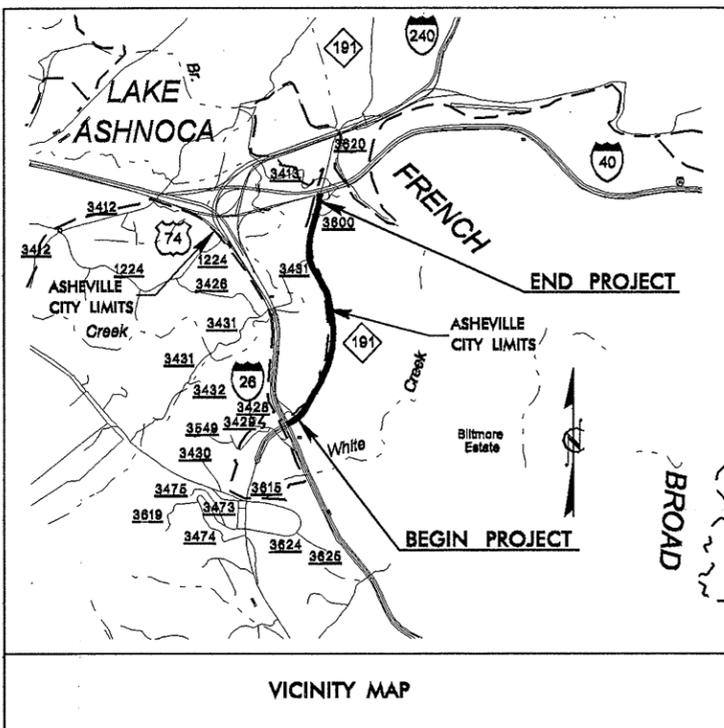


PROJECT ID: U-3601

PROJECT ID: C201369



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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3601	1	19
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34958.1.1	STP-191(4)	PE	
34958.2.1	STP-191(4)	RW & UTIL.	
34958.3.1	STP-191(6)	CONST.	

CAUTION NOTICE

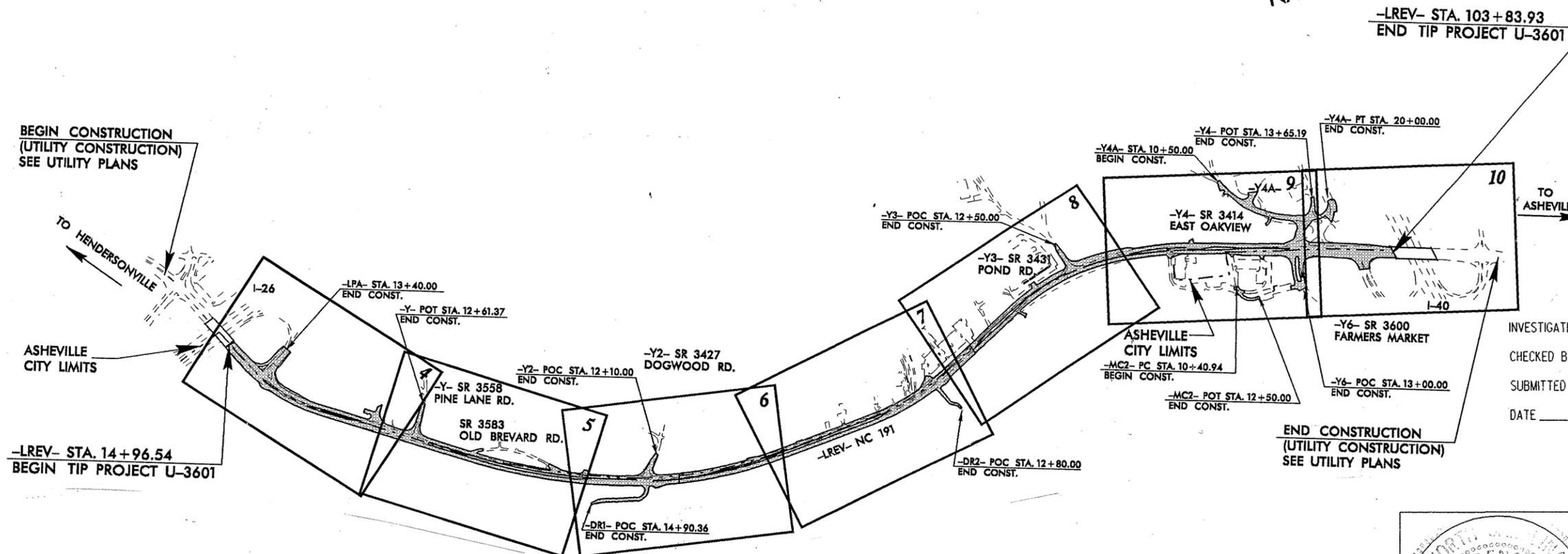
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WAS MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL 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.

SUBSURFACE INVESTIGATION

STATE PROJECT 8.1844501 I.D. NO. U-3601
 F.A. PROJECT STP-191(4)
 COUNTY BUNCOMBE
 DESCRIPTION NC 191 (BREVARD ROAD)
FROM I-26 TO I-40

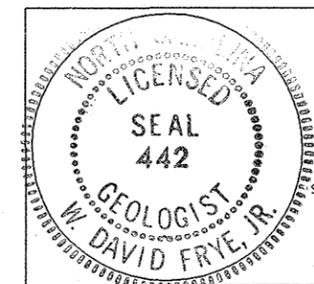


INVESTIGATED BY	PQ LOCKAMY	PERSONNEL	PQ LOCKAMY
CHECKED BY	WD FRYE		TB DANIEL
SUBMITTED BY	WD FRYE		JT WILLIAMS
DATE	AUGUST 15, 2002		LE LANKFORD
			GK ROSE

DRAWN BY: P. Q. LOCKAMY

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.



W. David Frye, Jr.
 SIGNATURE

PROJECT: 8.1844501 ID: U-3601

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL UNIT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3601	1A	19
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
8.1844501	STP-191(4)	P.E.	
		CONST.	

LINES INVESTIGATED:

- L- Sta. 17+50.00 TO 103+00
- Y1- Sta. 10+00.00 TO 12+61+37
- Y3- Sta. 10+00.00 TO 14+43.25
- Y4- Sta. 10+00.00 TO 16+83.13

SUBSURFACE INVESTIGATION

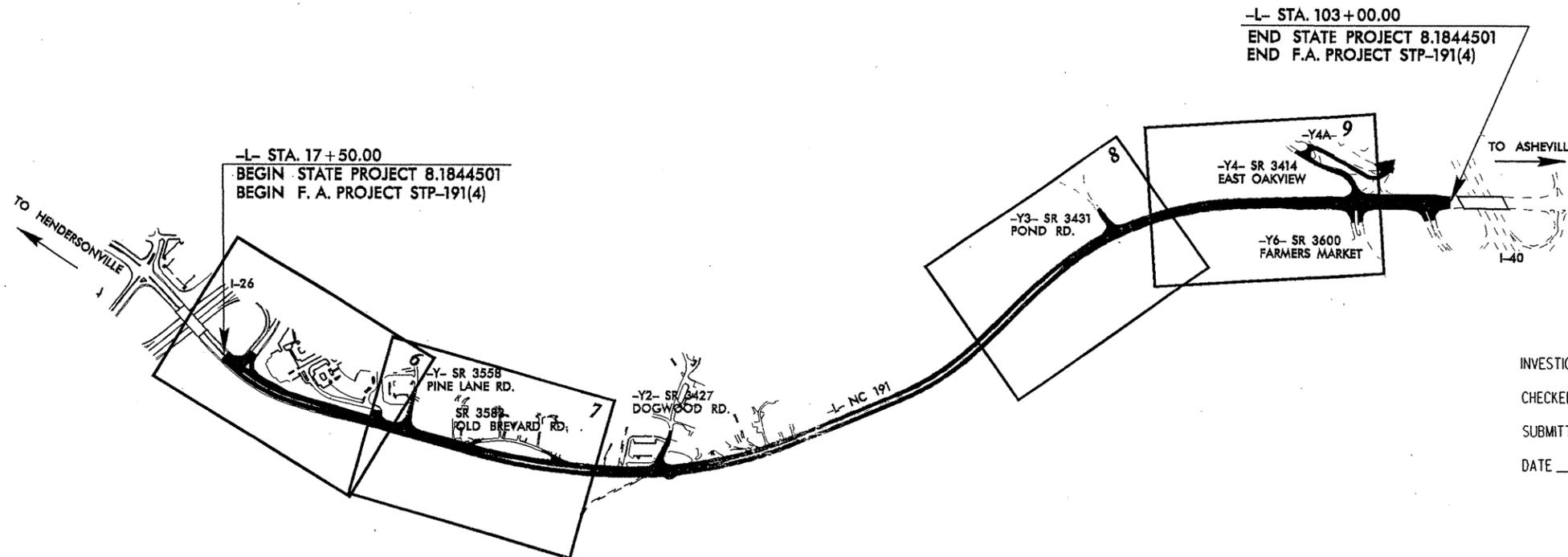
STATE PROJECT 8.1844501 I.D. NO. U-3601
 F.A. PROJECT STP-191(4)
 COUNTY BUNCOMBE
 DESCRIPTION NC 191 (BREVARD ROAD)
FROM I-26 TO I-40

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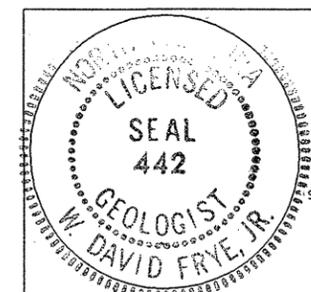


INVESTIGATED BY PQ LOCKAMY PERSONNEL PQ LOCKAMY
 CHECKED BY WD FRYE TB DANIEL
 SUBMITTED BY WD FRYE JT WILLIAMS
 DATE AUGUST 15, 2002 LE LANKFORD
GK ROSE

DRAWN BY: P. Q. LOCKAMY

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W. David Frye, Jr.
 SIGNATURE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL UNIT

ID	STATE PROJECT NO.	SHEET NO.	TOTAL SHEETS
B-3601	8.1844501	2	19

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 style="text-align: center;"><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)</p> <p>GAP-GRADED- INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-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.</p> <p>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 (REC.) - 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 (FM.) - 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 (MOT.) - 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 (N 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 (SREC.) - 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 style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th colspan="2">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> <th>A-7-5</th> <th>A-7-6</th> <th>A-7-8</th> <th>A-3</th> <th></th> <th></th> </tr> <tr> <td>GROUP CLASS.</td> <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></td> </tr> <tr> <td>SYMBOL</td> <td></td> </tr> <tr> <td>% PASSING</td> <td>50 MX</td> <td>30 MX</td> <td>50 MX</td> <td>50 MN</td> <td>50 MN</td> <td>50 MN</td> <td>40 MX</td> <td>40 MN</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX</td> <td>N.P.</td> <td>40 MX</td> <td>41 MN</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>10 MN</td> <td>11 MN</td> <td>11 MN</td> <td>11 MN</td> <td>11 MN</td> <td>11 MN</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. GRAVEL AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="2">GRANULAR SOILS</td> <td colspan="2">MUCK, PEAT</td> </tr> <tr> <td>GENERATING AS A SUBGRADE</td> <td colspan="6">EXCELLENT TO GOOD</td> <td colspan="4">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="4">UNSATURABLE</td> </tr> </table> <p style="text-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 (35% PASSING #200)							SILT-CLAY MATERIALS (35% 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	A-7-5	A-7-6	A-7-8	A-3			GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7											SYMBOL																	% PASSING	50 MX	30 MX	50 MX	50 MN	50 MN	50 MN	40 MX	40 MN	40 MN	40 MN	40 MN	40 MN	40 MN	40 MN	40 MN	40 MN	LIQUID LIMIT PLASTIC INDEX	6 MX	N.P.	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	GROUP INDEX	0	0	0	0	0	0	4 MX	8 MX	12 MX	16 MX	10 MN	11 MN	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		MUCK, PEAT		GENERATING AS A SUBGRADE	EXCELLENT TO GOOD						FAIR TO POOR				FAIR TO POOR	POOR	UNSATURABLE				<p style="text-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 style="text-align: center;">WEATHERED ROCK (WR)</p> <p style="text-align: center;">CRYSTALLINE ROCK (CR)</p> <p style="text-align: center;">NON-CRYSTALLINE ROCK (NCR)</p> <p style="text-align: center;">COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>	<p style="text-align: center;">COMPRESSIONIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 30 LIQUID LIMIT 31-50 LIQUID LIMIT GREATER THAN 50</p>				
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GROUP INDEX	0	0	0	0	0	0	4 MX	8 MX	12 MX	16 MX	10 MN	11 MN	11 MN	11 MN	11 MN	11 MN																																																																																																																																														
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STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

August 2002

STATE PROJECT: 8.1844501 (U-3601)
F. A. PROJECT NO: STP-191(4)
COUNTY: Buncombe
DESCRIPTION: NC-191 (Brevard Road) From I-26 to I-40 in Asheville

SUBJECT: Geotechnical Report – Inventory

Project Description

This project is located in south central Buncombe County. It begins south of Interchange 2 on I-26 near Biltmore Square Mall and ends north of Interchange 47 on I-40 at the Farmers Market. It involves widening the existing two-lane highway to four lanes with intermittent turning lanes at selected intersections, construction of a sidewalk on the west side of the road, realignment of SR-3414 (-Y4-), a new entrance road for Progress Energy (-Y4A-) and three retaining walls. Total length of this project is 1.62 miles. The focus of this investigation is on the three retaining walls.

A mix of older residential development and newer commercial activities characterizes existing NC-191. Woodlands and fields of the Biltmore Estate are found along most of the east side of the highway.

The subsurface investigation was conducted in April of 2002. Borings were advanced using a CME-550 ATV drill. Eight-inch hollow stem augers were utilized to conduct Standard Penetration Tests (SPT's). An automatic hammer was used during SPT's. Soil samples were taken for quality and moisture. A total of four Shelby Tubes were taken at two of the retaining walls.

Areas of Special Geotechnical Interest

- (1) Three retaining walls: Station Interval -L-
68 Feet Right, 21+00–29+00
50 Feet Right, 76+50–80+00
50 Feet Right, 89+28–90+95
- (2) Areas of Uncontrolled Fill: Station Interval -L-
Left of 30+40–31+70
Left of 81+50–83+40
Left of 94+00–95+70

Station Interval -Y4-
11+00–12+50

Station Interval -Y3-
Right of 11+00–12+50
- (3) The dwelling located left of -L- Station 96+30 may have a septic tank. A well appears to be in front of the house.

Physiography

The project is located in the Blue Ridge Mountains. NC-191 traverses the dividing ridge between the French Broad River and Hominy Creek. Hominy Creek is undergoing rapid headward erosion, has steep valley walls, and an almost canyon-like appearance in the vicinity of this project.

Geology and Regolith

Rock is not exposed within the project corridor. Bedrock is most likely of the Ashe Formation, gneissic in character and rich in mica. Thin residual soils are present throughout the area along with a rather unique type of colluvial clay. Slightly micaceous, fine sandy saprolite with varying amounts of silt underlies the clay cap. Weathered rock was rarely encountered during the investigation.

Geotechnical Descriptive Analysis of the Project.

A general description of soils along the project with specific discussions of areas of geotechnical interest follows.

The entire length of this project occupies a drainage divide ridge capped with one to twenty feet of medium stiff to stiff, residual or colluvial sandy clay and sandy silty clay (A-6, A-7-5, and A-7-6). Some intermittent topsoil occurs as thin (less than 1 foot) layers of soft sandy clayey silt. For the most part, the topsoil is too discontinuous to be shown on soil profiles. Underlying the cap clay is fine sandy silt to silty sand saprolite (A-4, A-2-4) which yields blow counts generally within the 10 to 30 blow range. Some saprolite has undergone clay enrichment resulting in stiff fine sandy clayey silt or medium dense slightly clayey sand (A-5, A-2-5). Nearly all of the saprolite encountered is slightly micaceous. Some soils classified as A-2-4 actually feel like A-4 soil due the presence of the mica. The small mica specks show up on soil test data classified as fine sand. Weathered rock is found at depths greater than 10 feet in isolated locations. It can be crushed by hand to sandy silt or silty sand and is occasionally interlayered with saprolite. Embankment encountered in one boring consists of fine sandy silty clay (A-7-5). The majority of embankment on the project is expected to be similar with a smaller portion of embankment to be fine sandy silt and silty sand (A-4, A-2-4). Proposed fill areas range from a few feet to almost 18 feet high. Proposed cuts go to approximately 15 feet high. Weathered rock may be encountered in very limited cut areas. Hard rock may not be encountered on this project.

Retaining Wall 68 feet Right of Station 21+00 to 29+00 -L-

This proposed wall is up to 10 feet high, 800 feet long and traverses the head of a small drainage. Part of the drainage has been naturally filled with colluvial clay that apparently flowed downhill in multiple episodes during past ice ages. The process of solifluction has caused residual clay formerly higher up in the drainage to flow and be deposited downslope to a thickness of up to 20 feet. This medium stiff to stiff, fine sandy clay and fine sandy silty clay (A-6, A-7-5, A-7-6) is easily distinguished from in-situ residual clay by the presence of weathered rock clasts. Rock clasts are more common in the upper portions of the colluvium. Also seen in the colluvium are buried wooden pieces of tree and brush, which have been blackened by time. Conditions leading to the formation of this clay mass are now extremely different and the colluvium is stable. Pavement upslope of the proposed wall is in excellent condition but it may be the case that ground saturation could possibly trigger slow, creeping movement. An excellent exposure of this soliflucted clay is visible approximately 240 feet right of Station 26+00 -L-.

Two Shelby Tubes were taken from the thickest part of the colluvium and a third tube was taken from along the edge of the colluvium on the northern end of the retaining wall where there is a vague transition to residual clay.

Saprolite underlies the clay at depths greater than 4 to 20 feet, consists of stiff to very stiff sandy silt and fine sandy clayey silty (A-4, A-5) with loose to dense silty fine sand (A-2-4). All of the saprolite is slightly micaceous.

Groundwater was not encountered at the time of boring.

Retaining Wall 50 feet Right of Station 76+50 to 80+00 -L-

This proposed wall is in a cut section and is up to 12 feet high. Residual clay soil is from zero to three feet thick. The fine sandy clay (A-7-5, A-7-6) is soft to medium stiff. Underlying saprolite includes medium dense to very dense silty sand and clayey sand (A-2-4, A-2-5) along with medium stiff to very stiff sandy silt and clayey sandy silt. All saprolitic soils are slightly micaceous and dry at the time of boring. Weathered rock may be encountered in the central portion of the wall below a depth of ten feet.

A Shelby Tube was taken from this wall. Bulk samples are available upon request.

Retaining Wall 50 feet Right of Station 89+28 to 90+65 -L-

This proposed retaining wall replaces an existing concrete retaining wall in front of Inanda Church and Cemetery. Well-compacted crusher run stone approximately one and a half feet deep covers the unpaved shoulder from the edge of pavement to the existing retaining wall. The underlying slightly micaceous saprolite is very stiff to hard sandy silt or loose to dense fine to coarse sand (A-4, A-2-4). Weathered rock was encountered at a depth of 15 feet at a boring 46 feet right of -L- Station 90+50. All borings were dry 24 hours after boring.

Uncontrolled Fill Left of -L- Station 30+40 to 31+70

An area of uncompacted fill containing one to six feet of clean soil, some rock and pieces of concrete pavement (which has apparently been added to since the cross sections for the project were made) is present in a proposed fill area left of -L- Station 30+40 to 31+70. This fill is mostly sandy silt (A-4) with some sand and clay soils included. This recent fill ends parallel to and outside of the proposed guardrail by approximately 5 feet.

Uncontrolled Fill Left of -L- Station 81+50 to 83+40 and Right of -Y3- 11+00 to 12+50

This fill contains soil, rubble, wood, metal, and construction debris. The fill is dumped in piles and larger masses and appears to have been added to since cross sections were made. It skirts the proposed edge of pavement left of -L- Station 81+50 to 83+40 and is outside of proposed paved areas right of -Y3-. Depth of the fill varies. It is shallow near the -Y3-/-L- intersection and appears to be approximately 5 feet deep at its terminus left of -L- Station 83+40. A partially buried manhole was observed left of -L- near Station 81+80 is not shown on the plans.

Uncontrolled Fill Left of -L- Station 94+00 to 95+70

This uncompacted soil and concrete rubble fill starts approximately 15 feet left of the edge of pavement. Portions of this fill underlie a proposed southbound travel lane, curb a gutter and sidewalk. The fill is expected to be one to four feet thick under proposed pavement areas.

Uncontrolled Fill Along -Y4- Station 11+00 to 12+50

This is in the backyard of a house where the downhill side of the yard was extended 10 to 20 feet. The fill will be on both sides of -Y4- from Station 11+00 to 12+00 and on the left side of -Y4- from Station 12+00 to 12+50. Fill depths are one to 5 feet. The fill may contain some trash in it.

Respectfully Submitted,



P. Q. Lockamy, TEG II

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT U-3601

COUNTY Buncombe

DATE 2/5/2008

SHEET 1 OF 2 SHEETS

RD09S02B

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	+15%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
SUMMARY NO. 1															
L	17+00.00 LT	17+55.00 LT	7				7	10		10	11	4			
LPA	10+80.00 LT	13+40.00 LT	218				218						218		218
	SUBTOTAL NO. 1		225				225	10		10	11	4	218		218
SUMMARY NO. 2															
LPA	11+00.00 RT	13+40.00 RT	66				66	84		84	97	31			
L	19+00.00 RT	47+00.00 LT	1842				1842	4858		4858	5587	3745			
Y	10+50.00	12+61.37	294				294	97		97	112		182		182
Y2	10+50.00	12+10.00	14				14	67		67	77	63			
	SUBTOTAL NO. 2		2216				2216	5106		5106	5873	3839	182		182
SUMMARY NO. 3															
L	47+35.00 LT	63+18.96 LT	371				371	2581		2581	2968	2597			
LREV	63+18.96 LT	77+00.00 LT	695				695	909		909	1046	351			
	SUBTOTAL NO. 3		1066				1066	3490		3490	4014	2948			
SUMMARY NO. 4															
LREV	77+00.00 LT	96+50.00 LT	2285				2285	5749		5749	6609	4324			
Y3	10+90.00	12+50.00	38				38	406		406	468	430			
	SUBTOTAL NO. 4		2323				2323	6155		6155	7077	4754			
SUMMARY NO. 5															
Y4A	10+50.00	17+56.00	4727				4727	4328		4328	4978	251			
Y4A	18+50.00	19+50.00	644				644	8		8	9		635		635
Y4	10+85.00	14+00.00	273				273	7490		7490	8614	8341			
LREV	98+00.00 LT	102+50.00 LT	935				935	19		19	22		913		913
	SUBTOTAL NO. 5		6579				6579	11845		11845	13623	8592	1548		1548
SUMMARY NO. 6															
L	17+50.00 RT	48+00.00 RT	2514				2514	16377		16377	18829	16315			
	SUBTOTAL NO. 6		2514				2514	16377		16377	18829	16315			
TOTAL THIS PAGE			14923				14923	42983		42983	49427	36452	1948		1948

*EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

EARTHWORK BALANCE SHEET

Volumes in Cubic Yards

PROJECT U-3601

COUNTY Buncombe

DATE 2/5/2008

SHEET 2 OF 2 SHEETS

RD09S02B

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	ROCK EXCAV.	UNDERCUT	UNSUIT. EXCAV.	SUITABLE EXCAV.	TOTAL EMB.	ROCK EMB.	EARTH EMB.	EMBANK. +15%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
TOTAL PREVIOUS PAGE			14923				14923	42983		42983	49427	36452	1948		1948
	SUMMARY NO. 7														
L	48+00.00 RT	63+18.96 RT	3604				3604	10242		10242	11777	8173			
DR1	10+75.00	14+90.36	163				163	5271		5271	6062	5899			
LREV	63+18.96 RT	78+00.00 RT	4090				4090	6661		6661	7660	3570			
DR2	10+50.00	12+80.00	1066				1066						1066		1066
	SUBTOTAL NO. 7		8923				8923	22174		22174	25499	17642	1066		1066
	SUMMARY NO. 8														
LREV	78+00.00 RT	96+00.00 RT	1737				1737	6704		6704	7708	5971			
Y6	10+75.00 RT	12+00.00 RT	4				4	113		113	130	126			
	SUBTOTAL NO. 8		1741				1741	6817		6817	7838	6097			
	SUMMARY NO. 9														
Y6	10+75.00 LT	12+00.00 LT	3				3	185		185	213	210			
LREV	98+00.00 RT	107+70.00 RT						1399		1399	1609	1609			
MC2	10+50.00	12+50.00	287				287	342		342	392	105			
	SUBTOTAL NO. 9		290				290	1926		1926	2214	1924			
	SUMMARY TOTALS		25877				25877	73900		73900	84978	62115	3014		3014
	WASTE TO BE USED IN LIEU OF BORROW											-3014	-3014		-3014
	LOSSES DUE TO CLEARING AND GRUBBING		-1700				-1700					1700			
	PROJECT TOTAL		24177				24177	73900		73900	84978	60801			
	EST 5% TO REPLACE TOPSOIL ON BORROW PIT											3000			
	GRAND TOTAL		24177				24177	73900		73900	84978	63801			
	SAY		24500									64000			
	EST UNDERCUT PER GEOTECH		1200 CU YDS												
	INCLUDES UNDERCUT ON X-SEC'S														
	FABRIC FOR SOIL STABILIZATION PER GEOTECH		1000 SQ YDS												
	SELECT GRANULAR MATERIAL		1100 CU YDS												
	SELECT MATERIAL CLASS IV		1890 TONS												
	DRAINAGE DITCH EXCAVATION		750 CU YDS												

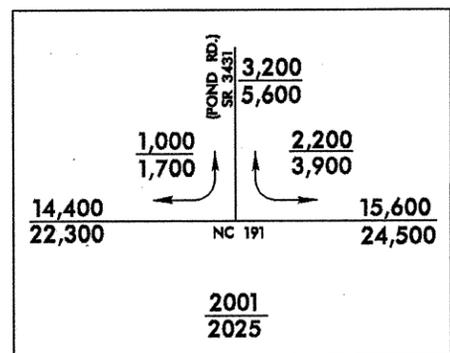
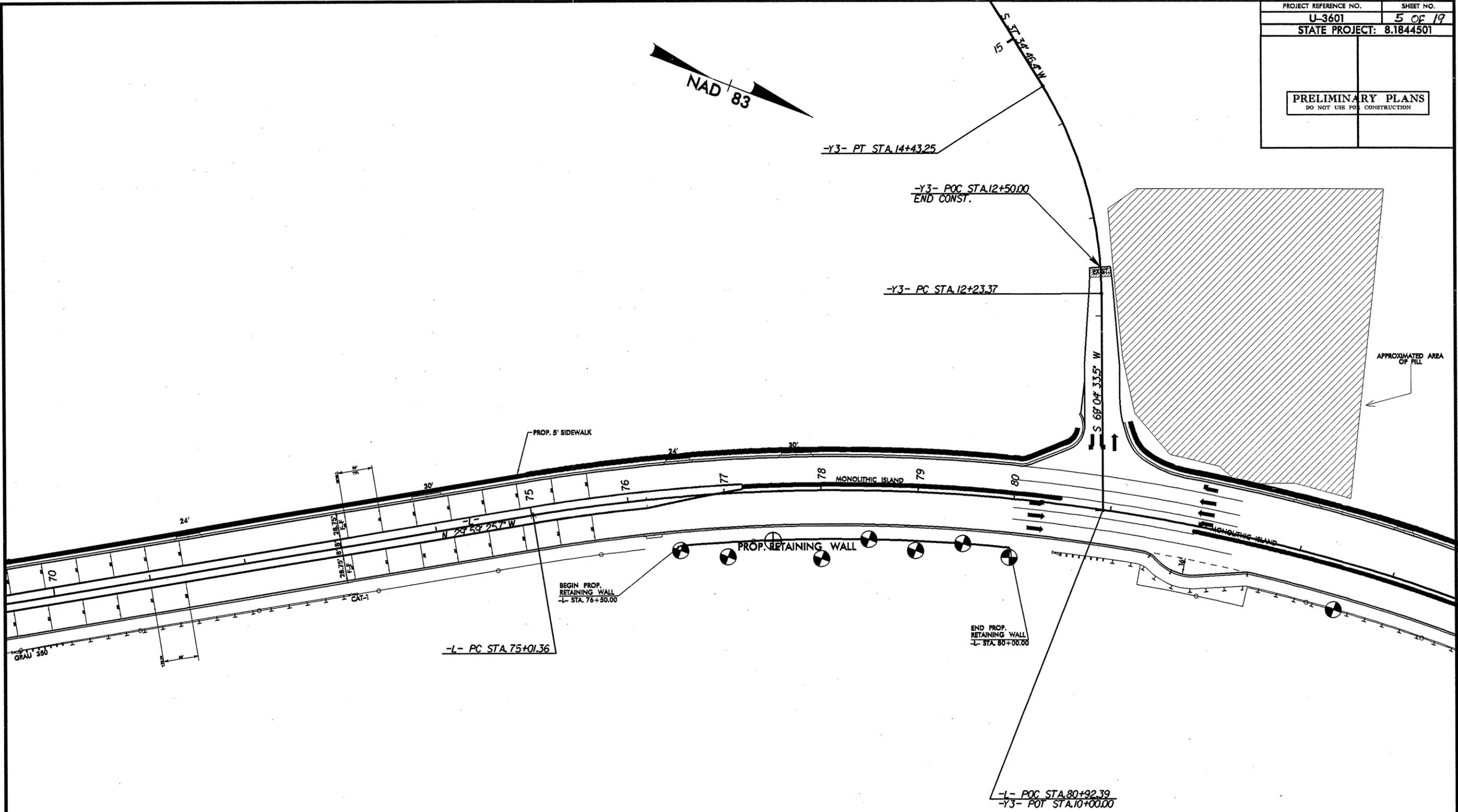
*EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

8/17/99

PROJECT REFERENCE NO. U-3601	SHEET NO. 5 OF 19
STATE PROJECT: 8.1844501	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	



REVISIONS



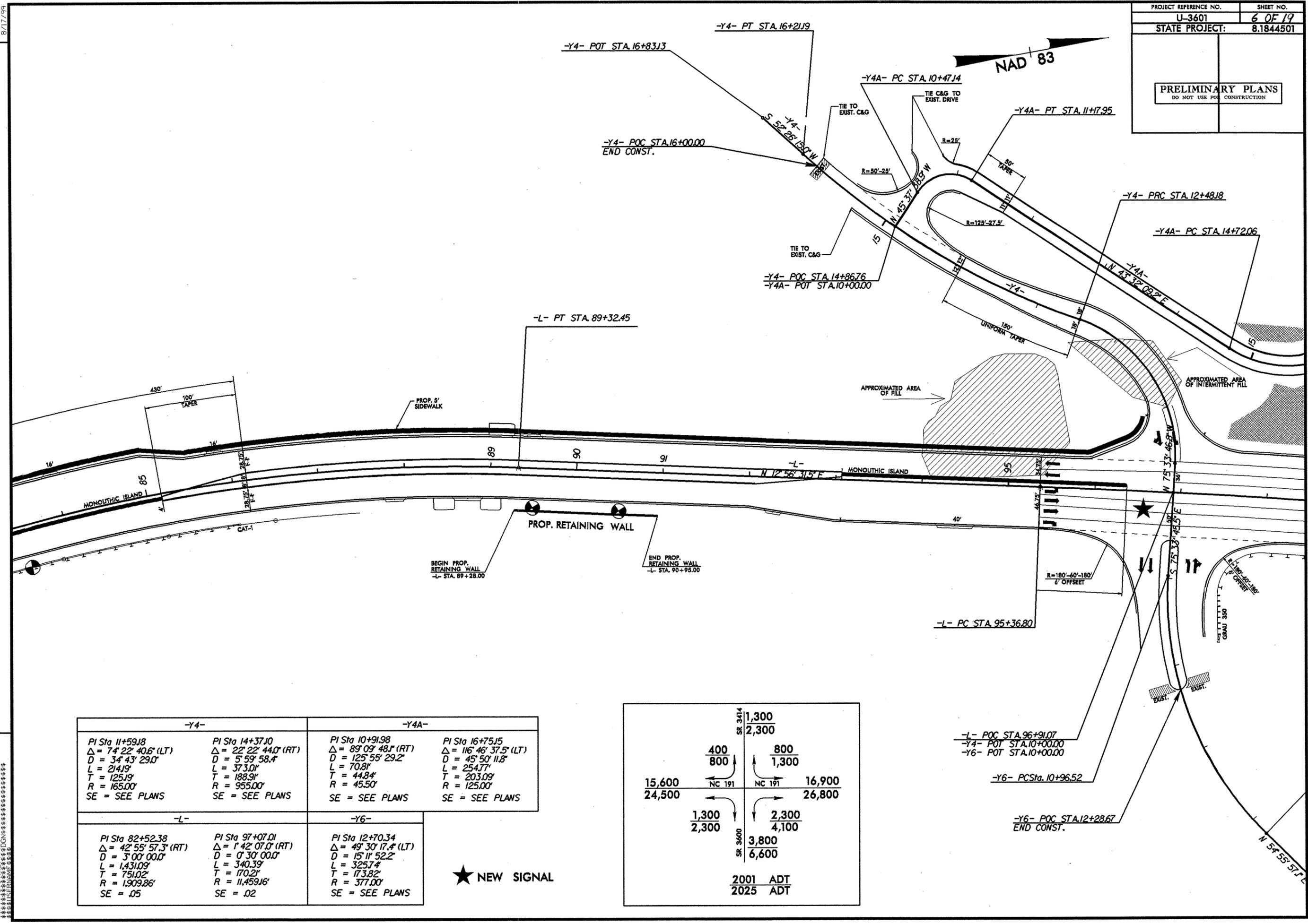
-L-	-Y3-
PI Sta 82+52.38	PI Sta 13+36.16
$\Delta = 42^\circ 55' 57.3''$ (RT)	$\Delta = 31^\circ 29' 47.2''$ (LT)
$D = 3^\circ 00' 00.0''$	$D = 14^\circ 19' 26.2''$
$L = 1,431.09'$	$L = 219.89'$
$T = 751.02'$	$T = 112.80'$
$R = 1,909.86'$	$R = 400.00'$
$SE = .05$	$SE = \text{SEE PLANS}$

★ EXISTING SIGNAL

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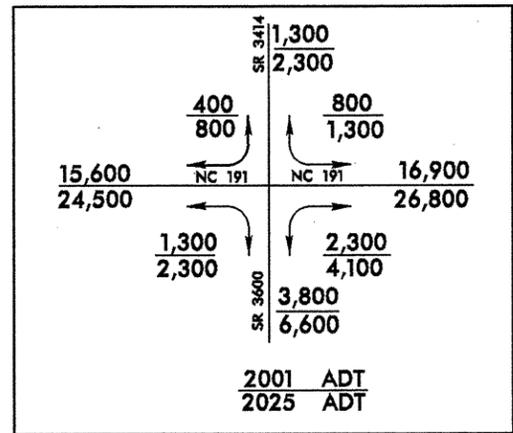
8/17/99

REVISIONS



-Y4-		-Y4A-	
PI Sta 11+59.18 Δ = 74° 22' 40.6" (LT) D = 34' 43" 29.0" L = 214.19' T = 125.19' R = 165.00' SE = SEE PLANS	PI Sta 14+37.10 Δ = 22° 22' 44.0" (RT) D = 5' 59" 58.4" L = 373.01' T = 188.91' R = 955.00' SE = SEE PLANS	PI Sta 10+91.98 Δ = 89° 09' 48.1" (RT) D = 125' 55" 29.2" L = 70.81' T = 44.84' R = 45.50'	PI Sta 16+75.15 Δ = 116° 46' 37.5" (LT) D = 45' 50" 11.8" L = 254.77' T = 203.09' R = 125.00'
-L-		-Y6-	
PI Sta 82+52.38 Δ = 42° 55' 57.3" (RT) D = 3' 00" 00.0" L = 1,431.09' T = 751.02' R = 1,909.86' SE = .05	PI Sta 97+07.01 Δ = 1° 42' 07.0" (RT) D = 0' 30" 00.0" L = 340.39' T = 170.21' R = 11,459.16' SE = .02	PI Sta 12+70.34 Δ = 49° 30' 17.4" (LT) D = 15' 11" 52.2" L = 325.74' T = 173.82' R = 377.00' SE = SEE PLANS	

★ NEW SIGNAL



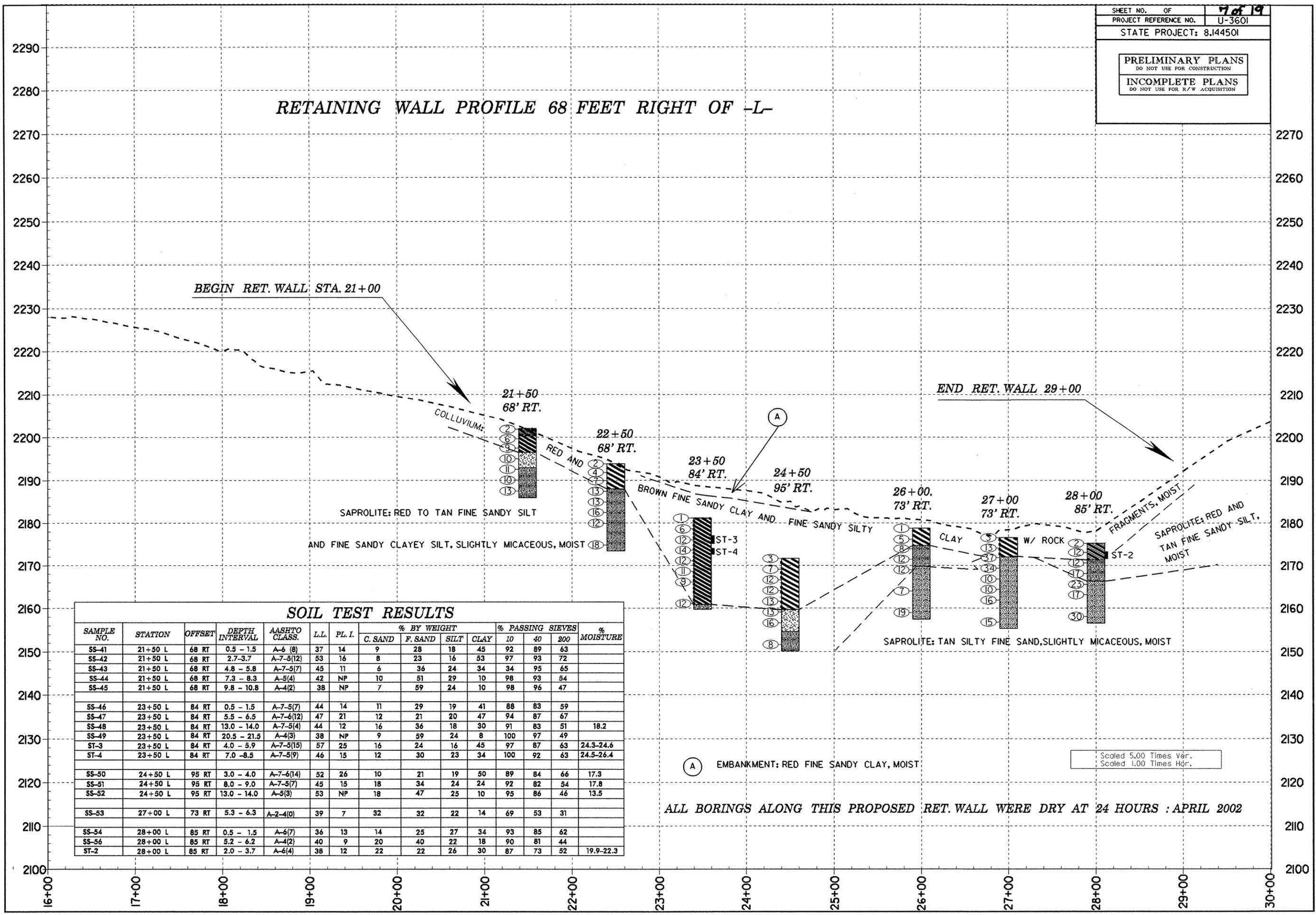
-L- POC STA. 96+91.07
-Y4- POT STA. 10+00.00
-Y6- POT STA. 10+00.00

-Y6- PC Sta. 10+96.52

-Y6- POC STA. 12+28.67
END CONST.

CONDITIONS

RETAINING WALL PROFILE 68 FEET RIGHT OF -L-



SOIL TEST RESULTS

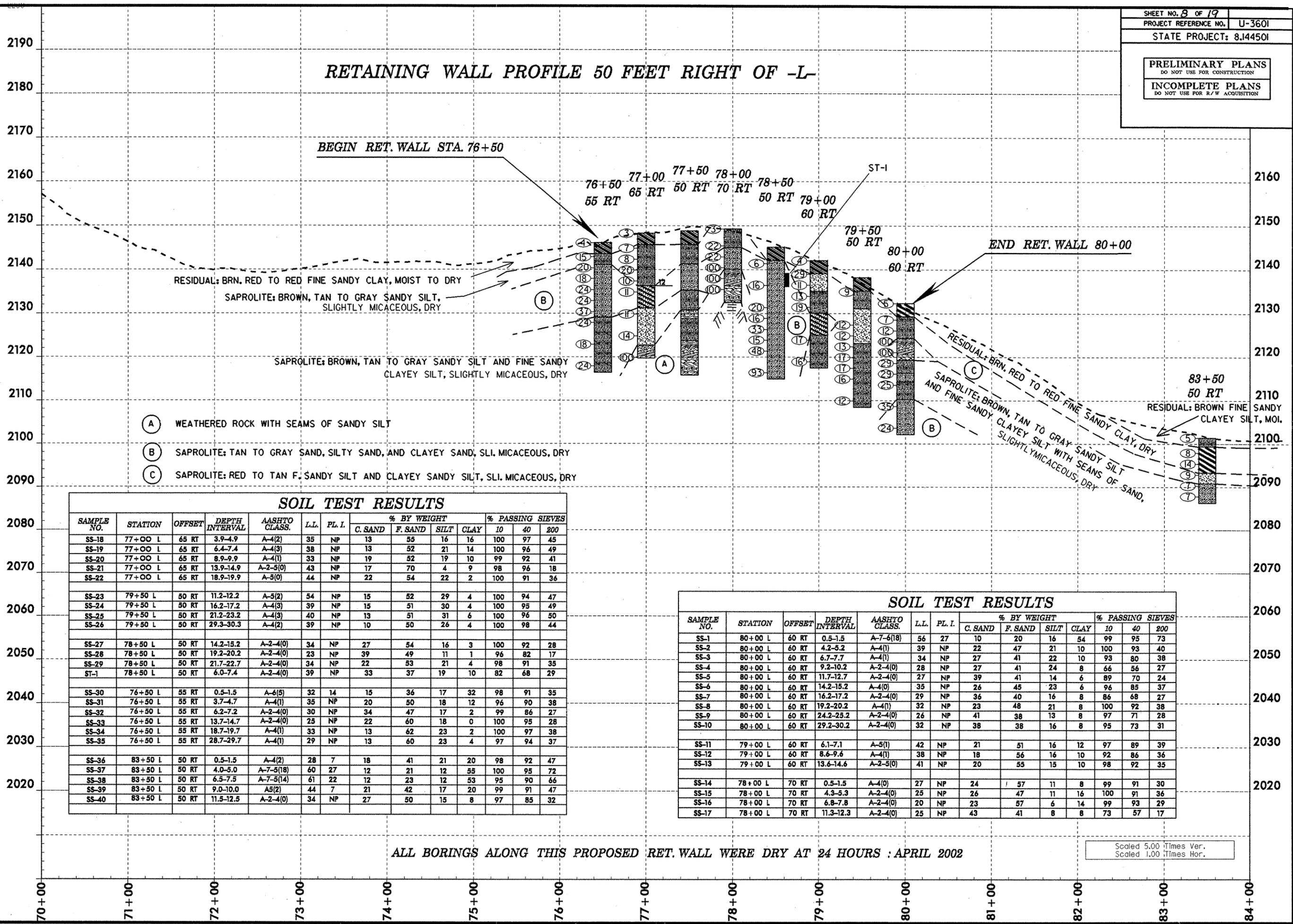
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.L. I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE
							C. SAND	F. SAND	SILT	CLAY	10	40	200	
SS-41	21+50 L	68 RT	0.5 - 1.5	A-6 (8)	37	14	9	28	18	45	92	89	63	
SS-42	21+50 L	68 RT	2.7-3.7	A-7-5(12)	53	16	8	23	16	53	97	93	72	
SS-43	21+50 L	68 RT	4.8 - 5.8	A-7-5(7)	45	11	6	36	24	34	95	95	65	
SS-44	21+50 L	68 RT	7.3 - 8.3	A-5(4)	42	NP	10	51	29	10	98	93	54	
SS-45	21+50 L	68 RT	9.8 - 10.8	A-4(2)	38	NP	7	59	24	10	98	96	47	
SS-46	23+50 L	84 RT	0.5 - 1.5	A-7-5(7)	44	14	11	29	19	41	88	83	59	
SS-47	23+50 L	84 RT	5.5 - 6.5	A-7-6(12)	47	21	12	21	20	47	94	87	67	
SS-48	23+50 L	84 RT	13.0 - 14.0	A-7-5(4)	44	12	16	36	18	30	91	83	51	18.2
SS-49	23+50 L	84 RT	20.5 - 21.5	A-4(3)	38	NP	9	59	24	8	100	97	49	
ST-3	23+50 L	84 RT	4.0 - 5.9	A-7-5(15)	57	25	16	24	16	45	97	87	63	24.3-24.6
ST-4	23+50 L	84 RT	7.0 - 8.5	A-7-5(9)	46	15	12	30	23	34	100	92	63	24.5-26.4
SS-50	24+50 L	95 RT	3.0 - 4.0	A-7-6(14)	52	26	10	21	19	50	89	84	66	17.3
SS-51	24+50 L	95 RT	8.0 - 9.0	A-7-5(7)	45	15	18	34	24	24	92	82	54	17.8
SS-52	24+50 L	95 RT	13.0 - 14.0	A-5(3)	53	NP	18	47	25	10	95	86	46	13.5
SS-53	27+00 L	73 RT	5.3 - 6.3	A-2-4(0)	39	7	32	32	22	14	69	53	31	
SS-54	28+00 L	85 RT	0.5 - 1.5	A-6(7)	36	13	14	25	27	34	93	85	62	
SS-56	28+00 L	85 RT	5.2 - 6.2	A-4(2)	40	9	20	40	22	18	90	81	44	
ST-2	28+00 L	85 RT	2.0 - 3.7	A-6(4)	38	12	22	22	26	30	87	73	52	19.9-22.3

Scaled 5.00 Times Ver.
 Scaled 1.00 Times Hor.

(A) EMBANKMENT: RED FINE SANDY CLAY, MOIST

ALL BORINGS ALONG THIS PROPOSED RET. WALL WERE DRY AT 24 HOURS : APRIL 2002

RETAINING WALL PROFILE 50 FEET RIGHT OF -L-



- (A) WEATHERED ROCK WITH SEAMS OF SANDY SILT
- (B) SAPROLITE: TAN TO GRAY SAND, SILTY SAND, AND CLAYEY SAND, SLI. MICACEOUS, DRY
- (C) SAPROLITE: RED TO TAN F. SANDY SILT AND CLAYEY SANDY SILT, SLI. MICACEOUS, DRY

SOIL TEST RESULTS													
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	% BY WEIGHT				% PASSING SIEVES		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-18	77+00 L	65 RT	3.9-4.9	A-4(2)	35	NP	13	55	16	16	100	97	45
SS-19	77+00 L	65 RT	6.4-7.4	A-4(3)	38	NP	13	52	21	14	100	96	49
SS-20	77+00 L	65 RT	8.9-9.9	A-4(1)	33	NP	19	52	19	10	99	92	41
SS-21	77+00 L	65 RT	13.9-14.9	A-2-5(0)	43	NP	17	70	4	9	98	96	18
SS-22	77+00 L	65 RT	18.9-19.9	A-3(0)	44	NP	22	54	22	2	100	91	36
SS-23	79+50 L	50 RT	11.2-12.2	A-5(2)	54	NP	15	52	29	4	100	94	47
SS-24	79+50 L	50 RT	16.2-17.2	A-4(3)	39	NP	15	51	30	4	100	95	49
SS-25	79+50 L	50 RT	21.2-23.2	A-4(3)	40	NP	13	51	31	6	100	96	50
SS-26	79+50 L	50 RT	29.3-30.3	A-4(2)	39	NP	10	50	26	4	100	98	44
SS-27	78+50 L	50 RT	14.2-15.2	A-2-4(0)	34	NP	27	54	16	3	100	92	28
SS-28	78+50 L	50 RT	19.2-20.2	A-2-4(0)	23	NP	39	49	11	1	96	82	17
SS-29	78+50 L	50 RT	21.7-22.7	A-2-4(0)	34	NP	22	53	21	4	98	91	35
ST-1	78+50 L	50 RT	6.0-7.4	A-2-4(0)	39	NP	33	37	19	10	82	68	29
SS-30	76+50 L	55 RT	0.5-1.5	A-6(5)	32	14	15	36	17	32	98	91	35
SS-31	76+50 L	55 RT	3.7-4.7	A-4(1)	35	NP	20	50	18	12	96	90	38
SS-32	76+50 L	55 RT	6.2-7.2	A-2-4(0)	30	NP	34	47	17	2	99	86	27
SS-33	76+50 L	55 RT	13.7-14.7	A-2-4(0)	25	NP	22	60	18	0	100	95	28
SS-34	76+50 L	55 RT	18.7-19.7	A-4(1)	33	NP	13	62	23	2	100	97	38
SS-35	76+50 L	55 RT	28.7-29.7	A-4(1)	29	NP	13	60	23	4	97	94	37
SS-36	83+50 L	50 RT	0.5-1.5	A-4(2)	28	7	18	41	21	20	98	92	47
SS-37	83+50 L	50 RT	4.0-5.0	A-7-5(18)	60	27	12	21	12	55	100	95	72
SS-38	83+50 L	50 RT	6.5-7.5	A-7-5(14)	61	22	12	23	12	53	95	90	66
SS-39	83+50 L	50 RT	9.0-10.0	A5(2)	44	7	21	42	17	20	99	91	47
SS-40	83+50 L	50 RT	11.5-12.5	A-2-4(0)	34	NP	27	50	15	8	97	85	32

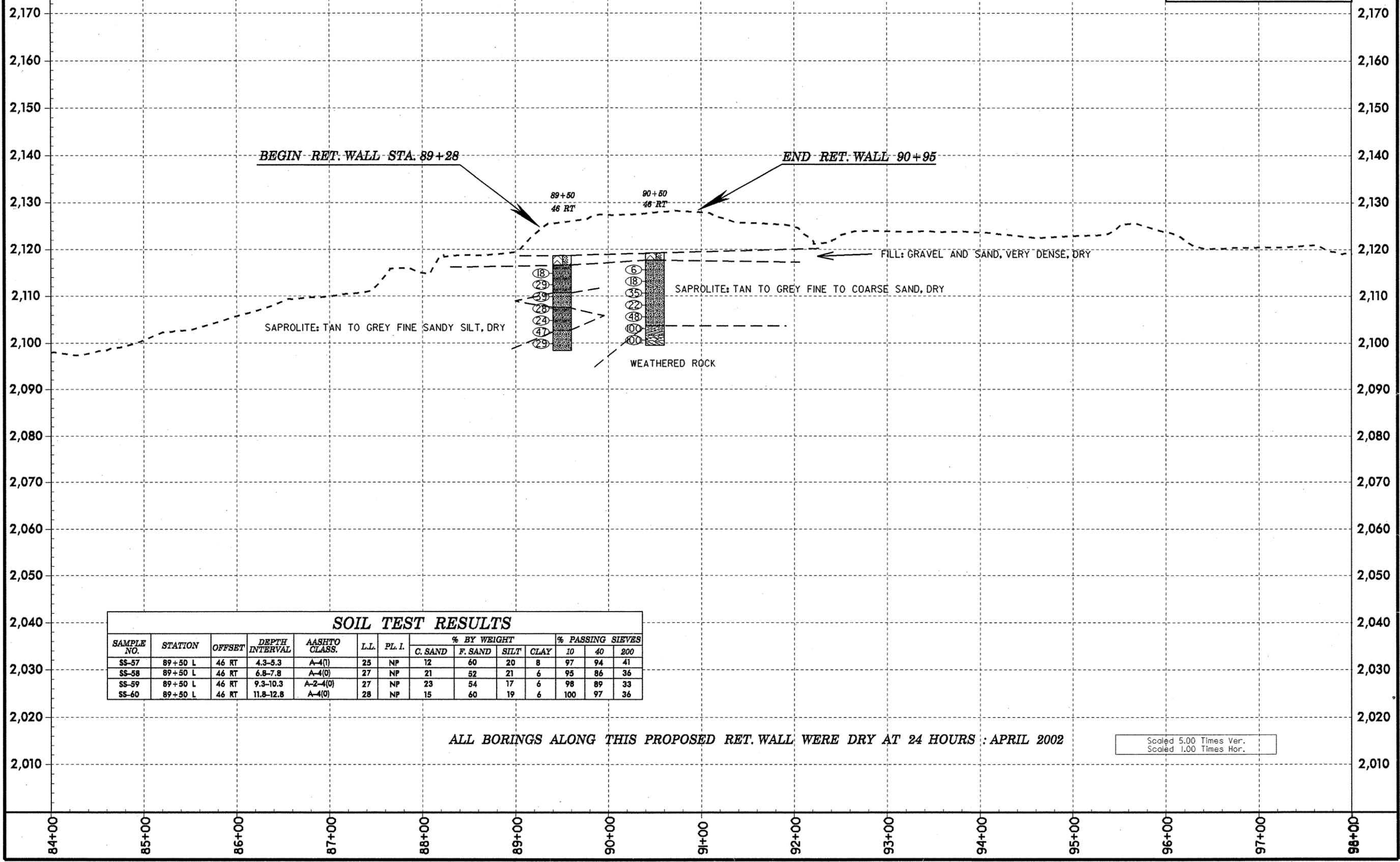
SOIL TEST RESULTS													
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	L.L.	PL. I.	% BY WEIGHT				% PASSING SIEVES		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-1	80+00 L	60 RT	0.5-1.5	A-7-6(18)	56	27	10	20	16	54	99	95	73
SS-2	80+00 L	60 RT	4.2-5.2	A-4(1)	39	NP	22	47	21	10	100	93	40
SS-3	80+00 L	60 RT	6.7-7.7	A-4(1)	34	NP	27	41	22	10	93	80	38
SS-4	80+00 L	60 RT	9.2-10.2	A-2-4(0)	28	NP	27	41	24	8	66	56	27
SS-5	80+00 L	60 RT	11.7-12.7	A-2-4(0)	27	NP	39	41	14	6	89	70	24
SS-6	80+00 L	60 RT	14.2-15.2	A-4(0)	35	NP	26	45	23	6	96	85	37
SS-7	80+00 L	60 RT	16.2-17.2	A-2-4(0)	29	NP	36	40	16	8	86	68	27
SS-8	80+00 L	60 RT	19.2-20.2	A-4(1)	32	NP	23	48	21	8	100	92	38
SS-9	80+00 L	60 RT	24.2-25.2	A-2-4(0)	26	NP	41	38	13	8	97	71	28
SS-10	80+00 L	60 RT	29.2-30.2	A-2-4(0)	32	NP	38	38	16	8	95	73	31
SS-11	79+00 L	60 RT	6.1-7.1	A-5(1)	42	NP	21	51	16	12	97	89	39
SS-12	79+00 L	60 RT	8.6-9.6	A-4(1)	38	NP	18	56	16	10	92	86	36
SS-13	79+00 L	60 RT	13.6-14.6	A-2-5(0)	41	NP	20	55	15	10	98	92	35
SS-14	78+00 L	70 RT	0.5-1.5	A-4(0)	27	NP	24	57	11	8	99	91	30
SS-15	78+00 L	70 RT	4.3-5.3	A-2-4(0)	25	NP	26	47	11	16	100	91	36
SS-16	78+00 L	70 RT	6.8-7.8	A-2-4(0)	20	NP	23	57	6	14	99	93	29
SS-17	78+00 L	70 RT	11.3-12.3	A-2-4(0)	25	NP	43	41	8	8	73	57	17

ALL BORINGS ALONG THIS PROPOSED RET. WALL WERE DRY AT 24 HOURS : APRIL 2002

Scaled 5.00 Times Ver.
 Scaled 1.00 Times Hor.

PRELIMINARY PLANS
 DO NOT USE FOR CONSTRUCTION
 INCOMPLETE PLANS
 DO NOT USE FOR R/W ACQUISITION

RETAINING WALL PROFILE 50 FEET RIGHT OF -L-



SOIL TEST RESULTS													
SAMPLE NO.	STATION	OFFSET	DEPTH INTERVAL	AASHTO CLASS.	LL	PL. I.	% BY WEIGHT				% PASSING SIEVES		
							C. SAND	F. SAND	SILT	CLAY	10	40	200
SS-57	89+50 L	46 RT	4.3-5.3	A-4(1)	25	NP	12	60	20	8	97	94	41
SS-58	89+50 L	46 RT	6.8-7.8	A-4(0)	27	NP	21	52	21	6	95	86	36
SS-59	89+50 L	46 RT	9.3-10.3	A-2-4(0)	27	NP	23	54	17	6	98	89	33
SS-60	89+50 L	46 RT	11.8-12.8	A-4(0)	28	NP	15	60	19	6	100	97	36

ALL BORINGS ALONG THIS PROPOSED RET. WALL WERE DRY AT 24 HOURS : APRIL 2002

Scaled 5.00 Times Ver.
 Scaled 1.00 Times Hor.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER					
BORING NO 21+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 21+50.000		OFFSET 68.00ft RT		24 HR N/A						
COLLAR ELEV 2202.00ft		TOTAL DEPTH 15.80ft		START DATE 4/09/02		COMPLETION DATE 04/09/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 21+50, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2202.00	0.00	1	1	1	1.0							Ground Surface
2200.00	2.20	2	2	4	1.0	X-2				SS-41	M	COLLUVIUM: RED SANDY CLAY
	4.30	3	4	5	1.0	X-6				SS-42	M	COLLUVIUM: RED FINE SANDY SILTY CLAY
	6.80	3	4	6	1.0	X-9				SS-43	M	RESIDUAL: RED FINE SANDY CLAYEY SILT
	9.30	4	5	6	1.0	X-10				SS-44	M	SAPROLITE: RED TO TAN FINE SANDY SILT
2190.00	11.80	3	5	5	1.0	X-10				SS-45	D	
2186.20	14.30	3	7	6	1.0	X-13						
BORING TERMINATED AT A DEPTH OF 15.8 FEET IN SAPROLITE												

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER					
BORING NO 22+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 22+50.000		OFFSET 68.00ft RT		24 HR N/A						
COLLAR ELEV 2194.00ft		TOTAL DEPTH 20.40ft		START DATE 4/09/02		COMPLETION DATE 04/09/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 22+50, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2194.00	0.00	0	1	1	1.0							Ground Surface
	2.00	1	2	2	1.0	X-2						
2190.00	3.90	2	3	4	1.0	X-4						COLLUVIUM: RED FINE SANDY SILTY CLAY
	6.40	3	4	9	1.0	X-7						
	8.90	4	6	7	1.0	X-13						SAPROLITE: TAN FINE SANDY SILT
	11.40	4	7	9	1.0	X-13						
2180.00	13.90	3	5	7	1.0	X-16						
	18.90	6	9	9	1.0	X-18						
2173.60												
BORING TERMINATED AT A DEPTH OF 20.4 FEET												

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL										
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER									
BORING NO 23+50		NORTHING 0.00		EASTING 0.00		0 HR N/A	24 HR N/A									
ALIGNMENT L		BORING LOCATION 23+50.000		OFFSET 84.00ft RT		0 HR N/A	24 HR N/A									
COLLAR ELEV 2191.00ft		TOTAL DEPTH 21.50ft		START DATE 4/11/02		COMPLETION DATE 04/11/02										
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC										
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 23+50, Page 1 of 1										
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION		
		6in	6in	6in		0	25	50	75	100						
2191.00	0.00	0	0	1	1.0											Ground Surface
	2.50	2	3	3	1.0											COLLUVIUM: RED FINE SANDY □ SILTY CLAY
	5.00	2	5	7	1.0											
	7.50	4	5	9	1.0											
	10.00	3	4	8	1.0											
2180.00	12.50	3	5	6	1.0											SAPROLITE: RED AND TAN FINE □ SANDY CLAYEY SILT
	15.00	2	4	5	1.0											
2170.00	20.00	4	4	8	1.0											SAPROLITE: TAN FINE SANDY □ SILT
															TERMINATED BORING AT A DEPTH OF 21.5 FEET IN SAPROLITE	

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL										
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER									
BORING NO 24+50		NORTHING 0.00		EASTING 0.00		0 HR N/A	24 HR N/A									
ALIGNMENT L		BORING LOCATION 24+50.000		OFFSET 95.00ft RT		0 HR N/A	24 HR N/A									
COLLAR ELEV 2171.50ft		TOTAL DEPTH 21.50ft		START DATE 4/11/02		COMPLETION DATE 04/11/02										
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC										
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 24+50, Page 1 of 1										
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION		
		6in	6in	6in		0	25	50	75	100						
2171.50	0.00	0	1	2	1.0											Ground Surface
2170.00	2.50	2	3	4	1.0											COLLUVIUM: RED FINE SANDY □ SILTY CLAY
	5.00	2	6	6	1.0											
	7.50	4	5	7	1.0											
	10.00	2	4	9	1.0											
2160.00	12.50	2	4	9	1.0											SAPROLITE: RED AND TAN FINE □ SANDY CLAYEY SILT
	15.00	2	7	9	1.0											
2150.00	20.00	4	4	4	1.0											SAPROLITE: TAN FINE SANDY □ SILT
															BORING TERMINATED AT A DEPTH OF 21.5 FEET IN SAPROLITE	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

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PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL							
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER						
BORING NO 26+00		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT L		BORING LOCATION 26+00.000		OFFSET 73.00ft RT		24 HR N/A							
COLLAR ELEV 2178.80ft		TOTAL DEPTH 21.30ft		START DATE 4/11/02		COMPLETION DATE 04/11/02							
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 26+00, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
2178.80	0.00	0	0	1	1.0								Ground Surface
	2.50	1	2	3	1.0								COLLUVIUM: RED FINE SANDY □ SILTY CLAY
	4.80	2	2	6	1.0								SAPROLITE: RED AND TAN FINE □ SANDY SILT
2170.00	7.30	3	6	6	1.0								SAPROLITE SILTY FINE SAND
	9.80	2	4	8	1.0								
	14.80	3	2	5	1.0								
2160.00	19.80	5	9	10	1.0								
2157.50													BORING TERMINATED AT A DEPTH OF 21.3 FEET IN SAPROLITE

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL							
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER						
BORING NO 27+00		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT L		BORING LOCATION 27+00.000		OFFSET 73.00ft RT		24 HR N/A							
COLLAR ELEV 2176.80ft		TOTAL DEPTH 21.30ft		START DATE 4/15/02		COMPLETION DATE 04/15/02							
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 27+00, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
2176.80	0.00	0	1	2	1.0								Ground Surface
	2.50	3	6	7	1.0								COLLUVIUM: RED FINE SANDY □ SILTY CLAY
2170.00	4.80	7	20	17	1.0								SAPROLITE: TAN SILTY FINE TO □ COARSE SAND
	7.30	8	13	21	1.0					SS-54	M		
	9.80	2	3	7	1.0								
	12.30	4	5	5	1.0								
2160.00	14.80	6	8	8	1.0								
	19.80	5	7	8	1.0								
2155.50													BORING TERMINATED AT A DEPTH OF 21.3 FEET IN SAPROLITE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL								
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER							
BORING NO 28+00		NORTHING 0.00		EASTING 0.00			0 HR N/A							
ALIGNMENT L		BORING LOCATION 28+00.000		OFFSET 85.00ft RT			24 HR N/A							
COLLAR ELEV 2175.30ft		TOTAL DEPTH 18.70ft		START DATE 4/16/02		COMPLETION DATE 04/16/02								
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 28+00, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT					SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75	100				
2175.30	0.00	1	1	1	1.0	Ground Surface								
	2.20	3	5	7	1.0	2	12				SS-54	M	█	COLLUVIUM: RED FINE SANDY □ SILTY CLAY
2170.00	4.70	3	5	7	1.0	12					SS-55	M		
	7.20	2	8	9	1.0	7					SS-56	M		SAPROLITE: SANDY SILT
	9.70	3	10	13	1.0	23								
	12.20	3	7	10	1.0	7								SAPROLITE: SILTY SAND
2160.00	17.20	11	12	18	1.0	30								
2156.60						BORING TERMINATED AT A DEPTH OF 18.7 FEET IN SAPROLITE								

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501	ID U-3601	COUNTY BUNCOMBE	GEOLOGIST T. B. DANIEL
SITE DESCRIPTION RETAINING WALL ON NC 191			GND WATER
BORING NO 76+50	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT L	BORING LOCATION 76+50.000	OFFSET 55.00ft RT	24 HR N/A
COLLAR ELEV 2146.10ft	TOTAL DEPTH 29.70ft	START DATE 4/04/02	COMPLETION DATE 04/04/02
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A	Log 76+50, Page 1 of 1	

ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2146.10	0.00	1	2	2	1.0							Ground Surface
	3.20	3	8	7	1.0	4				SS-30	D	RESIDUAL: BROWN FINE SANDY CLAY
2140.00	5.70	8	9	11	1.0	15				SS-31	D	SAPROLITE: TAN SLI. MICA SANDY SILT
	8.20	5	7	11	1.0	18				SS-32	D	GRAY, TAN AND BROWN SILTY SAND
	10.70	5	8	16	1.0	24						
	13.20	8	12	12	1.0	24				SS-33	D	
2130.00	15.70	10	19	18	1.0	37						
	18.20	7	11	13	1.0	24				SS-34	D	TAN FINE SANDY SILT
	23.20	7	7	11	1.0	18						
2120.00	28.20	9	7	17	1.0	24				SS-35	D	
2116.40												BORING TERMINATED AT A DEPTH OF 29.7 FEET IN SAPROLITE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501	ID U-3601	COUNTY BUNCOMBE	GEOLOGIST T. B. DANIEL
SITE DESCRIPTION RETAINING WALL ON NC 191			GND WATER
BORING NO 77+00	NORTHING 0.00	EASTING 0.00	0 HR N/A
ALIGNMENT L	BORING LOCATION 77+00.000	OFFSET 65.00ft RT	24 HR N/A
COLLAR ELEV 2148.30ft	TOTAL DEPTH 28.50ft	START DATE 4/03/02	COMPLETION DATE 04/03/02
DRILL MACHINE CME 550	DRILL METHOD H.S. AUGERS	HAMMER TYPE AUTOMATIC	
SURFACE WATER DEPTH N/A	DEPTH TO ROCK N/A	Log 77+00, Page 1 of 1	

ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2148.30	0.00	1	1	2	1.0							Ground Surface
	3.40	2	3	4	1.0	3				SS-18	D	RESIDUAL: BROWN FINE SANDY CLAY
	5.90	2	4	4	1.0	8				SS-19	D	SAPROLITE: TAN FINE SANDY SILT
2140.00	8.40	2	6	7	1.0	13				SS-20	D	
	10.90	3	4	6	1.0	10						
	13.40	3	5	6	1.0	11				SS-21	D	SAPROLITE: GRAY SIL. MICA CLAYEY FINE SAND
2130.00	18.40	3	5	6	1.0	11				SS-22	D	RED BROWN SLIGHTLY MICACEOUS SANDY SILT
	23.40	3	7	7	1.0	14						
2120.00	28.40	50			0.1							WEATHERED ROCK, BECOMES HARDER WITH DEPTH
												BORING TERMINATED AT A DEPTH OF 28.5 FEET IN WEATHERED ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER					
BORING NO 77+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 77+50.000		OFFSET 50.00ft RT		24 HR N/A						
COLLAR ELEV 2148.80ft		TOTAL DEPTH 33.00ft		START DATE 4/03/02		COMPLETION DATE 04/03/02						
DRILL MACHINE CME 550			DRILL METHOD SOLID AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A		Log 77+50, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2148.80												Ground Surface
												RESIDUAL: RED BROWN SANDY CLAY, MEDIUM STIFF
												SAPROLITE: TAN SANDY SILT, STIFF TO VERY STIFF
2140.00												SAPROLITE: TAN SILTY SAND
												SAPROLITE: TAN SANDY SILT
2130.00												WEATHERED ROCK
												TAN SILTY SAND, STIFF TO VERY STIFF
2120.00												WEATHERED ROCK
2115.80												BORING TERMINATED AT A DEPTH OF 33 FEET IN WEATHERED ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL								
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER							
BORING NO 78+00		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT L		BORING LOCATION 78+00.000		OFFSET 70.00ft RT		24 HR N/A								
COLLAR ELEV 2149.30ft		TOTAL DEPTH 16.70ft		START DATE 4/03/02		COMPLETION DATE 04/03/02								
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH		DEPTH TO ROCK 16.70ft		Log 78+00, Page 1 of 1										
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION		
		6in	6in	6in		0	25	50	75				100	
2149.30	0.00	1	1	2	1.0							Ground Surface		
	3.80	3	8	14	1.0							SS-13 D	SAPROLITE: TAN SANDY SILT	
	6.30	3	8	14	1.0							SS-15 D	TAN FINE TO COARSE SAND	
2140.00	8.80	7	52	48	0.8							SS-16 D		
	11.30	36	64		0.9							SS-17 D	WEATHERED ROCK, CRUSHES TO FINE TO COARSE SAND	
	13.80	27	73		0.9									
2132.60														BORING TERMINATED BY HOLLOW AUGER REFUSAL AT A DEPTH OF 16.7 FEET ON HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL							
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER						
BORING NO 78+50		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT L		BORING LOCATION 78+50.000		OFFSET 50.00ft RT		24 HR N/A							
COLLAR ELEV 2145.00ft		TOTAL DEPTH 30.20ft		START DATE 4/04/02		COMPLETION DATE 04/04/02							
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 78+50, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
2145.00													Ground Surface
2140.00	3.70	2	3	3	1.0	6							RESIDUAL: RED TO BROWN □ SANDY CLAY
	8.70	4	8	8	1.0	16				BS-1 ST-1	D		SAPROLITE: GRAY FINE TO □ COARES SAND AND SILTY SAND
2130.00	13.70	16	13	7	1.0	20				SS-27	D		
	16.20	3	6	10	1.0	16							
	18.70	8	16	17	1.0	33				SS-28	D		
	21.20	7	7	8	1.0	15				SS-29	D		
2120.00	23.70	9	22	26	1.0	48							
2114.80	28.70	20	47	46	1.0	93							
BORING TERMINATED AT A DEPTH OF 30.2 FEET IN SAPROLITE													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL							
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER						
BORING NO 79+00		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT L		BORING LOCATION 79+00.000		OFFSET 60.00ft RT		24 HR N/A							
COLLAR ELEV 2142.00ft		TOTAL DEPTH 24.60ft		START DATE 4/03/02		COMPLETION DATE 04/03/02							
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 79+00, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
2142.00	0.00	1	1	3	1.0								Ground Surface
2140.00	3.10	4	18	11	1.0	4							RESIDUAL: RED SANDY CLAY
	5.60	3	5	6	1.0	11				SS-11	D		TAN SLIGHTLY MICACEOUS □ SANDY SILT
	8.10	4	5	8	1.0	13				SS-12	D		TAN AND GRAY MICACEOUS □ FINE SANDY SILT
2130.00	10.60	3	6	9	1.0	15							
	13.10	4	9	10	1.0	19				SS-13	D		TAN MICACEOUS CLAYEY SAND
	18.10	4	6	11	1.0	7							SAPROLITE: BROWN TO TAN □ SANDY SILT
2120.00	23.10	3	6	10	1.0	16							
2117.40													
BORING TERMINATED AT A DEPTH OF 24.6 FEET IN SAPROLITE													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER					
BORING NO 79+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 79+50.000		OFFSET 50.00ft RT		24 HR N/A						
COLLAR ELEV 2138.20ft		TOTAL DEPTH 29.70ft		START DATE 4/04/02		COMPLETION DATE 04/04/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 79+50, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2138.20												Ground Surface
	3.20	2	4	5	1.0	9						RESIDUAL: RED SANDY CLAY
	10.70	3	6	6	1.0	12				BS-2	D	SAPROLITE: RED TO GRAY □ SANDY SILT
2130.00	13.20	3	4	8	1.0	12				SS-23	D	TAN AND GRAY MICACEOUS □ SANDY SILT
	15.70	3	6	7	1.0	13				SS-24	D	TAN AND GRAY MICACEOUS □ FINE SANDY SILT
2120.00	18.20	4	7	10	1.0	7						
	20.70	4	7	10	1.0	7				SS-25	D	
	23.20	4	7	9	1.0	16						
2110.00	28.20	3	5	7	1.0	12				SS-26	D	
2108.50												BORING TERMINATED AT A DEPTH OF 29.7 FEET IN SAPROLITE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION RETAINING WALL ON NC 191							GND WATER					
BORING NO 80+00		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 80+00.000		OFFSET 60.00ft RT		24 HR N/A						
COLLAR ELEV 2132.30ft		TOTAL DEPTH 30.20ft		START DATE 4/02/02		COMPLETION DATE 04/02/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 80+00, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
	0.00	1	2	3	1.0							Ground Surface
2130.00	3.70	2	4	3	1.0	5				SS-1	D	RESIDUAL: RED FINE SANDY □ CLAY
	6.20	4	6	6	1.0	7				SS-2	D	SAPROLITE: TAN SLIGHTLY □ MICACEOUS SANDY SILT
	8.70	10	55	45	0.9	12				SS-3	D	WEATHERED ROCK, EASILY CRUSHED BY HAND TO SILTY □ SAND
2120.00	11.20	8	34	66	0.9	100				SS-4	D	
	13.70	8	16	13	1.0	29				SS-5	D	GRAY AND TAN SLIGHTLY □ MICACEOUS SANDY SILT
	16.20	4	11	18	1.0	29				SS-6	D	
	18.70	6	12	13	1.0	25				SS-7	D	SAPROLITE: TAN TO GRAY SLI. □ MICA. FINE TO COARSE SAND
2110.00	23.70	9	14	21	1.0	35				SS-8	D	SAPROLITE: TAN TO GRAY SLI. □ MICA SANDY SILT
	28.70	5	10	14	1.0	24				SS-9	D	SAPROLITE: TAN SLI. MICA FINE □ TO COARSE SAND
2102.10												BORING TERMINATED AT A DEPTH OF 30.2 FEET IN SAPROLITE

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL							
SITE DESCRIPTION EMBANKMENT AREA ON NC 191							GND WATER						
BORING NO 83+50		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT L		BORING LOCATION 83+50.000		OFFSET 50.00ft RT		24 HR N/A							
COLLAR ELEV 2101.60ft		TOTAL DEPTH 15.00ft		START DATE 4/05/02		COMPLETION DATE 04/05/02							
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log 83+50, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	MOI	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75				
2101.60	0.00	0	2	3	1.0	Ground Surface							
2100.00	3.50	2	3	5	1.0	X 5				SS-36	M	RESIDUAL: RED BROWN FINE SANDY CLAY	
	6.00	4	6	8	1.0	X 8				SS-37	M		
	8.50	4	4	5	1.0	X 14				SS-38	M		
2090.00	11.00	3	4	3	1.0	X 9				SS-39	M	RESIDUAL: RED SANDY CLAYEY SILT	
2086.60	13.50	2	3	4	1.0	X 7				SS-40	D	SAPROLITE: TAN FINE TO COARSE SAND	
						BORING TERMINATED AT A DEPTH OF 15.0 FEET IN SAPROLITE							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION EMBANKMENT AREA ON NC 191							GND WATER					
BORING NO 89+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 89+50.000		OFFSET 46.00ft RT		24 HR N/A						
COLLAR ELEV 2118.90ft		TOTAL DEPTH 20.30ft		START DATE 4/18/02		COMPLETION DATE 04/18/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 89+50, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2118.90												
	3.80	9	9	9	1.0							
	6.30	5	13	16	1.0							
2110.00	8.80	10	16	23	1.0					SS-58	D	FILL: PACKED GRAVEL AND □ SILTY SAND
	11.30	6	12	16	1.0					SS-59	D	SAPROLITE: TAN FINE SANDY □ SILT, SLI. MICACEOUS
	13.80	4	10	14	1.0					SS-60	D	SAPROLITE: TAN FINE TO □ COARSE SAND ;
	16.30	10	21	26	1.0							SAPROLITE: TAN FINE SANDY □ SILT
2100.00 2098.60	18.80	9	13	16	1.0							SAPROLITE: TAN SILTY FINE □ SAND
BORING TERMINATED AT A DEPTH OF 20.3 FEET												

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 8.1844501		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST T. B. DANIEL						
SITE DESCRIPTION EMBANKMENT AREA ON NC 191							GND WATER					
BORING NO 90+50		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT L		BORING LOCATION 90+50.000		OFFSET 46.00ft RT		24 HR N/A						
COLLAR ELEV 2119.20ft		TOTAL DEPTH 19.70ft		START DATE 4/18/02		COMPLETION DATE 04/18/02						
DRILL MACHINE CME 550			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC						
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log 90+50, Page 1 of 1						
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2119.20												
	3.60	3	3	3	1.0							
	6.10	5	7	11	1.0							
2110.00	8.60	9	16	19	1.0							
	11.10	5	7	15	1.0							
	13.60	8	18	30	1.0							
	16.10	24	45	55	0.8							
2100.00 2099.80	18.60	16	84		0.9							
BORING TERMINATED AT A DEPTH OF 19.7 FEET IN SAPROLITE												

NOTE: SEE SHEET 1A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-3601	1	8
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
34958.1.1	STP-191(4)	PE	
34958.2.1	STP-191(4)	RW & UTIL.	
34958.3.1	STP-191(6)	CONST.	

ROADWAY
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34958.1.1 F.A. PROJ. U-3601
BUNCOMBE
PROJECT DESCRIPTION NC 191 FROM I-26 TO I-40

Borings along 24 inch Water Line

INVENTORY ADDENDUM

CAUTION NOTICE

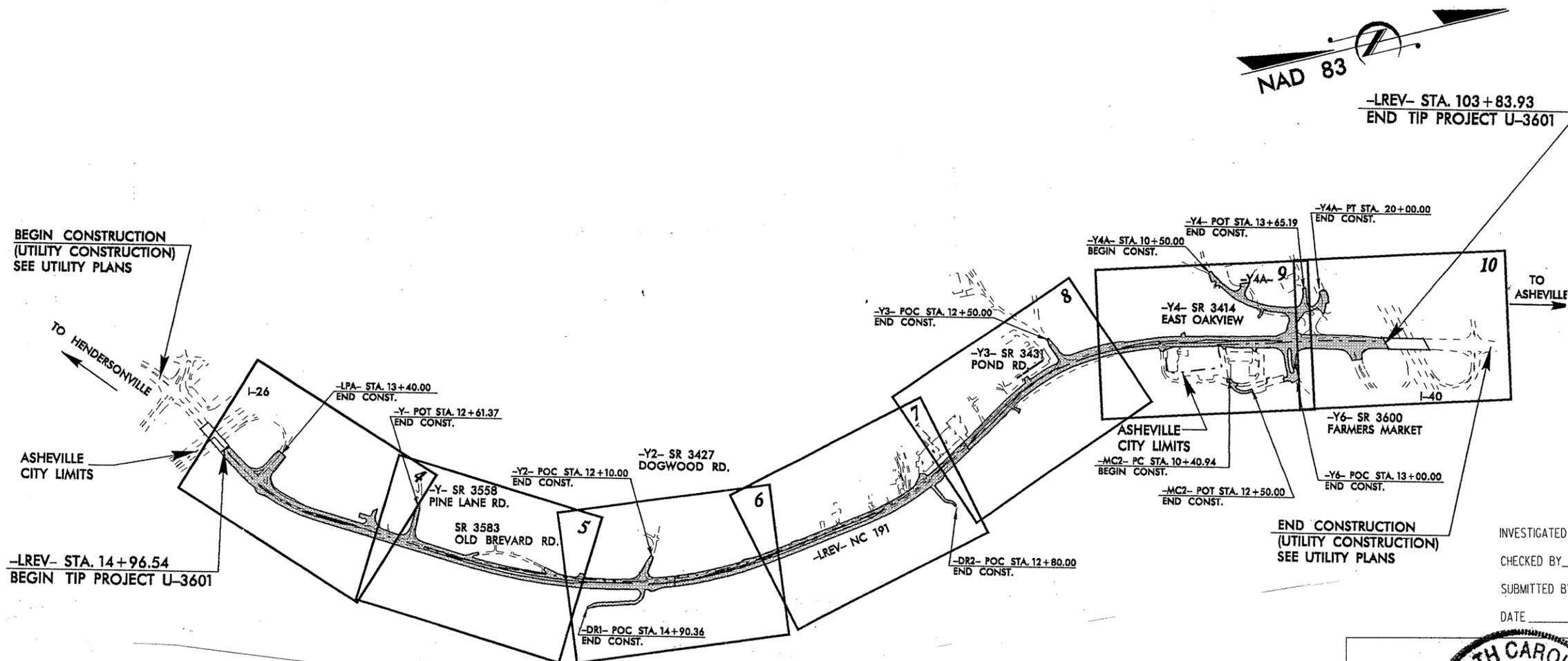
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE 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.

ID: U-3601

CONTRACT: C201369



PERSONNEL

TO	DO Cheek
ASHEVILLE	GK Rose
	MM Hager

INVESTIGATED BY PQ Lockamy
CHECKED BY WD Fryr
SUBMITTED BY WD Frye
DATE 10-18-07



DRAWN BY: PQ Lockamy

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

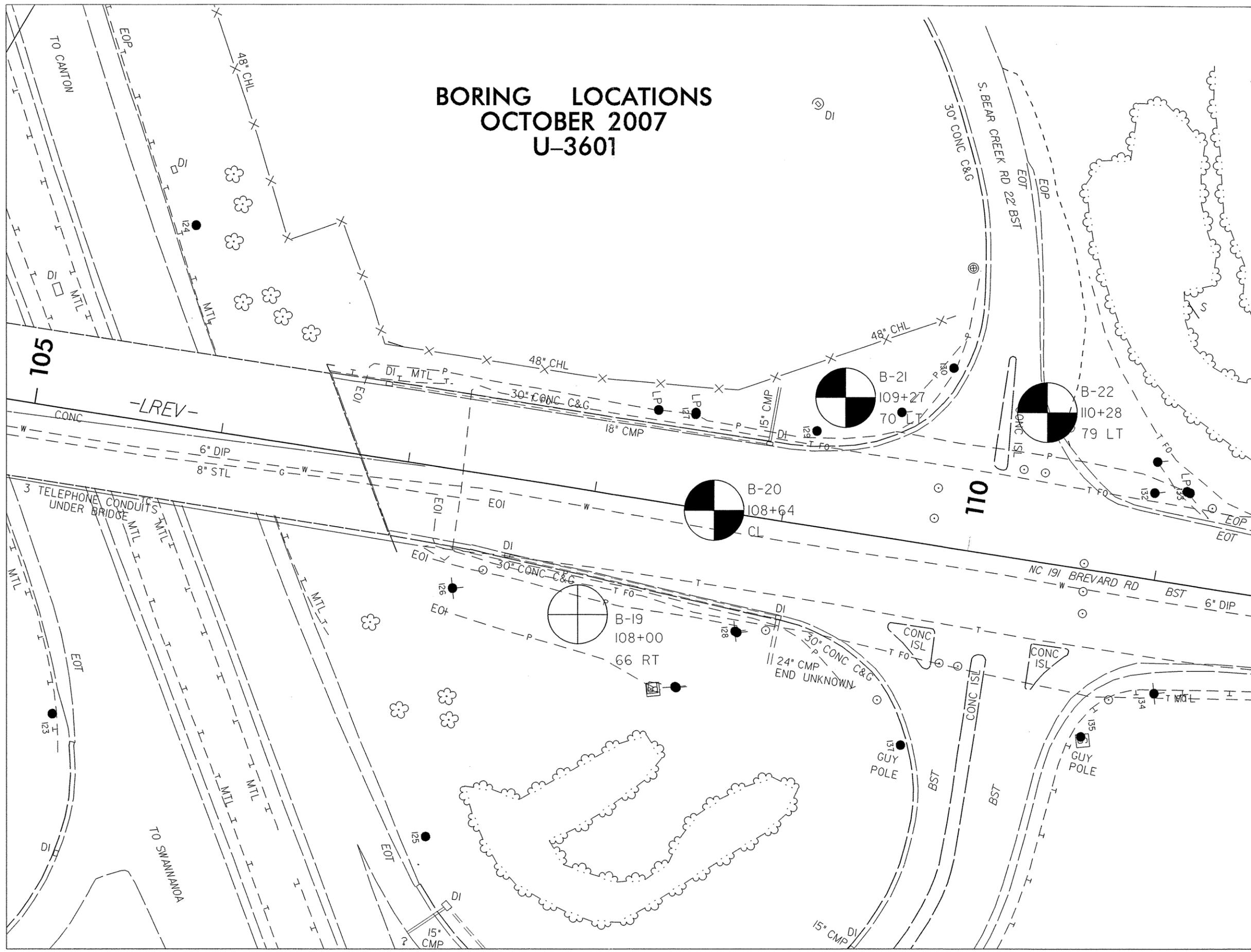
PROJECT REFERENCE NO. 34958.1I	SHEET NO. 2
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SUBSURFACE INVESTIGATION

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 THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. 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 style="text-align: center;"><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>POORLY GRADED</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF 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>WEATHERED ROCK (WR) </p> <p>CRYSTALLINE ROCK (CR) </p> <p>NON-CRYSTALLINE ROCK (ICR) </p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CPS) </p>	<p>ALLUVIUM (ALLUV.) - SOILS THAT 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 THAT 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 (REC.) - 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 (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - 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 (MOT.) - 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 (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (RQD) - 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 THAT 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, THAT 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																																																																																																																												
SOIL LEGEND AND AASHTO CLASSIFICATION																																																																																																																																																																																																																																																																																																																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-3</th> <th colspan="2">A-2</th> <th colspan="2">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-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <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></td> </tr> <tr> <td>SYMBOL</td> <td></td> </tr> <tr> <td>% PASSING</td> <td># 10 # 40 # 200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX 10 MX</td> <td>50 MX 25 MX 10 MX</td> <td>35 MX 15 MX 7.5 MX</td> </tr> <tr> <td>LIQUID LIMIT PLASTIC INDEX</td> <td>6 MX</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>0 MX</td> <td>0 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>20 MX</td> <td>0 MX</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <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></td> </tr> <tr> <td>GEN. RATING AS A SUBGRADE</td> <td colspan="4">EXCELLENT TO GOOD</td> <td colspan="4">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSUITABLE</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			A-1	A-3	A-2		A-2		A-4	A-5	A-6	A-7	A-1, A-2	A-3	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												SYMBOL																		% PASSING	# 10 # 40 # 200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	50 MX 25 MX 10 MX	35 MX 15 MX 7.5 MX	LIQUID LIMIT PLASTIC INDEX	6 MX	NP	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	GROUP INDEX	0	0	0	4 MX	0 MX	0 MX	8 MX	12 MX	16 MX	20 MX	0 MX	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS													GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD				FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE							<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE MODERATELY COMPRESSIBLE HIGHLY COMPRESSIBLE</p> <p>LIQUID LIMIT LESS THAN 31 LIQUID LIMIT EQUAL TO 31-50 LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <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> </tbody> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p> <p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>		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 style="text-align: center;">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 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></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> <p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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.</p> <p>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.</p> <p>SOFT CAN BE GROOVED 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.</p> <p>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.</p> <p style="text-align: center;">ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>HL - HIGHLY</td> <td>W - MOISTURE CONTENT</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MD. - MEDIUM</td> <td>V - VERY</td> </tr> <tr> <td>CL - CLAY</td> <td>MICA. - MICACEOUS</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>MOD. - MODERATELY</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CSE. - COARSE</td> <td>NP - NON PLASTIC</td> <td>W_u - UNIT WEIGHT</td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>ORG. - ORGANIC</td> <td>W_d - DRY UNIT WEIGHT</td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>F - VOID RATIO</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td></td> <td>TCR - TRICONE REFUSAL</td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>DRILL UNITS:</th> <th>ADVANCING TOOLS:</th> <th>HAMMER TYPE:</th> </tr> </thead> <tbody> <tr> <td><input type="checkbox"/> MOBILE B-___</td> <td><input type="checkbox"/> CLAY BITS</td> <td><input type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> BK-51</td> <td><input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td>CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td><input type="checkbox"/> B-___</td> </tr> <tr> <td><input checked="" type="checkbox"/> CME-550</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> N-___</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> TUNG.-CARBIDE INSERTS</td> <td><input type="checkbox"/> H-___</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td>HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE ___ * STEEL TEETH</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE ___ * TUNG.-CARB.</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> SOUNDING ROD</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> </tbody> </table> <p style="text-align: center;">FRACTURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> <p style="text-align: center;">BEDDING</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> <p style="text-align: center;">PLASTICITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. 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MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET																																																																																																																																																																																																																																																																																																																												
CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																																																																																																																																																																																																																																																												
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BORING LOCATIONS OCTOBER 2007 U-3601



PROJECT NO. 34958.1.1		ID. U-3601		COUNTY Buncombe		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION NC 191 (BREVARD ROAD) AT I-40							GROUND WTR (ft)								
BORING NO. B-18		STATION 100+20		OFFSET 80ft RT		ALIGNMENT -LREV-									
COLLAR ELEV. 100.0 ft		TOTAL DEPTH 19.4 ft		NORTHING 676,548		EASTING 929,698									
DRILL MACHINE CME-550X		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
START DATE 10/10/07		COMP. DATE 10/10/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
100													100.0	GROUND SURFACE	0.0
97.1	2.9	4	5	9									95.7	ROADWAY EMBANKMENT RED BROWN SANDY SILT	4.3
92.1	7.9	2	2	3										SAPROLITE YELLOW BROWN TO GREY SILTY SAND	
87.1	12.9	2	3	4											
82.1	17.9	33	28	29											
													80.6	Boring Terminated at Elevation 80.6 ft IN SAPROLITE	19.4

NCDOT BORE SINGLE U3601_GEO.GPJ NC_DOT.GDT 10/16/07

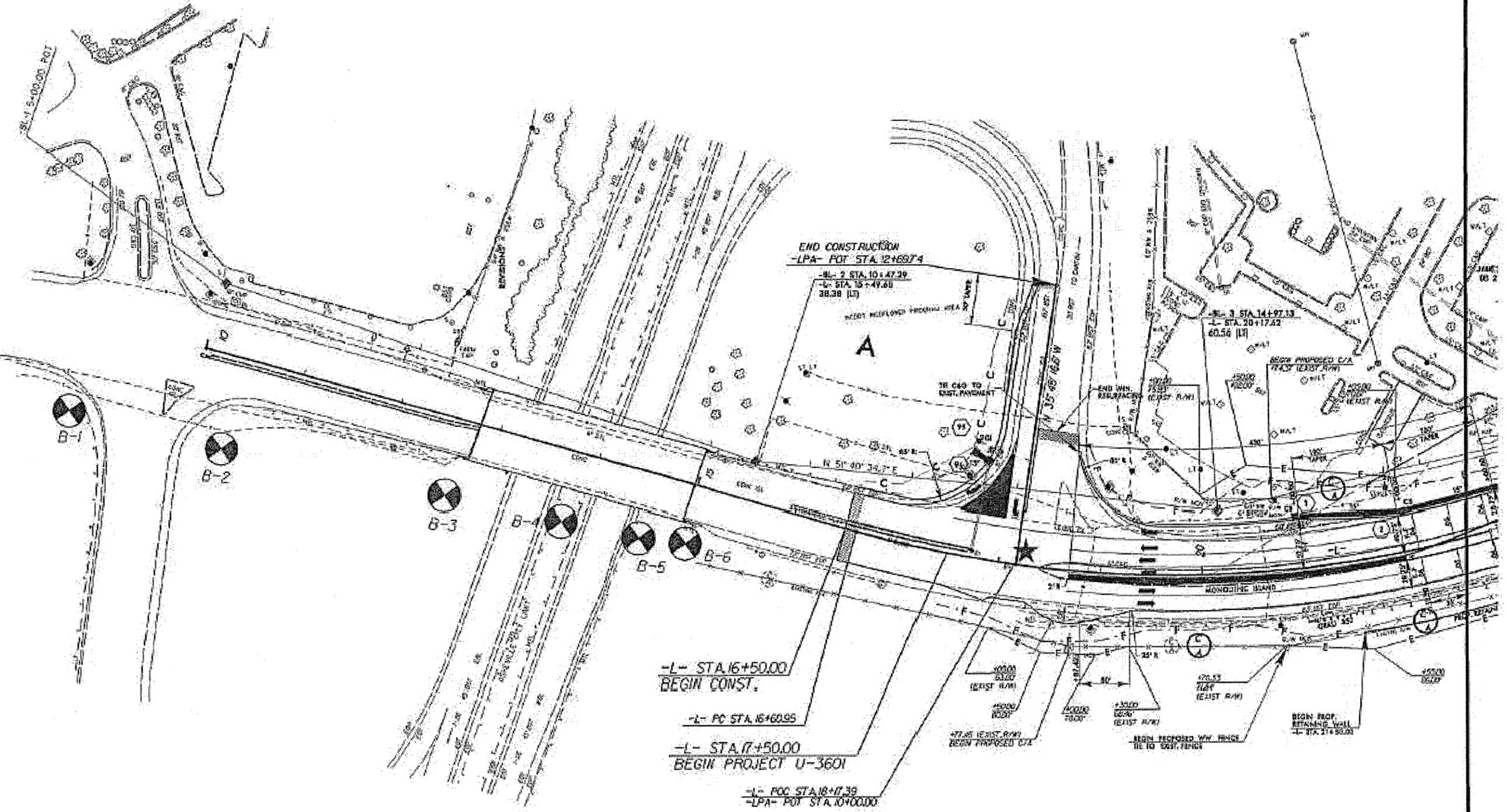
PROJECT NO. 34958.1.1		ID. U-3601		COUNTY Buncombe		GEOLOGIST Hager, M. M.									
SITE DESCRIPTION NC 191 (BREVARD ROAD) AT I-40							GROUND WTR (ft)								
BORING NO. B-19		STATION 108+00		OFFSET 66ft RT		ALIGNMENT -LREV-									
COLLAR ELEV. 100.0 ft		TOTAL DEPTH 17.0 ft		NORTHING 677,308		EASTING 929,882									
DRILL MACHINE CME-550X		DRILL METHOD Solid Augers		HAMMER TYPE N/A											
START DATE 10/10/07		COMP. DATE 10/10/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A									
ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
		0.5ft	0.5ft	0.5ft	0	25	50	75	100						
100													100.0	GROUND SURFACE	0.0
														ROADWAY EMBANKMENT BROWN MEDIUM STIFF TO STIFF SANDY SILT WITH COBBLES	
													90.0	RESIDUAL ORANGE MEDIUM STIFF TO STIFF CLAYEY SANDY SILT	10.0
													88.0	SAPROLITE ORANGE TO YELLOW-BROWN SANDY SILT	12.0
													83.0	Boring Terminated at Elevation 83.0 ft IN SAPROLITE	17.0
														OVERHEAD POWER LINES	

NCDOT BORE SINGLE U3601_GEO.GPJ NC_DOT.GDT 10/16/07

PROPOSED WATER LINE BORINGS
U-3601

PROJECT REFERENCE NO. U-3601	SHEET NO. 4
RAW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

RAW REV - PROPERTY LINES UPDATED, ADDED PARCEL 2A, ADDED NOTE *DO NOT DISTURB TREES AND WALL*, 100404 JT

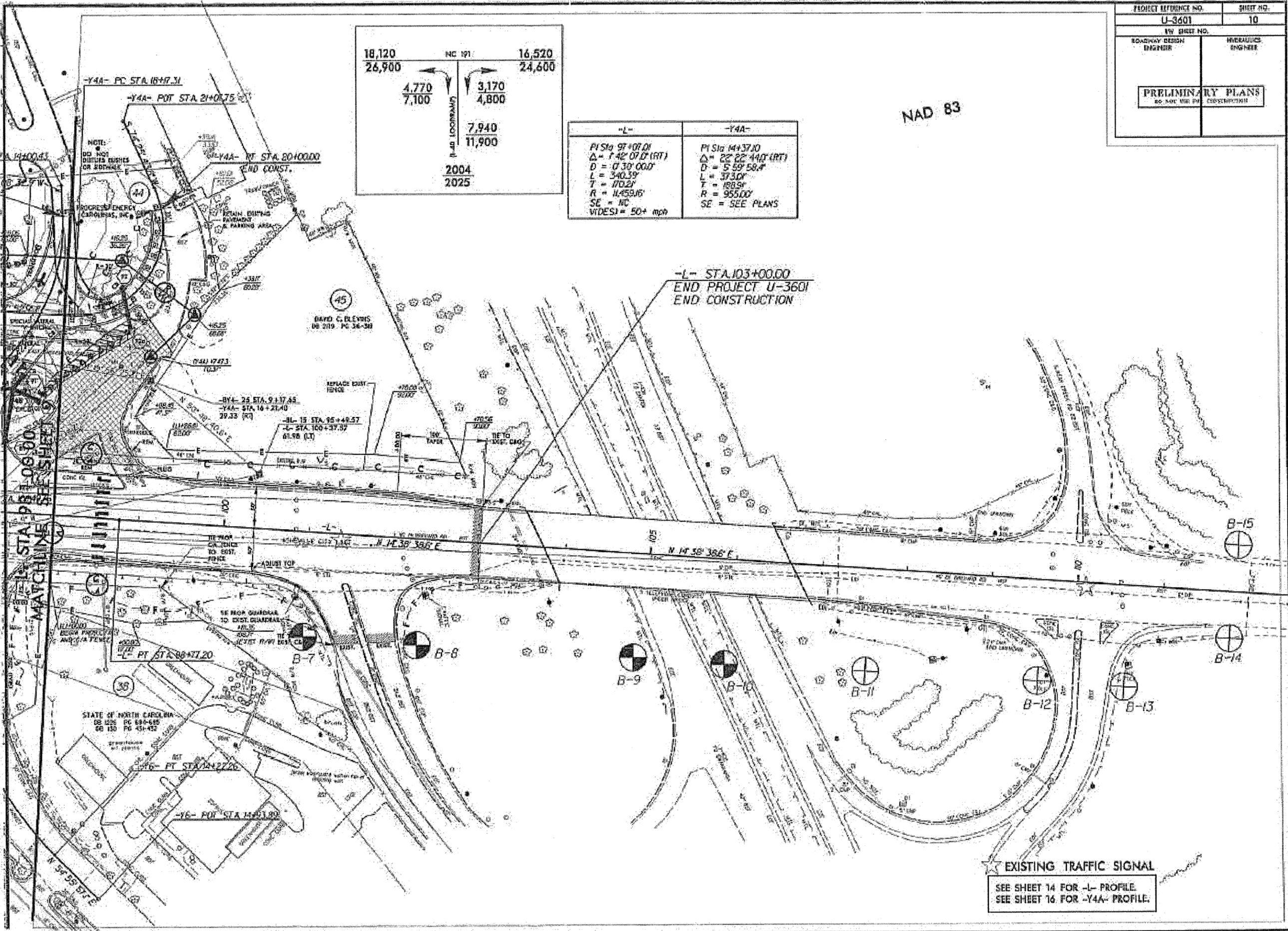


PROJECT REFERENCE NO. U-3401	SHEET NO. 10
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

18,120 26,900	NC 171	16,520 24,600
4,770 7,100		3,170 4,800
	7,940 11,900	
	2004	
	2025	

-L-	-Y4A-
PI Sta 97+07.01	PI Sta 144+37.10
$\Delta = 74^{\circ} 07' 07" (RT)$	$\Delta = 22^{\circ} 22' 41" (RT)$
$D = 0' 30" 00.0'$	$D = 5' 59" 58.4'$
$L = 340.33'$	$L = 37.30'$
$T = 170.21'$	$T = 188.91'$
$R = 11,459.16'$	$R = 955.00'$
SE = NC	SE = SEE PLANS
VIDES1 = 50+ mph	

NAD 83



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER							
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-1		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 8+87.000		OFFSET 94.00R RT		24 HR N/A							
COLLAR ELEV 2216.23R		TOTAL DEPTH 20.40R		START DATE 11/17/05		COMPLETION DATE 11/17/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B-1, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2216.23													Ground Surface
	3.90	3	6	7	1.0								EMBANKMENT: ORANGE SILTY CLAY
2210.00	8.90	6	12	44	1.0								SAPROLITE: TAN TO GREY SANDY SILT WITH SANDY ZONES AND OCCASIONAL WEATHERED ROCK LAYERS
2200.00	13.90	27	59	41	0.9								WEATHERED ROCK
2195.83	18.90	2	3	13	1.0								SAPROLITE: MULTI COLORED SANDY SILT WITH NUMEROUS MN OXIDE STAINS
BORING TERMINATED AT A DEPTH OF 20.4 FEET IN VERY STIFF SANDY SILT SAPROLITE. 24 HR WATER DRY AT 17 FEET.													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER							
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-2		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 10+40.000		OFFSET 90.00R RT		24 HR N/A							
COLLAR ELEV 2214.83R		TOTAL DEPTH 20.40R		START DATE 11/16/05		COMPLETION DATE 11/16/05							
DRILL MACHINE CME-45C			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log B-2, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2214.83													Ground Surface
2210.00	3.90	2	2	3	1.0								ORANGE SLIGHTLY SANDY SILTY CLAY, EMBANKMENT
	8.90	2	6	7	1.0								ORANGE FINE SANDY SILT, SAPROLITE.
2200.00	13.90	2	4	7	1.0								
2194.43	18.90	4	8	10	1.0								
BORING TERMINATED AT A DEPTH OF 20.4 FEET IN VERY STIFF SANDY SILT SAPROLITE. 24 HR WATER DRY AT 2 FEET.													

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER								
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER							
BORING NO B-5		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 14+57.000		OFFSET 63.00ft RT		24 HR N/A								
COLLAR ELEV 2205.97ft		TOTAL DEPTH 34.30ft		START DATE 11/30/05		COMPLETION DATE 11/30/05								
DRILL MACHINE CME-45C			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B-5, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION		
		6in	6in	6in		0	25	50	75				100	
2205.97													Ground Surface	
	2.80	6	12	10	1.0								22	ORANGE TO TAN SANDY SILT, SAPROLITE.
	7.80	6	14	16	1.0								30	
	12.80	16	29	71	0.9								100	WEATHERED ROCK, CRUSHES EASILY BY HAND TO BROWN SILTY SAND.
	17.80	35	65		0.9								100	
	22.80	8	47	53	0.9								100	
	27.80	8	45	55	0.8								100	
	32.80	28	28	50	1.0								78	BROWN SILTY SAND, SAPROLITE.
BT AT A DEPTH OF 34.3 FEET IN V DENSE, BROWN SILTY SAND, SAPROLITE. 24 HR WATER - DRY AT 30 FEET.														

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER								
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER							
BORING NO B-6		NORTHING 0.00		EASTING 0.00		0 HR N/A								
ALIGNMENT -L-		BORING LOCATION 15+02.000		OFFSET 58.00ft RT		24 HR N/A								
COLLAR ELEV 2223.12ft		TOTAL DEPTH 24.90ft		START DATE 11/29/05		COMPLETION DATE 11/29/05								
DRILL MACHINE CME-45C			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC								
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log B-6, Page 1 of 1								
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION		
		6in	6in	6in		0	25	50	75				100	
2223.12													Ground Surface	
	3.40	6	14	12	1.0								26	SAPROLITE: MULTI COLORED SANDY SILT WITH NUMEROUS MN OXIDE MOTTLES
	8.40	3	7	18	1.0								25	
	13.40	5	16	20	1.0								36	
	18.40	6	6	13	1.0								19	
	23.40	7	11	17	1.0								28	
BT AT A DEPTH OF 24.9 FEET IN VERY STIFF SANDY SILT SAPROLITE. 24 HR WATER - DRY AT 12 FEET.														

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER							
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-8		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 102+33.000		OFFSET 121.00ft RT		24 HR N/A							
COLLAR ELEV 2107.73ft		TOTAL DEPTH 16.20ft		START DATE 11/15/05		COMPLETION DATE 11/15/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE							
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log B-8, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG MOI	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2107.73													Ground Surface
	4.10	2	2	9	1.0						M		MIXED EMBANKMENT: CLAYS AND SILTS AND ROCKY LAYER FROM 4 TO 9 FEET DEEP
2100.00	9.20	6	6	6	1.0						M		SAPROLITE: MICACEOUS SANDY SILT
	14.20	10	28	72	0.8						M		WEATHERED ROCK
2091.53													TB AT A DEPTH OF 16.2 FEET IN HARD ROCK. 24 HR WATER - DRY AT 13 FEET.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL UNIT BORING LOG

PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER							
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-9		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 104+87.000		OFFSET 119.00ft RT		24 HR N/A							
COLLAR ELEV 2079.40ft		TOTAL DEPTH 17.90ft		START DATE 11/15/05		COMPLETION DATE 11/15/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH N/A			DEPTH TO ROCK N/A			Log B-9, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG MOI	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2079.40													Ground Surface
	2.70	12	24	33	1.0						M		HARD ROCK EXPOSED ON SURFACE NEAR BY
	7.70	5	10	17	1.0						M		SAPROLITE: SLI. MICA SANDY SILT W/ LAYERS OF SAND AND WEATHERED ROCK
2070.00	12.70	8	18	29	1.0						M		
	17.70	100			0.2								WEATHERED ROCK WITH SAPROLITE LAYERS AND HARD ROCK LAYERS
2061.50													BORING TERMINATED IN WEATHERED ROCK AT A DEPTH OF 17.9 FEET. 24 HOUR WATER DRY AT 14.9 FEET.

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PROJECT NO 34958.1.1		ID U-3601		COUNTY BUNCOMBE		GEOLOGIST M.M. HAGER							
SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-12		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 109+59.000		OFFSET 115.00ft RT		24 HR N/A							
COLLAR ELEV 2085.54ft		TOTAL DEPTH 27.70ft		START DATE 11/14/05		COMPLETION DATE 11/14/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B-12, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2085.54													Ground Surface
2080.00											M		EMBANKMENT: MIXED MED. STIFF TO STIFF SD. SI. WITH SOME SI. SD. AND ROCK, MOI.
2070.00											M		SAPROLITE: BROWN, VERY STIFF TO HARD SLI. MICA SD. SILT WITH WEATHERED ROCK LAYERS, MOI.
2060.00													WEATHERED ROCK WITH LAYERS OF VERY DENSE SAPROLITE.
2057.84													BT IN WEATHERED ROCK AT A DEPTH OF 27.7 FEET. 24 HR WATER - DRY AT 20 FEET.

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SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER						
BORING NO B-13		NORTHING 0.00		EASTING 0.00		0 HR N/A							
ALIGNMENT -L-		BORING LOCATION 110+60.000		OFFSET 115.00ft RT		24 HR N/A							
COLLAR ELEV 2082.97ft		TOTAL DEPTH 27.00ft		START DATE 11/11/05		COMPLETION DATE 11/11/05							
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE AUTOMATIC							
SURFACE WATER DEPTH			DEPTH TO ROCK N/A			Log B-13, Page 1 of 1							
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION	
		6in	6in	6in		0	25	50	75				100
2082.97													Ground Surface
2080.00													EMBANKMENT: LOOSE TO DENSE SILTY SAND WITH GRAVEL. BOULDER RICH FROM 5 - 8 & 23 - 24 FEET.
2070.00													
2060.00													
2055.97													BT IN LOOSE SILTY SAND EMBANKMENT AT A DEPTH OF 27 FEET. 24 HR WATER - DRY AT 19 FEET.

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SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER					
BORING NO B-14		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 111+80.000		OFFSET 52.00R RT		24 HR N/A						
COLLAR ELEV 2079.05ft		TOTAL DEPTH 27.00ft		START DATE 11/11/05		COMPLETION DATE 11/11/05						
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE						
SURFACE WATER DEPTH				DEPTH TO ROCK N/A								
Log B-14, Page 1 of 1												
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2079.05												Ground Surface
2070.00											M	EMBANKMENT: ORANGE AND BROWN SANDY SILT, MOI.
											M	EMBANKMENT: BROWN SANDY SILT WITH BOULDERS, MOI.
2060.00											M	EMBANKMENT: MEDIUM STIFF BROWN SANDY SILT, MOI.
2052.05												BT IN MED. STIFF SANDY SILT - SAPROLITE AT A DEPTH OF 27 FEET.

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SITE DESCRIPTION NC-191 WATER MAIN RELOCATION INVESTIGATION							GND WATER					
BORING NO B-15		NORTHING 0.00		EASTING 0.00		0 HR N/A						
ALIGNMENT -L-		BORING LOCATION 111+84.000		OFFSET 55.00R LT		24 HR N/A						
COLLAR ELEV 2073.25ft		TOTAL DEPTH 23.50ft		START DATE 11/09/05		COMPLETION DATE 11/09/05						
DRILL MACHINE CME-45			DRILL METHOD H.S. AUGERS			HAMMER TYPE						
SURFACE WATER DEPTH N/A				DEPTH TO ROCK N/A								
Log B-15, Page 1 of 1												
ELEV	DEPTH	BLOW CT			PEN (ft)	BLOWS PER FOOT				SAMPLE NO	LOG	SOIL AND ROCK DESCRIPTION
		6in	6in	6in		0	25	50	75			
2073.25												Ground Surface
2070.00												EMBANKMENT: ORANGE SANDY SILT.
											M	EMBANKMENT: BROWN SANDY SILT WITH BOULDERS, MOI.
2060.00											M	RESIDUAL: RED STIFF SANDY CLAY.
											M	SAPROLITE: BROWN SLI. MICA SANDY SILT.
2050.00												BT AT A DEPTH OF 23.5 FEET IN STIFF BROWN SD. SILT - 24 HR WATER - DRY AT 10 FEET.