

PROJECT: REFERENCE: NC-9

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY HENDERSON
PROJECT DESCRIPTION RETAINING WALLS 2 - 8

SITE DESCRIPTION NC-9 FROM US 74 ALT TO
HENDERSON/BUNCOMBE COUNTY LINE

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	NC-9	1	

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 - 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.

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DATE APRIL 2025

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4/14/2025

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

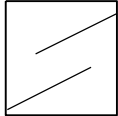
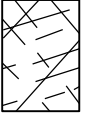
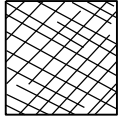
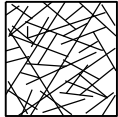
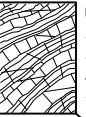
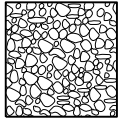
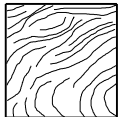
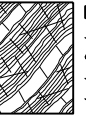
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (RQDD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
GENERAL CLASS.										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.									
GROUP CLASS.										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										CRYSTALLINE ROCK (CR)										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.									
SYMBOL										COMPRESSIBILITY										NON-CRYSTALLINE ROCK (NCR)										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.									
% PASSING										PERCENTAGE OF MATERIAL										COASTAL PLAIN SEDIMENTARY ROCK (CP)										COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.									
MATERIAL PASSING #10 #40 #200										ORGANIC MATERIAL										WEATHERING																			
GROUP INDEX										GROUND WATER										FRESH										ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.									
USUAL TYPES OF MAJOR MATERIALS										MISCELLANEOUS SYMBOLS										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.									
GEN. RATING AS SUBGRADE																				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.									
PI OF A-7.5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7.6 SUBGROUP IS ≥ LL - 30																				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.									
PRIMARY SOIL TYPE										RECOMMENDATION SYMBOLS										SEVERE (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. IF TESTED, WOULD YIELD SPT REFUSAL									
GENERALY GRANULAR MATERIAL (NON-COHESIVE)																				VERY SEVERE (V SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF									
GENERALY SILT-CLAY MATERIAL (COHESIVE)																				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.									
TEXTURE OR GRAIN SIZE																				ROCK HARDNESS																			
U.S. STD. SIEVE SIZE																				VERY HARD										CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.									
BOULDER (BLDR.)																				HARD										CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.									
GRAIN SIZE																				MODERATELY HARD										CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.									
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										MEDIUM HARD										CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.									
SOIL MOISTURE SCALE (ATTERBERG LIMITS)																				SOFT										CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.									
PLASTIC RANGE (PI)																				VERY SOFT										CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.									
OM SL																				FRACTURE SPACING										BEDDING									
PLASTICITY																				TERM										TERM									
NON PLASTIC																				VERY WIDE										THICKNESS									
SLIGHTLY PLASTIC																				WIDE										VERY THICK									

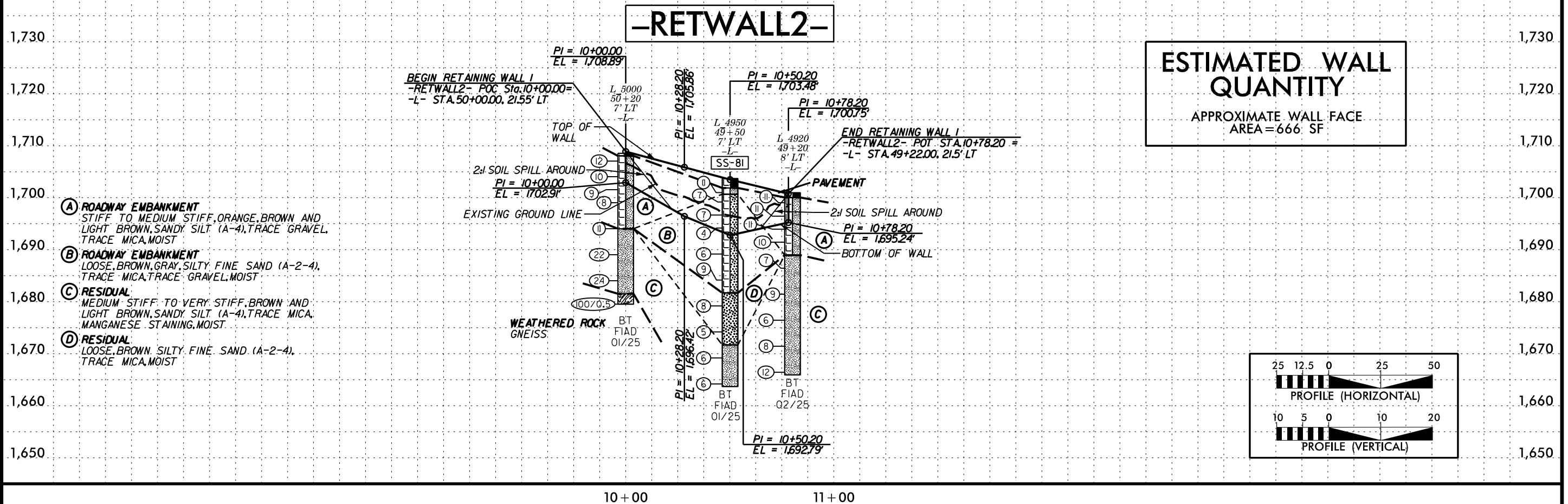
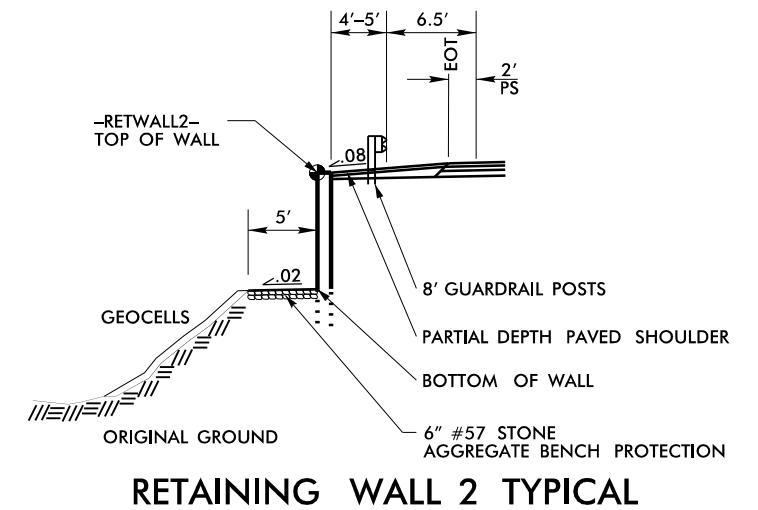
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)				
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD Very rough, fresh unweathered surfaces	GOOD Rough, slightly weathered, iron stained surfaces	FAIR Smooth, moderately weathered and altered surfaces	POOR Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments	VERY POOR Slickensided, highly weathered surfaces with soft clay coatings or fillings	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.		VERY GOOD - Very Rough, fresh unweathered surfaces	GOOD - Rough, slightly weathered surfaces	FAIR - Smooth, moderately weathered and altered surfaces	POOR - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments	VERY POOR - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings
STRUCTURE		DECREASING SURFACE QUALITY ➡					COMPOSITION AND STRUCTURE						
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90				N/A		N/A		A. Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	70		
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80									60		
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70							B. Sandstone with thin inter-layers of siltstone		50	
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60							C. Sandstone and siltstone in similar amounts		40	
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces		50							D. Siltstone or silty shale with sandstone layers		30	
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes		40							E. Weak siltstone or clayey shale with sandstone layers		20	
			30						C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.			10	
			20							F. Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure			
			10							G. Undisturbed silty or clayey shale with or without a few very thin sandstone layers			
										H. Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.			
									➡ Means deformation after tectonic disturbance				



RETAINING WALL 3 ENVELOPE

NAD 83/NA 2011

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PROJECT REFERENCE NO.
NC-9

SHEET NO.
4

R/W SHEET NO.

GEOTECHNICAL ENGINEER

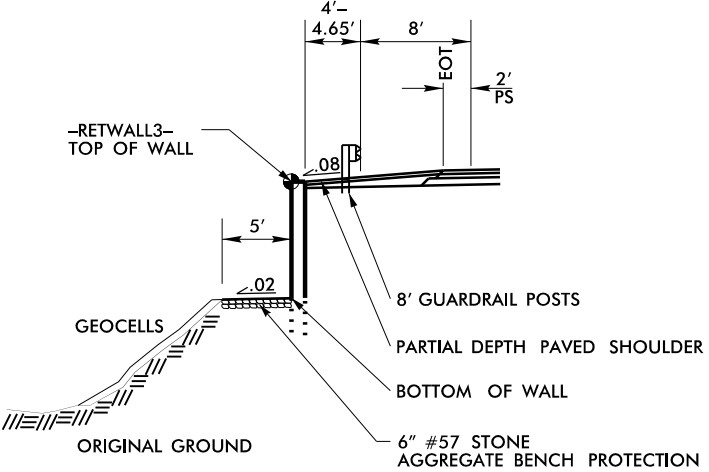
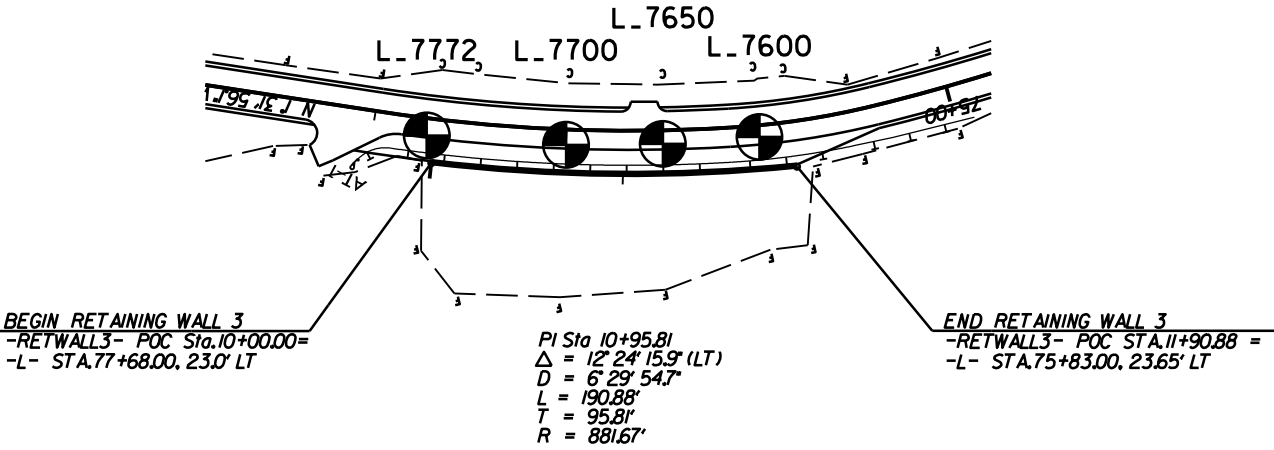
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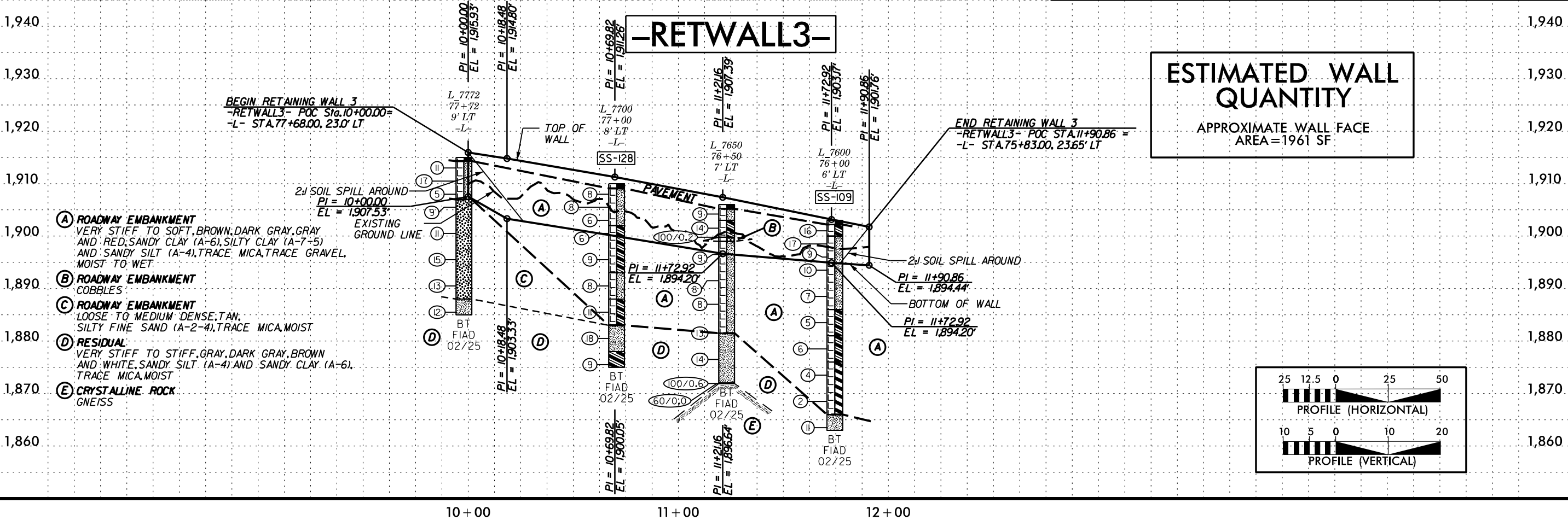
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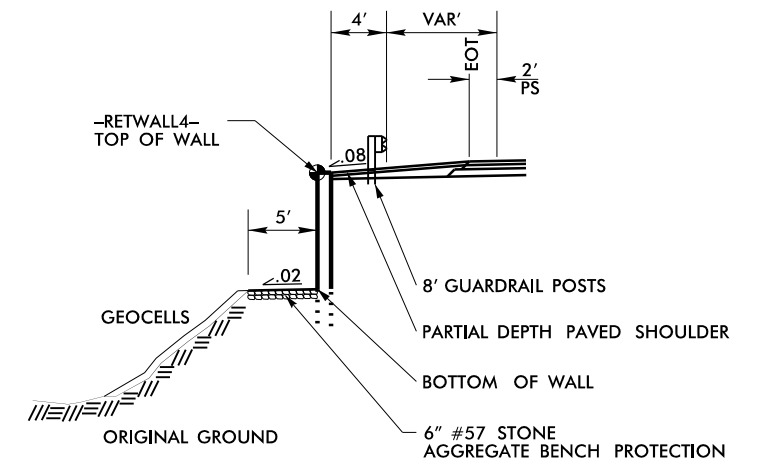
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PLANS

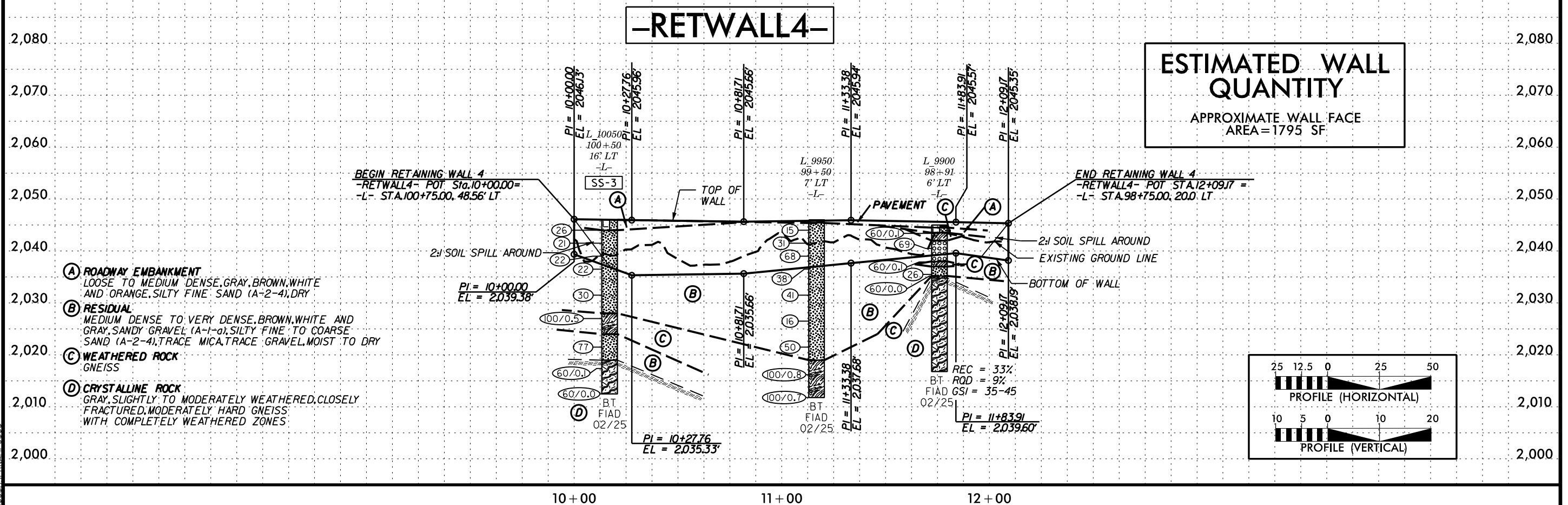


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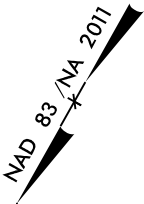


APPROXIMATE WALL FACE
AREA=1795 SF



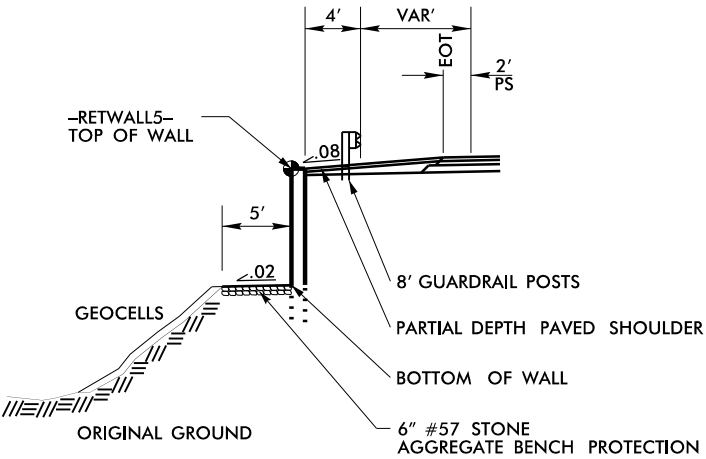
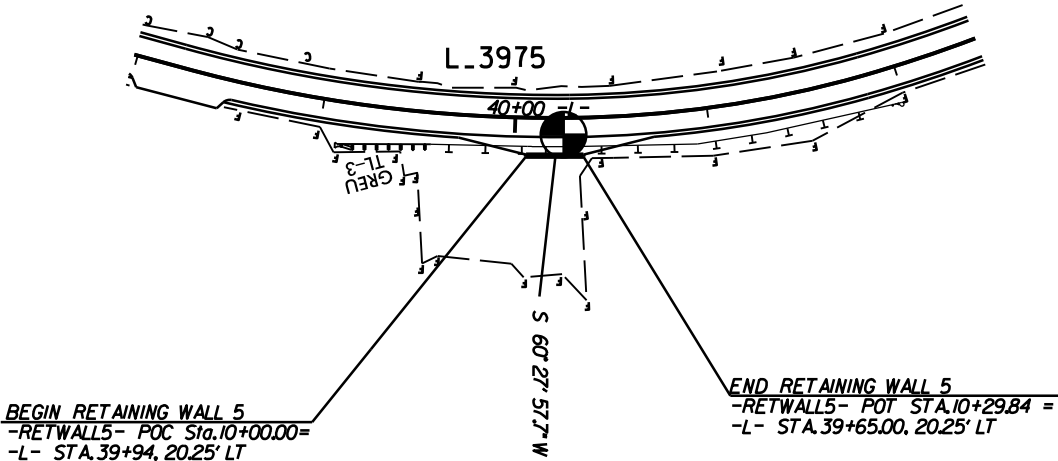
8/17/99
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RETAINING WALL 5 ENVELOPE

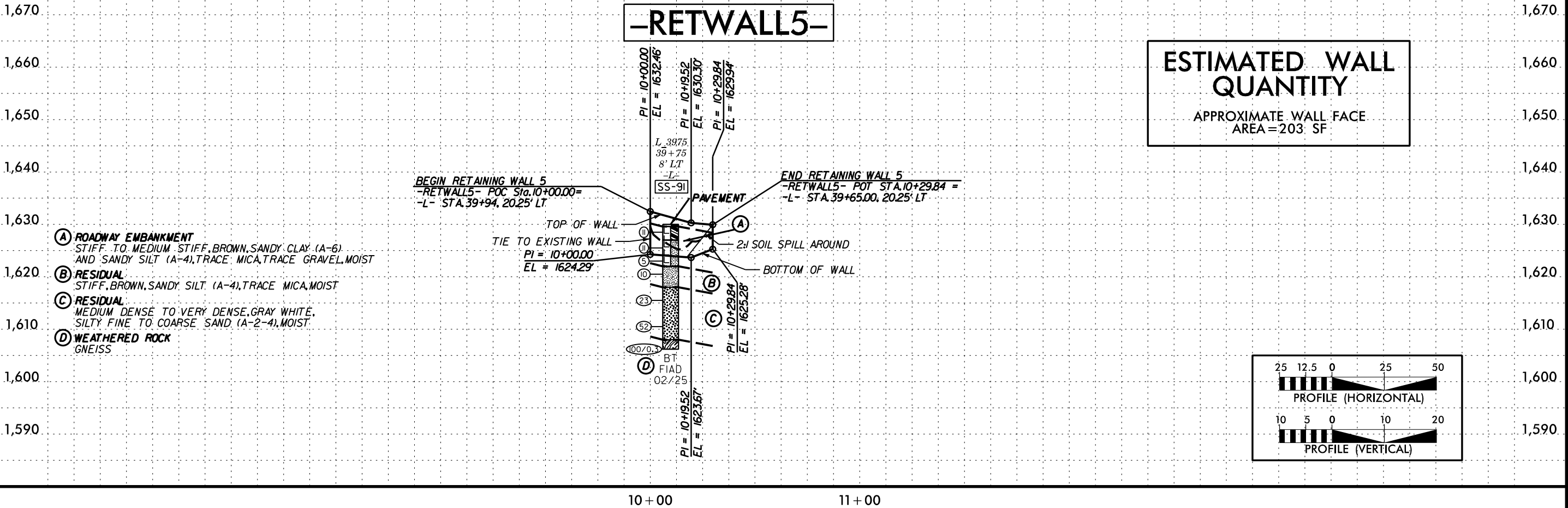


NC-9
8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726

PROJECT REFERENCE NO. NC-9	SHEET NO. 6
RW SHEET NO.	
GEOTECHNICAL ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



RETAINING WALL 5 TYPICAL

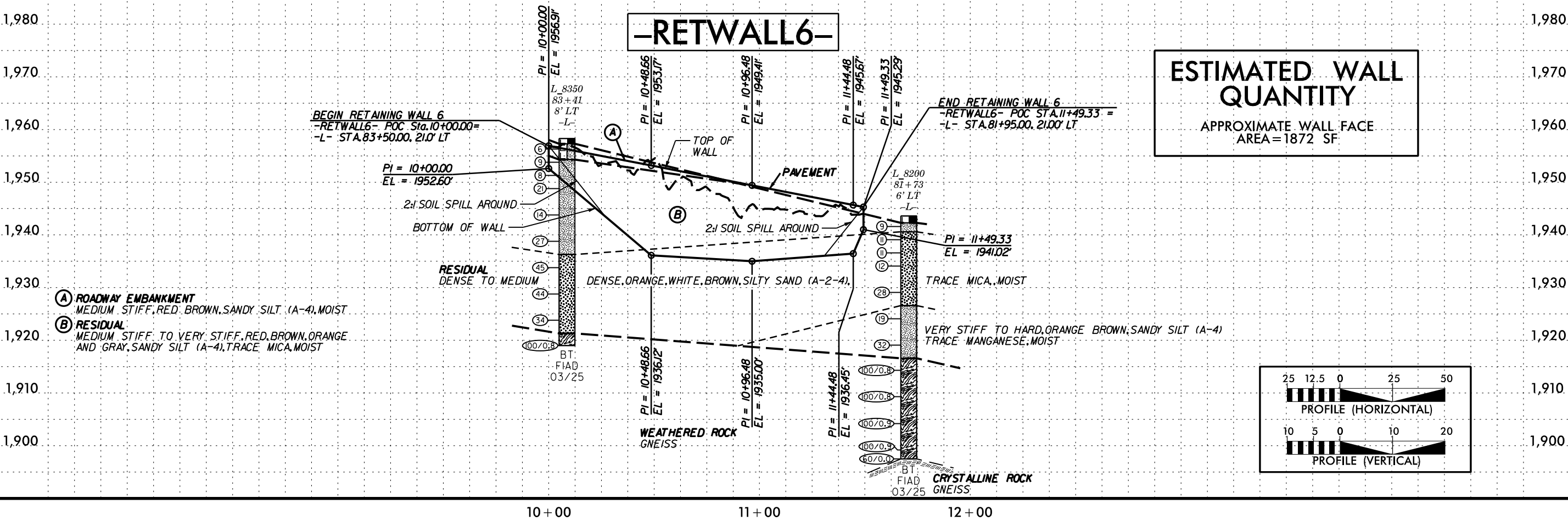
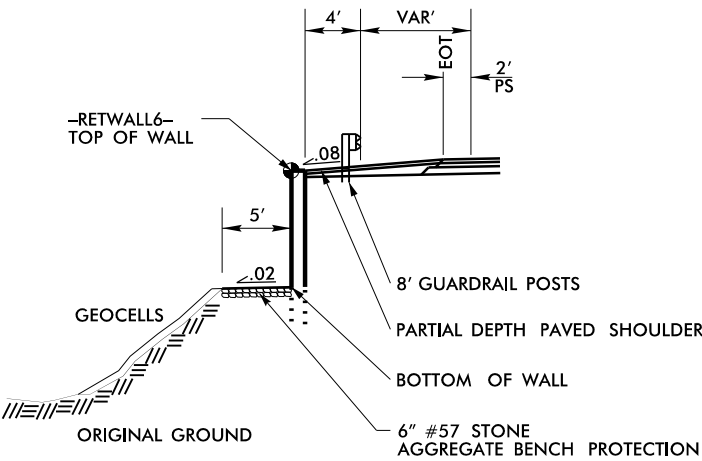
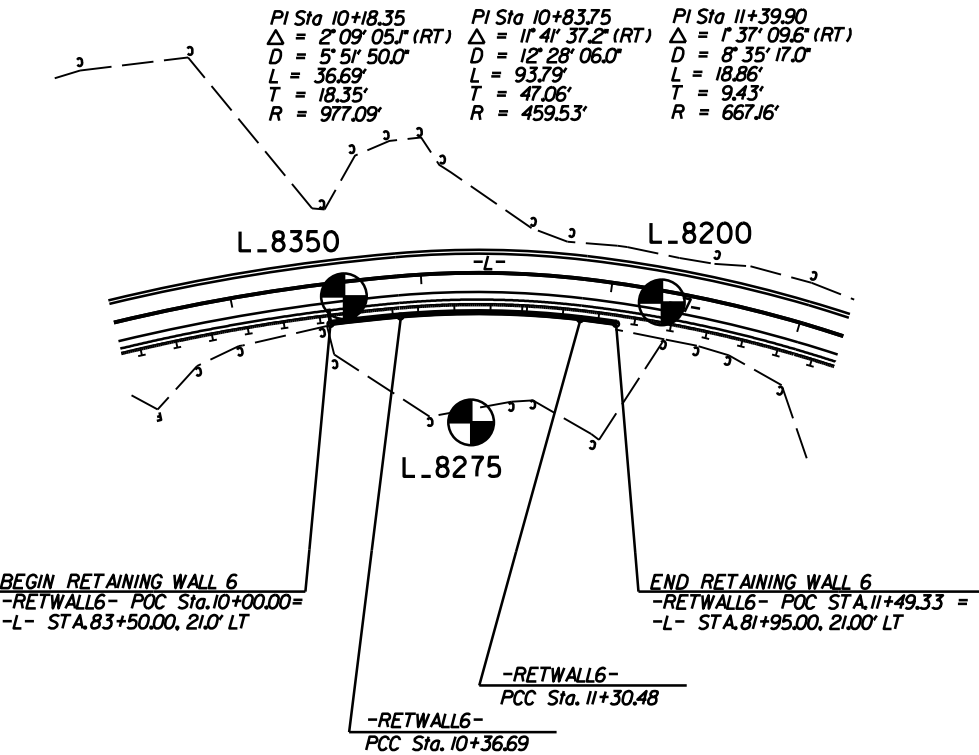


RETAINING WALL 6 ENVELOPE

8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726



PROJECT REFERENCE NO.	SHEET NO.
NC-9	7
R/W SHEET NO.	GEOTECHNICAL ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
50 25 0 50 100 PLANS	



RETAINING WALL 7 ENVELOPE

8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726

PROJECT REFERENCE NO.
NC-9

SHEET NO.
8

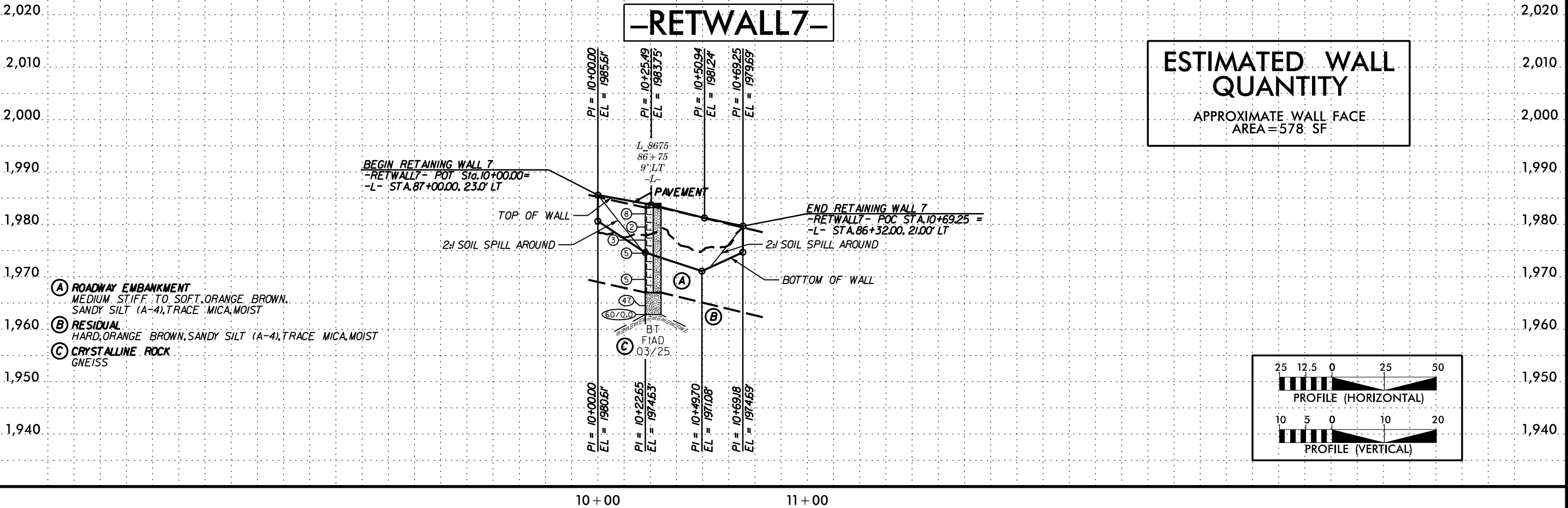
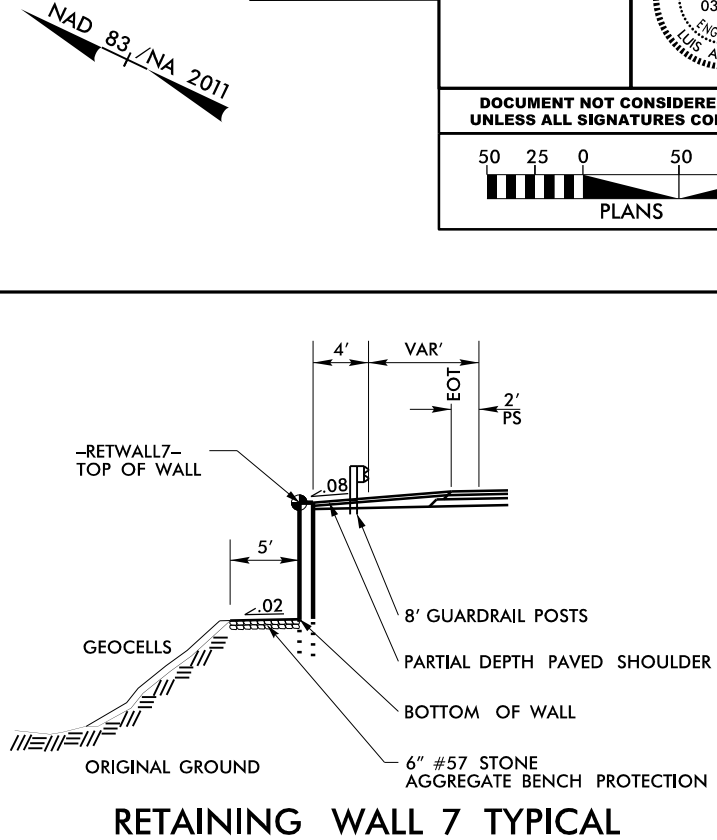
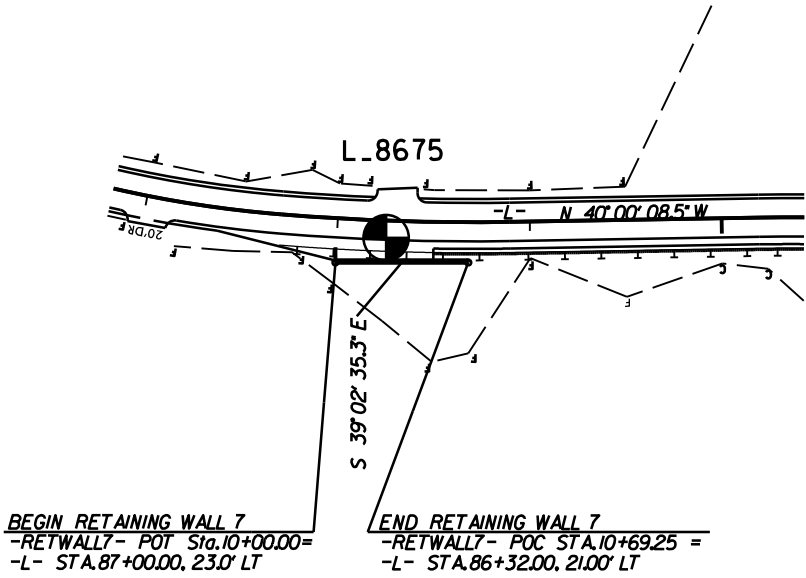
R/W SHEET NO.

GEOTECHNICAL ENGINEER

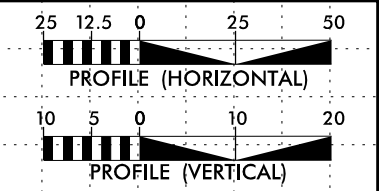
SEAL
037845
ENGINEER
LUIS A. CAMPOS

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

50 25 0 50 100
PLANS

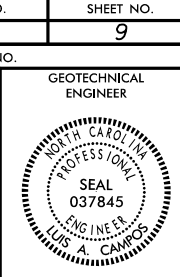


ESTIMATED WALL QUANTITY
APPROXIMATE WALL FACE AREA = 578 SF

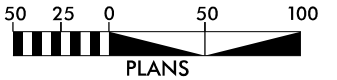


RETAINING WALL 8 ENVELOPE

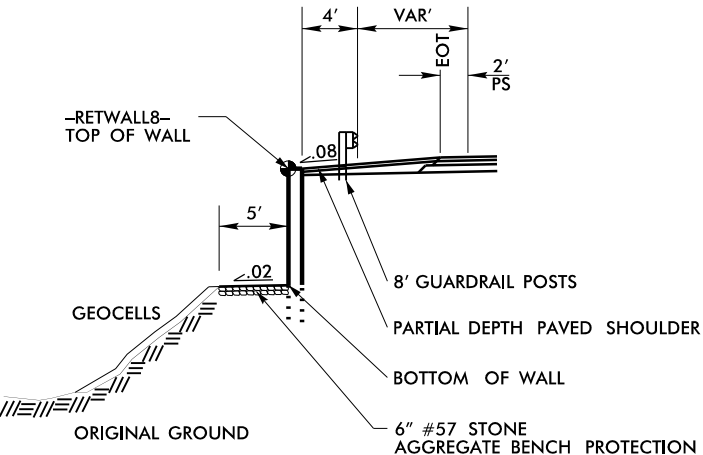
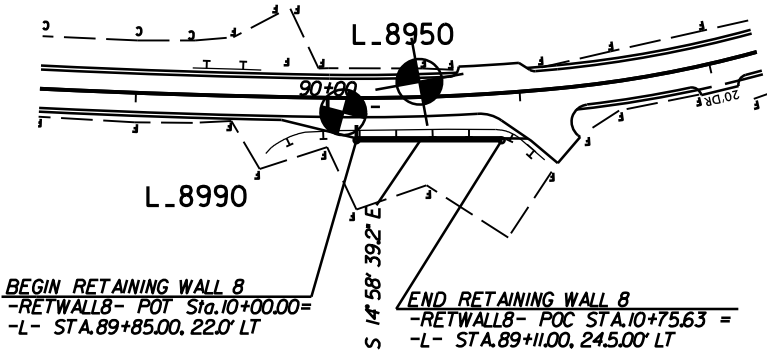
8848 RED OAK BLVD
SUITE A
CHARLOTTE, NC 28217
(704) 523-4726



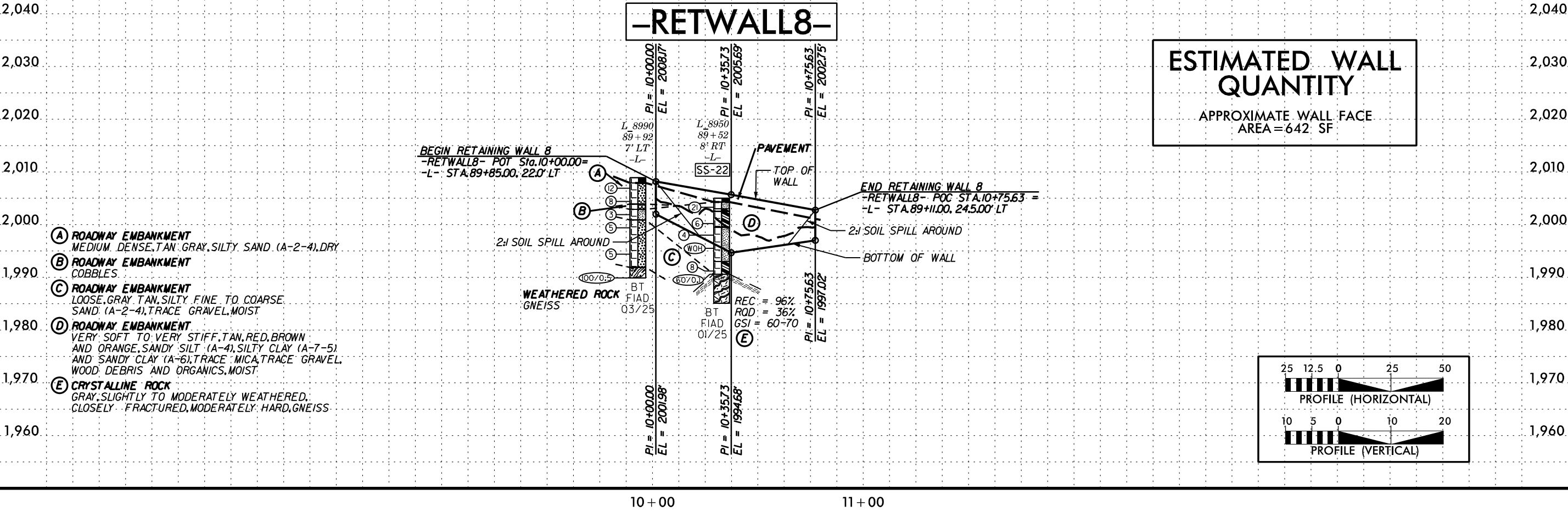
PROJECT REFERENCE NO. NC-9
SHEET NO. 9
RW SHEET NO.
GEOTECHNICAL ENGINEER
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED



NAD 83 / NA 2011



RETAINING WALL 8 TYPICAL



8/17/99
14.NC9 74A to Buncombe Co.Bat Cave.GEO-NCDDT\CAODD.GEO.WALLS\PlanPro\NC-9_GEO.psh_retaining_walls-8.dgn
\$\$\$\$\$SYTIME\$\$\$\$\$
I:\Charlotte\1350\Projects\2024\24350796.NCDDT_Division
\$\$\$\$\$END\$\$\$\$\$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 18314.1045035				TIP W0920		COUNTY HENDERSON		GEOLOGIST Payne, C.							
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE												GROUND WTR (ft)			
BORING NO. L_3975				STATION 39+75			OFFSET 8 ft LT			ALIGNMENT -L-		0 HR. N/A			
COLLAR ELEV. 1,630.0 ft				TOTAL DEPTH 23.8 ft			NORTHING 638,873			EASTING 1,021,373		24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024							DRILL METHOD Mud Rotary				HAMMER TYPE Automatic				
DRILLER Williams Jr., T.				START DATE 02/03/25			COMP. DATE 02/07/25			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)
1630	1,629.5	0.5	10	5	6									1,630.0 ROAD SURFACE 0.0	
	1,629.5													1,629.6 ROADWAY EMBANKMENT 0.4	
	1,626.5	3.5	5	6	5							M		1,627.0 STIFF, BROWN, SANDY CLAY (A-6), 3.0	
1625	1,624.0	6.0	2	2	3									TRACE MICA, TRACE GRAVEL	
	1,624.0													STIFF TO MEDIUM STIFF, BROWN,	
	1,621.5	8.5	3	4	6						SS-91	27%		SANDY SILT (A-4), TRACE MICA, TRACE 8.0	
1620	1,621.5													GRAVEL	
	1,621.5											M		RESIDUAL	
	1,616.5	13.5	5	9	14									STIFF, BROWN, SANDY SILT (A-4), TRACE 12.0	
1615	1,616.5													MICA	
	1,616.5											M		MEDIUM DENSE TO VERY DENSE, GRAY	
	1,611.5	18.5	9	14	38									WHITE, SILTY FINE TO COARSE SAND	
1610	1,611.5													(A-2-4)	
	1,611.5											M			
	1,606.5	23.5												1,608.0 22.0	
	1,606.5													1,606.2 WEATHERED ROCK 23.8	
	1,606.5													GNEISS	
	1,606.5													Boring Terminated at Elevation 1,606.2 ft IN	
	1,606.5													WEATHERED ROCK (GNEISS)	

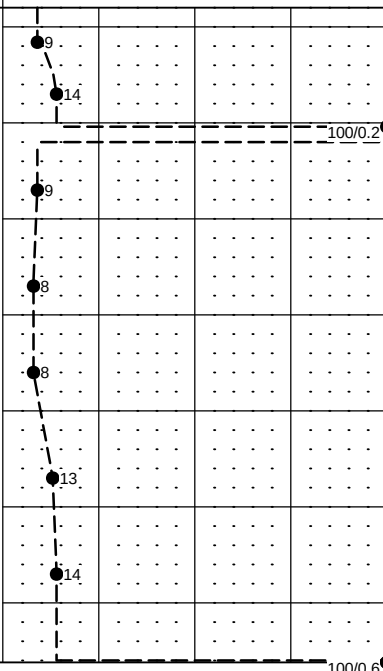
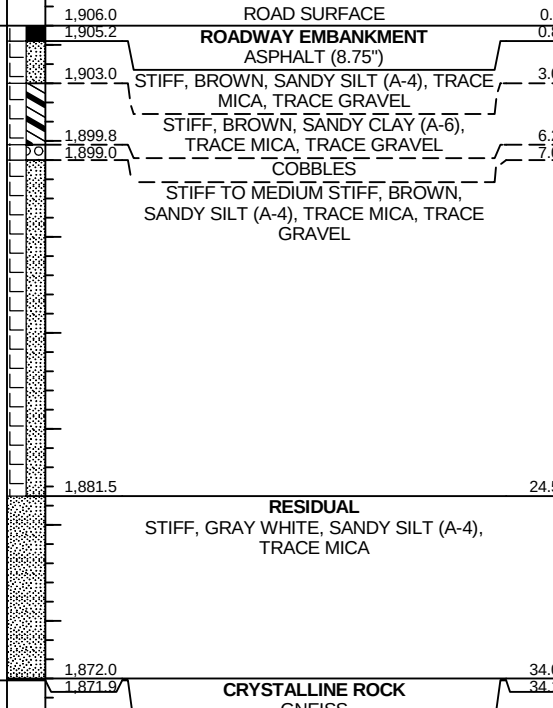
WBS 18314.1045035			TIP W0920			COUNTY HENDERSON			GEOLOGIST Payne, C.					
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE											GROUND WTR (ft)			
BORING NO. L_4920			STATION 49+20			OFFSET 8 ft LT			ALIGNMENT -L-			0 HR. N/A		
COLLAR ELEV. 1,701.0 ft			TOTAL DEPTH 35.0 ft			NORTHING 639,387			EASTING 1,022,045			24 HR. FIAD		
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic					
DRILLER Williams Jr., T.			START DATE 02/03/25			COMP. DATE 02/03/25			SURFACE WATER DEPTH N/A					
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
1705														
1700	1,700.1	0.9												1,701.0 ROAD SURFACE 0.0
1695	1,697.5	3.5	12	6	5	11					M		1,700.1 ROADWAY EMBANKMENT 0.9	
	1,695.0	6.0	5	6	5	11					M		ASPHALT (2") OVER GRAVEL (3")	
1690	1,692.5	8.5	4	5	6	11					M		STIFF, BROWN, SANDY SILT (A-4), TRACE MICA	
	1,689.0	12.0	3	4	6	10					M			
1685	1,687.5	13.5	2	3	4	7					M		1,689.0 RESIDUAL 12.0	
1680	1,682.5	18.5									M		MEDIUM STIFF TO STIFF, BROWN, SANDY SILT (A-4), TRACE MICA	
	1,677.5	23.5	3	4	5	9					M			
1675	1,672.5	28.5	3	3	3	6					M			
1670	1,667.5	33.5	3	4	4	5					M			
			3	5	7	12					M		1,666.0 Boring Terminated at Elevation 1,666.0 ft IN 35.0	
														RESIDUAL SANDY SILT

NCDOT BORE DOUBLE W0920_GEO_RDY.GPJ NC_DOT.GDT 4/4/25

NCDOT BORE DOUBLE W0920_GEO_RDY.GPJ NC_DOT_GDT 4/4/25

WBS 18314.1045035			TIP W0920			COUNTY HENDERSON			GEOLOGIST Payne, C.						
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE												GROUND WTR (ft)			
BORING NO. L_5000			STATION 50+00			OFFSET 7 ft LT			ALIGNMENT -L-			0 HR. N/A			
COLLAR ELEV. 1,709.0 ft			TOTAL DEPTH 29.0 ft			NORTHING 639,467			EASTING 1,022,050			24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic						
DRILLER Williams Jr., T.			START DATE 01/29/25			COMP. DATE 01/29/25			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1710															
	1,708.5	0.5	8	7	5									ROAD SURFACE	0.0
														ROADWAY EMBANKMENT	0.5
1705	1,705.5	3.5	5	5	5							M		ASPHALT (6.5")	
	1,703.0	6.0	2	5	4							M		STIFF TO MEDIUM STIFF, ORANGE AND	
												M		LIGHT BROWN, SANDY SILT (A-4), TRACE	
1700	1,700.5	8.5	2	4	4							M		MICA	
1695	1,695.5	13.5	4	4	7							M			
1690	1,690.5	18.5	6	10	12							M		RESIDUAL	14.5
														VERY STIFF, LIGHT BROWN, SANDY SILT	
												M		(A-4), TRACE MICA, MANGANESE	
1685	1,685.5	23.5	4	9	15							M		STAINING	
1680	1,680.5	28.5	100	0.5										WEATHERED ROCK	27.0
														GNEISS	29.0
														Boring Terminated at Elevation 1,680.0 ft IN	
														WEATHERED ROCK (GNEISS)	

NCDOT BORE DOUBLE W0920_GEO_RDY.GPJ NC_DOT_GDT 4/4/25

WBS		18314.1045035		TIP		W0920		COUNTY		HENDERSON		GEOLOGIST		Payne, C.																																													
SITE DESCRIPTION												NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE				GROUND WTR (ft)																																											
BORING NO.				L_7650				STATION				76+50				OFFSET				7 ft LT				ALIGNMENT				-L-				0 HR.		N/A																									
COLLAR ELEV.				1,906.0 ft				TOTAL DEPTH				34.1 ft				NORTHING				640,629				EASTING				1,023,123				24 HR.		FIAD																									
DRILL RIG/HAMMER EFF./DATE										SME275 DIEDRICH D-50 91% 01/19/2024										DRILL METHOD										Mud Rotary										HAMMER TYPE										Automatic									
DRILLER						Williams Jr., T.						START DATE						02/04/25						COMP. DATE						02/04/25						SURFACE WATER DEPTH												N/A											
ELEV (ft)		DRIVE ELEV (ft)		DEPTH (ft)		BLOW COUNT			BLOWS PER FOOT					SAMP. NO.		MOI		LOG		SOIL AND ROCK DESCRIPTION																																							
						0.5ft 0.5ft 0.5ft			0 25 50 75 100																																																		
1910																																																											
1905		1,905.2		0.8		8 4 5																																																					
		1,902.5		3.5		4 8 6																																																					
1900		1,900.0		6.0		100/0.2																																																					
		1,897.5		8.5		3 4 5																																																					
1895																																																											
		1,892.5		13.5		3 4 4																																																					
1890																																																											
		1,888.0		18.0		2 4 4																																																					
1885																																																											
		1,882.5		23.5		1 3 10																																																					
1880																																																											
		1,877.5		28.5		4 7 7																																																					
1875																																																											
		1,872.5		33.5		4 96/0.1																																																					
		1,871.9		34.1		60/0.0																																																					

NCDOT BORE DOUBLE W0920_GEO_RDY.GPJ NC_DOT_GDT 4/4/25

WBS 18314.1045035			TIP W0920			COUNTY HENDERSON			GEOLOGIST Payne, C.				
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE									GROUND WTR (ft)				
BORING NO. L_7772			STATION 77+72			OFFSET 9 ft LT			ALIGNMENT -L-			0 HR. N/A	
COLLAR ELEV. 1,915.0 ft			TOTAL DEPTH 30.0 ft			NORTHING 640,749			EASTING 1,023,105			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024						DRILL METHOD Mud Rotary			HAMMER TYPE Automatic				
DRILLER Williams Jr., T.			START DATE 02/04/25			COMP. DATE 02/04/25			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100	MOI		
1915													1,915.0 ROAD SURFACE 0.0
	1,914.0	1.0											1,914.3 ROADWAY EMBANKMENT 0.7
			8	5	6						M		ASPHALT (8")
	1,911.5	3.5											VERY STIFF TO MEDIUM STIFF, BROWN, SANDY SILT (A-4), TRACE MICA, TRACE GRAVEL
1910			4	8	9						M		
	1,909.0	6.0											
	1,909.0	6.0	2	2	3						M		1,907.0 8.0
	1,906.5	8.5											RESIDUAL
1905			2	4	5						M		LOOSE TO MEDIUM DENSE, TAN, SILTY FINE SAND (A-2-4), TRACE MICA
	1,901.5	13.5											
1900			4	5	6						M		
	1,896.5	18.5											
1895			6	8	7						M		
	1,891.5	23.5											
1890			5	5	8						M		
	1,886.5	28.5											1,888.0 27.0
1885			3	4	8						M		1,885.0 30.0
													STIFF, BROWN, SANDY SILT (A-4), TRACE MICA
													Boring Terminated at Elevation 1,885.0 ft IN RESIDUAL SANDY SILT

NCDOT BORE DOUBLE W0920_GEO_RDY.GPJ NC_DOT_GDT 4/4/25

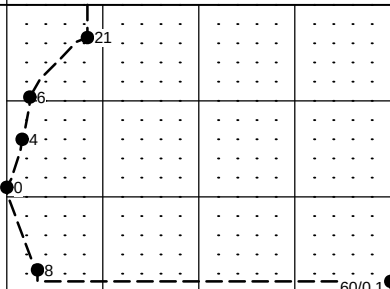
WBS			18314.1045035			TIP			W0920			COUNTY			HENDERSON			GEOLOGIST						Black, G.																															
SITE DESCRIPTION																	NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE																	GROUND WTR (ft)																					
BORING NO.						L_8275						STATION						82+75						OFFSET						78 ft LT						ALIGNMENT						-L-						0 HR.				N/A			
COLLAR ELEV.						1,916.0 ft						TOTAL DEPTH						29.2 ft						NORTHING						641,211						EASTING						1,022,977						24 HR.				FIAD			
DRILL RIG/HAMMER EFF./DATE													SME2938 CME-750X 84% 04/18/2024													DRILL METHOD						H.S. Augers						HAMMER TYPE						Automatic											
DRILLER						Gowan, S.						START DATE						03/13/25						COMP. DATE						03/13/25						SURFACE WATER DEPTH												N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION																																									
			0.5ft	0.5ft	0.5ft	0	25	50	75	100																																													
1920																																																							
1915	1,915.0	1.0	3	6	5																																																		
	1,912.5	3.5	4	3	3																																																		
1910	1,910.0	6.0	2	4	5																																																		
	1,907.5	8.5	5	7	6																																																		
1905																																																							
	1,902.5	13.5	8	18	22																																																		
1900																																																							
	1,897.5	18.5	20	25	31																																																		
1895																																																							
	1,892.5	23.5	11	15	15																																																		
1890																																																							
	1,887.5	28.5	68	32	0.2																																																		

NC DOT BORE DOUBLE W0920 GEO_RDY.GPJ NC DOT.GDT 4/14/25

WBS 18314.1045035			TIP W0920			COUNTY HENDERSON			GEOLOGIST Black, G.				
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE									GROUND WTR (ft)				
BORING NO. L_8675			STATION 86+75			OFFSET 9 ft LT			ALIGNMENT -L-			0 HR. N/A	
COLLAR ELEV. 1,984.0 ft			TOTAL DEPTH 21.2 ft			NORTHING 641,560			EASTING 1,022,802			24 HR. FIAD	
DRILL RIG/HAMMER EFF./DATE SVE2938 CME-750X 84% 04/18/2024						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic				
DRILLER Gowan, S.			START DATE 03/12/25			COMP. DATE 03/12/25			SURFACE WATER DEPTH N/A				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100	MOI		
1985													
	1,983.0	1.0	3	5	3								1,984.0 ROAD SURFACE 0.0
													1,983.2 ROADWAY EMBANKMENT 0.8
1980	1,980.5	3.5	2	1	1						M		ASPHALT (6") OVER MACADAM BASE (4")
	1,978.0	6.0	1	2	1						M		ROADWAY EMBANKMENT
	1,975.5	8.5	1	2	3						M		MEDIUM STIFF TO SOFT, ORANGE BROWN, SANDY SILT (A-4), TRACE MICA
1975											M		
	1,970.5	13.5	1	2	3						M		
1970													
	1,965.5	18.5	10	34	13						M		1,967.0 RESIDUAL 17.0
1965	1,962.8	21.2											HARD, ORANGE BROWN, SANDY SILT (A-4), TRACE MICA
													1,962.8 21.2
													Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,962.8 ft ON CRYSTALLINE ROCK (GNEISS)

GEOTECHNICAL BORING REPORT

BORE LOG

WBS				18314.1045035				TIP				W0920				COUNTY				HENDERSON				GEOLOGIST				Payne, C.																																											
SITE DESCRIPTION																				NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE																				GROUND WTR (ft)																															
BORING NO.								L_8950								STATION								89+52								OFFSET								8 ft RT								ALIGNMENT								-L-								0 HR.				N/A			
COLLAR ELEV.								2,005.0 ft								TOTAL DEPTH								19.9 ft								NORTHING								641,814								EASTING								1,022,693								24 HR.				FIAD			
DRILL RIG/HAMMER EFF./DATE																SME275 DIEDRICH D-50 91% 01/19/2024																DRILL METHOD								NW Casing W/SPT & Core								HAMMER TYPE								Automatic															
DRILLER								Williams Jr., T.								START DATE								01/16/25								COMP. DATE								01/16/25								SURFACE WATER DEPTH																N/A							
ELEV (ft)		DRIVE ELEV (ft)		DEPTH (ft)		BLOW COUNT			BLOWS PER FOOT										SAMP. NO.		MOI		LOG		SOIL AND ROCK DESCRIPTION																																														
						0.5ft 0.5ft 0.5ft			0 25 50 75 100																ELEV. (ft) DEPTH (ft)																																														
2005		2,004.3		0.7																					ROAD SURFACE 0.0																																														
		2,004.3				15 11 10																			ROADWAY EMBANKMENT 0.7																																														
		2,001.5		3.5		2 2 4																			ASPHALT (7.25") OVER MACADAM BASE 2.0																																														
2000		1,999.0		6.0		6 2 2																			VERY STIFF, TAN, SANDY SILT (A-4), TRACE MICA AND GRAVEL 5.5																																														
		1,996.5		8.5		WOH WOH WOH													SS-22		30%				STIFF, RED BROWN, SILTY CLAY (A-7-5) 11																																														
1995		1,992.2		12.8		4 3 5																			MEDIUM STIFF, BROWN, SANDY CLAY (A-6), TRACE MICA 12.0																																														
		1,990.7		14.3		60/0.1																			SOFT TO VERY SOFT, BROWN, SANDY SILT (A-4), TRACE GRAVEL AND ORGANICS 12.0																																														
1990																									MEDIUM STIFF, BROWN AND ORANGE, SANDY CLAY (A-6) 14.4																																														
																									CRYSTALLINE ROCK 19.9																																														
																									GRAY, SLIGHTLY TO MODERATELY WEATHERED, CLOSELY FRACTURED, MODERATELY HARD GNEISS																																														
																									REC = 96% RQD = 36% GSI = 60-70																																														
																									Boring Terminated at Elevation 1,985.1 ft IN CRYSTALLINE ROCK (GNEISS)																																														

GEOTECHNICAL BORING REPORT

CORE LOG

WBS 18314.1045035				TIP W0920				COUNTY HENDERSON				GEOLOGIST Payne, C.							
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE												GROUND WTR (ft)							
BORING NO. L_8950				STATION 89+52				OFFSET 8 ft RT				ALIGNMENT -L-				0 HR. N/A			
COLLAR ELEV. 2,005.0 ft				TOTAL DEPTH 19.9 ft				NORTHING 641,814				EASTING 1,022,693				24 HR. FIAD			
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024								DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic							
DRILLER Williams Jr., T.				START DATE 01/16/25				COMP. DATE 01/16/25				SURFACE WATER DEPTH N/A							
CORE SIZE NQ2				TOTAL RUN 5.5 ft															
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %		ROD (ft) %	SAMP. NO.	STRATA REC. (ft) %		ROD (ft) %	L O G	DESCRIPTION AND REMARKS				DEPTH (ft)		
1990.6													Begin Coring @ 14.4 ft						
1990.6	1990.6	14.4	0.5	1:55/0.5	(0.3)	(0.0)			(5.3)	(2.0)			CRYSTALLINE ROCK				14.4		
	1990.1	14.9	5.0	1:38 1:28 1:34 1:37 1:35	60% (5.0) 100%	0% (2.0) 40%			96%	36%	GRAY, SLIGHTLY TO MODERATELY WEATHERED, CLOSELY FRACTURED, MODERATELY HARD GNEISS								
	1985.1	19.9											GSI = 60-70				19.9		
													Boring Terminated at Elevation 1,985.1 ft IN CRYSTALLINE ROCK (GNEISS)						

GEOTECHNICAL BORING REPORT

BORE LOG

WBS		18314.1045035		TIP		W0920		COUNTY		HENDERSON		GEOLOGIST		Hager, M.																																													
SITE DESCRIPTION												NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE				GROUND WTR (ft)																																											
BORING NO.				L_8990				STATION				89+92				OFFSET				7 ft LT				ALIGNMENT				-L-				0 HR.		Dry																									
COLLAR ELEV.				2,008.9 ft				TOTAL DEPTH				19.0 ft				NORTHING				641,848				EASTING				1,022,667				24 HR.		FIAD																									
DRILL RIG/HAMMER EFF./DATE										SME2938 CME-750X 84% 04/18/2024										DRILL METHOD										H.S. Augers										HAMMER TYPE										Automatic									
DRILLER						Gowan, S.						START DATE						03/11/25						COMP. DATE						03/11/25						SURFACE WATER DEPTH												N/A											
ELEV (ft)		DRIVE ELEV (ft)		DEPTH (ft)		BLOW COUNT			BLOWS PER FOOT										SAMP. NO.		MOI		LOG		SOIL AND ROCK DESCRIPTION																																		
						0.5ft 0.5ft 0.5ft			0 25 50 75 100																ELEV. (ft) DEPTH (ft)																																		
2010																																																											
		2,007.9		1.0		5 7 5			12																2,008.9 ROAD SURFACE 0.0																																		
		2,005.4		3.5		2 3 5			8																2,007.9 ROADWAY EMBANKMENT 1.0																																		
2005						2 3 5																			ASPHALT (8.25") OVER STONE (4")																																		
		2,002.9		6.0		3 1 2			3																MEDIUM DENSE, TAN GRAY, SILTY SAND (A-2-4)																																		
2000						2 2 3			5																COBBLES																																		
		1,995.4		13.5		1 2 3			5																SOFT, TAN AND BROWN, SANDY SILT (A-4), TRACE GRAVEL AND WOOD DEBRIS																																		
1995						1 2 3			5																M																																		
		1,990.4		18.5		100/0.5			100/0.5																M																																		
1990						100/0.5			100/0.5																WEATHERED ROCK																																		
																									1,991.9 17.0																																		
																									1,989.9 19.0																																		
																									Boring Terminated at Elevation 1,989.9 ft IN WEATHERED ROCK (GNEISS)																																		

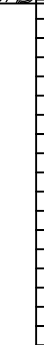
GEOTECHNICAL BORING REPORT

BORE LOG

[illegible]

GEOTECHNICAL BORING REPORT

CORE LOG

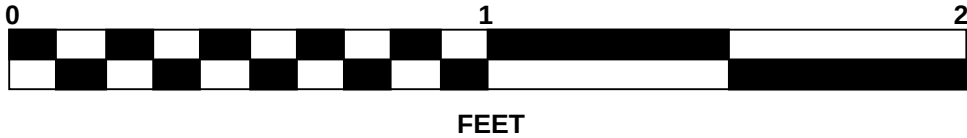
WBS 18314.1045035				TIP W0920				COUNTY HENDERSON				GEOLOGIST Payne, C.											
SITE DESCRIPTION NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE												GROUND WTR (ft)											
BORING NO. L_9900				STATION 98+91				OFFSET 6 ft LT				ALIGNMENT -L-				0 HR. Dry							
COLLAR ELEV. 2,045.0 ft				TOTAL DEPTH 28.2 ft				NORTHING 642,740				EASTING 1,022,619				24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE SME275 DIEDRICH D-50 91% 01/19/2024								DRILL METHOD NW Casing W/SPT & Core				HAMMER TYPE Automatic											
DRILLER Williams Jr., T.				START DATE 01/14/25				COMP. DATE 01/15/25				SURFACE WATER DEPTH N/A											
CORE SIZE NQ2				TOTAL RUN 18.0 ft																			
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %		ROD (ft) %	SAMP. NO.	STRATA REC. (ft) %		ROD (ft) %	L O G	DESCRIPTION AND REMARKS										DEPTH (ft)
2034.8													Begin Coring @ 10.2 ft										
	2,034.8	10.2	3.0	3:59 1:43 0:49	(2.1) 70%	(0.9) 30%			(5.9) 33%	(1.6) 9%			CRYSTALLINE ROCK										10.2
	2,031.8	13.2											GRAY, SLIGHTLY TO MODERATELY WEATHERED, CLOSELY FRACTURED, MODERATELY HARD GNEISS WITH COMPLETELY WEATHERED ZONES										
2030			5.0	2:36 1:37 0:51 2:04 0:59	(2.3) 46%	(0.7) 14%							GSI = 35-45										
	2,026.8	18.2																					
2025			5.0	0:45 1:17 1:42 1:12 1:14	(0.9) 18%	(0.0) 0%																	
	2,021.8	23.2																					
2020			5.0	1:04 1:18 0:43 0:48 0:59	(0.6) 12%	(0.0) 0%																	
	2,016.8	28.2											Boring Terminated at Elevation 2,016.8 ft IN CRYSTALLINE ROCK (GNEISS)										28.2

NC DOT BORE DOUBLE W0920 GEO RDY.GPJ NC_DOT_GDT 4/4/25

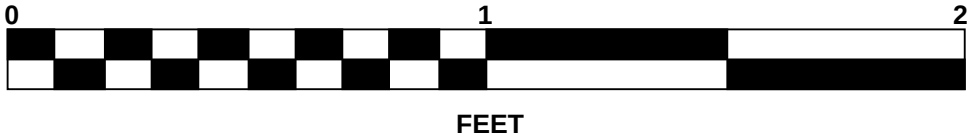
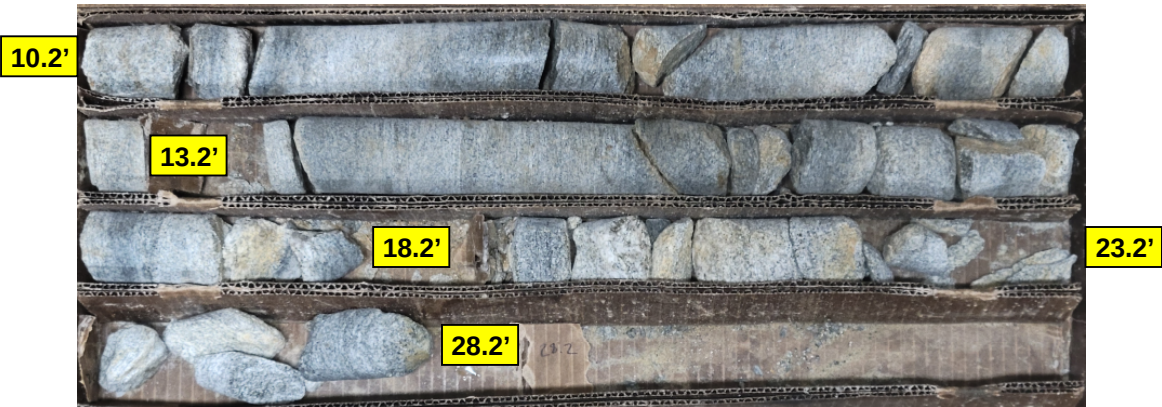
WBS		18314.1045035		TIP		W0920		COUNTY		HENDERSON		GEOLOGIST		Payne, C.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
SITE DESCRIPTION													NC-9 FROM US-74A TO BUNCOMBE COUNTY LINE			GROUND WTR (ft)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
BORING NO.				L_10050				STATION				100+50				OFFSET				16 ft LT				ALIGNMENT				-L-				0 HR.		Dry																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
COLLAR ELEV.				2,046.0 ft				TOTAL DEPTH				33.5 ft				NORTHING				642,897				EASTING				1,022,651				24 HR.		FIAD																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DRILL RIG/HAMMER EFF./DATE										SME275 DIEDRICH D-50 91% 01/19/2024										DRILL METHOD										H.S. Augers										HAMMER TYPE										Automatic																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DRILLER						Williams Jr., T.						START DATE						01/08/25						COMP. DATE						01/09/25						SURFACE WATER DEPTH												N/A																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
			0.5ft	0.5ft	0.5ft	0	25	50	75	100																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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CORE PHOTOGRAPHS

L_8950
14.4 – 19.9 FEET



L_9900
10.2 – 28.2 FEET



SUMMARY OF LABORATORY TEST DATA
Soil Classification and Gradation



S&ME, Inc. Charlotte, 8848 Red Oak Boulevard, Suite A, Charlotte, North Carolina 28217

S&ME Project No.: 24350796

S&ME Project Name: NC-9 from US-74A to Buncombe County Line

Date Report: 2/18/2025

State Project No.: -

County: Henderson

Date Tested: 1/10 - 2/17/2025

WBS No.: 18314.1045035

TIP No.: -

Client Name: Stantec

Client Address: Raleigh, NC

Boring No.	Sample No.	Station #:	Offset	Alignment	Sample Depth (feet)	AASHTO Classification		Total % Passing				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
								Sieve #				Coarse Sand	Fine Sand	Silt	Clay				
								10	40	60	200								
L_3975	SS-91	39+75	-8	-L-	6.0-7.5	A-4	(0)	100	91	81	48	20	39	24	17	34	31	3	26.6
L_4950	SS-81	49+50	-7	-L-	8.5-10.0	A-2-4	(0)	98	81	66	31	33	42	17	8	NP			26.8
L_7600	SS-109	76+00	-6	-L-	8.5-10.0	A-4	(0)	98	82	71	43	28	33	19	20	37	33	4	22.8
L_7700	SS-128	77+00	-8	-L-	13.5-15.0	A-6	(3)	98	83	73	51	25	27	18	30	39	28	11	24.3
L_8950	SS-22	89+50	8	-L-	6.0-7.5	A-4	(1)	98	90	80	48	18	39	21	22	35	28	7	29.6
L_10050	SS-3	100+50	-16	-L-	6.0-7.5	A-2-4	(0)	98	87	73	32	26	50	19	5	NP			17.6

References / Comments / Deviations:

NP=Not Plastic

QNS=Quantity Not Sufficient

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Karen Warner

Technician Name:

118-06-0305

Certification #

Signature

Luis Campos, P.E.

Technical Responsibility:

Project Manager

Position

This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

S&ME, Inc.

3201 Spring Forest Road
Raleigh, NC 27616

Lab Summary Table.xlsx