMENTED	CORE RECOVERY IREC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
2 PASSING		GRANT AR SILT- MUCK.		PERCENTAGE OF MATERIAL		(CP)	SHELL BEDS, ETC	c. ATHERING	······································	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
" 18 58 MX " 48 38 MX58 MX51 MN		GRANULAR CLAY PEAT	ORGANIC MATERIAL	CRANULAR SILT- CLAY SOILS SOILS	OTHER MATERIAL	F0F0+ 000+ F0				ROCKS OR CUTS MASSIVE ROCK.
* 288 IS HX 25 HX IB HX 35 HX 35	5 MX 35 HX 35 HX 36 HX 36 HX 36 HX 36 I	HN SOILS	TRACE OF ORGANIC MATTER	2 - 3% 3 - 5% TRA 3 - 5% 5 - 12% LITI		FRESH ROCK FR	IF CRYSTALLINE.	OINTS MAY SHOW SLIGHT STAINING, RO	CK RINGS UNDER	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIQUIO LIMIT 49 MX41	1 MN 48 HX41 MN 48 MX41 MN 48 MX41 M		MODERATELY ORGANIC	5 - 182 12 - 282 SOH	E 29 - 35%	VERY SLIGHT ROCK GE	ENERALLY FRESH, JOINTS STAIN	ED, SOME JOINTS MAY SHOW THIN CLI	AY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF
	MX 1 MM 1 MM 18 MX 18 MX 1 MM 11 M	- HIGHLY	HIGHLY ORGANIC	>19% >29% H[G:	ILY 35% AND ABOVE		LS ON A BROKEN SPECIMEN FAC RYSTALLINE NATURE.	CE SHINE BRIGHTLY, ROCK RINGS UNDE	R HAMMER BLOWS IF	THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
GROUP INDEX 8 8 8		AMOUNTS OF SOILS	✓ WATER L	GROUND WATER	AAL . I.A			ED AND DISCOLORATION EXTENDS INT		<u>FAULT</u> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF HAJOR GRAVEL AND CAND GRAVE	Y OR CLAYEY SILTY CLAYEY EL AND SAND SOILS SOILS	ORGANIC MATTER	l 	EVEL IN BORE HOLE IMMEDIATELY AFTER	DHILLING			AY. IN GRANITOID ROCKS SOME OCCAS . CRYSTALLINE ROCKS RING UNDER HA		FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND	22 12 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		-	ATER LEVEL AFTER 24 HOURS.		MODERATE SIGNIFIC	CANT PORTIONS OF ROCK SHOW	DISCOLORATION AND WEATHERING EFF	ECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGED FROM
AS A EXCELLENT TO G	SOOD FAIR TO POOR	FAIR TO POOR UNSUITABLE	VP₩ PERCHED	WATER, SATURATED ZONE OR WATER BEAR!	NG STRATA	(MOOL) GRANITO	DID ROCKS, MOST FELDSPARS AR DUND LINDER HAMMER BLOWS AN	RE DULL AND DISCOLORED, SOME SHOW NO SHOWS SIGNIFICANT LOSS OF STRE	CLAY, ROCK HAS NGTH AS COMPARED	PARENT MATERIAL.
SUBGRADE D.1 OF A.7-5	 5 ≤ L.L 38 : P.I. OF A-7-6 > L		OM- SPRING OF	R SEEPAGE		WITH FR	RESH ROCK.			FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
	NSISTENCY OR DENSENES			MISCELLANEOUS SYMBOLS		MODERATELY ALL ROC SEVERE AND DIS	CK EXCEPT OUARTZ DISCOLORED SCOLORED AND A MAJORITY SHO	D OR STAINED. IN GRANITOID ROCKS, A DW KAOLINIZATION. ROCK SHOWS SEVEI	LL FELDSPARS DULL RE LOSS OF STRENGTH	FORMATION (FMJ - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
Tangues	TNESS OR RANGE OF STANDARD PENETRATION RESISTENCE	RANGE OF UNCONFINED	III ROADWAY EMBANKA	ENT SPT OF TEST BORIN		(MOD. SEV.) AND CAN		OGIST'S PICK. ROCK GIVES "CLUNK" SO		THE FIELD.
	ISTENCY PERETRATION RESISTENCE	(TONS/FTP)	WITH SOIL DESCRI	IPTION VST PHT LEST BURN	G SAMPLE DESIGNATIONS			; ED OR STAINED, ROCK FABRIC CLEAR /	NATIONAL COLOR OF STREET	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
GENERALLY VERY L			SOIL SYMBOL	AUGER BORING	S- BULK SAMPLE	(SEV.) IN STRE	ENGTH TO STRONG SOIL. IN GRA	ANITOID ROCKS ALL FELDSPARS ARE K	CAOLINIZED TO SOME	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GRANULAR MEDIUM	SE 4 TO 19 M DENSE 18 TO 38	N/A	ARTIFICIAL FILL		SS- SPLIT SPOON		. SOME FRAGMENTS OF STRONG TED. YIELDS SPT N VALUES > 11			LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL DENS (NON-COHESIVE) VERY D	SE 39 10 59		ROADWAY EMBANKI		SAMPLE	1		D OR STAINED, ROCK FABRIC ELEMENT	S ARE DISCERNIBLE RUT	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN
VERY S			INFERRED SOIL B	OUNDARIES	ST- SHELBY TUBE , SAMPLE	IV. SEV.) THE MAS	SS IS EFFECTIVELY REDUCED T	TO SOIL STATUS, WITH ONLY FRAGMENT OF ROCK WEATHERED TO A DEGREE	IS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
GENERALLY SOFT	7 2 10 4	<0.25 0.25 TO 0.5	WHITE INFERRED ROCK L	MONITORING WEL	RS- ROCK SAMPLE			RIC REMAIN. IF TESTED YIELDS SPT		<u>PERCHED MATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM,
SILT-CLAY MEDIUM	H ST)FF 4 TO 8 FF 8 TO 15	0.5 TO 1 1 TO 2	1 -	A PIEZUME IEM	RT- RECOMPACTED	COMPLETE ROCK RE	DUCED TO SOIL. ROCK FABRIC	NOT DISCERNIBLE, OR DISCERNIBLE OF	NLY IN SHALL AND	RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY S	STIFF 15 TO 30	2 10 4	***** ALLUVIAL SOIL BO	SLOPE INDICATO	70104104 04404 F		RED CONCENTRATIONS. QUARTZ I N EXAMPLE.	MAY BE PRESENT AS DIKES OR STRIN	GERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (R.O.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF
HARC		>4	25/825 DIP/DIP DIRECTION ROCK STRUCTURES		CBR - CBR SAMPLE			HARONESS		ROCK SEGMENTS COURL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
T	TEXTURE OR GRAIN SIZE		• - SOUNDING RO	O SPT N-VALUE		VERY HARD CANNOT		SHARP PICK, BREAKING OF HAND SPE	CINERS DEVAILUES	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
U.S. STO. SIEVE SIZE		298 278 .875 8.853		REF SPT REFUSAL			AL HARD BLOWS OF THE GEOLO		en ens neosmes	PARENT ROCK.
OPENING (MPD)		INE		ABBREVIATIONS			E SCRATCHED BY KNIFE OR PIC TACH HAND SPECIMEN.	CK ONLY WITH DIFFICULTY, HARD HAM	ER BLOWS REQUIRED	Sill An intrusive 800y of igneous rock of approximately uniform thickness and relatively thin compared with its lateral extent, which has been emplaced parallel
80ULDER COBBLE (BLDRJ) (COBJ	GRAVEL SAND S	AND SILT CLAY	AR - AUGER REFU			I		CK. GOUGES OR GROOVES TO 8.25 INC	EC DEED PAN DE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
	1 10.30, 30,0 1 0.	<u>, 30,0 </u>	BT - BORING TER	MINATED N/A - NOT APP	LICABLE	HARD EXCAVA	ATED BY HARD BLOW OF A GEO	LOGISTS PICK. HAND SPECIMENS CAN	BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN HM 385 75 SIZE IN 12" 3"	2.8 9.25	9.95 9.995	CL CLAY CPT - CONE PENE	NM - NOT MEAS SO SANO, SA		l .	DERATE BLOWS. F GROOVED OR GOVICED R.O.S. IN	ICHES DEEP BY FIRM PRESSURE OF KI	HIEE OD DICY DOINT	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR B.P.F.) OF
SOIL MOIS	TURE - CORRELATION OF	TERMS	CSE COARSE	SL SILI, SIL		HARD CAN BE	E EXCAVATED IN SMALL CHIPS	TO PEICES I INCH MAXIMUM SIZE BY	HARD BLOWS OF THE	A 148 LB. HAMMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 8.) FOOT PENETRATION
SOIL MOISTURE SCALE	FIELD MOISTURE CHINE E	OR FIELD MOISTURE DESCRIPTION	C.T CORING TER DMT - DILATOMETI	FO TEST TCR - TRICON	REFUSAL	1	OF A GEOLOGISTS PICK.	BY KNIFE OR PICK, CAN BE EXCAVAT	ED IN EDACMENTS	MITH 68 BLOWS.
(ATTERBERG LIMITS)	DESCRIPTION		DPT - DYNAMIC PI	ENETRATION TEST 7 - UNIT W		FROM	CHIPS TO SEVERAL INCHES IN	SIZE BY MODERATE BLOWS OF A PICK		<u>STRATA CORE RECOVERY ISREC.</u>) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
		Y LIQUID: VERY WET, USUALLY ELOW THE GROUND WATER TABLE	e - VOID RATIO	γd - DRY UN W - MOISTURE		li .	CAN BE BROKEN BY FINGER P		DIEW DIEGER - In-	OF STRATOR AND EXPRESSED AS A PERCENTAGE. STRATA ROOK QUALITY DESIGNATION (S.R.O.D.) - A MEASURE OF ROOK QUALITY DESCRIBED BY:
LL LIQUID LIMIT	12mil From 0		FOSS FOSSILIFE	V VERY		SOFT OR MOR	re in Thickness can be brok	EXCAVATED READILY WITH POINT OF KEN BY FINGER PRESSURE. CAN BE SC	RATCHED READILY BY	TOTAL LENGTH OF ROCK SECRENTS WITHIN A STRATUM EDUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC RANGE <		LID: REDUIRES DRYING TO OPTIMUM MOISTURE		VST - VANE S IPMENT USED ON SUBJECT P		FINCER	RE SPACING	000000		IDPSOIL (I.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER,
(PI) PLASTIC LIMIT	ATTAIN	OPTIMUM MOISTORE	_		HANNER TYPE:	TERM		BEDOING TERM	THICKNESS	
1	- MOIST - MO SOLID	AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS:	ABYANCING TOOLS:	AUTOMATIC X MANUAL	VERY WIDE	SPACING MORE THAN 10 FEET	VERY THICKLY BEDOED	> 4 FEET	BENCH MARK: BM "1: 8" SPIKE IN BASE OF 10" BIRCH TREE -BL- STA, 34+33, 147" RT
OM OPTIMUM MOISTURE SL SHRINKAGE LIMIT	- HD(St - (H) SOCIAL	this of heat of their register.	X MOBILE 8- 57	CLAY BITS	Motoratic M sample	WIDE MODERATELY CLOSE	3 TO 10 FEET E 1 TO 3 FEET	THICKLY BEDDED THINLY BEDDED	1.5 - 4 FEET 8.16 - 1.5 FEET	ELEVATION: 3905,36'
		ES ADDITIONAL WATER TO	l	X 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	CLOSE	8.16 TO 1 FEET	VERY THINLY BEDDED THICKLY LAMINATED	8.83 - 8.16 FEET 8.888 - 8.83 FEET	NOTES:
	- DRY - (D) ATTAIN	OPTIMUM MOISTURE	8x-5i	8" HOLLOW AUGERS	8	VERY CLOSE	LESS THAN 8.16 FEET	THINLY LAMINATED	< 9.698 FEET	110.123
	PLASTICITY		CHE-45	HARD FACED FINGER BITS	X -N_O_			JURATION		
	PLASTICITY INDEX (PI)	DRY STRENGTH		TUNGCARBIDE INSERTS		FUR SEDIMENTARY ROCI		NING OF THE MATERIAL BY CEMENTING		
NONPLASTIC LOW PLASTICITY	6-5 6-15	VERY LOW SLIGHT	CHE-55	X CASING W/ ADVANCER		FRIABLE) with finger frees numerous grain Blow by Hammer Disintegrates sa		
MED. PLASTICITY	16-25	MEDIUM HIGH	PORTABLE HOIST	TRICONE STEEL TEETH	HAND TOOLS: POST HOLE DIGGER	MODERATELY		CAN BE SEPARATED FROM SAMPLE WI		
HIGH PLASTICITY	26 OR HORE	11141	45	X TRICONE 3% TUNGCARS.	HAND AUGER	FARRASELT		EASILY WHEN HIT WITH HAMMER.		
	COLOR		OTHER CHE 858	X CORE BIT	SOUNDING ROD	INDURATED		ARE DIFFICULT TO SEPARATE WITH S	TEEL PROBE:	
• · · · · · · · · · · · · · · · · · · ·	COLOR OR COLOR COMBINATIONS (TAN MRK, STREAKED, ETC. ARE USED TO DE		X OTHER ACKER MARK II	OTHER	WANE SHEAR TEST			LT TO BREAK WITH HAMPER.		
MODIFIERS SUCH AS LIGHT, DE	HERMA STREEMEDIETE PRE USEN 10 DE	PRINTER MECHINALES	The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon	L vines	01H€R	EXTREMELY		HAMMER BLOWS REQUIRED TO BREAK S BREAKS ACROSS GRAINS.	AMELE:	
<u> </u>			······································			<u> </u>				ACTUAL AND ALL AND









SHEET 6 OF 12

STATION 174+00 OFFSET 6ft RT ALIGNMENT -L- 0 HR. Dr. TOTAL DEPTH 18.5 ft NORTHING 900,113 EASTING 1,173,482 24 HR. Dr. DRILL METHOD HSA HAMMER TYPE 140 lb. Manual COMP. DATE 08/06/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 5.5 ft	PROJECT NO. 34499.1.1 SITE DESCRIPTION NC 194 S																	1	
STATION 174+00 OFFSET 6ft RT ALIGNMENT -L- 0 HR. D		ESCRIP	TION I	NC 194	Site 4	4											•	GROUND V	VTR (
TOTAL DEPTH		G NO.					TATION 1	74+0	00		0	FFSET	6ft RT			ALIGNME	NT -L-	0 HR.	D
DRILL METHOD HSA COMP. DATE 08/06/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 5.5 ft IT BLOWS PER FOOT 0.5ft 0 25 50 75 100 NO. MOI G ELEV. (ft) SOIL AND ROCK DESCRIPTION DEPTH 9 21 SS-7 14.0% SS-7 14.0% RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 3,177.4 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss WEATHERED ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss		R ELEV								ft	N	ORTHIN	G 900	,113		EASTING	1,173,482	24 HR.	
COMP. DATE		MACHIN																140 lb. Mar	nual
BLOWS PER FOOT 0.5ft 0 25 50 75 100 NO. MOI G ELEV. (ft) SOIL AND ROCK DESCRIPTION DEPTI SS-7 14.0% RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,165.9		DATE									s	URFAC	E WATE	R DE	PTH	N/A	DEPTH TO ROC	K 5.5 ft	
0.5ft 0 25 50 75 100 NO. MOI G ELEV. (ft) DEPT -3,184.4 -3,184.4 -3,184.4 RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 -3,177.4 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss -100/0.5 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4 -3,171.4		DEPTH	·	W COL	NT	П								V /	L		AND DOOK DECO	DIDTION	
9 21 SS-7 14.0% RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss	(ft)	(ft)	0.5ft	0.5ft		11	0 2	5	50)	75	100	NO.	МОІ			SOIL AND ROCK DESCR		DEPT
9 21 SS-7 M RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,165.9						П													
9 21 SS-7 14.0% RESIDUAL: Very Stiff to Hard, Brown and Grey, Clayey, Fine to Coarse Sandy SILT with Trace Rock Fragments 3,178.9 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss	3185															- 3 184 4			
21 M SS-7 M 3,178.9 Clayey, Fine to Coarse Sainty Sich With Hace Rock Fragments 3,177.4 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,165.9	183.4	1.0				$\dagger \dagger$	· · · · · · []				. :			14.0%		- RESID	UAL: Very Stiff to Hard, I	Brown and Grey	y.
3,178.9 3,177.4 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss	180.9	3.5	14	12	9		•2	1			. .		SS-7	-		Claye	Rock Fragment	SILT WITH TRACE	3
3,177.4 CRYSTALLINE ROCK: Granitic Gneiss WEATHERED ROCK: Granitic Gneiss 3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss	_	-	33	40	21				$\stackrel{\sim}{\longrightarrow}$	61-	+			M		 3,178.9			
3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,165.9	178.4- -	6.0	60/0.1													- 3,177.4 CF			
3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss 3,165.9	175.9	8.5	100/0.5								. :]	,				EATHERED ROCK. GIA	milic Greiss	
3,171.4 CRYSTALLINE ROCK: Tan and White, Granitic Gneiss	-	‡	100/0.5																
Gneiss 3,165.9	- - 170.9	13.5														3,171.4	TALLING DOOK To	d Mileita Cranit	
3,165.9	-	10.0	60/0.1								+:		'			CRYS		o vvnite, Granit	iC
1 3,165.9		‡									1								
	165.9	18.5	60/0.0	ļ	ļ	\perp							.	 	SP	3,165.9	ing Terminated at Fleva	tion 3 165 9 ft	
	-	+ + + + + + + + + + + + + + + + + + +																	
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SHEET 6 OF 12

PROJE	CT NO.					R-2710			COUNTY	Wa	taug	а			GEOLOGIST T.W	/ells/P.Wea	ver
	ESCRIP"														-	GROUND	WTR (ft)
	G NO.					TATION 174	4+04		OFFSET	6ft F	₹T			ALIGNMEN	T -L	0 HR.	23.0
	R ELEV					OTAL DEPTI		t	NORTHIN	G 9	00,1	17		EASTING	1,173,482	24 HR.	Dry
	MACHIN				DF	RILL METHO	D Was	h Rotary	L						HAMMER TYPE	140 lb. Ma	inual
	DATE					OMP. DATE			SURFACE	E WA	TER	DEP	тн	N/A	DEPTH TO ROC	K 5.5 ft	
ELEV.	DEPTH		W COU	VT	П	E	BLOWS PE	R FOOT		SAN	ЛP.		L	SC	OIL AND ROCK DESC	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft		0 25	50	7	5 100	NO	D. /	моі	- 1	ELEV. (ft)			DEPTH (
0405																	0
3185 _	<u> </u>				$-\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$		· · · · T			\vdash	\dashv			-3,184.2 RESIDU	AL: Very Stiff to Hard,	Brown and Gr	ey,
	‡													Clayey	Fine to Coarse SILT v Fragments in Upp	vith Trace Roo er 3	k
_	‡													 3,178.7			5
	‡													- 3.177.2 CR	YSTALLINE ROCK: Gr ATHERED ROCK: Gr		7
	‡														ATHERED ROOK. GI	aritic Oriciss	
•	Ŧ													-			
	Ī					: : : :								3,171.2 CRYST	ALLINE ROCK: Tan ar	d White, Grar	13 nitic
	$\frac{1}{1}$													- · · · · · · · · · · · · · · · · · · ·	Gneiss		
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	1													-			
	1					: : : :								- -			
3,160.7	23.5											\vee		- 3,160.2			24
3,158.7		60/0.1						[60/0.1			М		RESID	DUAL: Hard, Tan and V Fine Sandy SII	Vhite, Coarse ₋ T	
	1	20	15	47	+	• • • •		•62		4-				3,157.2 Bori	ng Terminated at Eleva	ation 3,157.2 f	2 [,]
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ICDO I BORE SINGLE UT-UT-USC.GFJ NC_DOT.GDT ICTORY	+													 			
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SHEET 7 OF 12

OJEC	CT NO.	34499	9.1.1	11	D.	R-2710			COUNTY	VV &	atau	ya		1	GEOLOGIST T.W	/ells/P.Weav	er
TE DE	SCRIP	TION	NC 194	Site 4	4											GROUND V	VTR (
DRING	NO.	174+50	1		S	TATION 1	74+50		OFFSET	4ft	RT			ALIGNMENT		0 HR.	16
DLLAF	RELEV	. 3,18	0.4 ft		T	OTAL DEPT	'H 34.2 f	t	NORTHIN	IG S	900,	162		EASTING 1	,173,473	24 HR.	25
RILL N	IACHIN	E Ack	er ADI		D	RILL METH	OD Was	h Rotary							HAMMER TYPE	140 lb. Mar	nual
ART I	DATE	08/08/0	07		C	OMP. DATE	08/08/0	7	SURFAC	E W	ATE	R DEF	TH	N/A	DEPTH TO ROC	K N/A	
	DEPTH	BLC	w cou	NT			BLOWS PE			SAM	MP.	lacktriangledown/	L	so	IL AND ROCK DESCF	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	$\perp \mid$	0 25	50 	7	5 100	NO	O. /	MOI	G	ELEV. (ft)			DEPT
185	1.0											21.3%	- 100		WAY EMBANKMENT		
76.9	3.5	3	2	2		4				SS	8-6				Stiff, Brown, Clayey, Sandy SILT with Little		
Ŧ		3	3	4		7						W		_3,174.9			
74.4+	6.0	3	6	12	-	18						М		RESIDUA	L: Medium Dense to \ , Silty, Fine to Coarse	Very Dense, Ta	in le
71.9	8.5	13	40	32	-		***					М		and Grey	Rock Fragment		
‡	-	,,,	40	J2					/2					3,169.4			
66.9	13.5													WEATH	ERED ROCK: White, E Granitic Gneiss		у,
+	. 10.0	32	68/0.4						100/0.9	•							
‡	•											∇		- ·			
61.9	18.5	60/0.2					: : :		60/0.2					•			
‡	-	00/0.2												-			
56.9	23.5													•			
136.9	. 23.5	60/0.2							60/0.2			_		•			
+	.										1			- ·			
151.9	28.5							: : : :	60/0.2					•			
#	• •	60/0.2							60/0.2					•			
‡									: : : :					•			
146.9	33.5	65	35/0.2	ļ	\perp	1			100/0.7	.				3,146.2	Terminated at Eleva	tion 2 146 2 ft	
+	.								,00,0						g reminated at Eleva	11011 3, 140.2 11	
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SHEET 7 OF 12

STEE DESCRIPTION NO. 194 Site 4 GROUND WTR (TO DORING NO. 175+00 STATION 175+00 OFFSET 4ft RT ALIGNMENT -L- OR	BORING NO. 175+0 STATION 175+0 OFFSET 4ft RT ALIGNMENT L- O HR. 25.9	PROJE	CT NO.	34499	9.1.1	IE). I	R-2710			COUNTY	Wataı	ıga			GEOLOGIST T.W	/ells/P.Weav	/er
COLLAR ELEV. 3,182.2 ft	Collar Elev. 3,182.2 ft Total Depth 28.7 ft Northing 90,211 Easting 1,173,467 24 Hr. Dry	SITE D	ESCRIP	TION	NC 194	Site 4	4										GROUND I	WTR (ft)
DRILL MACHINE Acker ADII DRILL METHOD Wash Rotary START DATE 08/09/07 COMP. DATE 08/09/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 16.0 ft	DRILL MACHINE Acker ADII ORIGINAL	BORIN	G NO.	175+00)		ST	ATION 1	75+00		OFFSET	4ft RT			ALIGNMEN	T -L-	0 HR.	25.9
START DATE	START DATE 08/09/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 16.0 ft	COLLA	R ELEV	. 3,18	2.2 ft		то	TAL DEP	TH 28.7	ft	NORTHIN	G 900	,211		EASTING	1,173,467	24 HR.	Dry
ELEV (ft) DEPTH (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft)	BLEV DEPTH (ft) DEPTH (ft) O.5ft O.5	DRILL	MACHIN	E Acl	ker ADI		DR	RILL METH	t OD Wa	sh Rotary						HAMMER TYPE	140 lb. Ma	nual
(ft) (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.5ft 0.	(ft) (ft) 0.5ft 0.5ft 0.5ft 0.5ft 0 25 50 75 100 NO. MOI G ELEV.(ft) SOIL AND ROCK DESCRIPTION DEPTH (ft) 3185	START	DATE	08/09/	07		СО	MP. DATE	E 08/09/	07	SURFACI	WATE	R DE	PTH N	N/A	DEPTH TO ROC	K 16.0 ft	
3,181.2 1.0 3 2 3 3 5 5 5 3,178.7 3.5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	3,181.2 1.0						0) 25			5 100		MOI			DIL AND ROCK DESCR	RIPTION	DEPTH (ft)
		3.185 _ 3.181.2	DEPTH (ft) 1.0 3.5 6.0 13.5 18.5	BLC 0.5ft 3 4 14 60/0.1 60/0.1	0.5ft 2 5	0.5ft 3 5		5	BLOWS P	PER FOOT 70 70 70 70 70 70 70 70 70 70 70 70 70		SAMP. NO.	w w		3,182.2 ROAD Mediur SAND 3,176.7 RESIDU 3,174.2 WEATI	WAY EMBANKMENT In Dense, Brown, Silty, with Some Gravel and Fine to Coarse SAHERED ROCK: Grey, COATHERED ROCK: Grave ATHERED R	FILL: Loose to Fine to Coarsed Trace CLAY and Grey, Silty ND Granitic Gneiss	5.5, 8.0



SHEET 8 OF 12

ROJE	CT NO.	34499	9.1.1	II	D.	R-2710		COUNTY	Watau	ıga			GEOLOGIST T.	Wells/P.Weaver
SITE D	ESCRIP	TION	NC 194	Site	4									GROUND WTR (
BORIN	G NO.	177+00)		s	TATION 177	+00	OFFSET	2ft RT			ALIGNME	NT -L-	0 HR . 15
OLLA	R ELEV	. 3,16	0.9 ft		Т	OTAL DEPTH	23.6 ft	NORTHIN	G 900	,279		EASTING	1,173,625	24 HR . 22
RILL	MACHIN	IE Ack	er ADI	1	D	RILL METHO	Wash Rotary						HAMMER TYPI	E 140 lb. Manual
TART	DATE	08/09/	07		С	OMP. DATE	08/10/07	SURFACE	WATE	R DEF	РΤΗ	N/A	DEPTH TO RO	CK N/A
ELEV	DEPTH	BLC	ow cou	INT	Ï	BL	OWS PER FOOT		SAMP.	lacksquare	L O		SOIL AND ROCK DES	CRIPTION
(ft)	(ft)	0.5ft	0.5ft	0.5ft	1	0 25	50 7	5 100	NO.	MOI		ELEV. (ft)	OOIL AND ROOK BEG	DEPTI
3165 _ - -	- -													
159.9	1.0				+	 			ļ			3,160.9 RESI	DUAL: Medium Dense,	White and Brown,
•	-	10	12	9		•21				M			r, Fine to Coarse SAND Fragments	with Little Rock
157.4	3.5	32	46	54	\dashv								THERED ROCK: Grey	
54.9	6.0	75	25/0.3					1				_	Gneiss	
52.4	8.5							100/0.8				F		
	‡	46	54/0.4					. 100/0.9			16	-		
-	‡										1/1	-		
47.4	13.5	60/0.2						· · · 60/0.2			1/1	- -		
_	‡									-V		_		
142.4	18.5				-							-		
12.1	10.0	100/0.4			-			100/0.4	'		9/0	-		
-	<u> </u>				ı							-		
137.4	23.5	60/0.1		ļ	4	.		60/0.1	.		90/	3,137.3	ring Terminated at Elev	vation 3 137 3 ft
_	1	(80/0.1	1										mig reminated at Liev	adion o, for lo it
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SHEET 8 OF 12

PROJE	CT NO.	34499	9.1.1	IC).	R-27	710					С	OUNTY	W	atau	ga					GE	DLOGIST	T.W	/ells/P.We	aver	
SITE DI	SCRIP	TION	NC 194	4 Site 4	4						,													GROUND	WTR	(ft
BORING	3 NO.	177+50	l		ST	ATIO	ОИ	177	+50		···	0	FFSET	5ft	RT				ALIG	NMEN.	T -	L-		0 HR.		Dry
COLLA									23.1				ORTHI	NG.	900,	276			EAST	ING				24 HR.		Dry
DRILL I) Wa		Rotar													140 lb. N	lanual	
START	DATE	,]	CC	MP.	DAT		08/14				URFAC			R DEI	4	N/A			D	ЕРТН ТО	ROC	K 18.0 ft		
ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft)	2	BL 25	.OWS	PER 50	FOOT	75	100		MP. O.	MOI	0 G	ELE	V. (ft)	sc	OIL A	ND ROCK	DESCF	RIPTION	DEP'	<u>TH (</u>
3160	- -																	-								•
3,155.8	1.0				$^{+}$			Τ.		T.		. .		-			:::	_ 3,15		RESIDU	AL: E	ense, Tan	and Gr	ey, Silty, Fin	e to	0
3,153.3	- - 3.5	13	27	23				<u>├</u>		50						•••	***	 _ 3,15	3.8					ck Fragment		3.
1	-	22	75	25/0.1	11	: :		:		:		: :	 100/0.6					-		WEATH	HERE	D ROCK: 0 Gne		nd Tan, Gran	itic	
3,150.8_	<u>6.0</u>	60/0.3			11		• •	<u> </u> :		<u> </u> :	• • •	<u> </u>	60/0.3													
3,148.3	8.5	60/0.2						:		:		: :	· · · · · · · · · · · · · · · · · · ·													
-	-	80/0.2						1:		:		: :						-								
3,143.3	- 13.5							+-		+-		. .						-								
0,140.0	- 10.0	19	56	44/0.1	11	: :	· ·	.		:		: :	 100/0.6					-								
-	- -					• •	• •	<u> :</u>		<u> </u> :		· ·														
3,138.3	18.5	60/0.0				: :		:		:		: :	 - 60/0.0					3,13	88.8	CRY	YSTA	LLINE ROC	CK: Gra	anitic Gneiss		18
_	-	00/0.0				: :	· ·	:		:		: :						+								
3,133.8_	_ 23.0					<u>.</u> .		1.		<u> </u>			<u> </u>					- 3,13	33.7							23
		60/0.1											60/0.1					-		Borin	ng Te	rminated at	Elevat	tion 3,133.7	ft	
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SHEET 9 OF 12

ROJE	CT NO.	34499	9.1.1	ı	D.	R-2710			COUNTY	Wata	ıga			SEOLOGIST T.W	ells/P.Weav	er
ITE DE	SCRIP	TION	NC 19	4 Site	4				.						GROUND V	VTR (
ORING	G NO.	178+00)		s	STATION 178	3+00		OFFSET	5ft RT			ALIGNMENT	-L-	0 HR.	17
OLLA	R ELEV	. 3,15	2.6 ft		Т	OTAL DEPTH	4 38.8 ft		NORTHIN	G 900	,277		EASTING 1	,173,725	24 HR.	27
RILL I	MACHIN	IE Ack	er AD		D	RILL METHO	D Wash R	otary						HAMMER TYPE	140 lb. Mar	nual
TART	DATE	08/14/	07		c	OMP. DATE	08/14/07		SURFACE	WATE	R DE	РΤΗ	N/A	DEPTH TO ROCK	K N/A	
	DEPTH		OW COL		4	I	LOWS PER F			SAMP.		L	SOI	L AND ROCK DESCR	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	+	0 25	50 L	7! 	5 100	NO.	MOI		ELEV. (ft)		····	DEPT
															*	
3155	-				l											
454.0				ļ	1	ļ						0.000	- _ 3,152.6			
151.6	- 1.0	12	6	4	1	10					М			NAY EMBANKMENT Stiff; Grey, Tan and E	Brown; Fine to	
149.1	3.5	3	3	3	-	1					w		_	Coarse Sandy SIL	_T	
146.6	- - 6.0					• • • • •		: :			w	L.	3,147.1	LIAV FAADANIKAENIT I	Til I . Madisus	
144.1	- - 8.5	3	4	7		• •11 •		• •	• • • • •		**			VAY EMBANKMENT F Prangish Brown, Silty,	Fine to Coarse	
144.1	- 0.5	22	26	26	1	: : : : 7	52	::			М		- RESIDU	SAND with Little Gra JAL: Very Dense to Me		
1	-						::/:	: :					- Brown ai	nd Grey, Silty, Fine to with Little Rock Fragn	Coarse SAND	
39.1	13.5						/				ľ			With Entire Mook Fragil	nonto	
Ŧ	-	19	14	14		•2	8					5011	- 3,137.6	DED DOOK To a see	1 O Oiti-	
7	-		<u>.</u>					::					- WEATHE	RED ROCK; Tan and Gneiss	i Grey, Granitic	;
34.1	18.5	60/0.3							60/0.3				-			
‡	-	0070.0											- -			
129 1	- - 23.5				ļ								-			
20.1	- 20.0	60/0.2				: : : : :		: :	60/0.2				-			
1	-							: :	::::		_		-			
124.1	28.5				1						_					
1		60/0.2							60/0.2			10	-			
7												10	-			
119.1	33.5	60/0.3	-		-				60/0.3				-			
1	-	00,0.0										9/	- -			
114.1	38.5												- _ 3,113.8			
	-	60/0.3	1-	1	\dagger		<u> </u>	<u> l</u>	60/0.3		 			Terminated at Elevati	ion 3,113.8 ft	
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SHEET 9 OF 12

PROJE	CT NO.	34499	.1.1	II). F	R-2710			COUNTY	Wata	ıga			GEOLOGIST T.W	/ells/P.Weav	ver
SITE DE	SCRIP	TION I	NC 194	Site 4	1		······································								GROUND	WTR (ft)
BORING	NO.	178+50			STA	ATION 1	78+50		OFFSET	5ft RT			ALIGNMEN	T -L-	0 HR.	23.0
COLLA					TO	TAL DEP	TH 26.5	ft	NORTHIN	G 900	,270		EASTING	1,173,774	24 HR.	23.7
DRILL I				I			IOD Was		1					HAMMER TYPE	140 lb. Ma	nual
START							E 08/15/0		SURFACE	WATE	R DE	PTH	N/A	DEPTH TO ROC	K N/A	
			ow cou	INT			BLOWS P			SAMP.	V /	L				
ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	$\exists \mid_{0}$	2,5			5 100	NO.	моі	O G	SC ELEV. (ft)	DIL AND ROCK DESCR	RIPTION	DEPTH (
					$\dagger \dagger$											
0.450																
3150 _ 3,148.6-	- - 1.0				+	[18.1%			VAY EMBANKMENT FI		
,	-	3	4	5	11	. ∳ 9				SS-10	10.1%		Clayey, 3,146.6	Fine to Coarse Sandy, Gravel Content		h 3
3,146.1	3.5	3	5	6	+L						М	E		IDUAL: Stiff, Tan and E	rown, Fine to	
3,143.6-	- 6.0				41	. I					М	L	3,143.1	Coarse Sandy SI		6
3,141.1	8.5	14	26	74		:]			100/1.0	·			WEAT	THERED ROCK: White and Grey, Granitic 0		1
-	-	45	55/0.2		\parallel				100/0.7	,			-	•		
-	_															
3,136.1	5.1 13.5 60/0.2															
-	‡				\mathbb{H}				60/0.2				-			
-	1.1 18.5 60/0.3												•			
3,131.1	18.5	00/0.0							60/0.3	,			•			
-	+ 00/0.5												- ·			
3,126.1	6.1 23.5 60/0.2								60/0.2				-			
3,123.1	26.5												3,123.1			26
		60/0.0							60/0.0				Borir	ng Terminated at Eleva	tion 3,123.1 ft	
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	T	y B	ORI	ELC	OG	G REF	POR	T							
PROJE	CT NO.					R-2710			COUNTY	Wata	uga			GEOLOGIST T.W	/ells/P.Weaver
SITE D	ESCRIP	TION	NC 194	Site 4	4										GROUND WTR (ft)
BORIN	G NO.	179+00)		ST	TATION 1	179+00		OFFSET	4ft RT			ALIGNMENT	-L-	0 HR. Dry
COLLA	R ELEV	. 3,14	5.4 ft		TC	OTAL DEP	TH 21	.1 ft	NORTHIN	IG 900	,259		EASTING 1	,173,822	24 HR. Dry
DRILL	MACHIN	E Ack	ker ADI	ı	DF	RILL METI	OD V	Vash Rotary	<u> </u>				····	HAMMER TYPE	140 lb. Manual
START	DATE				CC	OMP. DAT	E 08/1	5/07	SURFAC	E WATE	R DEF	РТН	N/A	DEPTH TO ROC	K 6.0 ft
ELEV (ft)	DEPTH (ft)		OW COL		۱۱,	0 25		S PER FOOT 50	75 100	SAMP.	17	0	so	IL AND ROCK DESC	RIPTION
3150 _	-	0.5ft	0.5ft	0.5ft		0 2 <u>5</u>		<u> </u>		NO.	MOI	G	ELEV. (ft)		DEPTH (fi
3,144.4	- - 1.0				╬				T		-	110	- 3,145.4 WEA	THERED ROCK: Brov	
3,141.9	3.5	21	60	40/0.1		: : : :			- 100/0.6)			-	Granitic Gneiss	3
-	-	60/0.2							60/0.2	'			- 2 420 4		
3,139.4	- 6.0 -	60/0.0						: : : : :	60/0.0 60/0.0	'			3,139.4 	STALLINE ROCK: Gra	6. anitic Gneiss
3,136.9	8.5	60/0.1							60/0.1	,					
_					$\ \cdot\ $			1					_		
3,131.9	13.5												-		
-		60/0.1							60/0.1	'			_		
_								: : : : :					- 2 127 4		10
3,126.9	18.5	60/0.3							60/0.3	,	1		- 3,127.4 - WEA	THERED ROCK: Tar	18. and Brown,
3,124.6-	- 20.8	60/0.3			止				60/0.3	,	<u> </u>	9/1	3,124.3	Granitic Gneise	21.

NC 194 Retaining Walls Investigation NCDOT Project No. 34499.1.1 NCDOT TIP No. R-2710 Trigon Project No. 071-07-036

Trigon Project No. 071-07-036 LOCATIONS FOR HAND DRILLED BORINGS AT SITE 4

							_				-
		**Notes	no rock	no rock/ bouldery fill	6-10' weathered rock	large houlder then weathered rock		soft weathered at 8	weathered rock 5-10' (no seams)	hand weathered nock affer 8'	וומות שכמווכוכת וסמו מונטו כ
	Weathered Termination	Depth (ft.)	10	10	10	10	2 9	2	10	Q.F	2
מר וועסט		Rock			.9	īα		<u></u> ω	5'	775	7.73
	Depth to Boulder	Easting Overburden Boulder Thickness	9	9/9	-4	S 5'	5.5				
	Depth to	Boulder	7.5'	4.5/7	c	1 5	i.				
	Depth of	Overburden	10'	10,	0.0	7 5	C	~	5.	7 7 7	0/:/
		Easting	1173482.93	1173493 71	1173509 56	4472507 00	00.1266111	1173550.57	1173575 71		11/3000.85
		Northing	175+25 16' RT 3179.39 900229.34 1173482.93 10'	3161 54 900246 08 1173493 71	3448 66 90025 53 1173509 56 IV	200201.00	3145.53 900262.61 111/3527.00 1.3	178+25 16' RT 3145 19 900263 24 1173550 57 8'	176+50 16' RT 3147 98 900263 69 1173575 71 5'	2002000	176+75 16 KI 3154.86 900264.14 1173600.85 7.75
		Elev.	3179.39	3161 54	3178 66	20.00	3145.53	3145 19	3147 98	00.11	3154.86
		Offset	16' RT	175+50 15' RT	10 PT		16. K	16' RT	16' RT	2	16. K
		te Station Offset	175+25	175+50	175-75 16' PT	07.07.	17/6+00 16 KI	176+25	176+50	3	176+75
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State Project No. 34499.1.1

TIP No. R-2710

F.A. No. STP-194(4)

NC 194 from Banner Elk in Avery County to Valle Crucis in Watauga County Site 4: One Retaining Wall from -L- Stations 174+00 to 179+00

Watauga County, North Carolina

SUMMARY OF LABORATORY TEST DATA

						Atte	rberg Li	mits	Gradation Results							
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
174+00	1.0-2.5	SS-7	14.0	A-4 (0)	21	22	21	1	96	73	47	60	31	27	27	15
174+50	1.0-2.5	SS-8	21.3	A-4 (0)	4	25	17	8	82	56	43	59	38	12	30	20
175+00	1.0-2.5	SS-9	-	A-2-4 (0)	5	32	26	6	70	47	35	67	40	14	38	8
178+50	1.0-2.5	SS-10	18.1	A-4 (0)	9	27	18	9	69	53	40	63	29	19	37	15

* SS = Split-Barrel Sample (ASTM-D-1586)

** G = Grab Sample

***ST=Shelby Tube (Undisturbed) Sample
NP -- Non Plastic NA-- Non Applicable

TRIGON ENGINEERING CONSULTANTS, INC. GREENSBORO, NORTH CAROLINA

Trigon Job Number: <u>071-07-036</u>

Page: <u>1 of 1</u>

SHEET 12 OF 12

SITE PHOTOGRAPHS State Project No. 34499.1.1 TIP No. R-2710 NC 194 from Banner Elk to Valle Crucis Site 4: One Retaining Wall from -L- Sta. 174+00 to 179+00 Watauga County, North Carolina Page 1 of 1



Photograph 1 – View Along Retaining Wall at Site 4 Looking Upstation



Photograph 2 – View of Rock Outcrop at Sta. 178+50 Left of Existing Roadway

R-2710

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STATE	STAT	PROJECT REFERENCE NO.	SHBBT NO.	TOTAL SHEETS	
N.C.		R-2 <i>7</i> 10		1	14
8TAT	E PROLNO.	P.A.PROLNO.	Т	DESCRIPT	NON
344	199.1.1	STP - 194(4)	1	P.E.	
344	99.2.2	STP - 194(4)		R/W	
344	99.3.ST1	STM - 194(13)		CONST	
			-		

STRUCTURE SUBSURFACE INVESTIGATION

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARROUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL LINIT & 9191 250-408B. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA IS 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

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 BORNOS 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 RELIABLITY 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 TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

CAUTION NOTICE

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 PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE IN FORMATION.

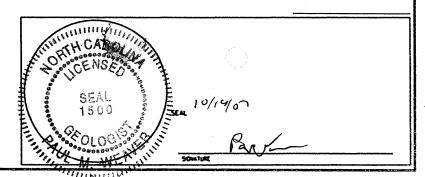
CONTENTS:

1)	NCDOT LEGEND SHEET (SHEET 2)		
2)	SITE VICINITY MAP (DRAWING No. 1, SHEET 3)	•	
3)	BORING INDENTIFICATION DIAGRAM (DRAWING No. 2. SHEET 4)		
4)	SUBSURFACE PROFILE (DRAWING Nos. 3-4, SHEET'S 5-6)		
5)	FINAL BORING LOGS, CORING LOGS, AND CORE PHOTOGRAPHS	(SHEETS	7-12)
3)	SUMMARY OF SOIL LABORATORY TEST DATA (SHEET 13)	101,661	1 127
7)	SITE PHOTOGRAPHS (SHEET 14)		

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

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

INVESTIGATED BY	T WELLS	PERSONNELD	KITCHEN
CHECKED BY	J VINSON	A	HAYES
SUBMITTED BY	P WEAVER	T	WELLS
DATE	9/12/07	R	TOOTHMAN
		В	DUNCAN



DRAWN BY: DRK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

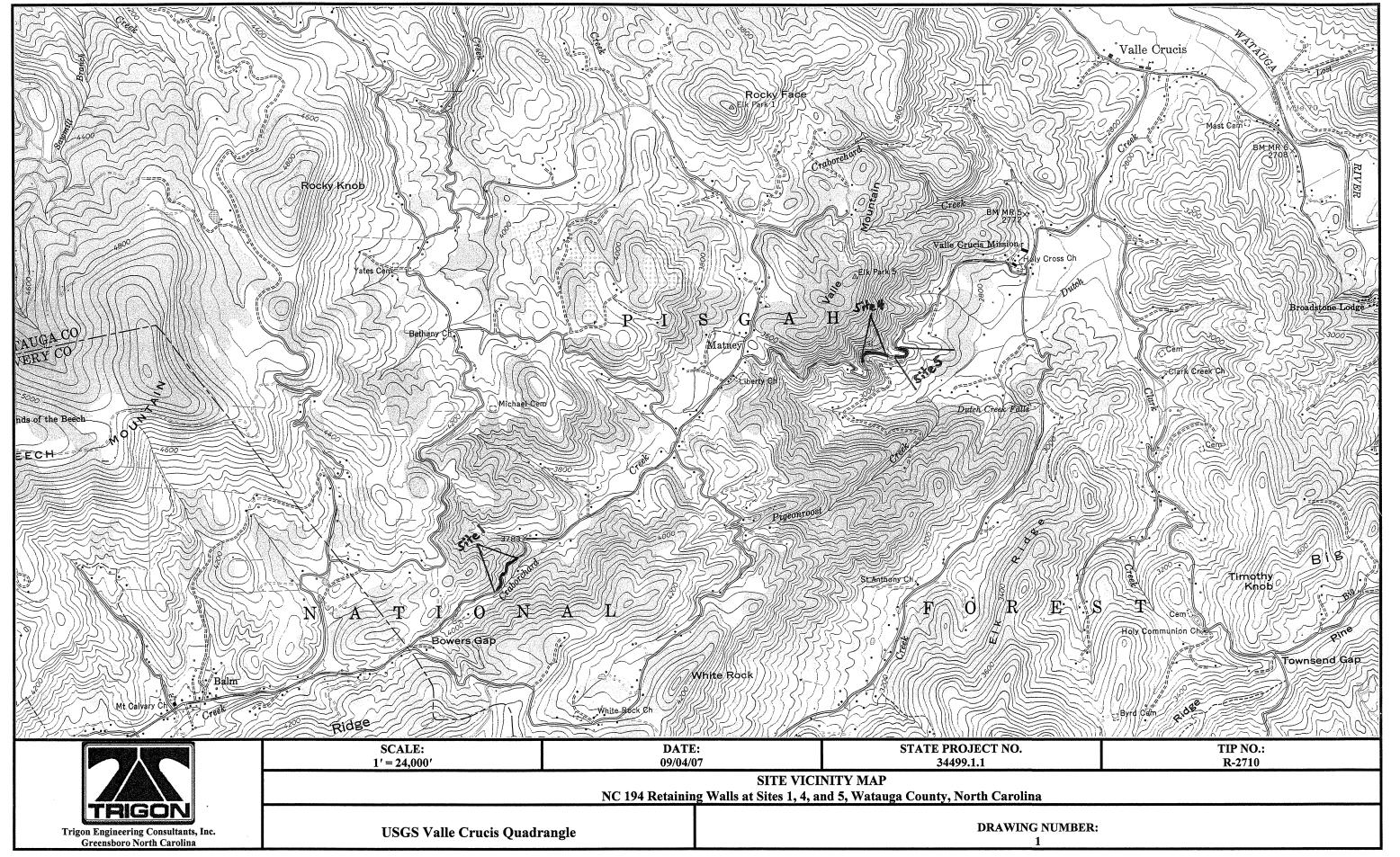
GEOTECHNICAL ENGINEERING UNIT

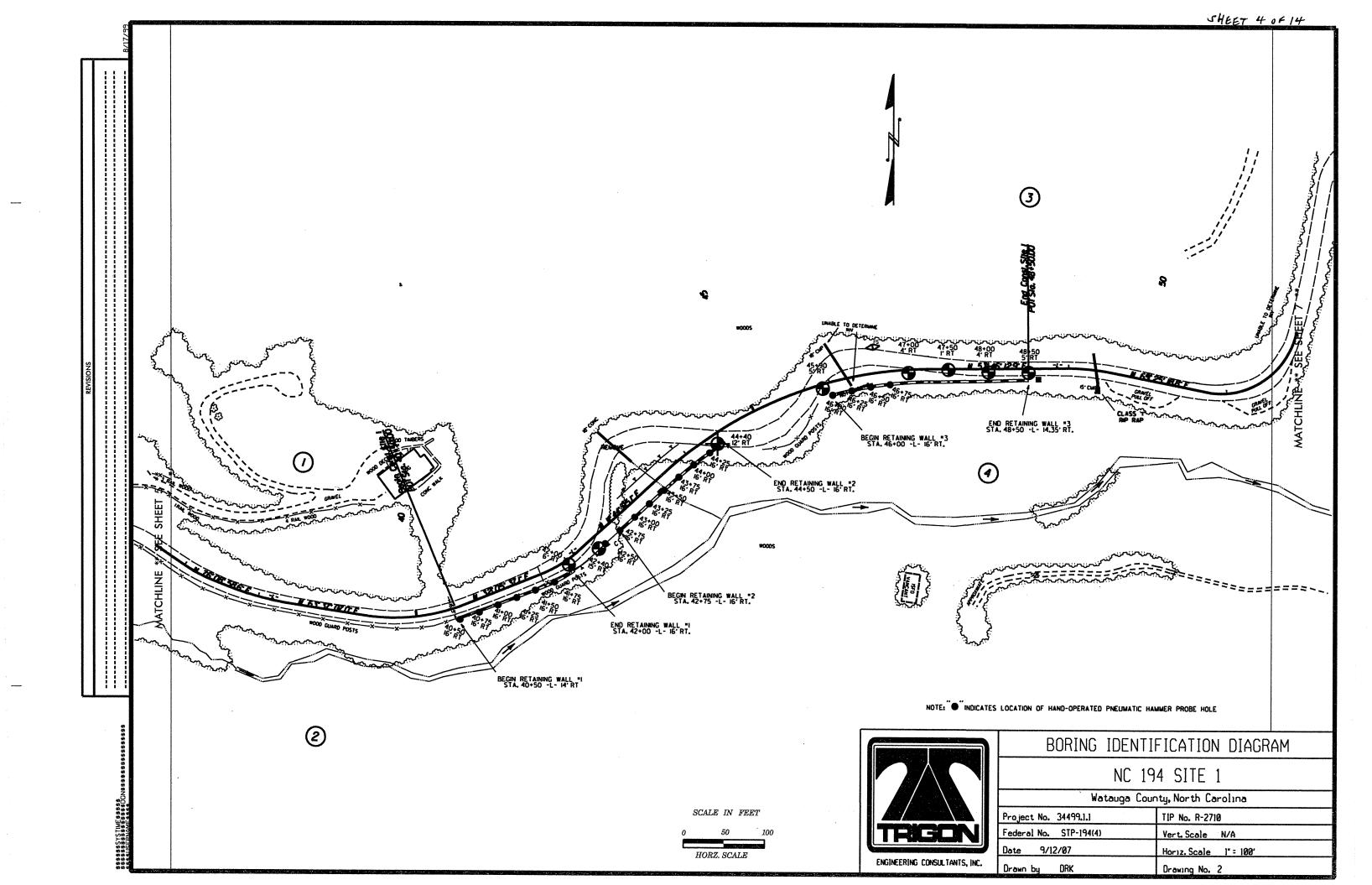
SUBSURFACE INVESTIGATION

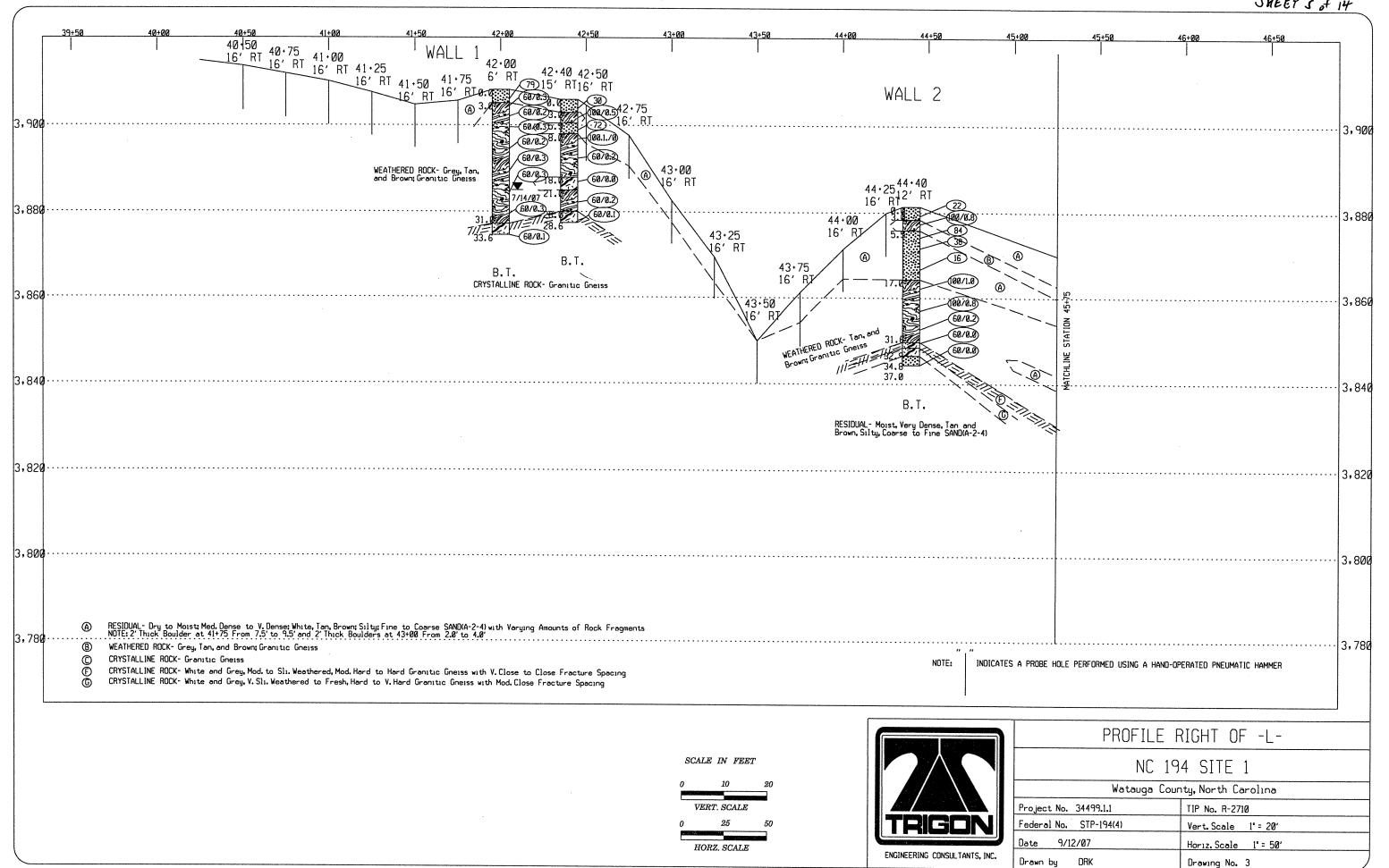
			SOIL AND ROC	K LEGEND, TERM	s, symbols, an	ND ABBREVIA	ATIONS		
SOIL DESCRIPTION		WELL COADED, INDICATES A COOR SECO	GRADATION	A Chr. to coaper		ROCK (DESCRIPTION		TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR ME WHICH CAM BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WIGH BOB BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST MASKITO CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS CONSISTENCY, COLOR, TEXTURE, HOISTURE, AASHTO CLASSIFICATION, AND OTHER AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETL. EX VERY STRIF, GAM SUT CLM, MOST WITH WERRECORD FINE SIMO UNERS, HO	HICH YIELDS LESS THAN 1296, ASTM D.15961. SOIL CENERALLY SHALL INCLUDE: PERTINENT FACTORS SUCH AMPLE:	THE ANGULARITY OR ROUNDNESS OF SO SUBANGULAR, SUBROUNDED, OR ROUNDED	CLES ARE ALL APPROXIMATELY THE S UNIFORM PARTICLES OF TWO OR MOR NGULARITY OF GRAINS DIL GRAINS ARE DESIGNATED BY THE L	e sizes. E sizes. Terms, angular,	ROCK LINE INDICATES THE SPT REFUSAL IS PENETRA	E LEVEL AT WHICH NON-CO ATION BY A SPLIT SPOON MATERIAL. THE TRANSITION PICALLY DIVIDED AS FOLDS	I MEN TESTED, MOULD YIELD SPT R DASTAL PLAIN MATERIAL WOULD YIE SAMPLER EDUAL TO OR LESS THAN IN BETMEEN SOIL AND ROCK IS OFTE MS: AIN MATERIAL THAT YIELDS SPT N	.O SPT REFUSAL. 8.1 FOOT PER 68 BLOWS. N REPRESENTED BY A ZONE	ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. AREMACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIF			RALOGICAL COMPOSITION		CRYSTALLINE	FINE TO COARSE	GRAIN IGNEOUS AND METAMORPHIC	POCK THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANLLAR MATERIALS SILT-CLAY MATERIALS CLASS. (195% PASSING "2001 (195% PASSING "2001)		MINERAL NAMES SUCH AS QUARTZ, FELD WHENEVER THEY ARE CONSIDERED OF S	ISPAR, MICA, TALC, KAOLIN, ETC. ARE US IGNIFICANCE.	ED IN DESCRIPTIONS	ROCK (CR)	CHEISS, GABBRO, S			GROUND SURFACE. CALCAREOUS ICALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CROUP A-1 A-3 A-2 A-4 A-5 A-6 A-6 A-1-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7	A-7 A-1, A-2 A-4, A-5 2-5 A-3 A-6, A-7	SLIGHTLY COMPRESSIBLE	COMPRESSIBILITY	500 T 00	NON-CRYSTALLINE ROCK (NCR)	SEDIMENTARY ROC	GRAIN METAMORPHIC AND NON-COAS CK THAT WOULD YEILD SPT REFUSAL	IAL PLAIN IF TESTED, ROCK TYPE	COLLUYIUM - ROCK FRACHENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL		MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE	LIQUID LIMIT I LIQUID LIMIT (LIQUID LIMIT (COASTAL PLAIN SEDIMENTARY ROCK	COASTAL PLAIN S	<u>ITE, SLATE, SANDSTONE, ETC.</u> SEDIMENTS CEMENTED INTO ROCK, BU DCK TYPE INCLUDES LIMESTONE, SAN	T MAY NOT YIELD STONE, CEMENTED	OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
Z PASSING 18 58 MX	GRANULAR SILT- MUCK.	CDAME	RCENTAGE OF MATERIAL AR SILT-CLAY		(CP)	SHELL BEDS, ETC.	THERING		DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
* 48 39 MX58 MX51 MN * 298 15 MX 25 MX98 MX 35 MX35 MX35 MX35 MX36 MX36 MX36 MX36 MX36 MX36 MX36 MX36	SOILS CLAY PEAT	ORGANIC MATERIAL SOILS TRACE OF ORGANIC MATTER 2 - 3: LITTLE ORGANIC MATTER 3 - 5:	2 3 - 52 TRAC		FRESH ROCK FRESH, (INTS MAY SHOW SLICHT STAINING. R	OCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. <u>OIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
LIDIND LIMIT 48 MX4] HN 48 MX4] HN 48 MX4] HN 48 MX4] HN 48 MX4] HN 48 MX 11 HN 11 MX 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 HN 11 H	HN LITTLE OR HIGHLY	LITTLE ORGANIC MATTER 3 - 5: MODERATELY ORGANIC 5 - 18 HIGHLY ORGANIC >102	12 12 - 292 SOME	29 - 35X	IV. SLIJ CRYSTALS ON	A BROKEN SPECIMEN FACI	EO, SOME JOINTS MAY SHOW THIN CL E SHINE BRIGHTLY. ROCK RINGS UND	AY COATINGS IF OPEN, IR HAMMER BLOWS IF	DIP DIRECTION (DIP AZIM <u>UTH) -</u> THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKNISE FROM NORTH,
GROUP MICEX 8 9 9 4 MX 8 MX 12 MX 16 MX NO USING TYPES STORE FRACE. FINE SILTY OR CLAYEY SILTY CLAY	AMOUNTS OF SOILS	✓ WATER LEVEL IN	GROUND WATER N BORE HOLE IMMEDIATELY AFTER I	ORILLING.		LLY FRESH, JOINTS STAINE	ED AND DISCOLORATION EXTENDS INT NY. IN GRANITOID ROCKS SOME OCCAS		FAULT - A FRACTURE OR FRACTURE ZOME ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS		4	EVEL AFTER 24 HOURS.		CRYSTALS AR	E DULL AND DISCOLORED.	CRYSTALLINE ROCKS RING UNDER HE DISCOLORATION AND WEATHERING EF	MMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
DEM. RATING AS A EXCELLENT TO GOOD FAIR TO POOR SUBCRADE	FAIR TO POOR UNSUITABLE	1	SATURATED ZONE OR WATER BEAR)	NG STRATA	(MOD.) GRANITOID RO DULL SOUND I	ICKS, MOST FELDSPARS ARE UNDER HAMMER BLOWS AND	E DULL AND DISCOLORED, SOME SHOW D SHOWS SIGNIFICANT LOSS OF STRE	CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL.
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 >		OM SPRING OR SEEPA			WITH FRESH F MODERATELY ALL ROCK EXC	CEPT QUARTZ DISCOLORED	OR STAINED, IN GRANITOID ROCKS,	NLL FELOSPARS DULL	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM,
CONSISTENCY OR DENSENE PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE COMPACTNESS OR PRIMARY SOIL TYPE	D RANGE OF UNCONFINED	II) ROADWAY EMBANKHENT	ISCELLANEOUS SYMBOLS POPT ONT TEST BORING		(MOD, SEV.) AND CAN BE E	EXCAVATED WITH A GEOLOG	n kaolinization. Rock shows seve Gist's Pick. Rock Gives "Clunk" so	RE LOSS OF STRENGTH UND WHEN STRUCK.	<u>FORMATION IFM.</u> A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
LUNSISTENCT (N-VALUE)	(TDNS/FTP)	WITH SOIL DESCRIPTION	_	SAMPLE DESIGNATIONS	SEVERE ALL ROCKS E	<u>OLLO YIELD SPT REFUSAL</u> XCEPT QUARTZ DISCOLOREI	D OR STAINED ROCK FABRIC CLEAR	AND EVIDENT BUT REDUCED	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SHALL COMPARED TO
GRANULAR LOOSE 4 TO 18	N/A	SOIL SYMBOL ARTIFICIAL FILL OTHER:	AUGER BORING	S- BULK SAMPLE	EXTENT. SOME	to strong soil. In Graf Fragments of strong I IELOS SPT N VALUES > 18		CAOLINIZED TO SOME	ITS LATERAL EXTENT.
MATERIAL DENSE 38 TO 58 VERY DENSE 359		ROADWAY EMBANKHENTS	- CORE BORING	SS- SPLIT SPOON SAMPLE ST- SHELBY TUBE	VERY SEVERE ALL ROCK EX	CEPT QUARTZ DISCOLORED	OR STAINED, ROCK FABRIC ELEMENT		LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTILED (MOTI) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTILING IN
VERY SOFT C2 GENERALLY SOFT 2 TO 4	<0.25 8.25 TO 8.5	INFERRED SOIL BOUNDARI	IES MONITORING WEL	SAMPLE	REMAINING. S	APROLITE IS AN EXAMPLE	O SOIL STATUS, WITH ONLY FRAGMEN OF ROCK WEATHERED TO A DEGREE RIC REMAIN. <i>IF TESTED, YIELDS SP</i>	SUCH THAT DNLY MINOR	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE, <u>PERCHED WATER</u> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
SILT-CLAY MEDIUM STIFF 4 TO 8 MATERIAL STIFF 8 TO 15	8.5 TO 1	MFERRED ROCK LINE	A PIEZOMETER INSTALLATION	RS- ROCK SAMPLE RT- RECOMPACTED	COMPLETE ROCK REDUCED	TO SOIL, ROCK FABRIC P	NOT DISCERNIBLE, OR DISCERNIBLE O	NLY IN SHALL AND	INTERVENING IMPERVIOUS STRATUM, RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK,
(COHESIVE) VERY STIFF 15 TO 38 HARD >38	2 TO 4 >4	25/825 DIP/DIP DIRECTION OF	SLOPE INDICATOR INSTALLATION	TRIAXIAL SAMPLE CBR - CBR SAMPLE	ALSO AN EXAM	₽LE.	MAY BE PRESENT AS DIKES OR STRIN	GERS. SAPROLITE IS	ROCK QUALITY DESIGNATION IR.Q.Q.J. 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
TEXTURE OR GRAIN SIZE		ROCK STRUCTURES • - SOUNDING ROD	- SPT N-VALUE		VERY HARD CANNOT BE S		HARDNESS SHARP PICK, BREAKING OF HAND SPE	Cinche Denviore	EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE
	200 278 8.875 0.853		REF- SPT REFUSAL		SEVERAL HA	RO BLOWS OF THE GEOLOG			PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
BOULDER CORRLE GRAVEL SAND	FINE SILT CLAY SAND ISLJ ICLJ	AR - AUGER REFUSAL	ABBREVIATIONS FRAGS FRAGM	ENTS	TO DETACH I	HAND SPECIMEN.	K GOUGES OR GROOVES TO 8.25 INC		RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS
GRAIN MM 385 75 2.8 8.25 SIZE IN. 12" 3"	8.85 8.885	BT - BORING TERMINATED CL - CLAY	N/A - NOT APPI NM - NOT MEAS SD SAND, SAN	URED	HARD EXCAVATED (BY MODERATI	BY HARD BLOW OF A GEOL E BLOWS.	.OGISTS PICK. HAND SPECIMENS CAN	BE DETACHED	SLIDERSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
SOIL MOISTURE - CORRELATION O	F TERMS	CPT - CONE PENETRATION CSE COARSE C.T CORING TERMINATED	SL SILT, SIL SLI SLIGHTL	TY Y	HARD CAN BE EXC		CHES DEEP BY FIRM PRESSURE OF K TO PEICES 1 INCH MAXIMUM SIZE BY		STANDARD PENETRATION TEST OPENETRATION RESISTANCE (SPT) - NUMBER OF BLOWS IN OR B.P.F.) OF A 148 LB, HAMMER FALLING 38 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH DUTSIDE DIAMETER SPLIT SPOON SAMPLER, SPT REFUSAL IS LESS THAN 8,1 FOOT PENETRATION
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE MATTERBERG LIMITS) DESCRIPTION	FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST DPT - DYNAMIC PENETRAT	from test γ - unit we	IGHT	SOFT CAN BE GRO	VED OR GOUGED READILY E	BY KNIFE OR PICK, CAN BE EXCAVAT SIZE BY MODERATE BLOWS OF A PICE	ed in Fraghents	MITH 68 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
(SAT.) FROM	LY LIDUID; VERY WET, USUALLY BELOW THE GROUND WATER TABLE	e - VOID RATIO F FINE FOSS FOSSILIFEROUS	7⁄d - DRY UNI W - MOISTURE		PIECES CAN VERY CAN BE CAR	BE BROKEN BY FINGER PR VED WITH KNIFE. CAN BE I	RESSURE. EXCAVATED READILY WITH POINT OF	PICK, PIECES I INCH	OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.D.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY:
	OLIDEREQUIRES DRYING TO	FRAC FRACTURED	V VERY VSI - VANE SI		FINGERNAIL.		EN BY FINGER PRESSURE. CAN BE SC	RATCHED READILY BY	TOTAL LENGTH OF ROCK SECHENTS WITHIN A STRATUM EQUAL TO OR CREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE COLOR PLASTIC LIMIT	N OPTIMUM MOISTURE		NT USED ON SUBJECT P		FRACTURE S		BEDOIN TERM	THICKNESS	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER,
ON OPTIMUM MOISTURE - MOIST - (M) SOLI	O; AT OR NEAR OPTIMUM MOISTURE	1_ _	ANCING TOOLS:	HANNER TYPE: AUTOMATIC X MANUAL	VERY WIDE	SPACING MORE THAN 19 FEET	VERY THICKLY BEDDED THICKLY BEDDED	> 4 FEET 1.5 - 4 FEET	BENCH MARK: BM "1: 8" SPIKE IN BASE OF 18" BIRCH TREE -BL- STA, 34+33, 147" RT
SL SHRINKAGE LIMIT	RES ADDITIONAL WATER TO	TE ROSILE 8- 37	CLAY BITS 6" CONTINUOUS FLIGHT AUGER	CORE SIZE:	MODERATELY CLOSE	3 TO 18 FEET 1 TO 3 FEET 8.16 TO 1 FEET	THINLY BEDOED VERY THINLY BEDOED	8.16 - 1.5 FEET 8.83 - 8.16 FEET	ELEVATION: 3905.36'
- DRY - CD ATTA	N OPTIMUM MOISTURE	8x-5i	8" HOLLOW AUGERS			LESS THAN 8.16 FEET	THICKLY LAMINATED THINLY LAMINATED	8.888 - 8.83 FEET < 8.888 FEET	NOTES:
PLASTICITY PLASTICITY INDEX (P))	ORY STRENGTH	~ · · · · · · · · · · · · · · · · · · ·	HARD FACED FINGER BITS	x -N_0_	FOR SEDIMENTARY ROCKS, INC		URATION NG OF THE MATERIAL BY CEMENTING	HEAT, PRESSURE ETC	
NONPLASTIC 8-5	VERY LOW SLIGHT	III CMC.KK I	TUNGCARBIDE INSERTS CASING // M/ ADVANCER	н <u>о</u>	FRIABLE	RUBBING	WITH FINGER FREES NUMEROUS GRAI	NS;	
LOW PLASTICITY 6-15 HEO. PLASTICITY 16-25 HIGH PLASTICITY 25 OR MORE	SLIGHT MEDIUM HIGH		TRICONESTEEL TEETH	HAND TOOLS: POST HOLE DIGGER	MODERATELY INDU		blow by Hammer Disintegrates sa Ian be separated from Sample wi		
COLOR		T OTHER CHE AND	TRICONE 3%" TUNG,-CARB.	HAND AUGER		BREAKS E	EASILY WHEN HIT WITH HAMMER.	·	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TA			CORE BIT	SOUNDING ROD VANE SHEAR TEST	INDURATED		ARE DIFFICULT TO SEPARATE WITH S IT TO BREAK WITH HAMMER.	TEEL PROBE:	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO (R SUMBE AFFE AMANCE.	X OTHER ACKER MARK	0THER	OTHER	EXTREMELY INDUR		AMMER BLOWS REQUIRED TO BREAK S BREAKS ACROSS GRAINS.	AMPLE:	
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ENGINEERING CONSULTANTS, INC.

Drawn by

Drawing No. 4

NCDOT GEOTECHNICAL ENGINEERING UNIT

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ORING NO.	42+00)		S	TATION -	42+00			OFFSET	6	ft RT			ALIGNMEN	NΤ	-L-	0 HR.	19.
OLLAR ELI	EV. 3,9	08.1 ft		T	OTAL DEF	TH 33	3.6 ft		NORTHI	٧G	895	,239		EASTING	1,	164,918	24 HR.	23.
RILL MACH	IINE A	cker AD	II	D	RILL MET	HOD V	Vash F	Rotary							П	HAMMER TYPE	140 lb. Man	ual
TART DATE	E 07/12	2/07		C	OMP. DAT	E 07/1	3/07		SURFAC	ΕV	VATE	R DEF	PTH	N/A		DEPTH TO ROCI	K 31.0 ft	
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BORING NO.					TATION				OFFSE					ALIGNME			0 HR.	Dry
COLLAR ELEV					OTAL DEI				NORTI	HING	895,	277		EASTING	1	r	24 HR.	Dry
DRILL MACHIN					RILL MET				T							HAMMER TYPE	140 lb. Ma	anual
START DATE				CC	OMP. DAT	E 07/1	6/07	·····	SURF			R DEF	TH N	I/A 		DEPTH TO RO	18.0 ft	
ELEV DEPTH (ft)	0.5ft	0.5ft	NT 0.5ft		0 2	BLOWS	50		75 10	00	SAMP. NO.	MOI	L O G E	ELEV. (ft)	SOI	L AND ROCK DESC	RIPTION	DEPTH (fi
3910													1	,906.0				0.1
3,905.0 1.0	7	8	22	#			4			井		M		RESI	DU	AL: Medium Dense t	Dense, Brow	n.
3,902.5 3.5	′	8	22			30 .	<u>: </u>		<u> </u>				<u> </u>	Silty ;903.0	, Fi	ne to Coarse SAND Fragments	with Little Rock	3.0
İ	13	100/0.5					: :			5					THE	RED ROCK: Grey a	nd Tan, Grani	
3,900.0 6.0	33	44	28	┨┝			-	· · · ·	- 100/0	<u> </u>		D	<i>ST.//</i> 2	,900.5 RESI	DU	Gneiss AL: Very Dense, Gre	y and Tan, Silt	y, 5.5
3,897.5 8.5							: :	1	72 · · · + — — —	41			3077	,898.0		Fine to Coarse S RED ROCK: Grey a	AND	8.0
‡	41	59							. 100/1	.o •				VVEA	ını	Gneiss	no Tan, Grani	ac
3,892.5 13.5	60/0.2								· · · 60/0									
3,887.5 + 18.5							- -			.				3,888.0				18.0
7 10.5	60/0.0						: :		60/0						RYS	TALLINE ROCK: G	anitic Gneiss	
‡							4	· · ·	<u> </u>	41				,885.0		TUEDED DOOK 0		21.0
3,882.5 + 23.5						: : :	: :		: : :	: []				V	/EA	THERED ROCK: Gr	anitic Gneiss	
1	60/0.2						. .		60/0	.2								
Ŧ				$\ \cdot\ $					ļ					s,880.0	200	TALLINE ROCK: G	anitic Chaise	26.0
3,877.5 28.5							- 1			: []				5,877.4	\ 1 C	TALLINE ROCK. GI	anillo Gneiss	28.6
<u> </u>	60/0.1			T					60/0	.1					ring	Terminated at Eleva	tion 3,877.4 ft	
-+																		



SHEET 8 OF 14

ROJE	CT NO.	34499	9.1.1		D.	R-2710			COUNTY	V	Vatau	ga			GEOLOGIST T.W	Vells/P.Weaver		
ITE DE	SCRIP	TION	NC 194	4 Site	1							***************************************				GROUND W	TR (
ORING	S NO.	44+40			S.	TATION 4	4+40		OFFSET	12	2ft RT			ALIGNMENT	· -L-	0 HR.	D	
OLLAI	R ELEV	. 3,88	1.4 ft		T	OTAL DEP	TH 37.0	0 ft	NORTHIN	IG	895,	470		EASTING	,164,980	24 HR.	D	
RILL N	MACHIN	IE Ack	er ADI	I	D	RILL METH	OD HS	SA/Wash F	Rotary/NQ C	ore)				HAMMER TYPE	140 lb. Manu	ıal	
TART	DATE	07/16/	07		C	OMP. DATI	07/18	SURFAC	ΕV	VATE	R DEF	TH	N/A	DEPTH TO ROC	K 31.6 ft			
	DEPTH	<u> </u>	ow cor	T	41			PER FOOT			AMP.	▼/	D L	SC	IL AND ROCK DESC	RIPTION		
(ft)	(ft)	0.5ft	0.5ft	0.5ft	+	0 25		50	75 100	+	NO.	/MOI	G	ELEV. (ft)		D	EPTI	
885																		
	• ·												İ					
880.4	1.0			ļ	4			 	 	-			****	- 3,881.4 - RESIDI	JAL: Medium Dense; V	Nhite Tan and		
300.4	- 1.0 -	5	9	13		2:	2	 	+			D			Silty; Fine to Coarse S.	AND with Trace		
877.9	3.5	50	50/0.3	-		4							W		Rock Fragments ERED ROCK: Tan and			
875.4	- 6.0								100/0,8	Ĺ		M	<i>57</i> /2	3,875.9	Gneiss AL: Very Dense to Med	lium Doneo, Tan		
872.9	- - 8.5	24	49	35				1			SS-2			- RESIDO/ - and I	Brown, Silty, Fine to Co	oarse SAND		
712.5	. 0.5	9	16	22	1		• • • 38	+				М		- -				
	- -						/	<u> </u>						-				
867.9	13.5					: : : : ; /	' 					М		-				
1	-	9	8	8		• • •16						141		-				
7	_												3000	-3,864.4	RED ROCK: Tan and	Drown Caratia		
362.9	18.5	24	76	-										- VVEATHI	Gneiss	i biowii, Giailiuc		
7	_	-	"			: : : :		: : : :	100/1.0					-				
357.9	23.5																	
357.9	_ 23.5	27	47	53/0.3	3									- -				
1	<u>-</u>							<u> </u>	. 100/0.8					-				
852.9	28.5					::::								<u>-</u> -				
1	-	60/0.2							60/0.2					-				
849.8	_ 31.6	60/0.0	1			 		 	. 60/0.0					3,849.8 3,848.5 CRY	STALLINE ROCK: Wh	ite and Grey,		
7	_													- Modera	ely to Slightly Weathe Hard, Granitic Gneiss	red, Moderately	Γ	
. ‡								: : : :							to Close Fracture Sp	pacing		
844.4	- 37.0 -	60/0.0	 	 	+				60/0.0	+				Slight	ALLINE ROCK: White y Weathered to Fresh	, Hard to Very	\vdash	
1	-														Franitic Gneiss with Mo Fracture Spacin	oderately Close	l	
<u>†</u>	_													RESIDU	AL: Very Dense, Tan a	and Brown, Silty,	1	
1														- Porin	Coarse to Fine SA Terminated at Eleva			
1														- BOIIII	j reminated at Eleva	11011 3,044.4 IL		
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SHEET 8 OF 14

BORING NO. 44+40 STATION 44+40 OFFSET 12ft RT ALIGNMENT -L- COLLAR ELEV. 3,881.4 ft TOTAL DEPTH 37.0 ft NORTHING 895,470 EASTING 1,164,980 2 DRILL MACHINE Acker ADII DRILL METHOD HSA/Wash Rotary/NQ Core HAMMER TYPE 140	O Ib. Manual
BORING NO. 44+40 STATION 44+40 OFFSET 12ft RT ALIGNMENT -L- COLLAR ELEV. 3,881.4 ft TOTAL DEPTH 37.0 ft NORTHING 895,470 EASTING 1,164,980 2. DRILL MACHINE Acker ADII DRILL METHOD HSA/Wash Rotary/NQ Core HAMMER TYPE 140	0 HR. Dry 24 HR. Dry 10 lb. Manual
COLLAR ELEV. 3,881.4 ft TOTAL DEPTH 37.0 ft NORTHING 895,470 EASTING 1,164,980 2 DRILL MACHINE Acker ADII DRILL METHOD HSA/Wash Rotary/NQ Core HAMMER TYPE 140	24 HR. Dry 10 lb. Manual
DRILL MACHINE Acker ADII DRILL METHOD HSA/Wash Rotary/NQ Core HAMMER TYPE 140	0 lb. Manual
OTABT DATE OTHORS	
START DATE 07/16/07 COMP. DATE 07/18/07 SURFACE WATER DEPTH N/A DEPTH TO ROCK 3	31.6 ft
CORE SIZE NQ TOTAL RUN 3.2 ft DRILLER R. Toothman	
ELEV (ft) DEPTH (ft) RUN (ft) DRILL RATE (Min/ft) RUD (ft) (ft) (ft) SAMP. REC. RQD (ft) (ft) (ft) SAMP. REC. RQD (ft) COLUMN (ft) (ft) DESCRIPTION AND REMARKS	DEPTH (ft)
3849.8 Begin Coring @ 31.6 ft	
3,849.8 31.6 3.2 3:42 (3.2) (1.9) (1.3) (0.3) 3,849.8 CRYSTALLINE ROCK: White and Grey, Moderately to Slightly Wea 4:10 4:15 1:05/0.2 (1.9) (1.6) 23% 3,846.6 Moderately Hard to Hard, Granitic Gneiss with Very Close to Close F Spacing	athered, 31.6 Fracture \(\sum_{32.9} \)
3,846.6 34.8 1.05/0.2 (1.9) (1.6) 3,846.6 Spacing Very Broken 31.6 ft. to 31.8 ft.	34.8
1 Joint at 80° N=60/0.0	37.0
Several Partially Healed Moderately to High Angle Fractures CRYSTALLINE ROCK: White and Grey, Very Slightly Weathered to Fre	
Very Hard, Granitic Gneiss with Moderately Close Fracture Space	
1 Joint at 34.5 ft.	
Moderately Weathered at 34.5 ft. to 34.8 ft. RESIDUAL: Very Dense, Tan and Brown, Silty, Coarse to Fine S.	SAND
Boring Terminated at Elevation 3,844.4 ft	
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SHEET	9	of	14	
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CORE PHOTOGRAPH

NCDOT Project No. 34499.1.1 TIP No. R-2710 NC 194 Site 1



Box 1 of 1 (SCALE = 1:4)



SHEET 10 OF 14

PROJE	CT NO.	34499	9.1.1	II	D.	R-2710	COUNTY	Watau	uga			(SEOLOGIST T.W	ells/P.Weav	er
SITE DI	ESCRIP	TION	NC 194	1 Site	1									GROUND V	VTR (f
ORIN	G NO.	45+90			S	TATION 45+90	OFFSET	5ft RT			ALIGNM	ENT	-L-	0 HR.	D
OLLA	R ELEV	. 3,86	7.9 ft		T	OTAL DEPTH 45.8 ft	NORTHIN	I G 895	,601		EASTIN	G 1	,165,046	24 HR.	33
RILL	MACHIN	IE Acl	er ADI	1	D	RILL METHOD Wash Rotary							HAMMER TYPE	140 lb. Mar	nual
	DATE				<u> </u>	OMP. DATE 07/20/07	SURFACI	E WATE	R DE	PTH	l N/A		DEPTH TO ROCI	K 41.0 ft	
LEV	DEPTH	r	ow cor	JNT	Т	BLOWS PER FOOT		SAMP.	V /	TL			L AND DOOK DECCE	UDTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	1	0 25 50	75 100	NO.	Mo	0 1 G	ELEV. (ft)	501	L AND ROCK DESCR		DEPTH
3870															
-	F										3,867.9				
,866.9	1.0	10	9	8	_				М		RE	SIDU	AL: Loose to Very Der wn, Silty, Fine to Coar	nse, White and	
- -864.4	3.5	10	9	ľ		17	ļ		М		;	ы	wit, Gitty, Fille to Goal	30 0/1112	
_	Ē	3	3	5					IVI		‡				
_861.9 -	6.0	7	24	65	1				М						
859.4	8.5	37	63/0.3							W	3,859.9	WEA	THERED ROCK: Gra	nitic Gneiss	
-	ł	3"	03/0.3				. 100/0.8			1	3,856.9				
054 4-	42.5										RI	ESIDU	JAL: Very Dense, Whi Silty, Fine to Coarse	ite and Brown, SAND	
854.4	13.5	17	26	36	-				М		<u></u>				
-	Ŧ									19/	3,851.9 W	EATH	IERED ROCK: White,	Tan and Grey	
-849.4,	18.5												Granitic Gneiss	•	
	‡	60/0.3					60/0.3								
-	‡									57					
,844.4	23.5	60/0.2	-				60/0.2	 		52					
	‡									52					
839 4 -	28.5						• • • •		١.,		3,839.4				
	1 20.0	55	24	19	٦	43	T = = = = = = = = = = = = = = = = = = =		M		RE:	SIDU	AL: Dense, Tan and B to Coarse SANI		е
,	İ								_		3,835.9				
,834.4	33.5	100/4	4								W	EATH	ERED ROCK: Grey, 1 Granitic Gneiss		1
	Ŧ	100/.4		ŀ			100/.4								
,829.4	38.5														
,029.4	30.5	60/0.2					60/0.2								
	Ŧ				ļ						3,826.9	CRY	STALLINE ROCK: Gra	anitic Gneiss	
,824.4	43.5				l		60/0.1			فيهنط					
3,822.1	45.8	60/0.1					60/0.1			مجو	3,822.1				
4	+	60/0.0					60/0.0				-	Boring	Terminated at Elevat	tion 3,822.1 ft	
-	‡										-				
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SHEET 10 OF 14

															Wa							T	
		TION 1	NC 194																			GROUND	
	G NO. 4				 		NC							SET					ALIGNMEN			0 HR.	32.2
COLLA	R ELEV	. 3,856	5.4 ft		 				38.				NOI	RTHIN	G 8	95,6	79		EASTING	1,		24 HR.	29.2
	MACHIN								D W			tary	T								HAMMER TYPE		nual
STARI	DATE			1	co	MP.	DA		07/3				SUI	RFAC			DEF	TH	N/A		DEPTH TO ROC	K 36.0 ft	
ELEV (ft)	DEPTH (ft)	т	0.5ft	NT 0.5ft	$\left\ \cdot \right\ _{0}$	1	,	BL 25	.ows	PEI 50	R FO	ΟΤ 7!	5	100	SAM	-		0		SOII	L AND ROCK DESC	RIPTION	
	(1.9)	0.5ft	0.511	0.511	╫			Ĭ				i		100	INC		MOI	G	ELEV. (ft)				DEPTH (f
3860 _																		-					
																		-	3,856.4				0.
3,855.4	1.0	2	2	3	- -	T	-	Ľ			-				SS-	2	2.6%	EE			VAY EMBANKMENT nnish Brown, Clayey,		
3,852.9	3.5					P 5.		:				: :		: :	33	\dashv	w		San	ndy	SILT with Trace of O	rganic Matter	
3,850.4	6.0	1	1	4		5.		:		:	· ·			: :					3,850.9				5.
-	4 7 9												M		RES White	e, T	JAL: Medium Dense t an and Brown; Silty;	o Very Dense Coarse to Fin	.				
3,847.9	35 · · · · · · · · · · · · · · · · · · ·						:	· ·						М				SAND					
_	Ţ							<u> </u> :	· · · · ·														
3,842.9	13.5							:		:]`							М						
		17	26	43				:		:		• 69	 				141		3,840.4				16.
-	ł				\parallel			+-		:+		 	==	 -					WEAT	THE	RED ROCK: White, Granitic Gneis		
3,837.9	18.5	45	55/0.3			 		:		:			1	 00/0.8							Granico Gridio	,	
	1												'	00/0.6									
3,832.9	23.5							:					1										
	-	60/0.2						:	: :		: :		†	60/0.2	<u>'</u>								
	‡				11	· ·		+-		-				· ·									
3,827.9	28.5	60/0.2				: :	: :	:				: :	l	60/0.2 [©]		l	V						
	‡	00/0.2			Ш			:					1										
3,822.9	33.5							1.								-	<u>V</u>		•				
3,022.3	+ 33.3	46	54/0.3					:					: :	00/0.8		l							
	‡				11			-	• •	4										RYS	STALLINE ROCK: Gr	anitic Gneiss	36
3,817.9	38.5	00/0.4			$\perp \! \! \perp$	· ·	· ·	<u> </u>	· ·	:	· ·	·. ·		60/0.1	.				3,817.8	ring	Terminated at Eleva	tion 3 817 8 ft	38
	‡	60/0.1												00/0.1				F	ВО	ing	Terminated at Lieve	4011 5,517.5 11	
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SHEET 11 OF 14

		34499	2.1.1		υ.	R-2710				COUNTY	vvatat	uga			GEOLOGIST T.W	elis/P.vveav	er
SITE D	ESCRIP	TION	NC 194	Site	1											GROUND V	VTR (1
BORIN	G NO.	47+50			s	TATION	47+5	50		OFFSET	1ft RT			ALIGNMENT	Γ -L-	0 HR.	11.
COLLA	R ELEV	. 3,85	3.8 ft		Т	OTAL DE	PTH	38.8 ft		NORTHIN	G 895	,711		EASTING	1,165,160	24 HR.	30.
RILL	MACHIN	IE Acl	er ADI		D	RILL ME	THOD	Wash Ro	otary		······································	*****			HAMMER TYPE	140 lb. Mar	nual
TART	DATE	07/31/	07		С	OMP. DA	TE C	07/31/07		SURFACI	E WATE	R DEI	РТН	N/A	DEPTH TO ROCI	K N/A	
ELEV	DEPTH	BLC	ow cou	NT			BLC	OWS PER FO	ОТ		SAMP.	lacksquare	L	90	IL AND ROCK DESCR	PIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	\perp	0	25	50 	75 1	100	NO.	MOI		ELEV. (ft)			DEPTH
3855 _	-													3,853.8			
852.8 <u>.</u>	1.0				_] .	Τ					22.6%		ROADV	VAY EMBANKMENT F	ILL: Very Stiff,	
- 850.3°	3.5	.6	7	9			\$\\\.\\.			: : : :	SS-4				Brown, Clayey, Coars SILT	e to Fine Sand	
		7	24	31			 	55				M			DUAL: Hard, Tannish B		
847.8 <u>.</u>	6.0	7	7	9	-		<u>.</u> :			: : :		M		Coarse	to Fine Sandy, SILTwit Dense to Very Dense	h Trace of Mica ; White, Brown	a /
345.3	8.5	9	18	44	4				• •			w			Silty; Coarse to Fine S Mica		
	‡		10	-7-7					62 .	: : :				- -	mod		
340.3°	13.5				1	: : : :	: :	/	::			- V		- -			
-	13.5	15	15	32	\dashv							W		-			
	1									: : : :				- - 3,836.8			
835.3	18.5														HERED ROCK: Tan, Br Granitic Gneiss		
-	Ŧ	35	65/0.3							- 100/0.8)				Granitic Griciss	'	
	‡													- -			
330.3	23.5	10	100/0.4											- 			
,	‡	"	100/0.4		l				: :	- 100/0.4	'			<u>.</u>			
005.0	20.5								::	: : : :				- -			
825.3	28.5	64	36/0.3							. 100/0.8	,						
	Ŧ													- -			
821.3	32.5	23	60/0.2							60/0.2	,			-			
	Ŧ													<u>.</u>			
	Ŧ													_			
815.3	38.5	60/0.3	}		+	1	Ш.			60/0.3	· 		1	3,815.0 Borin	g Terminated at Elevat	ion 3,815.0 ft	
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NCDOT GEOTECHNICAL ENGINEERING UNIT

SHEET 11 OF 14

PROJE	CT NO.					R-2710				COUNTY	Wata	uga			GEOLOGIST T.W	/ells/P.Weaver	
SITE DE	SCRIP	TION	NC 194	Site	1											GROUND WTF	! (ft)
BORING	NO.	48+00			ST	ATION	48+00)		OFFSET	4ft RT			ALIGNMEN		0 HR.	2.3
	R ELEV				то	TAL DE	PTH	23.8	ft	NORTHIN	IG 895	,738		EASTING		24 HR.C.I.@	
DRILL I	MACHIN	IE Acl	er ADI		DR	ILL ME	THOD	Wa	sh Rotary						HAMMER TYPE	140 lb. Manual	
START	DATE	07/31/	07		co	MP. DA	TE 0	7/31/	07	SURFAC	E WATE	R DE	PTH	N/A	DEPTH TO ROC	K N/A	
ELEV	DEPTH		ow cou		$\left\ \cdot \right\ _{\cdot}$				PER FOOT		SAMP.	lacksquare	0	sc	OIL AND ROCK DESCR	RIPTION	
(ft)	(ft)	0.5ft	0.5ft	0.5ft	10)	25 		50	75 100	NO.	MOI	G	ELEV. (ft)		DEP	TH (f
3850	. 1.0				4				7			ļ	1 10.0		DIAZAN END ANIMAENT	TU I . I	0.
3,848.8	. 1.0	5	3	4	11	.i		· ·				∇			DWAY EMBANKMENT The Brown, Silty, Fine to		Ū.
3,846.3	3.5	10	100			· · · ·		· ·	<u> </u>	1				3,845.8			4.
3,843.8	6.0				┧┝		†			100/.5	<u> </u>	м		- 3,044.3	HERED ROCK: White, Granitic Gneiss	· /-	5.
- 3,841.3	· · 8.5	34	28	36				: :	64	: : : :	SS-5	-			DUAL: Very Dense; W Silty; Fine to Coarse S		
	•	36	27	24	1 -			• •	51			W		· ·	Clay		
1							: :	: :		L				3,837.8			12.
3,836.3	13.5	49	51/0.3				: :	: :						- WEATH -	IERED ROCK: Tan, W Granitic Gneiss		
_	- -	13	3 1/0.3				+::			100/0.8	1			- -			
- 3,831.3-	- 18.5							: :	::::					- -			
0,001.0	- 10.0	60/0.2						• •		* 60/0.2	'			-			
	-									: : : :				- -			
3,826.3	23.5]				3,826.0			23
_	-	60/0.3	1							60/0.3			1 -	Borin	g Terminated at Elevat	ion 3,826.0 ft	
-														- - - - - - -			

PROJE	CT NO.	34499	.1.1	I). R	-2710				COL	JNTY	Watau	ga			GEOLOGIST T.V	
SITE DE	SCRIPT	TION 1	NC 194	Site 1													GROUND WTR (ft
BORING						TION 4				 		5ft RT			ALIGNMEN		0 HR. 5.0
COLLA						AL DEF					RTHIN	G 895	767		EASTING		24 HRC.I.@14.8
DRILL						L MET									N1/A	DEPTH TO ROC	140 lb. Manual
START	DATE				COM	IP. DAT				SUF	RFACE	SAMP.	R DEI	PIH TL	N/A	DEPTH TO ROC	K 21.0 it
ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0	2		50 50	FOOT 7	'5 L	100	NO.	моі	0	SC ELEV. (ft)	IL AND ROCK DESC	RIPTION DEPTH (
3850	-														- -		
3,844.5	- 1.0				#					1	_		M		- - 3,845.5 — RESIDU	IAL: Very Dense, Whit Coarse to Fine SA	te and Tan, Silty
3,842.0	3.5	19	30	46] :					76	<u>-</u> -			37/10	- - 3,842.5 - WEATH	Coarse to Fine SA ERED ROCK: Tannish	3
3,839.5		40	55	45/0.4	1L	: : :				1	00/0.9		∇		- -	Gneiss	, Brown, Gramme
	-	40	57	43	11:			: :		. 1	00/1.0				- - 3,837.5		
3,837.0	8.5 -	14	22	30	<u>:</u>			. j	· · · · · · · · · · · · · · · · · · ·	1		SS-6	W		- RESI	DUAL: Very Dense; W Variably Clayey, Silty, SAND	hite, Tan and Fine to Coarse
3,832.0	13.5	4	28	36	- ·				.\				w		_ - -		
3,827.0	- - 18.5									-:-	-				- 3,828.5 - WE	ATHERED ROCK: Gr	1' anitic Gneiss
-	-	60/0.3								<u> </u>	60/0.3	'			- 3,824.5		2
3,822.0	23.5								 	: :	::				- CRY	STALLINE ROCK: Gr	anitic Gneiss 2

LOCATIONS FOR HAND DRILLED BORINGS AT SITE 1

		cobbly overburden/ full depth	cobbly overburden/ clay like material after 6	clay like seam at 5.57 (1' thick)	cobbly overburden full depth	cobbly overburden full depth	hit 2' boulder at 7.5'	weathered rock at 9'	good weathered rock at 7'	good weathered rock at 5'	good weathered rock at 6'	good weathered rock full depth/ in creek bed	hit clay like seam at 4' (2' thick)	hit clay like seam at 6' (1.5' thick)	no rock/ clay seam at 9'	straight dirt full depth	straight dirt full depth	weathered rock at 9'	no boulders/ competent dirt before rock
Termination	Depth (ft.)	10	10	10	10	10	10	10	10	10	10	10	10	10	10	9	10	10	10
Depth To Weathered Termination	Rock							O	7.	5'	9.	6"	7	7.				6,	8
Boulder	Thickness						2'			2'									
Don'th to							7.5'			2'									
- 4+ 40 C	Depuir bi Overburden	10,	10,	10,	10,	10,	7.5'	9.		5'	9	6"		7;	10,	10,	10,	.6	ω
	Easting	1	1164862.72	1164876.01	1164889.29	1164902.55	1164916.09	1164939.70	1164944.72	1164949.83	1164954.90	1164959.99	1164965.16	1164971.32	1164978.81	1165061.18	1165077.28	1165093.67	1165111.73 8
	Northing	895102.86 1164848.81	3911.77 895124.54 1164862.72 10	3910.06 895145.73 1164876.01 10	3907.56 895166.90 1164889.29 10	3904.82 895188.04 1164902.55 10	3905.74 895210.40 1164916.09 7.5	895286.27	3897.74 895310.44 1164944.72 7	3882.71 895335.04 1164949.83 5	895359.46 1164954.90 6	3849.99 895383.94 1164959.99 6"	3861.27 895407.82 1164965.16 7	3871.48 895431.04 1164971.32 7	895454.48	3862.47 895601.36 1165061.18 10	895619.42 1165077.28 10	3845.19 895637.33 1165093.67	3848.76 895653.77
	Elev.	2	3911.77	3910.06	3907.56	3904.82	3905.74	15' RT no stake	3897.74	3882.71	3869.68	3849.99	3861.27	3871.48	3879.85	3862.47	3850.81	3845.19	3848.76
	Offset	15' RT	16' RT	15' RT	15' RT	15' RT	15' RT	15' RT	15' RT	16' RT	15' RT	16' RT	15' RT	15' RT	15' RT	16' RT	16' RT	15' RT	16'RT
	Station	40+50	40+75	41+00	41+25	41+50	41+75	42+50	42+75	43+00	43+25	43+50	43+75	44+00	44+25	46+00	46+25	46+50	46+75
	Site	-	-	-	-	-	-	-	F	-	-	-	-	-	-	-	-	F	-

State Project No. 34499.1.1

TIP No. R-2710

F.A. No. STP-194(4)

NC 194 from Banner Elk in Avery County to Valle Crucis in Watauga County

Site 1: Three Retaining Walls from -L- Stations 40+50 to 48+50 Watauga County, North Carolina

SUMMARY OF LABORATORY TEST DATA

						Atte	erberg Li	mits				Gradation R	esults			
Boring Number	Sample Depth (ft.)	Sample No.*	Natural Moisture Content (%)	AASHTO Class (Group Index)	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Retained #270 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
42+00	1.0-2.5	SS-1	-	A-1-b (0)	79	25	NP	NP	55	26	15	88	59	18	19	4
44+40	6.0-7.5	SS-2	-	. A-2-4 (0)	84	27	NP	NP	99	63	25	79	47	32	13	8
47+00	1.0-2.5	SS-3	22.6	A-4 (0)	5	26	21	5	97	74	49	55	29	25	25	21
47+50	1.0-2.5	SS-4	22.6	A-4 (2)	16	24	16	8	95	81	59	43	20	21	29	30
48+00	6.0-7.5	SS-5	-	A-2-4 (0)	74	27	NP	NP	90	54	26	77	50	24	16	10
48+50	8.5-10.0	SS-6	-	A-2-4 (0	52	25	NP	NP	98	65	29	75	46	29	13	12

* SS = Split-Barrel Sample (ASTM-D-1586)

** G = Grab Sample

***ST=Shelby Tube (Undisturbed) Sample

NP -- Non Plastic

NA-- Non Applicable

TRIGON ENGINEERING CONSULTANTS, INC. GREENSBORO, NORTH CAROLINA

Trigon Job Number: <u>071-07-036</u>

Page: 1 of 1

SITE PHOTOGRAPHS

State Project No. 34499.1.1 TIP No. R-2710
NC 194 from Banner Elk to Valle Crucis
Sites 1: Three Retaining Walls from -L- Sta. 40+50 to 48+50
Watauga County, North Carolina
Page 1 of 2



Photograph 1 – View Along Retaining Wall 1, Site 1 Looking Upstation



Photograph 2 – View Along Retaining Wall 2, Site 1 Looking Upstation

SHEET 14 OF 14

SITE PHOTOGRAPHS

State Project No. 34499.1.1 TIP No. R-2710
NC 194 from Banner Elk to Valle Crucis
Sites 1: Three Retaining Walls from -L- Sta. 40+50 to 48+50
Watauga County, North Carolina
Page 2 of 2



Photograph 3 – View Along Retaining Wall 3, Site 1 Looking Upstation