

PROJECT: 35015.1.1 ID: U-4020

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 35015.1.1 I.D. NO. U-4020
 F.A. PROJECT NHF-421(31)
 COUNTY WATAUGA
 PROJECT DESCRIPTION US 421(KING ST.) FROM
US 321(HARDIN ST.) TO NC 194 (JEFFERSON
RD.) IN BOONE
 SITE DESCRIPTION RETAINING WALL 4
-L- STA. 55+81.73 - 61+40

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4020	1	17
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35015.1.1	NHF-421(31)	P.E.	
			CONST.

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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 BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT @ 1938 250-4088. 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 REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (UN-PLACED) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON 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.

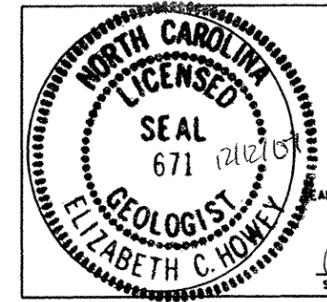
INVESTIGATED BY F&R, Inc. PERSONNEL J. GILCHRIST
 CHECKED BY E.C. HOWEY, L.G., P.E. J. SEHULSTER
 SUBMITTED BY F&R, Inc. S. DAVIS
 DATE 12/07 C. BALDWIN
D. RACEY
S. DEEGAN
D. JENKS

For Letting

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

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

DRAWN BY: D. RACEY



Elizabeth C. Howey
 SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

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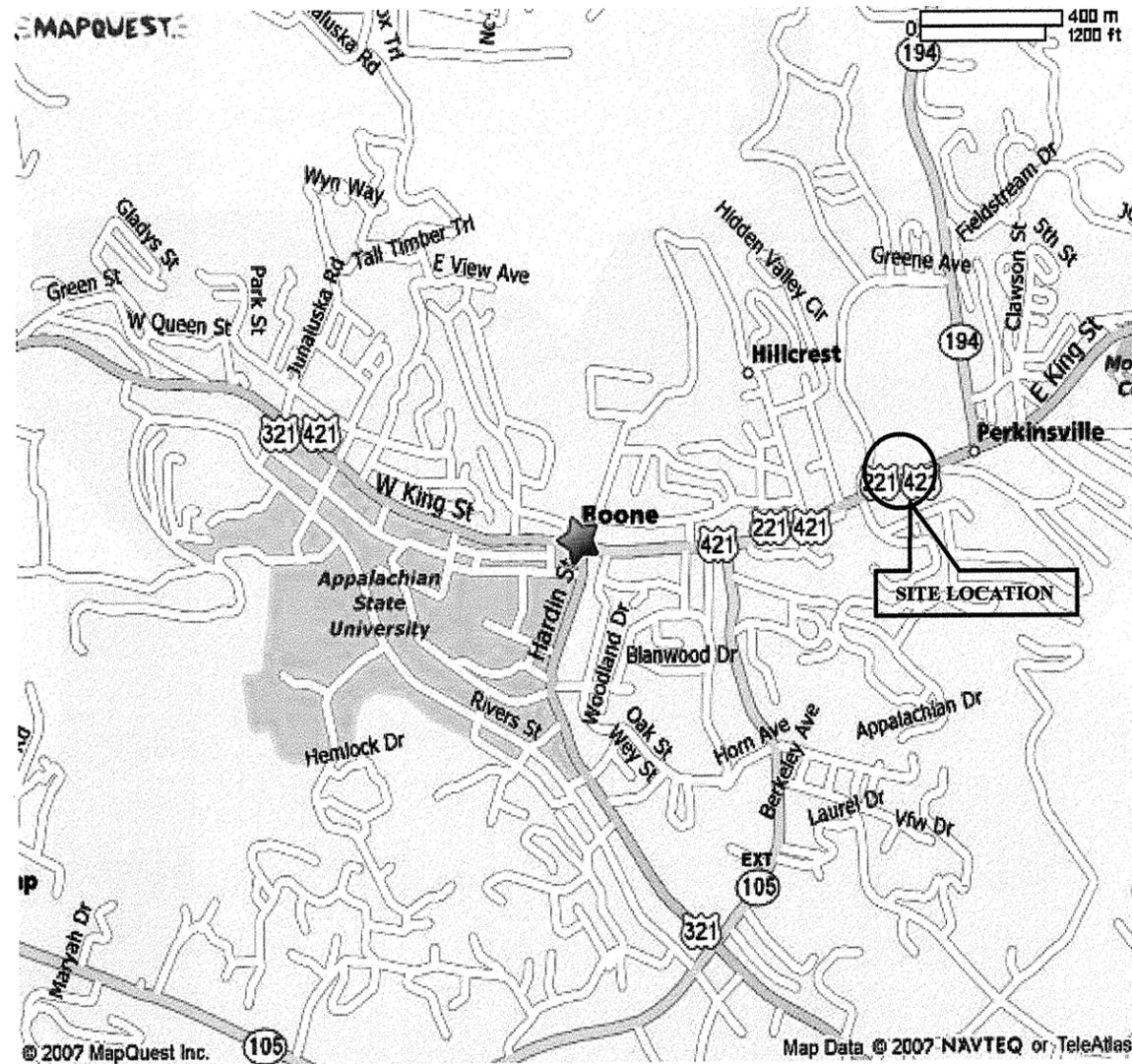
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																			
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASHTO T298, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE ASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>		<p>WELL GRADED- INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM- INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.)- SOILS WHICH HAVE BEEN TRANSPORTED BY WATER.</p> <p>AQUIFER- A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS- APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>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.</p> <p>ARTESIAN- GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.)- SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM- ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (RECJ)- TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE- A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP- THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH)- THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT- A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE- A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT- ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (F.P.)- LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FMJ)- A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT- FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE- A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS- A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOTJ)- IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER- WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL SOIL- SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (R.Q.D.)- A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.)- RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL- AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE- POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)- NUMBER OF BLOWS IN OR B.P.F. OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SRECJ)- TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.)- A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (T.S.)- SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																			
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="3">GRANULAR MATERIALS (<math>75\%</math> PASSING #200)</th> <th colspan="3">SILT-CLAY MATERIALS (>85% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1</td> <td>A-3</td> <td>A-2</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-4, A-5</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> </tr> <tr> <td>% PASSING</td> <td>50 MX</td> <td>30 MX</td> <td>10 MX</td> <td>10 MX</td> <td>10 MX</td> <td>10 MX</td> <td>10 MX</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX</td> <td>N.P.</td> <td>40 MX</td> <td>40 MX</td> <td>40 MX</td> <td>40 MX</td> <td>40 MX</td> <td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. 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ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p>		<p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p>WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V. SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i></p> <p>SEVERE (SEV.) ALL ROCKS EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF.</i></p> <p>VERY SEVERE (V. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF.</i></p> <p>COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>	
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FIGURE 1

FIGURE 2

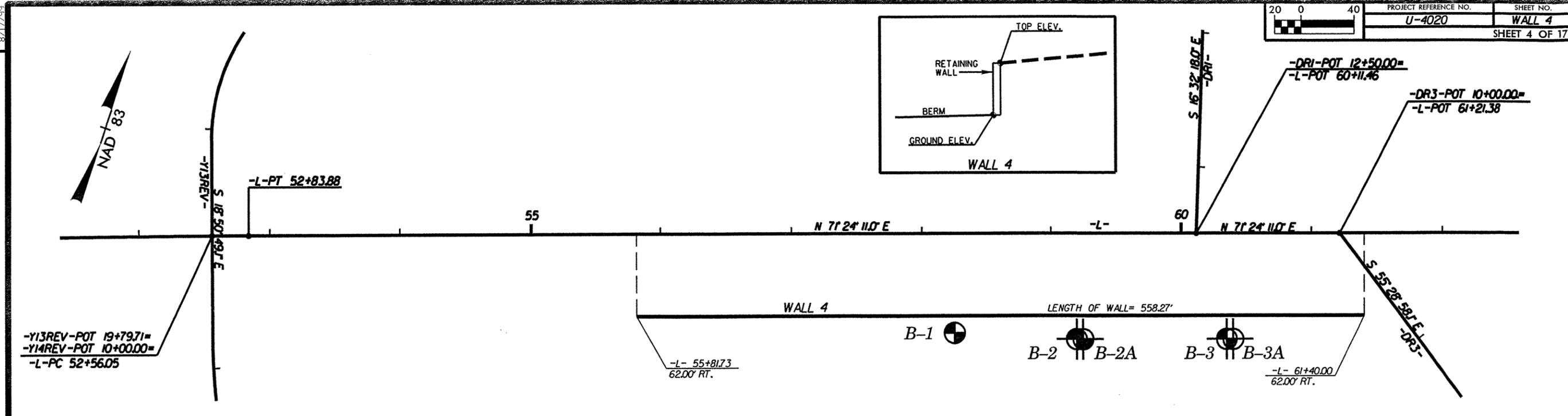


NORTH



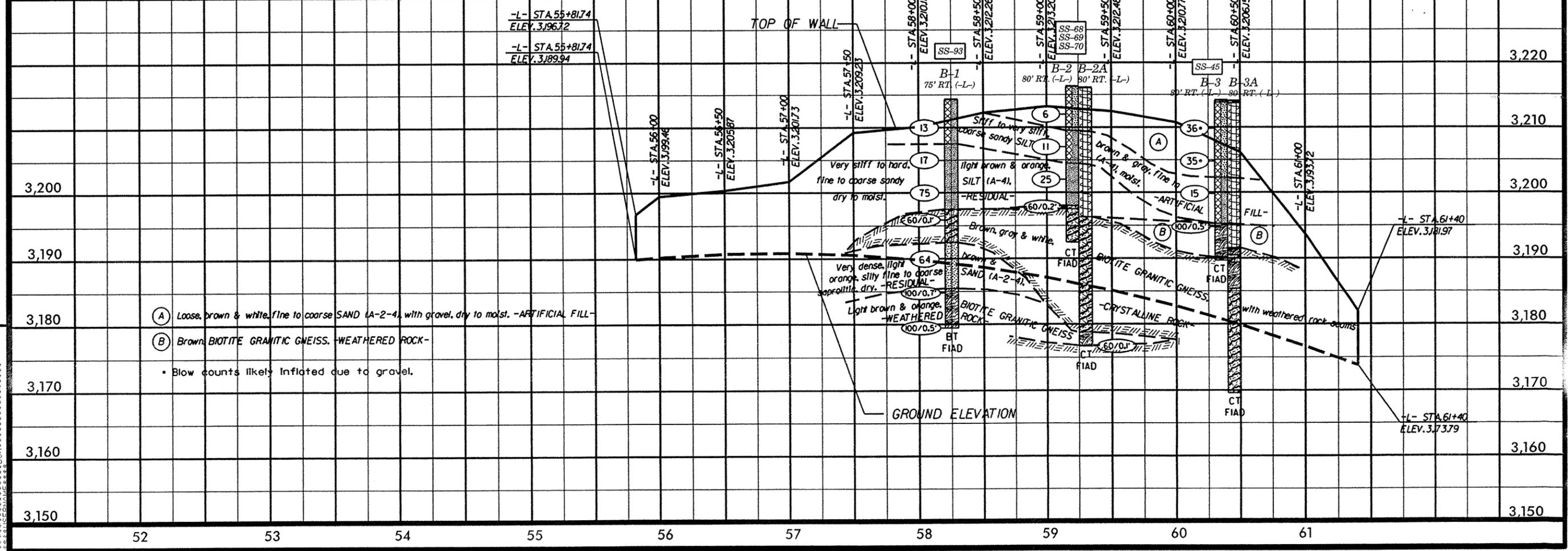
SITE VICINITY MAP

AERIAL PHOTO OF SITE



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-93	75' RT.	58+25	8.5'-10.0'	A-4(0)	26	NP	22.3	41.2	21.4	15.1	99.2	89.0	41.8	12.8	-
SS-68	80' RT.	59+20	3.5'-5.0'	A-2-4(0)	26	NP	30.1	34.3	24.6	11.0	82.8	66.8	32.4	-	-
SS-69	80' RT.	59+20	8.5'-10.0'	A-4(0)	26	5	16.9	36.6	22.2	24.3	99.6	92.1	51.7	16.4	-
SS-70	80' RT.	59+20	13.5'-15.0'	A-4(0)	28	NP	16.4	45.7	29.5	8.4	99.9	93.3	45.3	9.3	-
SS-45	80' RT.	60+35	13.5'-15.0'	A-4(0)	22	NP	25.4	35.5	14.0	25.1	87.8	72.7	41.8	19.0	-





NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-1 Wall 4	STATION 58+25	OFFSET 75ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,214.6 ft	TOTAL DEPTH 35.0 ft	NORTHING 908,770	EASTING 1,214,846
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA	HAMMER TYPE Automatic	
START DATE 07/02/07	COMP. DATE 07/02/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 17.0 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3215														
3,214.6													GROUND SURFACE	0.0
3,214.4													ASPHALT	0.2
3,211.1	3.5	10	6	7									ARTIFICIAL FILL Brown, fine sandy SILT (A-4).	
3,207.6	7.0												RESIDUAL	
3,206.1	8.5	6	5	12									Light brown with orange, fine to coarse sandy SILT (A-4(0)), with little clay.	
3,201.1	13.5	10	18	57										
3,197.6	17.0												CRYSTALLINE ROCK	
3,196.1	18.5	60/0.1'											Light brown, BIOTITE GRANITIC GNEISS.	
3,192.6	22.0													
3,191.1	23.5	28	34	30									Light brown & orange, silty fine to coarse SAND (A-2-4), saprolitic.	
3,186.1	28.5	30	56	44/0.2'										
3,185.6	29.0												WEATHERED ROCK	
3,181.1	33.5	46	51	49/0.5'									Light brown & orange, BIOTITE GRANITIC GNEISS.	
3,179.6	35.0													
													Boring Terminated at Elevation 3,179.6 ft in WEATHERED ROCK (BIOTITE GRANITIC GNEISS)	

NOTES:
1) Driller indicates harder drilling at a depth of 17.0'.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT_GDT_12/11/07



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-2 Wall 4	STATION 59+20	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,216.5 ft	TOTAL DEPTH 24.0 ft	NORTHING 908,796	EASTING 1,214,938
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/26/07	COMP. DATE 06/27/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 19.0 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
3220													
												GROUND SURFACE	6.2
												ASPHALT	
												ARTIFICIAL FILL	
3,213.0	3.5											Light brown, fine to coarse SAND (A-2-4(0)), with some silt, little clay.	
3,208.0	8.5	3	4	2								ARTIFICIAL FILL	7.0
												Gray, fine to coarse sandy SILT (A-4(0)), with some clay.	
3,203.0	13.5	5	5	6								RESIDUAL	12.0
												Light brown, fine to coarse sandy SILT (A-4(0)), with trace clay.	
3,198.0	18.5	10	10	15								WEATHERED ROCK	18.5
												Light brown, BIOTITE GRANITIC GNEISS.	19.0
												CRYSTALLINE ROCK	
												Brown, gray & white, BIOTITE GRANITIC GNEISS.	24.0
												Boring Terminated at Elevation 3,192.5 ft in CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	

NOTES:
1) Auger refusal at a depth of 19.0'.
2) Began coring at a depth of 19.0'.
3) 0 hr. water not measured due to water introduced for coring.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT.GDT 12/10/07



NCDOT GEOTECHNICAL ENGINEERING UNIT
CORE BORING REPORT

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-2 Wall 4	STATION 59+20	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,216.5 ft	TOTAL DEPTH 24.0 ft	NORTHING 908,796	EASTING 1,214,938
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/26/07	COMP. DATE 06/27/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 19.0 ft

CORE SIZE NQ-3	TOTAL RUN 5.0 ft	DRILLER J. Schulster
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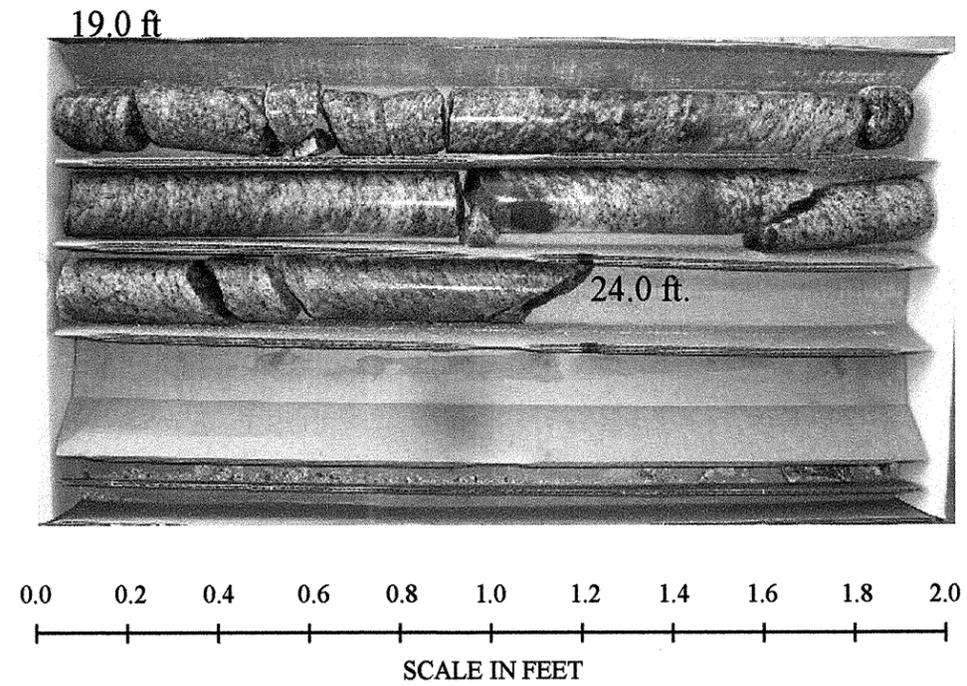
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3197.5											
3,197.5	19.0	5.0	4:40/1.0 4:29/1.0 4:37/1.0 4:45/1.0 4:52/1.0	(5.0)	(3.8)	RS-2	(5.0)	(3.8)		Begin Coring @ 19.0 ft	19.0
										CRYSTALLINE ROCK	
										Brown, gray & white, slightly weathered, hard BIOTITE GRANITIC GNEISS, joints @ 0°, 20°, 30°, 60°.	
										RS-2 20.2'-20.5' qu=22,866 psi	
3,192.5	24.0									Boring Terminated at Elevation 3,192.5 ft in CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	24.0

NOTES:
1) Auger refusal at a depth of 19.0'.
2) Began coring at a depth of 19.0'.
3) 0 hr. water not measured due to water introduced for coring.

NCDOT CORE SINGLE J66-039.GPJ NC_DOT.GDT 12/11/07



CORE PHOTOGRAPHS: Station 59+20, 80 feet Right



PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-2A Wall 4	STATION 59+25	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,216.3 ft	TOTAL DEPTH 39.6 ft	NORTHING 908,797	EASTING 1,214,943
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 07/03/07	COMP. DATE 07/03/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.0 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
3220													
												GROUND SURFACE	3,216.3
												ASPHALT	3,216.3
												Augered through soil.	3,216.3
													3,196.3
												CRYSTALLINE ROCK	20.0
												Gray & white with brown, BIOTITE GRANITIC GNEISS.	20.0
													3,178.8
												WEATHERED ROCK	37.5
												Brown, severely weathered, soft BIOTITE GRANITIC GNEISS.	39.5
												CRYSTALLINE ROCK	39.5
												Brown, BIOTITE GRANITIC GNEISS.	39.5
												Boring Terminated at Elevation 3,176.7 ft in CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	39.5

NOTES:
1) Auger refusal at a depth of 20.0'.
2) Began coring at a depth of 20.0'.
3) 0 hr. water not measured due to water introduced for coring.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT_GDT 12/11/07

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-2A Wall 4	STATION 59+25	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,216.3 ft	TOTAL DEPTH 39.6 ft	NORTHING 908,797	EASTING 1,214,943
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 07/03/07	COMP. DATE 07/03/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 20.0 ft

ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3196.3											
3,196.3	20.0	5.0	4:16/1.0 4:37/1.0 4:40/1.0 4:47/1.0 4:39/1.0	(5.0) 100%	(3.3) 66%	RS-3	(17.5) 100%	(14.1) 81%		Begin Coring @ 20.0 ft	20.0
3,191.3	25.0	5.0	4:37/1.0 4:40/1.0 4:46/1.0 4:50/1.0 4:52/1.0	(5.0) 100%	(4.0) 80%					Gray & white with brown, slightly to very slightly weathered, hard to very hard BIOTITE GRANITIC GNEISS, joints @ 10°, 30°, 40°, 70°. RS-3 20.7'-21.0' qu=15,500 psi	
3,186.3	30.0	4.5	2:15/0.5 4:47/1.0 4:52/1.0 4:39/1.0 4:45/1.0	(4.5) 100%	(4.0) 89%						
3,181.8	34.5	5.0	4:30/1.0 4:27/1.0 4:31/1.0 1:30/1.0 1:15/1.0	(3.4) 68%	(2.8) 56%						
3,176.8	39.5						(0.4) 20%	N/A			

NOTES:
1) Auger refusal at a depth of 20.0'.
2) Began coring at a depth of 20.0'.
3) 0 hr. water not measured due to water introduced for coring.

NCDOT CORE SINGLE J66-039.GPJ NC_DOT_GDT 12/11/07



CORE PHOTOGRAPHS: Station 59+25, 80 feet Right



29.2 ft

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET



29.2 ft

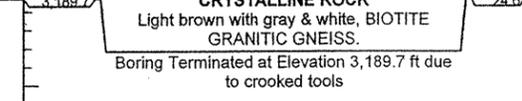
39.5 ft

0.0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0

SCALE IN FEET

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-3 Wall 4	STATION 60+35	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,214.3 ft	TOTAL DEPTH 24.6 ft	NORTHING 908,832	EASTING 1,215,047
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/21/07	COMP. DATE 06/21/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 24.1 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3215													GROUND SURFACE	0.0
													ASPHALT	0.5
													ABC STONE	
3,210.8	3.5												ARTIFICIAL FILL	
													Brown & white, silty fine to coarse SAND (A-2-4), with gravel.	
3,205.8	8.5	8	18	18										
3,200.8	13.5	12	12	23										
3,195.8	18.5	14	8	7										
		28	100/0.5'											



NOTES:
 1) Auger refusal at a depth of 22.6'.
 2) Began coring at a depth of 22.6'.
 3) Abandoned boring at a depth of 24.6' due to crooked tools.
 4) 0 hr. water not measured due to water introduced for coring.
 * Blow counts at 3.5' & 8.5' likely inflated due to gravel.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT.GDT 12/10/07

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 4 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-3 Wall 4	STATION 60+35	OFFSET 80ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,214.3 ft	TOTAL DEPTH 24.6 ft	NORTHING 908,832	EASTING 1,215,047
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/21/07	COMP. DATE 06/21/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 24.1 ft

CORE SIZE NQ-3	TOTAL RUN 2.0 ft	DRILLER J. Sehuister
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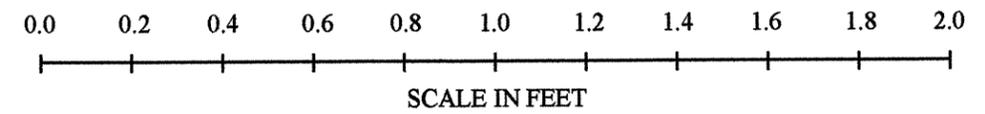
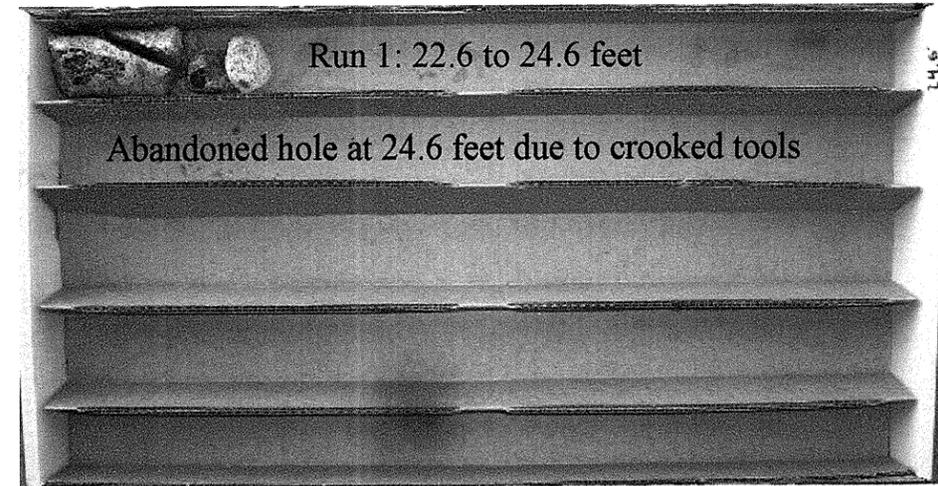
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3191.7											
3,191.7	22.6	2.0	2:27/1.0	(0.5)	(0.0)		(0.5)	(0.0)		Begin Coring @ 22.6 ft	
3,189.7	24.6		3:32/1.0	25%	0%		100%	0%		WEATHERED ROCK Light brown, severely weathered, soft BIOTITE GRANITIC GNEISS. STRATA REC=0%, RQD=N/A (continued)	24.1
										CRYSTALLINE ROCK Light brown with gray & white, moderately weathered, moderately hard BIOTITE GRANITIC GNEISS.	24.6
										Boring Terminated at Elevation 3,189.7 ft due to crooked tools	

NOTES:
 1) Auger refusal at a depth of 22.6'.
 2) Began coring at a depth of 22.6'.
 3) Abandoned boring at a depth of 24.6' due to crooked tools.
 4) 0 hr. water not measured due to water introduced for coring.
 * Blow counts at 3.5' & 8.5' likely inflated due to gravel.

NCDOT CORE SINGLE J66-039.GPJ NC_DOT.GDT 12/11/07



CORE PHOTOGRAPHS: Station 60+35, 80 feet Right



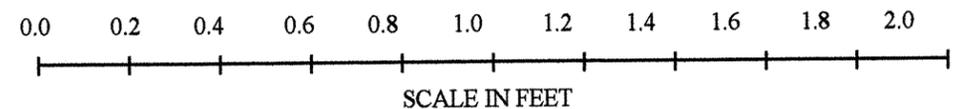


CORE PHOTOGRAPHS: Station 60+40, 80 feet Right

22.6 ft.



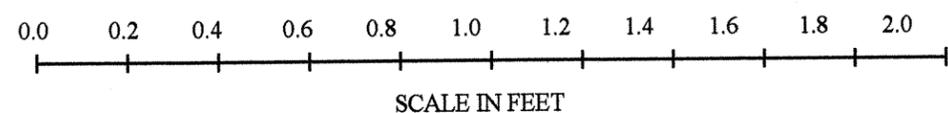
32.6 ft.



32.6 ft



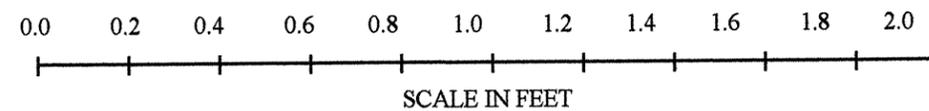
42.0 ft.



42.0 ft.



44.6 ft.



North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: U-4020
 DESCRIPTION: US 421 in Boone Wall 4

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 35015.1.1
 DATE SAMPLED: 6/07
 SAMPLED FROM: Wall 4 (-L- Stations)
 SUBMITTED BY: E.C. Howey, L.G., P.E.

COUNTY: Watauga
 RECEIVED: 7/07 and 10/07
 REPORTED: 8/07 and 11/07
 BY: D. Jenks

TEST RESULTS

PROJ. SAMPLE NO.	SS-93	SS-68	SS-69	SS-70	SS-45												
BORING NO.	Wall 4																
Retained #4 Sieve %	0.0	10.6	0.0	0.0	6.8												
Passing #10 Sieve %	99.2	82.8	99.6	99.9	87.8												
Passing #40 Sieve %	89.0	66.8	92.1	93.3	72.7												
Passing #200 Sieve %	41.8	32.4	51.7	45.3	41.8												

MINUS #10 FRACTION

SOIL MORTAR - 100%																	
Coarse Sand Ret - #60 %	22.3	30.1	16.9	16.4	25.4												
Fine Sand Ret - #270 %	41.2	34.3	36.6	45.7	35.5												
Silt 0.053 - 0.010 mm %	21.4	24.6	22.2	29.5	14.0												
Clay < 0.010 mm %	15.1	11.0	24.3	8.4	25.1												
L.L.	26	26	26	28	22												
P.L.	NP	NP	21	NP	NP												
P.I.	NP	NP	5	NP	NP												
AASHTO Classification	A-4(0)	A-2-4(0)	A-4(0)	A-4(0)	A-4(0)												
Station (-L-)	58+25	59+20	59+20	59+20	60+35												
Offset	75' RT	80' RT	80' RT	80' RT	80' RT												
Depth (ft)	8.5	3.5	8.5	13.5	13.5												
to	10.0	5.0	10.0	15.0	15.0												
Moisture Content (%)	12.8		16.4	9.3	19.0												

NP=Not plastic

E.C. Howey, L.G., P.E.
 Soils Engineer



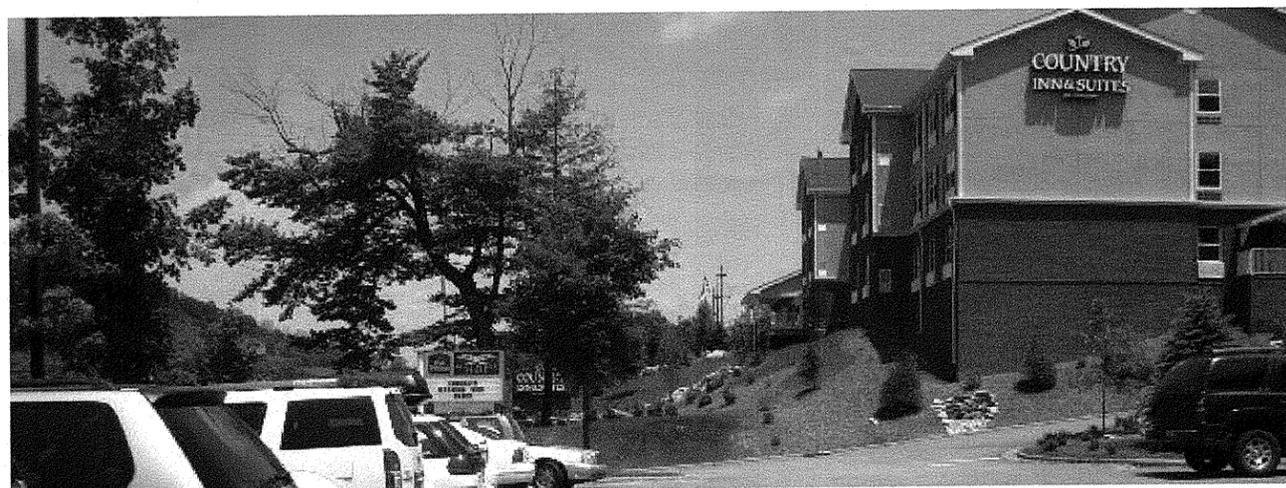
SITE PHOTOGRAPHS



Photograph No. 1: Along Wall 4, looking west



Photograph No. 3: Front Slope at beginning of Wall 4, looking south



Photograph No. 2: Beginning of Wall 4, in front of Country Inn & Suites, looking east



Photograph No. 4: Front Slope at Wall 4, looking south



SITE PHOTOGRAPHS



Photograph No. 5: Front Slope at Wall 4, looking southeast
(in front of Country Inn & Suites)



Photograph No. 7: Front Slope at Wall 4, looking southeast
(in front of Best Western)



Photograph No. 6: Front Slope at Wall 4 between Best Western (left)
and Country Inn & Suites, looking south



Photograph No. 8: Front Slope at end of Wall 4, looking south

PROJECT: 35015.1.1 ID: U-4020

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4020	1	9
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35015.1.1	NHF-421(31)	P.E.	
			CONST.

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 35015.1.1 I.D. NO. U-4020
 F.A. PROJECT NHF-421(31)
 COUNTY WATAUGA
 PROJECT DESCRIPTION US 421(KING ST.) FROM
US 321(HARDIN ST.) TO NC 194 (JEFFERSON
RD.) IN BOONE
 SITE DESCRIPTION RETAINING WALL 3
-L- STA. 52+86.89 - 55+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 BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT @ 1949 250-4088. 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 REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON 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 F&R, Inc. PERSONNEL J. GILCHRIST
 CHECKED BY E.C. HOWEY, L.G., P.E. J. SEHULSTER
 SUBMITTED BY F&R, Inc. S. DAVIS
 DATE 12/07 C. BALDWIN
D. RACEY
S. DEEGAN
D. JENKS

For Letting

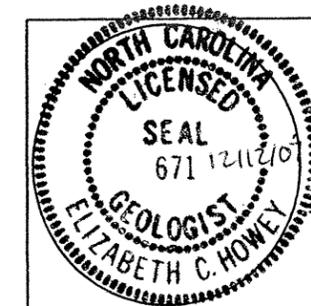
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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.

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE VICINITY MAPS
4	TEST SITE PLAN/PROFILE
5-7	BORE LOGS/CORE LOGS/CORE PHOTOS
8	SOIL TEST RESULTS
9	SITE PHOTOGRAPHS

DRAWN BY: D. RACEY



Elizabeth C. Howey
SIGNATURE

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

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4020	35015.1.1	2	9

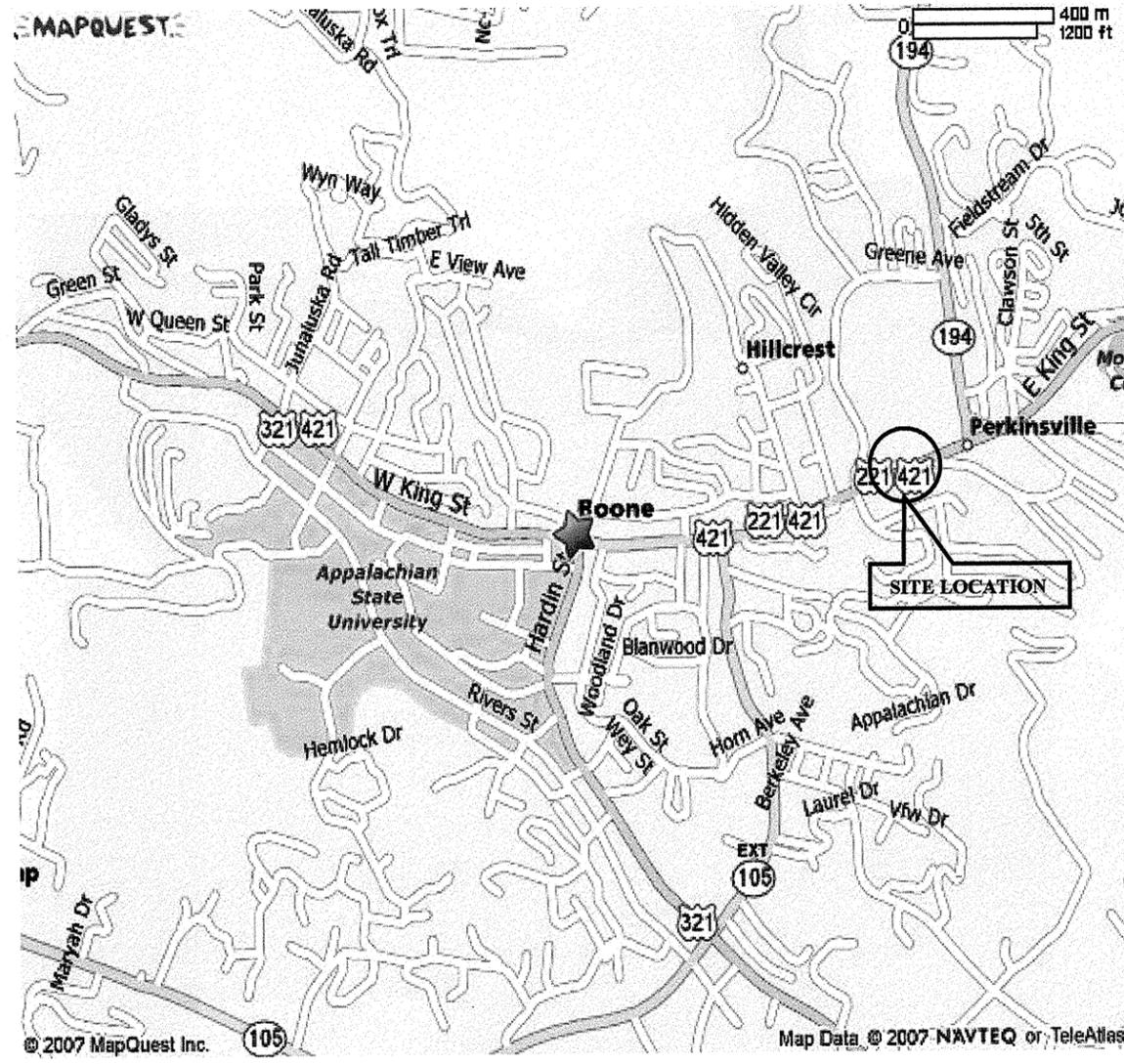
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																												
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p><i>VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>		<p>WELL GRADED: INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM: INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) POORLY GRADED: INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p align="center">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FMJ) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOTJ) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAPJ) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR B.P.F. OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SRECJ) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.SJ) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																												
<p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (<85% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (<85% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>GROUP CLASS.</th> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4-4</td> <td>A-4-5</td> <td>A-6-6</td> <td>A-7-7</td> </tr> <tr> <th>SYMBOL</th> <td></td> </tr> <tr> <th>% PASSING</th> <td>50 MX</td> <td>30 MX</td> <td>10 MX</td> </tr> <tr> <th>LIQUID LIMIT PLASTIC INDEX</th> <td>6 MX</td> <td>N.P.</td> <td>40 MX</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>STONE FRAGS. GRAVEL AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GENERAL RATING AS A SUBGRADE</th> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> </tr> </table> <p align="center">P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (<85% PASSING #200)				SILT-CLAY MATERIALS (<85% PASSING #200)				ORGANIC MATERIALS		A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4-4	A-4-5	A-6-6	A-7-7	SYMBOL											% PASSING	50 MX	30 MX	10 MX	10 MX	10 MX	10 MX	10 MX	10 MX	10 MX	10 MX	LIQUID LIMIT PLASTIC INDEX	6 MX	N.P.	40 MX	40 MX	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT	HIGHLY ORGANIC SOILS	GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE		<p align="center">MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p align="center">COMPRESSION</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p>		<p align="center">WEATHERING</p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V. SLJ) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SLJ) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MODJ) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEVJ) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEVJ) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i> VERY SEVERE (V. SEVJ) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i> COMPLETE - ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>																																
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FIGURE 1



SITE VICINITY MAP

FIGURE 2

NORTH ↑



AERIAL PHOTO OF SITE

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 3 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-1 Wall 3	STATION 53+35	OFFSET 65ft RT	ALIGNMENT -L-
COLLAR ELEV. 3,194.1 ft	TOTAL DEPTH 17.4 ft	NORTHING 908,623	EASTING 1,214,379
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/20/07	COMP. DATE 06/20/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 12.4 ft

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ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
3195												GROUND SURFACE	0.0
												ASPHALT	0.5
												ABC STONE	
	3.5	8	5	3							M	ARTIFICIAL FILL	4.5
												Brown, fine to coarse sandy SILT (A-4), with gravel.	
	8.5	6	7	6							M	RESIDUAL	7.0
												Brown, micaceous fine sandy SILT (A-4), saprolitic.	
												CRISTALLINE ROCK	12.4
												Brown, white & gray, BIOTITE GRANITIC GNEISS.	13.1
												WEATHERED ROCK	17.4
												Brown, BIOTITE GRANITIC GNEISS.	

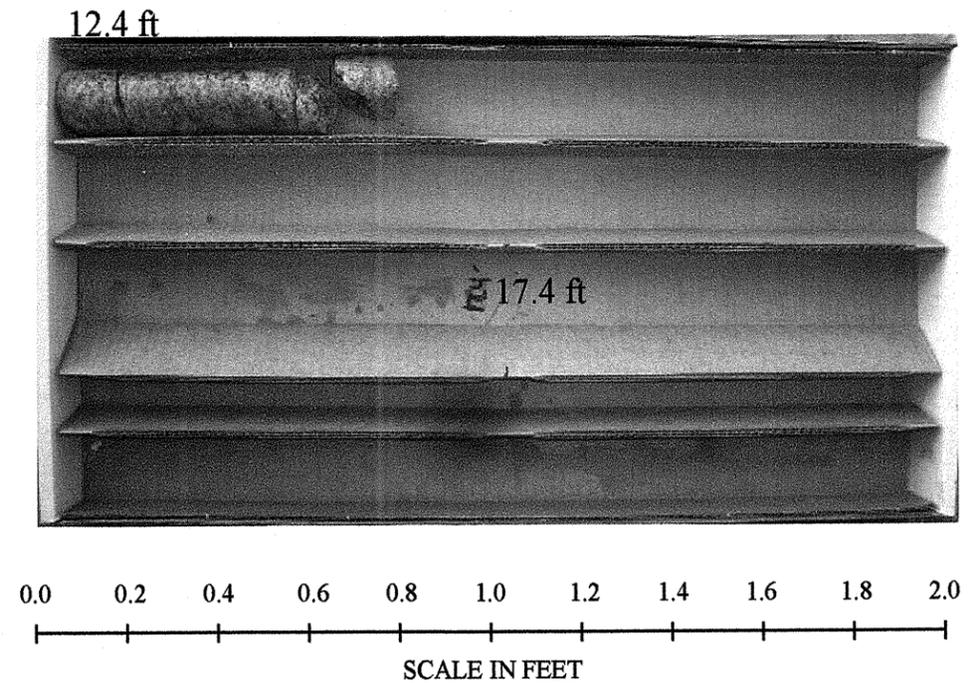
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3181.7	12.4	5.0	4:07/1.0	(0.7)	(0.4)		(0.7)	(0.4)		Begin Coring @ 12.4 ft	12.4
			1:46/1.0	14%	8%		100%	57%		CRYSTALLINE ROCK	13.1
			1:40/1.0				(0.0)	N/A		Brown, white & gray, moderately weathered, hard BIOTITE GRANITIC GNEISS.	
	17.4		1:57/1.0				0%			WEATHERED ROCK	17.4
			1:48/1.0							Brown, severely weathered, soft BIOTITE GRANITIC GNEISS.	

NOTES:
 1) Geologist indicates strata break in split spoon at a depth of 4.5'.
 2) Auger refusal at a depth of 12.4'.
 3) Began coring at a depth of 12.4'.
 4) 0 hr. water not measured due to water introduced for coring.

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CORE PHOTOGRAPHS: Station 53+35, 65 feet Right



North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: U-4020
 DESCRIPTION: US 421 in Boone Wall 3

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 35015.1.1
 DATE SAMPLED: 6/07
 SAMPLED FROM: Wall 3 (-L- Stations)
 SUBMITTED BY: E.C. Howey, L.G., P.E.

COUNTY: Watauga
 RECEIVED: 6/07
 REPORTED: 7/07
 BY: D. Jenks

TEST RESULTS

PROJ. SAMPLE NO.	SS-38	SS-34	SS-39	SS-41													
BORING NO.	Wall 3	Wall 3	Wall 3	Wall 3													
Retained #4 Sieve %	1.7	1.6	0.1	0.6													
Passing #10 Sieve %	96.9	96.5	98.5	94.2													
Passing #40 Sieve %	85.5	84.8	76.7	68.5													
Passing #200 Sieve %	33.5	35.0	31.6	28.4													

MINUS #10 FRACTION

SOIL MORTAR - 100%																	
Coarse Sand Ret - #60 %	22.9	25.5	34.5	39.2													
Fine Sand Ret - #270 %	52.4	46.2	41.0	38.2													
Silt 0.053 - 0.010 mm %	17.3	17.2	13.8	14.8													
Clay < 0.010 mm %	7.4	11.1	10.7	7.8													
L.L.	30	25	24	21													
P.L.	NP	NP	NP	NP													
P.I.	NP	NP	NP	NP													
AASHTO Classification	A-2-4(0)	A-2-4(0)	A-2-4(0)	A-2-4(0)													
Station	53+35	54+00	54+80	54+80													
Offset	65' RT	40' RT	40' RT	40' RT													
Depth (ft)	8.5	8.5	3.5	13.5													
to	10.0	10.0	5.0	15.0													
Moisture Content (%)																	

NP=Not plastic

E.C. Howey, L.G., P.E.
 Soils Engineer



SITE PHOTOGRAPHS



Photograph No. 1: Along Wall 3, looking east



Photograph No. 3: Front of Wall 3, looking southwest



Photograph No. 2: Front Slope at Wall 3-, looking south

PROJECT: 35015.1.1 ID: U-4020

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4020	1	8
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35015.1.1	NHF-421(31)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

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SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE VICINITY MAPS
4	TEST SITE PLAN/PROFILE
5-6	BORE LOGS
7	SOIL TEST RESULTS
8	SITE PHOTOGRAPHS

STRUCTURE SUBSURFACE INVESTIGATION

STATE PROJECT 35015.1.1 I.D. NO. U-4020
 F.A. PROJECT NHF-421(31)
 COUNTY WATAUGA
 PROJECT DESCRIPTION US 421(KING ST.) FROM
US 321(HARDIN ST.) TO NC 194 (JEFFERSON
RD.) IN BOONE
 SITE DESCRIPTION RETAINING WALL 2
-L- STA. 60+40 - 63+52.12

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 BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT @ (919) 250-4088. 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 REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON 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.

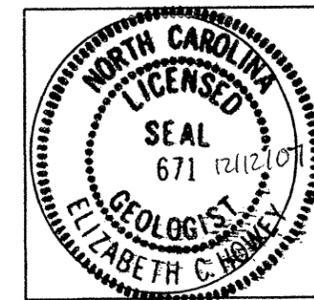
INVESTIGATED BY F&R, Inc. PERSONNEL J. GILCHRIST
 CHECKED BY E.C. HOWEY, I.C., P.E. J. SEHULSTER
 SUBMITTED BY F&R, Inc. S. DAVIS
 DATE 12/07 C. BALDWIN
D. RACEY
S. DEEGAN
D. JENKS

For Letting

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

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

DRAWN BY: D. RACEY



Elizabeth C. Howey
SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

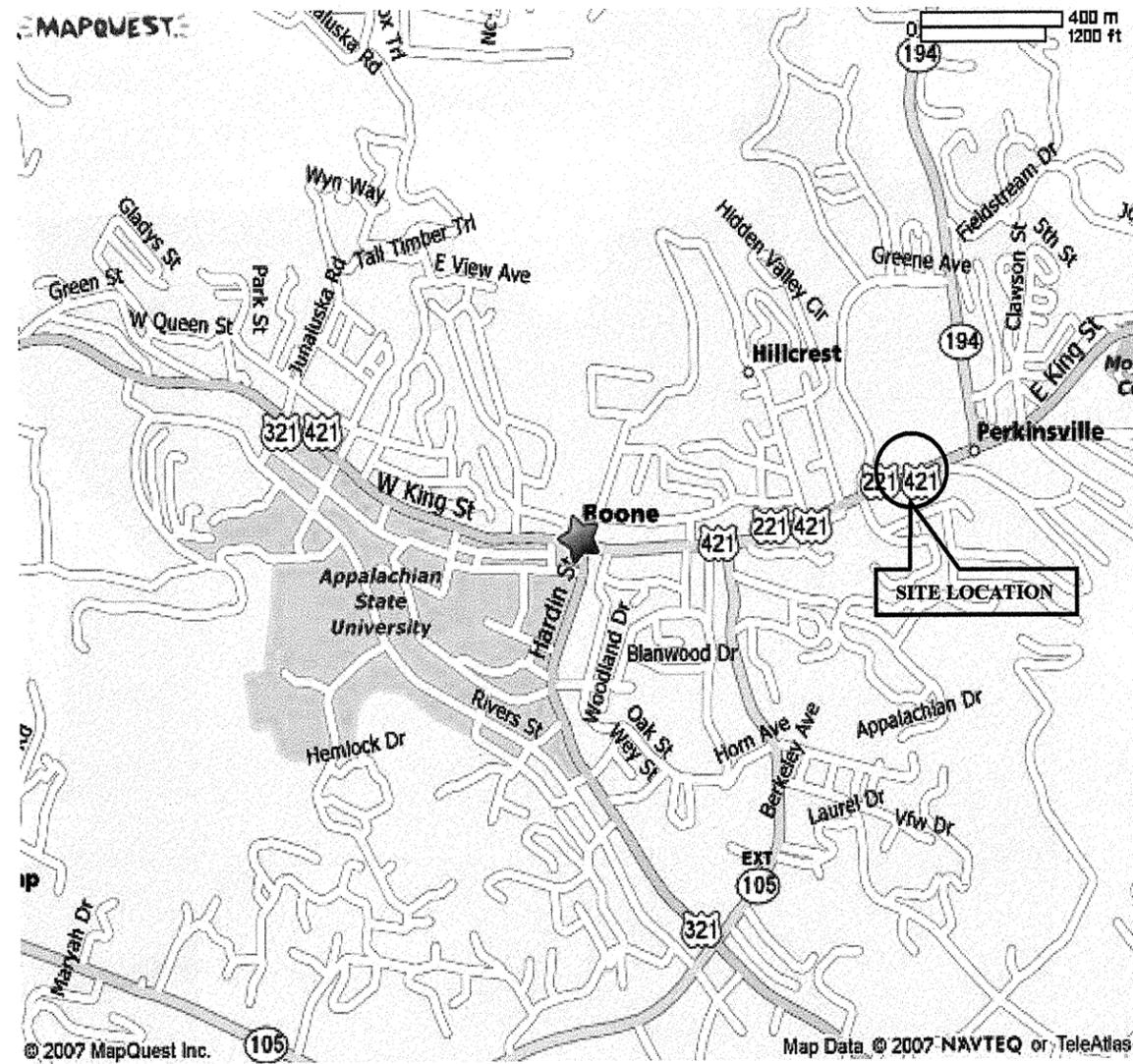
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
U-4020	35015.1.1	2	8

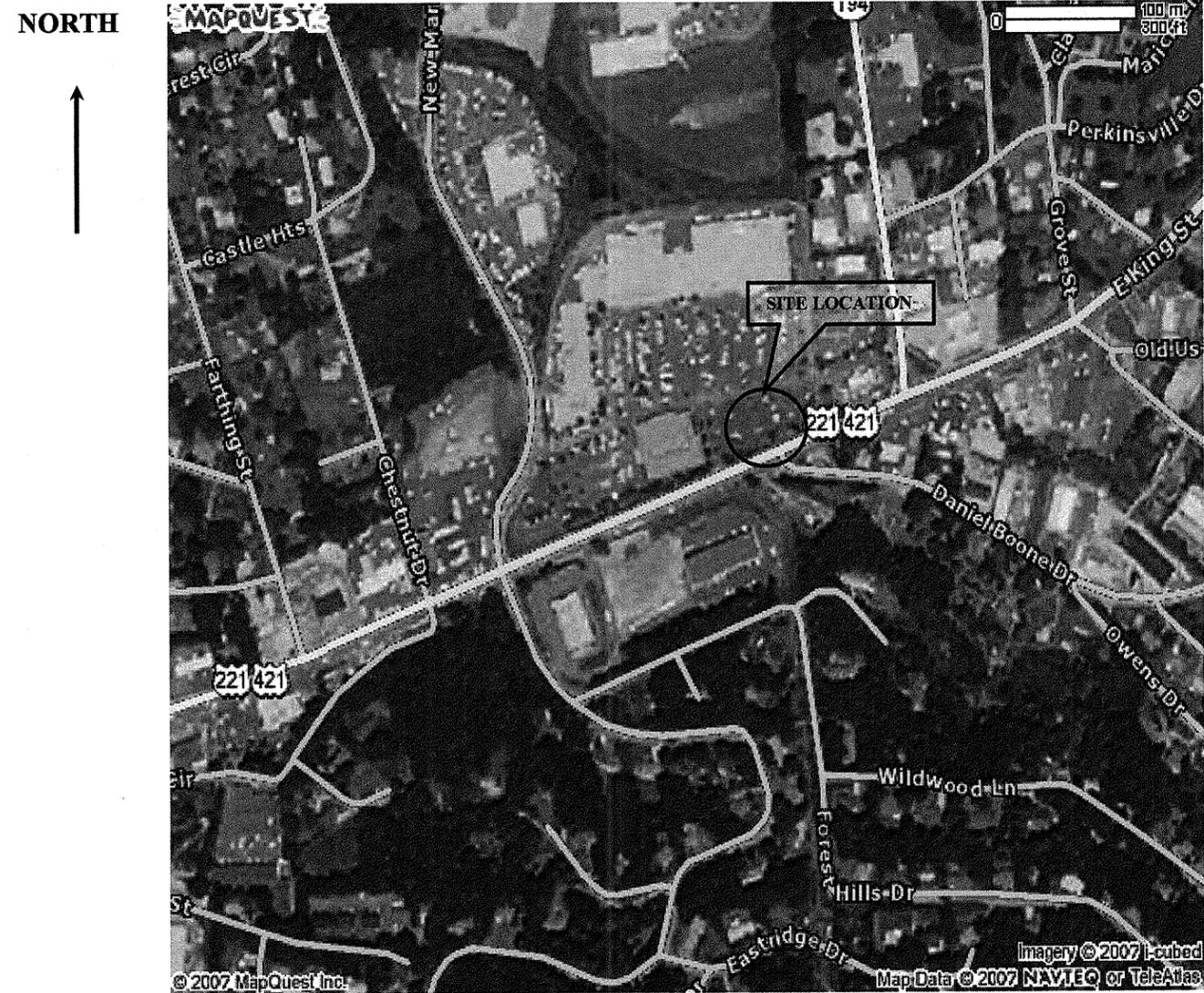
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																							
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>		<p>WELL GRADED: INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM: INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED: INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>ANGULARITY OF GRAINS THE ANGULARITY OR ROUNNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>		<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>		<p>ALLUVIUM (ALLUV.) - SOILS WHICH HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN EMPLOYED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS ON OR B.P.F. OF A 148 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS LESS THAN 0.1 FOOT PENETRATION WITH 60 BLOWS. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (S.R.Q.D.) - A MEASURE OF ROCK QUALITY DESCRIBED BY: TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																							
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th colspan="3">GRANULAR MATERIALS (>95% PASSING #200)</th> <th colspan="3">SILT-CLAY MATERIALS (>95% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td></td> </tr> <tr> <th>% PASSING</th> <td>100</td> </tr> <tr> <th>LIQUID LIMIT</th> <td>≤ 5</td> <td>≤ 10</td> <td>10-15</td> <td>15-20</td> <td>20-25</td> <td>25-30</td> <td>30-40</td> <td>≤ 5</td> <td>≤ 10</td> <td>10-15</td> </tr> <tr> <th>PLASTIC INDEX</th> <td>0</td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td>GRAVEL AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY GRAVEL</td> <td>SILTY SAND</td> <td>CLAYEY SAND</td> <td>CLAYEY SILT</td> <td>CLAYEY SILT</td> <td>CLAYEY SILT</td> <td>CLAYEY SILT</td> </tr> <tr> <th>GENERATING AS A SUBGRADE</th> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> </tr> </table> <p>P.I. OF A-7-5 ≤ L.L. - 30 : P.I. OF A-7-6 > L.L. - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (>95% PASSING #200)			SILT-CLAY MATERIALS (>95% PASSING #200)			ORGANIC MATERIALS			GROUP CLASS.	A-1	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL											% PASSING	100	100	100	100	100	100	100	100	100	100	LIQUID LIMIT	≤ 5	≤ 10	10-15	15-20	20-25	25-30	30-40	≤ 5	≤ 10	10-15	PLASTIC INDEX	0	0	0	0	0	0	0	0	0	0	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	GRAVEL AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY GRAVEL	SILTY SAND	CLAYEY SAND	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT	GENERATING AS A SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE		<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table>		ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>		<p>WEATHERING</p> <p>FRESH</p> <p>VERY SLIGHT (V. SL.)</p> <p>SLIGHT (SL.)</p> <p>MODERATE (MOD.)</p> <p>MODERATELY SEVERE (MOD. SEV.)</p> <p>SEVERE (SEV.)</p> <p>VERY SEVERE (V. SEV.)</p> <p>COMPLETE</p>	
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FIGURE 1

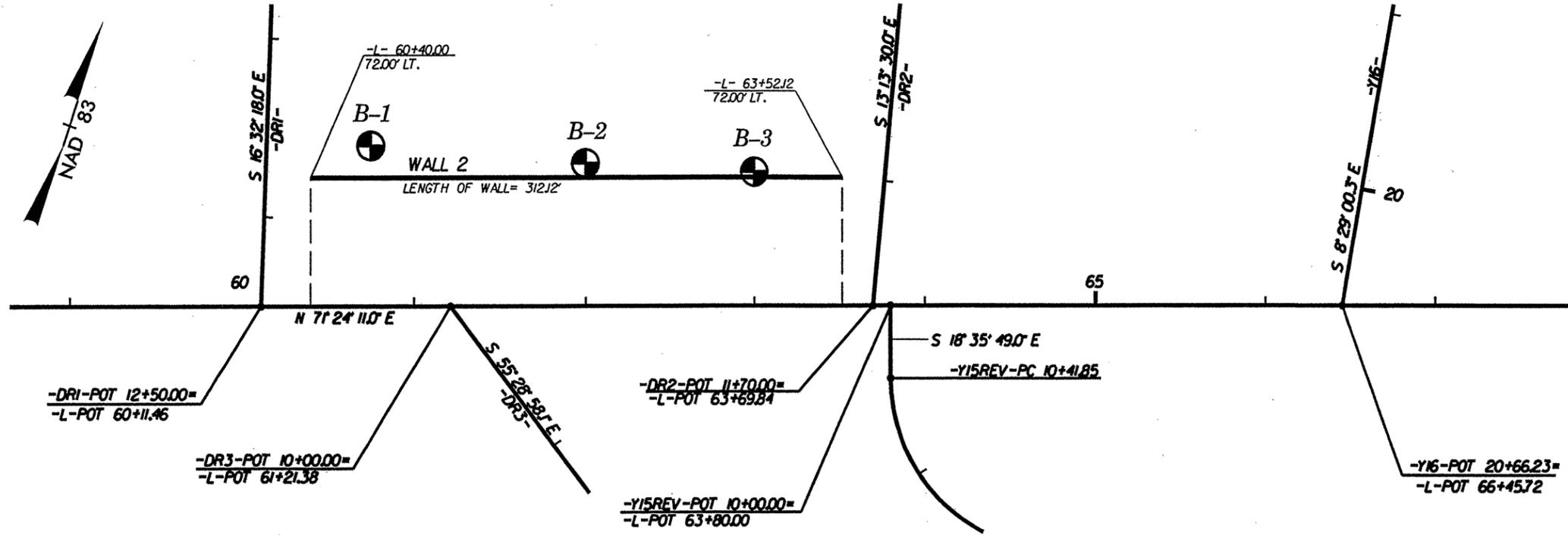


SITE VICINITY MAP

FIGURE 2

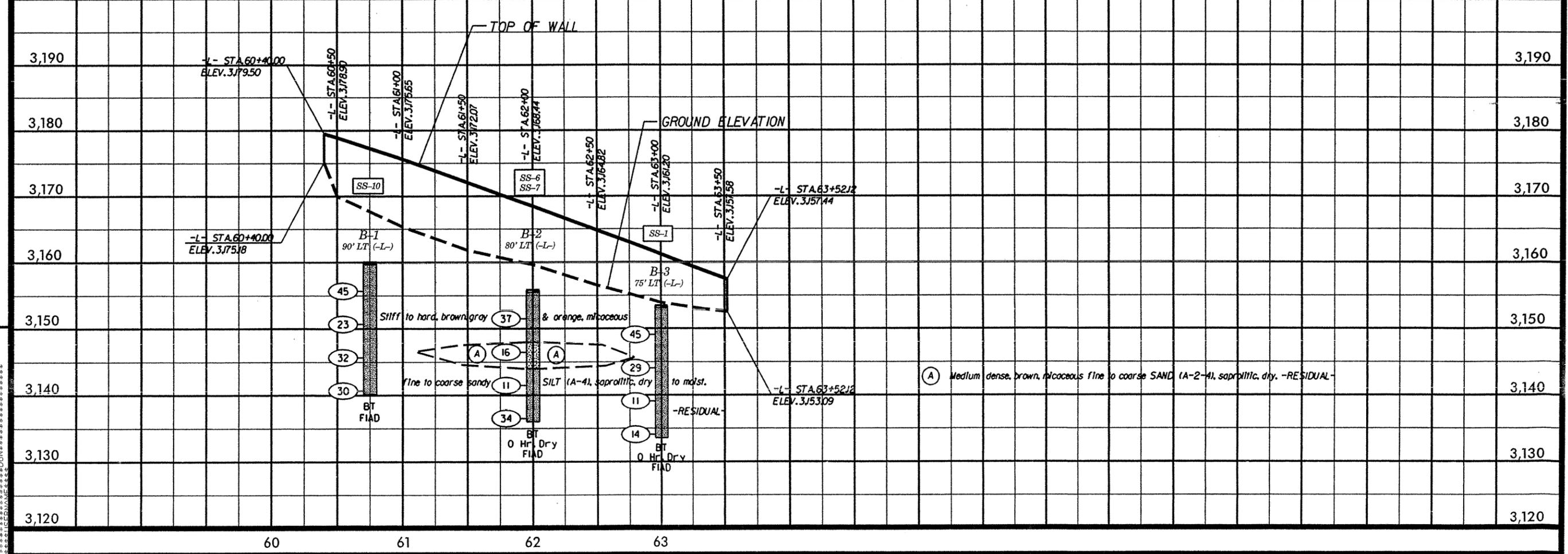
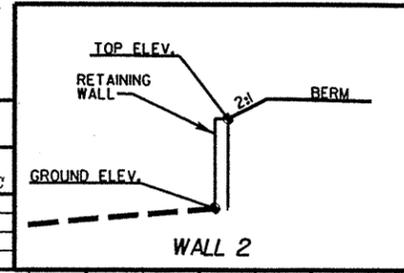


AERIAL PHOTO OF SITE



SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-10	90' LT.	60+75	8.5'-10.0'	A-4(0)	36	0	4.9	33.0	51.2	10.9	100.0	97.2	77.4	20.9	-
SS-6	80' LT.	62+00	8.5'-10.0'	A-2-4(0)	24	NP	33.0	41.3	18.5	7.2	90.2	71.3	30.5	-	-
SS-7	80' LT.	62+00	13.5'-15.0'	A-4(0)	40	NP	9.1	46.0	33.4	11.5	98.2	93.8	58.4	33.8	-
SS-1	75' LT.	63+00	3.5'-5.0'	A-4(0)	22	NP	27.2	46.7	19.3	6.8	99.4	82.9	36.2	8.6	-



8/17/99
 SYSTEMS
 8/17/99

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 2 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-1 Wall 2	STATION 60+75	OFFSET 90ft LT	ALIGNMENT -L-
COLLAR ELEV. 3,160.2 ft	TOTAL DEPTH 20.0 ft	NORTHING 909,008	EASTING 1,215,035
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA	HAMMER TYPE Automatic	
START DATE 06/13/07	COMP. DATE 06/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3165														
3,156.7	3.5	9	17	28									ASPHALT	0.5
3,151.7	8.5	7	9	14									ABC STONE	0.5
3,146.7	13.5	16	21	11									RESIDUAL	
3,141.7	18.5	7	10	20									Brown, gray & orange, micaceous fine to coarse sandy SILT (A-4(0)), with little clay, saprolitic.	

Boring Terminated at Elevation 3,140.2 ft in RESIDUAL SOIL (SILT)

PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 2 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-2 Wall 2	STATION 62+00	OFFSET 80ft LT	ALIGNMENT -L-
COLLAR ELEV. 3,156.0 ft	TOTAL DEPTH 20.0 ft	NORTHING 909,037	EASTING 1,215,152
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA	HAMMER TYPE Automatic	
START DATE 06/13/07	COMP. DATE 06/13/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100					
3160														
3,152.5	3.5	17	18	19									ASPHALT	0.5
3,147.5	8.5	8	9	7									ABC STONE	0.5
3,142.5	13.5	4	4	7									RESIDUAL	
3,137.5	18.5	6	12	22									Brown, micaceous fine to coarse sandy SILT (A-4(0)), with little silt, trace clay, saprolitic.	

Boring Terminated at Elevation 3,136.0 ft in RESIDUAL SOIL (SILT)

North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: U-4020
 DESCRIPTION: US 421 in Boone Wall 2

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 35015.1.1
 DATE SAMPLED: 6/07
 SAMPLED FROM: Wall 2 (-L- Stations)
 SUBMITTED BY: E.C. Howey, L.G., P.E.

COUNTY: Watauga
 RECEIVED: 6/07
 REPORTED: 7/07
 BY: D. Jenks

TEST RESULTS

PROJ. SAMPLE NO.	SS-10	SS-6	SS-7	SS-1													
BORING NO.	Wall 2	Wall 2	Wall 2	Wall 2													
Retained #4 Sieve %	0.0	3.3	0.8	0.0													
Passing #10 Sieve %	100.0	90.2	98.2	99.4													
Passing #40 Sieve %	97.2	71.3	93.8	82.9													
Passing #200 Sieve %	77.4	30.5	58.4	36.2													

MINUS #10 FRACTION

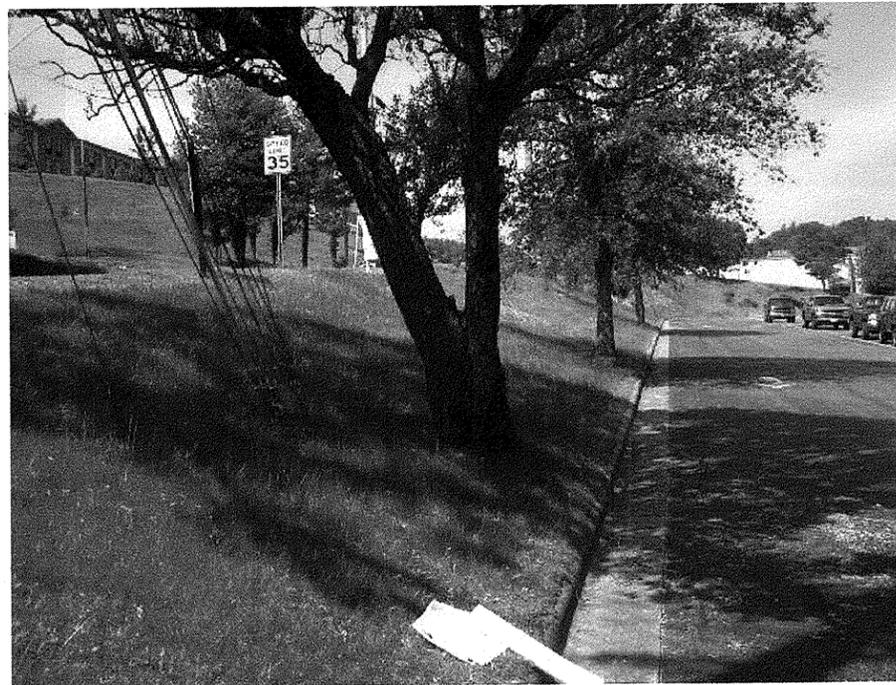
SOIL MORTAR - 100%																	
Coarse Sand Ret - #60 %	4.9	33.0	9.1	27.2													
Fine Sand Ret - #270 %	33.0	41.3	46.0	46.7													
Silt 0.053 - 0.010 mm %	51.2	18.5	33.4	19.3													
Clay < 0.010 mm %	10.9	7.2	11.5	6.8													
L.L.	36	24	40	22													
P.L.	36	NP	NP	NP													
P.I.	0	NP	NP	NP													
AASHTO Classification	A-4(0)	A-2-4(0)	A-4(0)	A-4(0)													
Station	60+75	62+00	62+00	63+00													
Offset	90' LT	80' LT	80' LT	75' LT													
Depth (ft)	8.5	8.5	13.5	3.5													
to	10.0	10.0	15.0	5.0													
Moisture Content (%)	20.9		33.8	8.6													

NP=Not plastic

E.C. Howey, L.G., P.E.
 Soils Engineer



SITE PHOTOGRAPHS



Photograph No. 1: Along Wall 2, looking west



Photograph No. 3: Beginning of Wall 2, looking west at -DR1-



Photograph No. 2: End of Wall 2 at -DR2-, looking east

PROJECT: 35015.1.1 ID: U-4020

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-4020	1	15
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
35015.1.1	NHF-421(31)	P.E.	
		CONST.	

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

CONTENTS

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE VICINITY MAPS
4	TEST SITE PLAN/PROFILE
5-11	BORE LOGS/CORE LOGS/CORE PHOTOS
12	SOIL TEST RESULTS
13	ROCK CORE SUMMARY SHEET
14-15	SITE PHOTOGRAPHS

STRUCTURE

SUBSURFACE INVESTIGATION

STATE PROJECT 35015.1.1 I.D. NO. U-4020
 F.A. PROJECT NHF-421(31)
 COUNTY WATAUGA
 PROJECT DESCRIPTION US 421(KING ST.) FROM
US 321(HARDIN ST.) TO NC 194 (JEFFERSON
RD.) IN BOONE
 SITE DESCRIPTION RETAINING WALL 1
-L- STA. 53+40 - 60+12.13

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 BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT @ (919) 250-4068. 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 REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (ON-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.

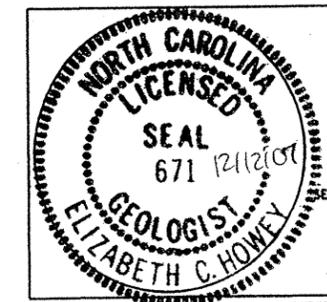
THE BODER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BODER 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 INFORMATION.

INVESTIGATED BY F&R, Inc. PERSONNEL J. GLCHRIST
 CHECKED BY E.C. HOWEY, L.G., P.E. J. SEHRLSTER
 SUBMITTED BY F&R, Inc. S. DAVIS
 DATE 12/07 C. BALDWIN
D. RACEY
S. DEEGAN
D. JENKS

For Letting

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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.



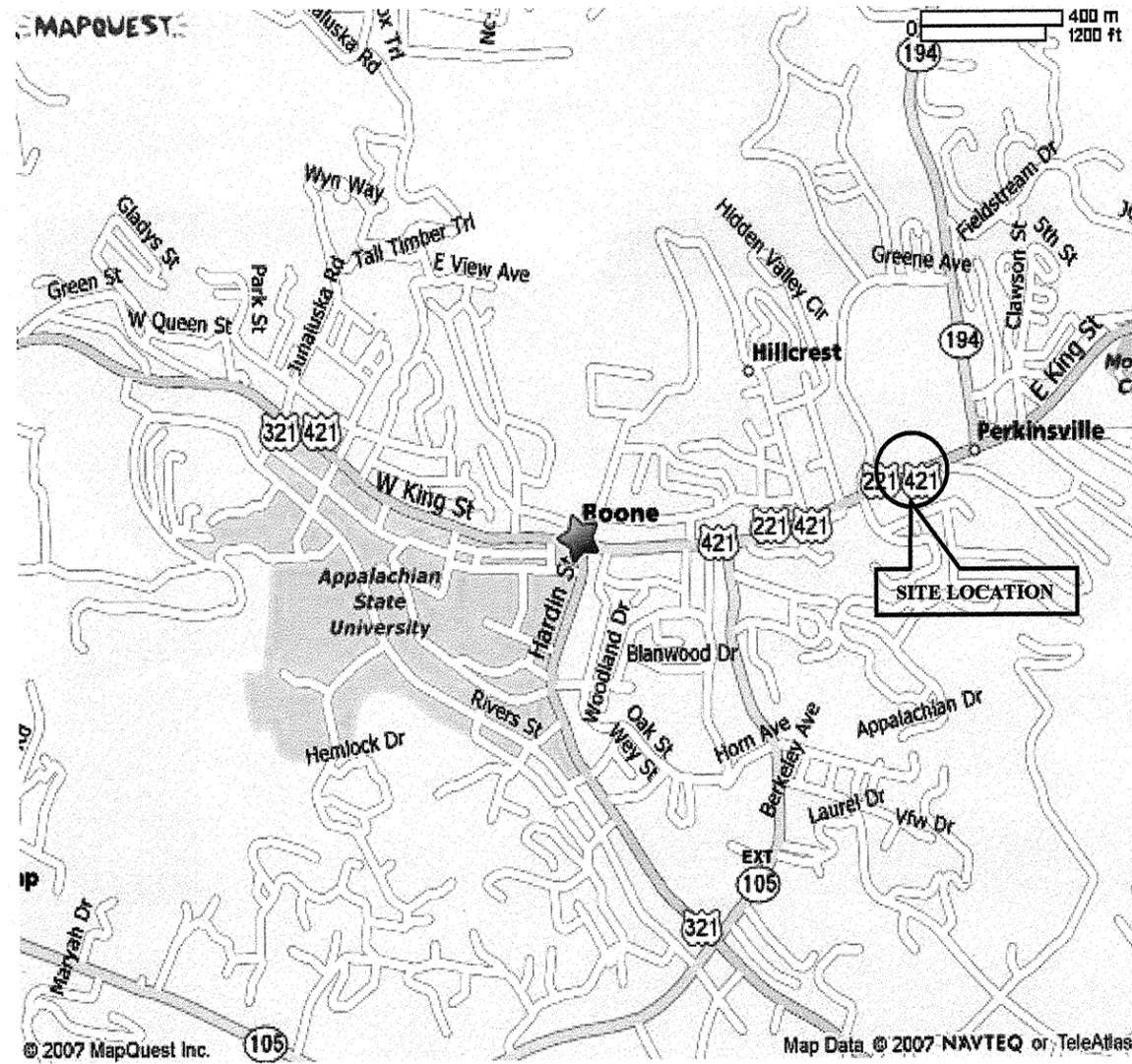
Elizabeth C. Howey
SIGNATURE

DRAWN BY: D. RACEY



FIGURE 1

FIGURE 2



NORTH



SITE VICINITY MAP

AERIAL PHOTO OF SITE

PROJECT NO. 35015.1.1		ID. U-4020		COUNTY Watauga		GEOLOGIST C. Baldwin									
SITE DESCRIPTION Retaining Wall 1 - US 421 from US 321 to NC 194 in Boone							GROUND WTR (ft)								
BORING NO. B-3 Wall 1		STATION 55+65		OFFSET 95ft LT		ALIGNMENT -L-									
COLLAR ELEV. 3,169.8 ft		TOTAL DEPTH 21.8 ft		NORTHING N/A		EASTING N/A									
DRILL MACHINE CME 550		DRILL METHOD 2.25" ID HSA/NQ-3 Core		HAMMER TYPE Automatic											
START DATE 06/15/07		COMP. DATE 06/15/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.4 ft									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
3170														3,169.8 GROUND SURFACE 0.0	
														3,169.6 ASPHALT 0.2	
														3,169.3 ABC STONE 0.5	
3,166.3	3.5													RESIDUAL	
		34	32	25										White & brown, micaceous fine to coarse sandy SILT (A-4(0)).	
3,161.3	8.5													WEATHERED ROCK	
		15	100/0.3											Brown, BIOTITE GRANITIC GNEISS.	10.4
														CRYSTALLINE ROCK	12.2
														White, gray & brown, BIOTITE GRANITIC GNEISS.	
														WEATHERED ROCK	
														Brown, BIOTITE GRANITIC GNEISS.	
3,148.5	21.3													Boring Terminated at Elevation 3,148.0 ft in WEATHERED ROCK (BIOTITE GRANITIC GNEISS)	21.8
		100/0.5													

NOTES:
 1) Auger refusal at a depth of 9.3'.
 2) Began coring at a depth of 9.3'.
 3) 0 hr. water not measured due to water introduced for coring.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT_GDT 12/7/07

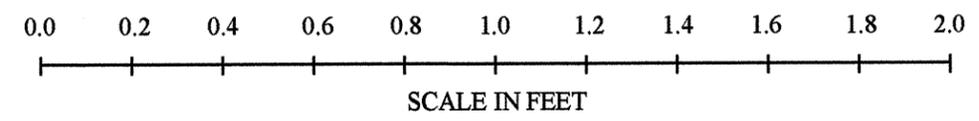
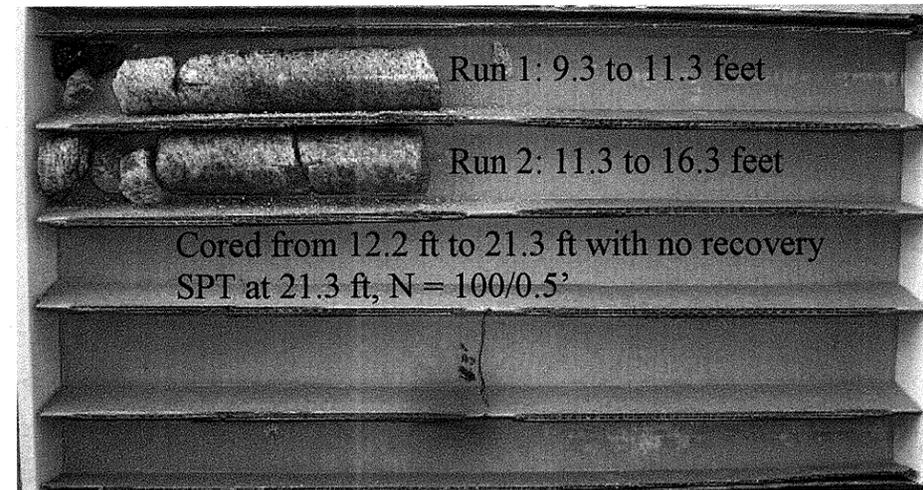
PROJECT NO. 35015.1.1		ID. U-4020		COUNTY Watauga		GEOLOGIST C. Baldwin					
SITE DESCRIPTION Retaining Wall 1 - US 421 from US 321 to NC 194 in Boone							GROUND WTR (ft)				
BORING NO. B-3 Wall 1		STATION 55+65		OFFSET 95ft LT		ALIGNMENT -L-					
COLLAR ELEV. 3,169.8 ft		TOTAL DEPTH 21.8 ft		NORTHING 908,848		EASTING 1,214,546					
DRILL MACHINE CME 550		DRILL METHOD 2.25" ID HSA/NQ-3 Core		HAMMER TYPE Automatic							
START DATE 06/15/07		COMP. DATE 06/15/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 10.4 ft					
CORE SIZE NQ-3		TOTAL RUN 12.0 ft		DRILLER J. Sehulster							
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3160.5											
3,160.5	9.3	2.0	2:37/1.0	(0.9)	(0.7)					Begin Coring @ 9.3 ft	
3,158.5	11.3		4:20/1.0	45%	35%					WEATHERED ROCK	10.4
		5.0	3:27/1.0	(0.9)	(0.0)					Brown, severely weathered, soft BIOTITE GRANITIC GNEISS.	
			2:45/1.0	18%	0%					Strata REC=0% RQD=N/A (continued)	12.2
			2:00/1.0							CRYSTALLINE ROCK	
			1:45/1.0							White, gray & brown, moderately severely weathered, moderately hard BIOTITE GRANITIC GNEISS, close fracture spacing, joints @ 20°, 80°.	
3,153.5	16.3		1:47/1.0							WEATHERED ROCK	
		5.0	2:00/1.0	(0.0)	(0.0)					Brown, severely weathered, soft BIOTITE GRANITIC GNEISS.	
			1:57/1.0	0%	0%						
			1:48/1.0								
3,148.5	21.3		1:52/1.0							Boring Terminated at Elevation 3,148.0 ft in WEATHERED ROCK (BIOTITE GRANITIC GNEISS)	21.8
			1:37/1.0								
			N=100/0.5								

NOTES:
 1) Auger refusal at a depth of 9.3'.
 2) Began coring at a depth of 9.3'.
 3) 0 hr. water not measured due to water introduced for coring.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT_GDT 12/11/07



CORE PHOTOGRAPHS: Station 55+65, 95 feet Left





PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 1 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-4 Wall 1	STATION 56+50	OFFSET 95ft LT	ALIGNMENT -L-
COLLAR ELEV. 3,169.2 ft	TOTAL DEPTH 16.4 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/19/07	COMP. DATE 06/19/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 10.2 ft

ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
		0.5ft	0.5ft	0.5ft	0	25	50	75	100				
3170												GROUND SURFACE	8.9
												ASPHALT	0.5
												ABC STONE	
3,165.7	3.5											RESIDUAL	
		18	15	13								Brown & tan with orange, silty fine to coarse SAND (A-2-4), saprolitic.	
3,161.2	8.0											WEATHERED ROCK	8.5
		46	46	60/0.1'								Brown, BIOTITE GRANITIC GNEISS.	10.2
												CRYSTALLINE ROCK	
												Gray & white, BIOTITE GRANITIC GNEISS.	
												Boring Terminated at Elevation 3,152.8 ft in CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	16.4

NOTES:
 1) Auger refusal at a depth of 9.4'.
 2) Began coring at a depth of 9.4'.
 3) 0 hr. water not measured due to water introduced for coring.

NCDOT BORE SINGLE J66-039.GPJ NC_DOT.GDT 12/7/07



PROJECT NO. 35015.1.1	ID. U-4020	COUNTY Watauga	GEOLOGIST C. Baldwin
SITE DESCRIPTION Retaining Wall 1 - US 421 from US 321 to NC 194 in Boone			GROUND WTR (ft)
BORING NO. B-4 Wall 1	STATION 56+50	OFFSET 95ft LT	ALIGNMENT -L-
COLLAR ELEV. 3,169.2 ft	TOTAL DEPTH 16.4 ft	NORTHING 908,875	EASTING 1,214,626
DRILL MACHINE CME 550	DRILL METHOD 2.25" ID HSA/NQ-3 Core	HAMMER TYPE Automatic	
START DATE 06/19/07	COMP. DATE 06/19/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 10.2 ft

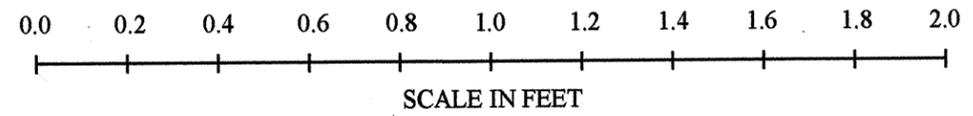
ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
				REC. (%)	RQD (%)		REC. (%)	RQD (%)			
3159.8										Begin Coring @ 9.4 ft	
3,159.8	9.4	2.0	4:07/1.0	(1.2)	(0.8)					WEATHERED ROCK	
3,157.8	11.4		5:10/1.0	60%	40%	RS-1	(6.2)	(5.7)		Brown, severely weathered, soft BIOTITE GRANITIC GNEISS.	10.2
		5.0	5:07/1.0	(5.0)	(4.9)		100%	92%		Strata REC=0% RQD=N/A (continued)	
			5:10/1.0							CRYSTALLINE ROCK	
			5:25/1.0							White & gray, slightly to very slightly weathered, hard BIOTITE GRANITIC GNEISS, close to moderately close fracture spacing, joints @ 20°, 70°.	
3,152.8	16.4		5:20/1.0							RS-1 10.6'-10.9' qu=21,801 psi	16.4
			5:32/1.0							Boring Terminated at Elevation 3,152.8 ft in CRYSTALLINE ROCK (BIOTITE GRANITIC GNEISS)	

NOTES:
 1) Auger refusal at a depth of 9.4'.
 2) Began coring at a depth of 9.4'.
 3) 0 hr. water not measured due to water introduced for coring.

NCDOT CORE SINGLE J66-039.GPJ NC_DOT.GDT 12/11/07



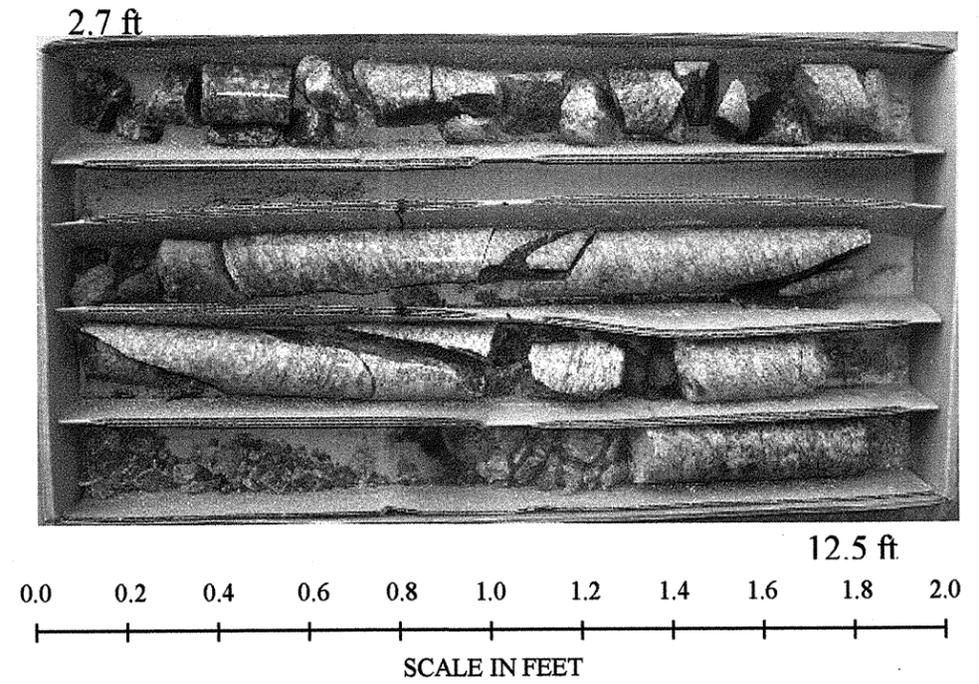
CORE PHOTOGRAPHS: Station 56+50, 95 feet Left





CORE PHOTOGRAPHS: Station 57+50, 95 feet Left

SHEET 11 OF 15



North Carolina Department of Transportation
 Division of Highways
 Materials and Test Unit
 Soils Laboratory

T.I.P. ID NO.: U-4020
 DESCRIPTION: US 421 in Boone Wall 1

REPORT ON SAMPLES OF: SOIL FOR QUALITY

PROJECT: 35015.1.1
 DATE SAMPLED: 6/07
 SAMPLED FROM: Wall 1 (-L- Stations)
 SUBMITTED BY: E.C. Howey, L.G., P.E.

COUNTY: Watauga
 RECEIVED: 6/07
 REPORTED: 7/07
 BY: D. Jenks

TEST RESULTS

PROJ. SAMPLE NO.	SS-29	SS-20	SS-13														
BORING NO.	Wall 1	Wall 1	Wall 1														
Retained #4 Sieve %	4.2	3.1	0.0														
Passing #10 Sieve %	92.2	86.6	99.2														
Passing #40 Sieve %	74.5	59.5	80.6														
Passing #200 Sieve %	41.3	29.5	41.2														

MINUS #10 FRACTION

SOIL MORTAR - 100%																	
Coarse Sand Ret - #60 %	27.3	31.3	28.0														
Fine Sand Ret - #270 %	37.8	43.1	41.7														
Silt 0.053 - 0.010 mm %	20.3	13.1	21.6														
Clay < 0.010 mm %	14.6	12.5	8.7														
L.L.	27	23	23														
P.L.	NP	NP	NP														
P.I.	NP	NP	NP														
AASHTO Classification	A-4(0)	A-2-4(0)	A-4(0)														
Station (-L-)	53+50	54+50	55+65														
Offset	80' LT	80' LT	95' LT														
Depth (ft)	0.0	8.5	3.5														
to	1.5	10.0	5.0														
Moisture Content (%)	12.2		11.8														

NP=Not plastic

E.C. Howey, L.G., P.E.
 Soils Engineer



SITE PHOTOGRAPHS



Photograph No. 1: Beginning of Wall 1, looking west



Photograph No. 3: Approximate middle of Wall 1, looking east



Photograph No. 2: Beginning of Wall 1, looking east



Photograph No. 4: Near end of Wall 1, looking west



SITE PHOTOGRAPHS



Photograph No. 5: End of Wall 1 along -DR1-, looking south, movie theatre on right



Photograph No. 6: Existing block wall behind movie theatre