

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	34448.1.1 (R-2533CC)	1	4

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

**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 34448.1.1 (R-2533CC) F.A. PROJ. NHF-28-1(5)  
COUNTY CABARRUS  
PROJECT DESCRIPTION NC 49 FROM EAST OF SR 2630 (CLINE RD.)  
TO EAST OF NC 73.

SITE DESCRIPTION CULVERT NO. 2 ON NC 49 OVER McALLISTER  
CREEK.

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**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND 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.

PERSONNEL

R.W. TODD

J.P. ROGERS

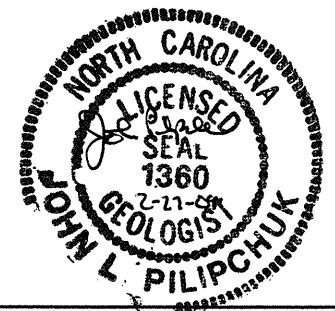
A.C. SMITH

INVESTIGATED BY J.P. ROGERS

CHECKED BY J.P. ROGERS

SUBMITTED BY J.L. PILIPCHUK

DATE FEBRUARY 2009



**PROJECT: 34448.1.1**  
**ID: R-2533CC**

DRAWN BY: J. P. ROGERS /JK McCLURE

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.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

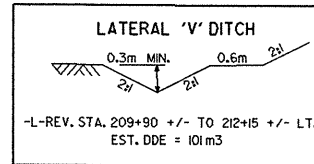
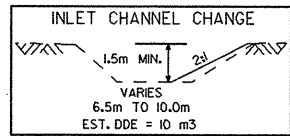
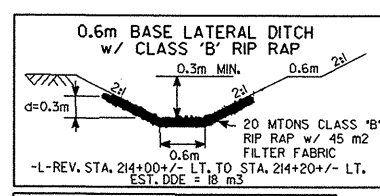
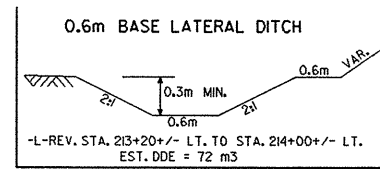
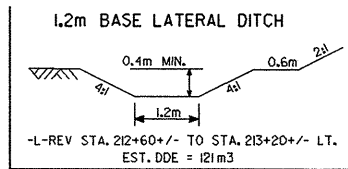
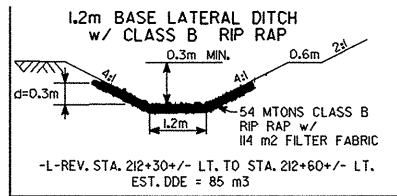
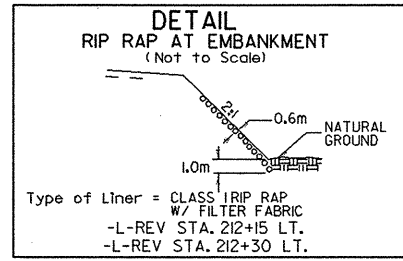
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

PROJECT REFERENCE NO. 34448.II(R-2533CC)	SHEET NO. 2
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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. EXAMPLES:</p> <p>VERY STIFF, GRAVELLY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>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.</p> <p>ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p> <p>WEATHERED ROCK (WR)</p> <p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</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 DISLOADED 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 (MOTJ) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (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 (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																											
<p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <tr> <th>GENERAL CLASS.</th> <th>GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th>SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1, A-1-a, A-1-b, A-2, A-2-1, A-2-5, A-2-6, A-2-7</td> <td>A-3, A-4, A-5, A-6, A-7</td> <td>A-1, A-2, A-3, A-4, A-5, A-6, A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>10, 40, 200</td> <td>40, 10, 200</td> <td>40, 10, 200</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>6, 10, 15</td> <td>10, 15, 20, 25, 30, 35, 40, 45, 50</td> <td>10, 15, 20, 25, 30, 35, 40, 45, 50</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> </tr> <tr> <td>GROUP INDEX</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> <td>0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL AND SAND</td> <td>FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILT, SILTY SILT, CLAYEY SILT, CLAY, SILTY CLAY, CLAYEY CLAY</td> </tr> <tr> <td>GENERAL RATING AS A SUBGRADE</td> <td>EXCELLENT TO GOOD</td> <td>FAIR TO POOR</td> <td>POOR TO UNSUITABLE</td> </tr> </table> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS	GROUP CLASS.	A-1, A-1-a, A-1-b, A-2, A-2-1, A-2-5, A-2-6, A-2-7	A-3, A-4, A-5, A-6, A-7	A-1, A-2, A-3, A-4, A-5, A-6, A-7	SYMBOL				% PASSING	10, 40, 200	40, 10, 200	40, 10, 200	LIQUID LIMIT	6, 10, 15	10, 15, 20, 25, 30, 35, 40, 45, 50	10, 15, 20, 25, 30, 35, 40, 45, 50	PLASTIC INDEX	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	GROUP INDEX	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL AND SAND	FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND	SILT, SILTY SILT, CLAYEY SILT, CLAY, SILTY CLAY, CLAYEY CLAY	GENERAL RATING AS A SUBGRADE	EXCELLENT TO GOOD	FAIR TO POOR	POOR TO UNSUITABLE	<p>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>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31</p> <p>MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50</p> <p>HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p>PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>&gt;10%</td> <td>&gt;20%</td> <td>HIGHLY</td> </tr> <tr> <td></td> <td></td> <td></td> <td>35% AND ABOVE</td> </tr> </table> <p>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>		ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY				35% AND ABOVE	<p>WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SLJ) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SLJ) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MODJ) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS, IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY (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, IF TESTED, WOULD YIELD SPT REFUSAL.</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, IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF.</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, IF TESTED, YIELDS SPT N VALUES &lt; 100 BPF.</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>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 PIECES 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>	
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)	SILT-CLAY MATERIALS (> 35% PASSING #200)	ORGANIC MATERIALS																																																														
GROUP CLASS.	A-1, A-1-a, A-1-b, A-2, A-2-1, A-2-5, A-2-6, A-2-7	A-3, A-4, A-5, A-6, A-7	A-1, A-2, A-3, A-4, A-5, A-6, A-7																																																														
SYMBOL																																																																	
% PASSING	10, 40, 200	40, 10, 200	40, 10, 200																																																														
LIQUID LIMIT	6, 10, 15	10, 15, 20, 25, 30, 35, 40, 45, 50	10, 15, 20, 25, 30, 35, 40, 45, 50																																																														
PLASTIC INDEX	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50																																																														
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USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL AND SAND	FINE SAND, SILTY OR CLAYEY GRAVEL AND SAND	SILT, SILTY SILT, CLAYEY SILT, CLAY, SILTY CLAY, CLAYEY CLAY																																																														
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**METRIC**

Scale: 5m 0 10m

**R-2533CA**

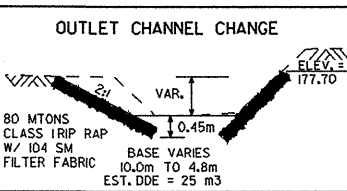
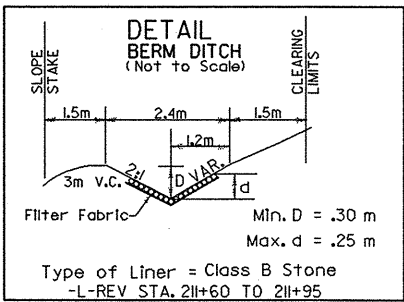
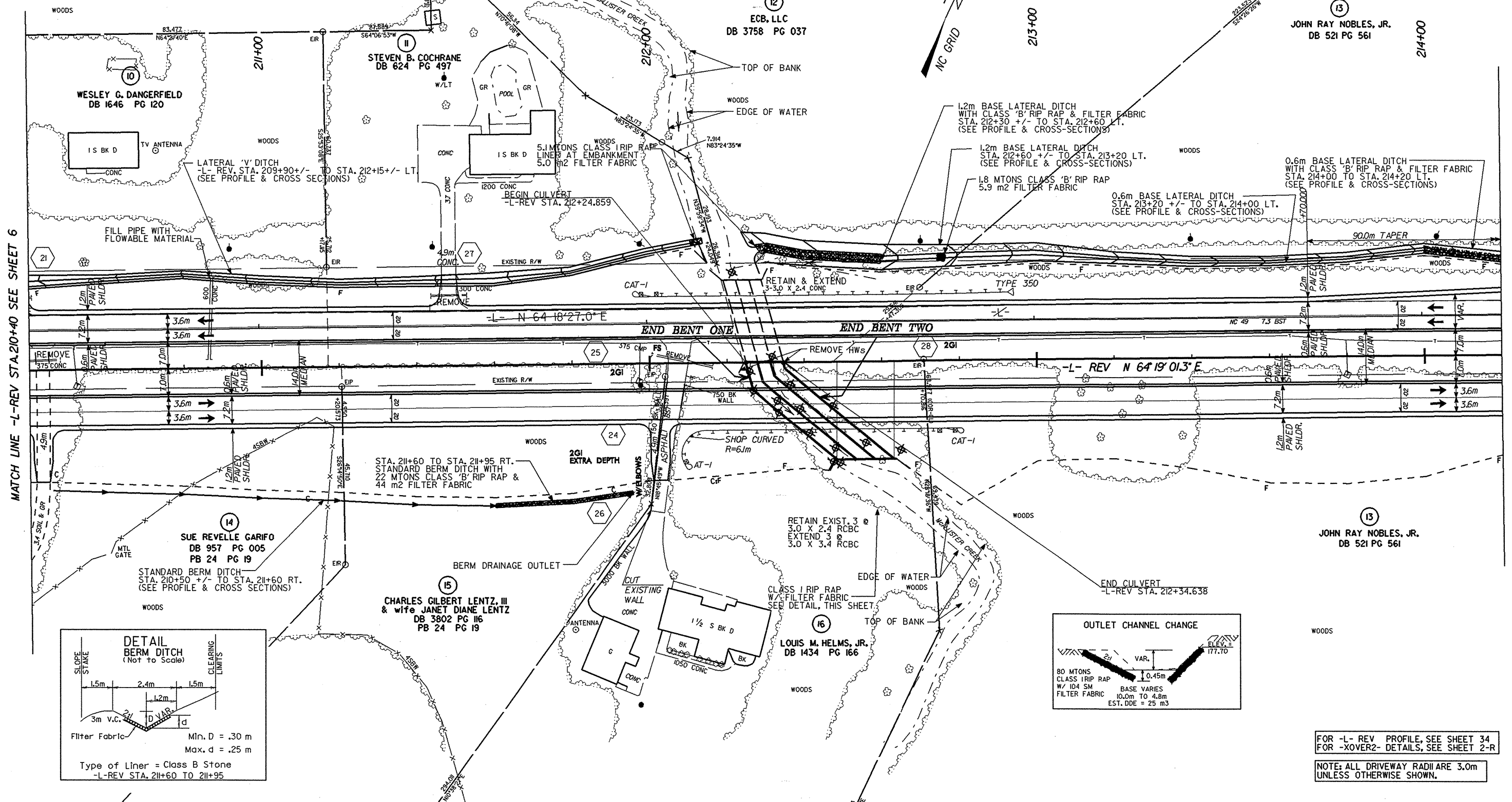
**HIGHWAY DESIGN**  
PROFESSIONAL SEAL  
17823

**HYDRAULICS**  
PROFESSIONAL SEAL  
14101

Prepared in the Office of:

**EarthTech**  
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CONST. REV.  
R/W REV.




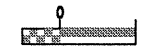
FOR -L- REV PROFILE, SEE SHEET 34  
FOR -XOVER2- DETAILS, SEE SHEET 2-R

NOTE: ALL DRIVEWAY RADII ARE 3.0m  
UNLESS OTHERWISE SHOWN.

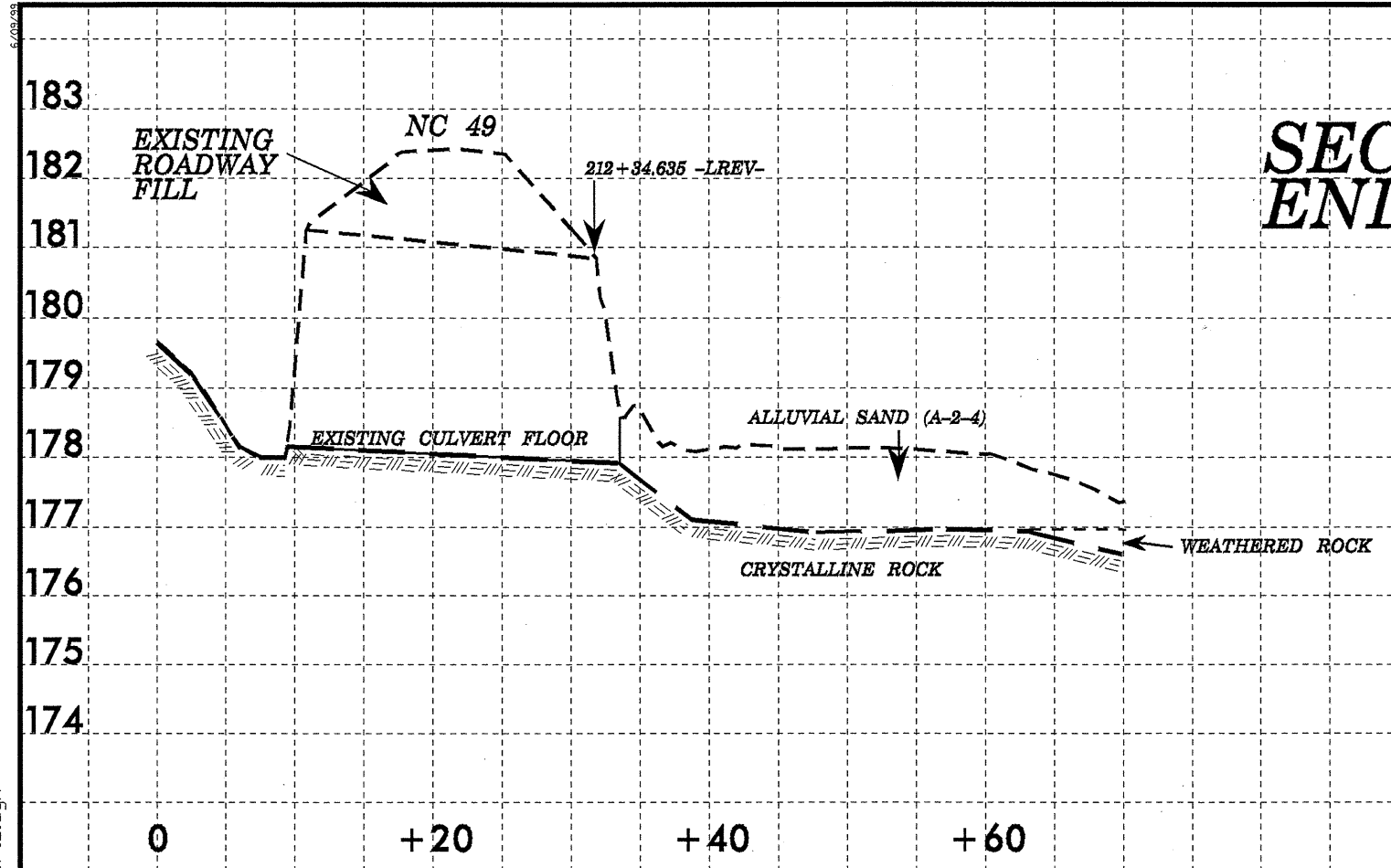
MATCH LINE -L-REV STA. 210+40 SEE SHEET 6

MATCH LINE -L-REV STA. 214+20 SEE SHEET 8

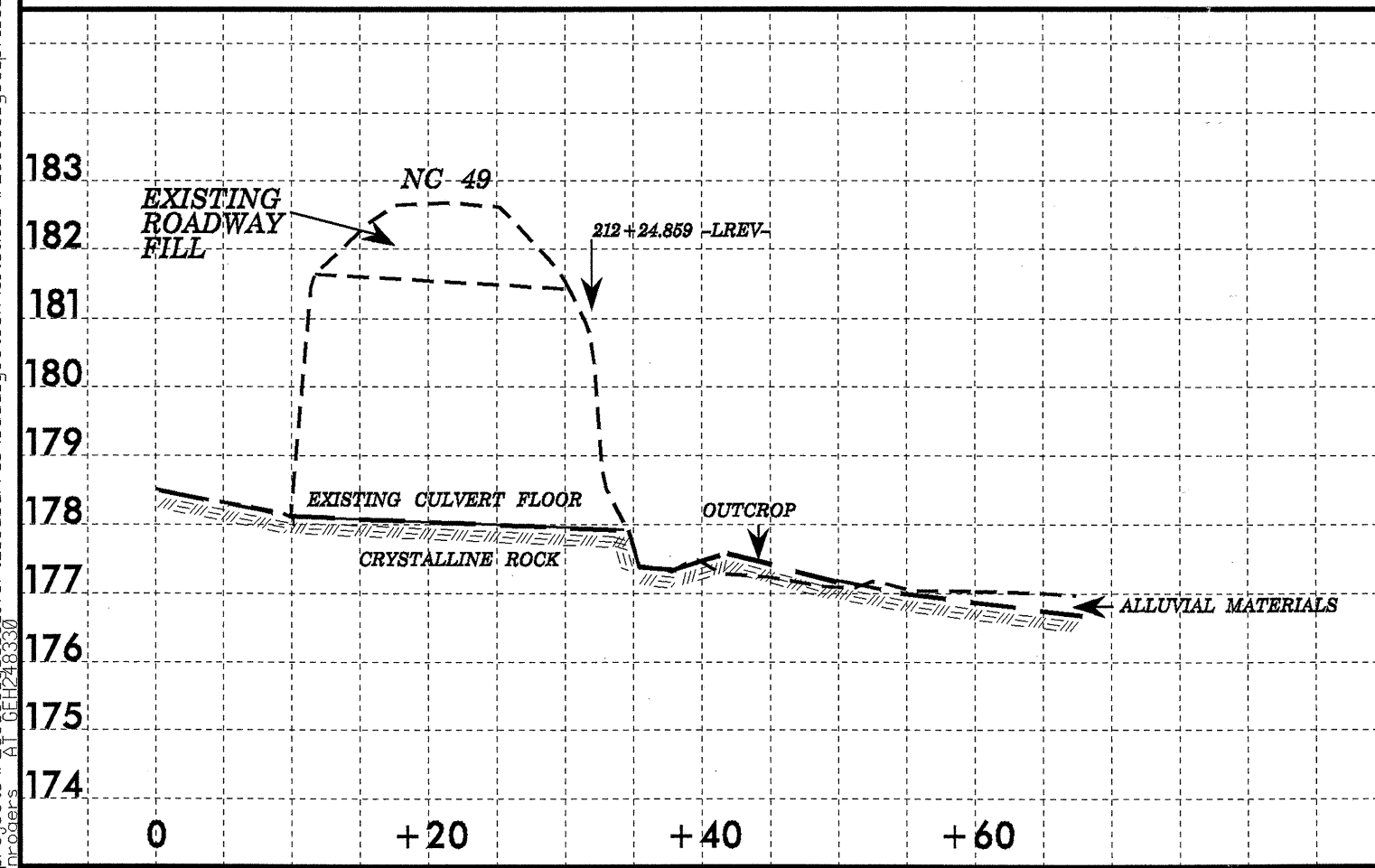
USER: \*\*\*DATE\*\*\*  
DATE: \*\*\*DATE\*\*\*

	PROJECT REFERENCE NO.	SHEET NO.				
	R-2533CC					
	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER				
CONST. REV.	<table border="1"> <tr> <td>INCOMPLETE PLANS</td> <td>DO NOT USE FOR R/W ACQUISITION</td> </tr> <tr> <td>PRELIMINARY PLANS</td> <td>DO NOT USE FOR CONSTRUCTION</td> </tr> </table>		INCOMPLETE PLANS	DO NOT USE FOR R/W ACQUISITION	PRELIMINARY PLANS	DO NOT USE FOR CONSTRUCTION
INCOMPLETE PLANS	DO NOT USE FOR R/W ACQUISITION					
PRELIMINARY PLANS	DO NOT USE FOR CONSTRUCTION					
R/W REV.						

# SECTION THROUGH END BENT TWO



# SECTION THROUGH END BENT ONE



09-MAR-2009 09:35  
 d:\projects\2533cc\geo\culvert2.cabarrus\cadd\geotech\site\sub\2533cc-geo-pfl-culvert2.dgn  
 01/06/2009

GEOTECHNICAL UNIT

SOIL AND ROCK CLASSIFICATION, LEGEND, AND ABBREVIATIONS

SOIL LEGEND AND AASHTO CLASSIFICATION										CONSISTENCY OR DENSENESS				
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N - VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (q <sub>u</sub> ) (kN / m <sup>2</sup> )
GROUP CLASS.	A-1	A-3	A-2		A-4	A-5	A-6	A-7	A-1,A-2 A-3	A-4,A-5 A-6,A-7	GENERALLY GRANULAR MATERIAL	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
SYMBOL														
% PASSING	#10 50 MX #40 30 MX #200 15 MX	50 MX 51 MN	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT			
(PASSING #40) LL PI	6 MX	N.P.	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 25 25 TO 50 50 TO 100 100 TO 200 200 TO 400 > 400
GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX			HIGHLY ORGANIC SOILS			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL & SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS	CLAYEY SOILS								
* PI OF A-7-5 ≤ (LL-30); PI OF A-7-6 > (LL-30)														

TEXTURE OR GRAIN SIZE						
BOULDER	COBBLE	GRAVEL	COARSE SAND	MED. SAND	FINE SAND	CLAY
GRAIN (mm)	305	75	2	0.6	0.425	0.2
SIZE (IN)	12	3				

SOIL MOISTURE - CORRELATION OF TERMS		
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
LL	LIQUID LIMIT	-SATURATED- (SAT.)
PLASTIC RANGE (PD) PL	PLASTIC LIMIT	-WET- (W)
OM	OPTIMUM MOISTURE	-MOIST- (M)
SL	SHRINKAGE LIMIT	-DRY- (D)

ROCK DESCRIPTION	
IN THE BROADEST MEANING, HARD ROCK IS CONSIDERED TO BE THAT INDURATED EARTH MATERIAL WHICH CANNOT BE SAMPLED BY CONVENTIONAL SOIL SAMPLING TOOLS OR TECHNIQUES. THE BOUNDARY BETWEEN SOIL AND ROCK IS ARBITRARY. TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF 'WEATHERED ROCK'. FOR THE PURPOSE OF THIS INVESTIGATION, THESE MATERIALS ARE DIVIDED AS FOLLOWS:	
TERM	SYMBOLS
HARD ROCK (HR)	
WEATHERED ROCK (WR)	

ABBREVIATIONS	
ADS	AVG. DISCONTINUITY SPACING
ADT	AVG. DISCONTINUITY THICKNESS
ALLUV.	ALLUVIUM
AR	AUGER REFUSAL
BLDR.	BOULDER
CALC.	CALCAREOUS
CL.	CLAY
CLY.	CLAYEY
COB.	COBBLE
CSE.	COARSE
DPT	DYNAMIC PENETRATION TEST
EST.	ESTIMATED
F.	FINE
FOSS.	FOSSILIFEROUS
FRAC.	FRACTURED
FRAG(S).	FRAGMENT(S)
GR.	GRAVEL
GS	SPECIFIC GRAVITY
GW	GROUND WATER
MED.	MEDIUM
MIC.	MICACEOUS
MOT.	MOTTLED
N	BLOWS / 300 mm
NS	NO SAMPLE TAKEN
ORG.	ORGANIC
REF.	REFER TO
RES.	RESIDUAL
RS	ROCK SAMPLE
S.	SOFT
SAT.	SATURATED
SD.	SAND
SDY.	SANDY
SED(S).	SEDIMENT(S)
SL.	SILT, SILTY
SLI.	SLIGHTLY
SPT	STANDARD PENETRATION TEST
TS.	TOPSOIL
VST	VANE SHEAR TEST
V.	VERY
W/	WITH

BENCH MARK: **TBM #2: CHIP IN WING WALL**  
**STA. 15+48 -L- 19.0 RT.**  
**ELEV. 192.476**

STATE PROJECT NO. **8.1661001**

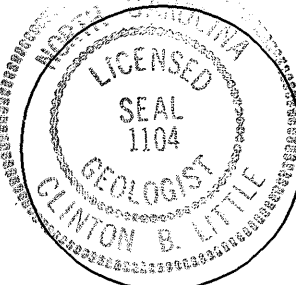
T.I.P. NO. **R-2533CA** F.A. NO. \_\_\_\_\_

COUNTY **CABARRUS** ROUTE **NC 73**

SITE DESCRIPTION **-Y1-REV. (NC 73) OVER -L- (NC 49)**

PROJECT GEOLOGIST **J.P. ROGERS** SUBMITTED BY **C.B. LITTLE**

PERSONNEL **R.W. TODD**  
**R.J. TUCKER**  
**R.S. HINSON** DATE SUBMITTED **OCT. 1999**



SEAL  
 Signature

## 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.

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.

## LEGEND SUPPLEMENT

In addition to the terms and abbreviations listed on the Legend Sheet, the following will be used to further describe rock quality on this project. Because of limited space on the logs, abbreviations are in parenthesis.

### WEATHERING

Fresh	Rock fresh, crystals bright, few joints may show slight staining. Rock rings under hammer in crystalline.
Very Slight (V. SLI.)	Rock generally fresh, joints stained, some joints may show thin clay coatings if open, crystals on a broken specimen face shine brightly. Rock rings under hammer blows if of a crystalline nature.
Slight (SLI.)	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in.). Open joints may contain clay. In granitoid rocks some occasional feldspar crystals are dull and discolored.
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 show significant loss of strength as compared with fresh rock.
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 & can be excavated with geologist's pick. Rock gives "clunk" sound when struck. <b>Comparable to hard weathered rock.</b>
Severe (SEV.)	All rocks except quartz discolored or stained. Rock "fabric" clear and evident but reduced in strength to strong soil. In granitoid rocks all feldspars are kaolinized to some extent. Some fragments of strong rock usually remain. <b>Comparable to soft weathered rock.</b>
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. <b>Comparable to soil.</b>
Complete	Rock reduced to soil. Rock fabric not discernible only in small and scattered concentrations. Quartz may be present as dikes or stringers. Saprolite is also an example. <b>Comparable to soil.</b>

### ROCK CONTINUITY

Sound	Core pieces larger than 200 mm.
Slightly Fractured (SLI. FRAC.)-	Core pieces between 100 mm and 200 mm
Moderately Fractured (MOD. FRAC.) -	Core pieces between 25 mm and 100 mm
Extremely Fractured (EXT. FRAC.) -	Core pieces less than 25 mm

### JOINT SPACING

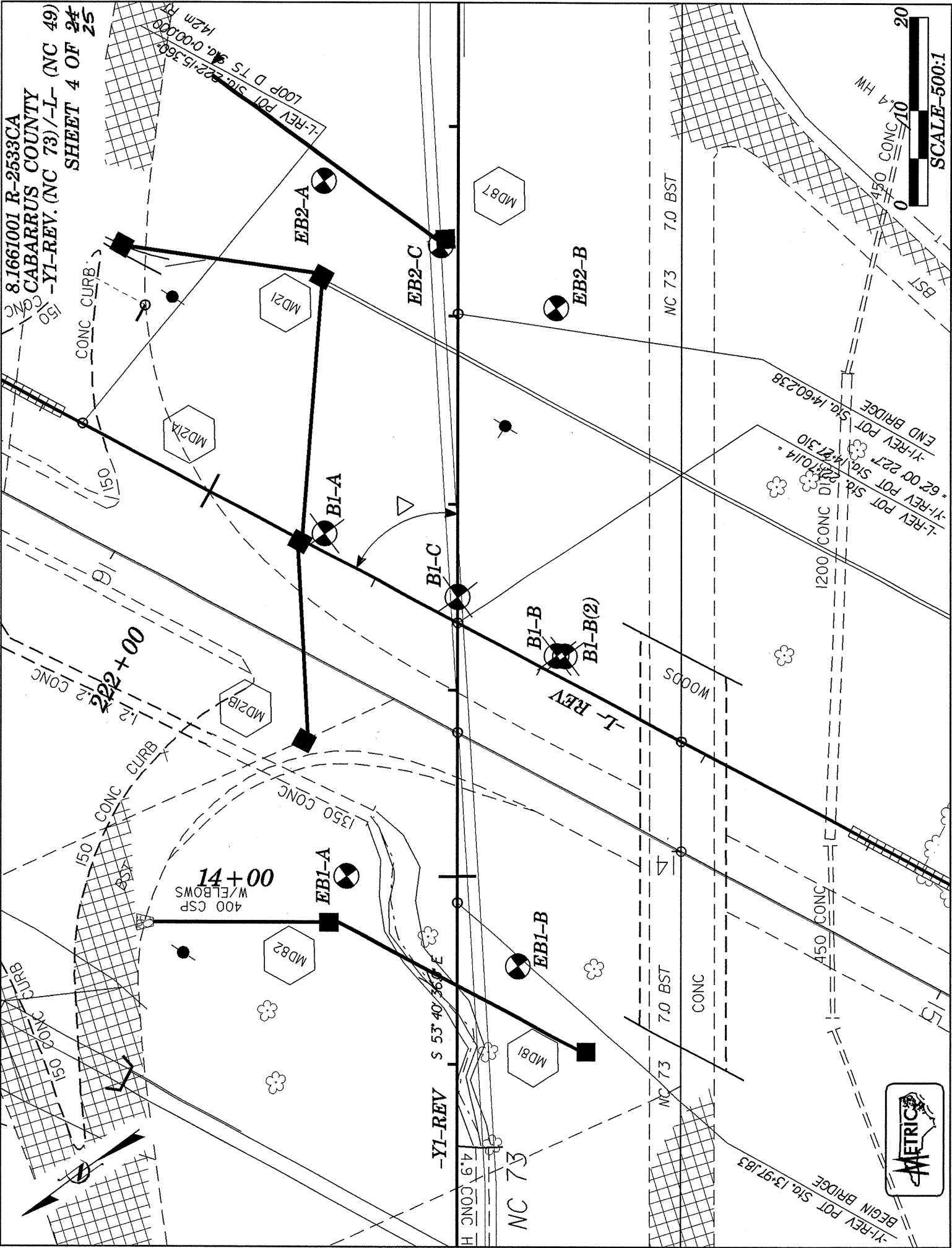
Average Discontinuity Spacing (ADS)

The average measured distance (in centimeters) between joints in the same set. Will not apply to individual joints.

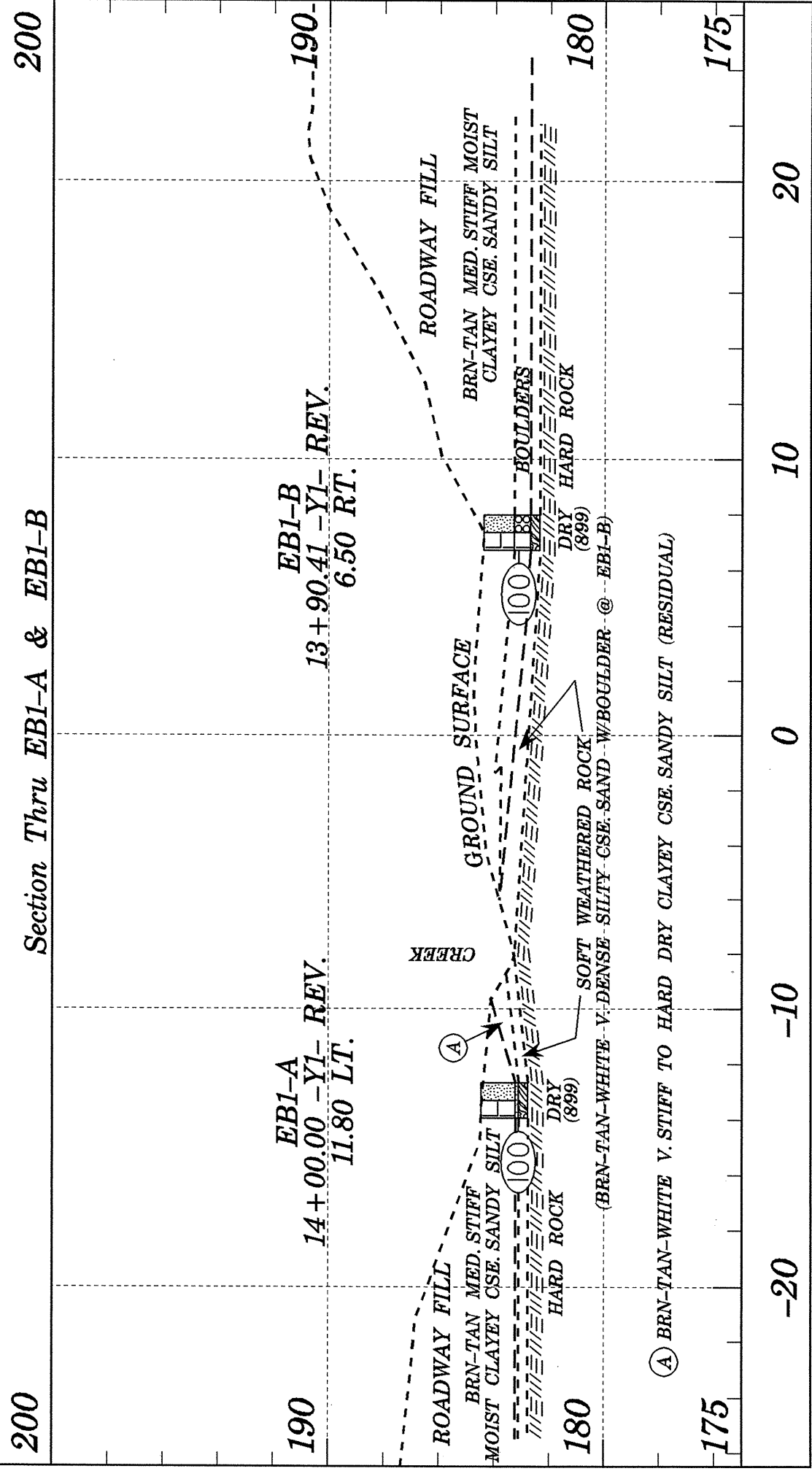
### JOINT THICKNESS

Average Discontinuity Thickness (ADT)

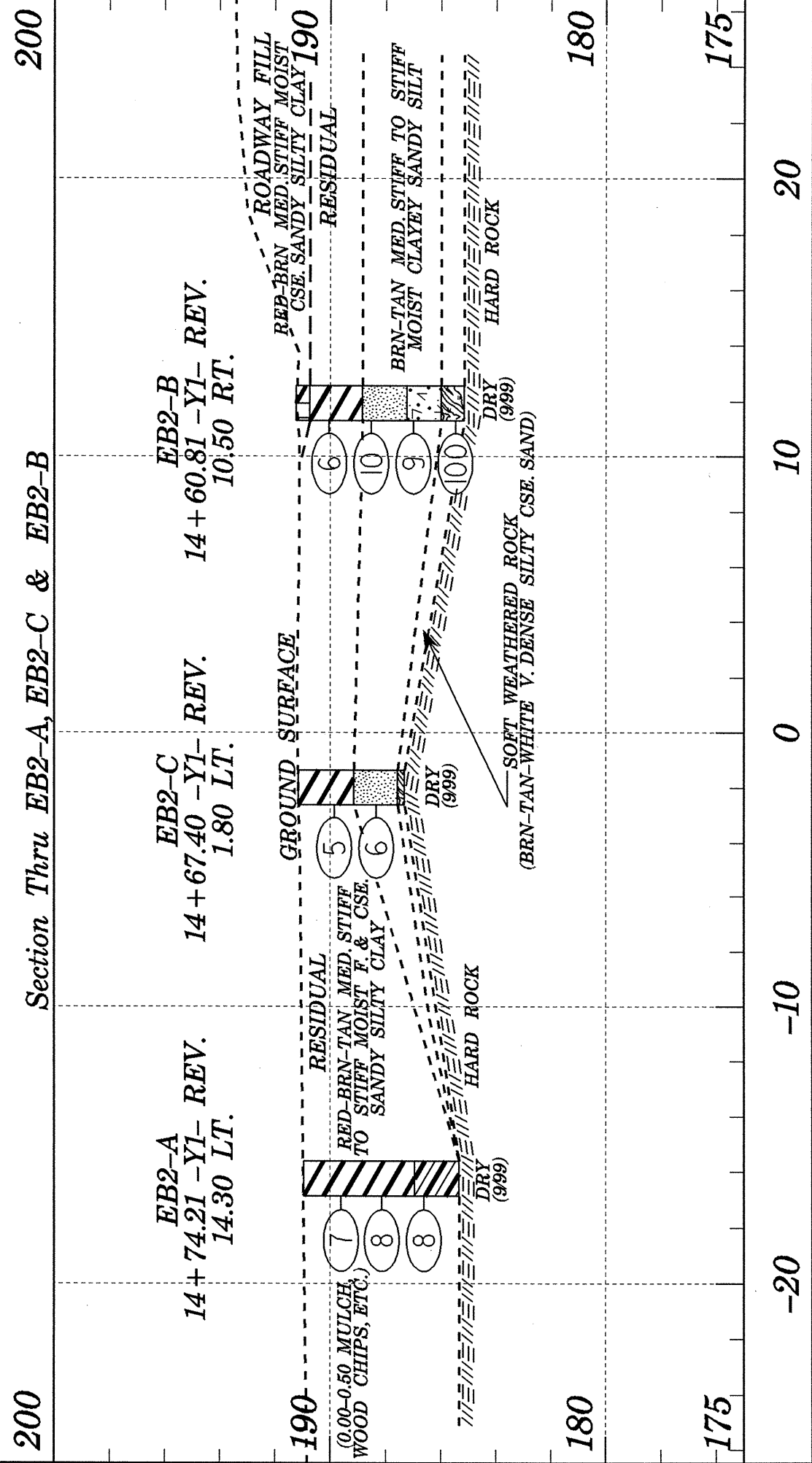
The average thickness or width of gap in the joint.













NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 9 OF 24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.					
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER				
BORING NO. EBI-A		BORING LOCATION 14+00.00		OFFSET -11.8	ALIGNMENT YIREV		0 HR.				
COLLAR ELEV. 184.49		NORTHING 0.00		EASTING 0.00		24 HR. DRY					
TOTAL DEPTH 1.71		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC					
START DATE 8/26/99		COMPLETION DATE 8/26/99		SURFACE WATER DEPTH		DEPTH TO ROCK 1.71					
ELEV.	DEPTH	BLOW COUNT			BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm	(m)	0	25	50			
184.49											
184.00	1.37	75	25	0.21					SS-1	M	(ROADWAY FILL) BRN-TAN MED. STIFF CLAYEY CSE. SANDY SILT
182.00										D	(RESIDUAL) BRN-TAN-WHITE V. STIFF TO HARD CLAYEY CSE. SANDY SILT SOFT WEATHERED ROCK (BRN-TAN-WHITE V. DENSE SILTY SAND)
180.00											
178.00											
176.00											
174.00											
172.00											
170.00											
168.00											
166.00											AUGER REFUSAL AT ELEV. 182.78 ON HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 10 OF 24<sup>25</sup>

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.						
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER					
BORING NO. EBI-B		BORING LOCATION 13+90.41		OFFSET 6.500		ALIGNMENT YIREV						
COLLAR ELEV. 184.42		NORTHING 0.00		EASTING 0.00		0 HR.						
TOTAL DEPTH 2.04		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC						
START DATE 8/26/99		COMPLETION DATE 8/26/99		SURFACE WATER DEPTH		DEPTH TO ROCK 2.04						
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
184.42												
184.00	1.28	100		0.09					100 X	SS-2	M	(ROADWAY FILL) BRN-TAN MED. STIFF CLAYEY CSE. SANDY SILT
182.00												BOULDERS
												SOFT WEATHERED ROCK (BOULDER & V. DENSE CSE. SAND)
180.00												
178.00												
176.00												
174.00												
172.00												
170.00												
168.00												
166.00												
												AUGER REFUSAL AT ELEV. 182.38 ON HARD ROCK

**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
GEOTECHNICAL UNIT BORING LOG**

SHEET 11 OF 24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.						
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER					
BORING NO. BI-A		BORING LOCATION 14+36.81		OFFSET -14.2	ALIGNMENT YIREV		0 HR.					
COLLAR ELEV. 188.76		NORTHING		EASTING		24 HR. 3						
TOTAL DEPTH 10.01		DRILL MACHINE CME-550		DRILL METHOD NW CAS/NXWL		HAMMER TYPE AUTOMATIC						
START DATE 9/1/99		COMPLETION DATE 9/1/99		SURFACE WATER DEPTH		DEPTH TO ROCK 5.7						
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
188.76												
188.00											M	(RESIDUAL) RED-BRN MED. STIFF CSE. SANDY SILTY CLAY
186.00											▼	
184.00	3.7	100			0.03							SOFT TO HARD WEATHERED ROCK (SEV. -MOD. SEV. WEATH. META-GRANODIORITE)
182.00	5.7											CORE1 RS-1 GRAY-WHITE MOD. WEATH. & FRAC. META-GRANODIORITE REC=97% RQD=79%
180.00	7.16											CORE2 RS-2 GRAY-WHITE MOD. WEATH. & FRAC. META-GRANODIORITE & MAFIC META-VOLCANICS REC=99% RQD=46%
178.00	8.63											CORE3 RS-3 GRAY-GREEN SLI. WEATH. & FRAC. MAFIC META-VOLCANICS REC=93% RQD=81%
176.00												
174.00												
172.00												
170.00												TERMINATED BORING AT ELEV. 178.75 IN SLI. WEATH. & FRAC. MAFIC META-VOLCANICS

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO: 8.1661001	PROJECT ID: R-2533CA	COUNTY: CABARRUS	GEOLOGIST: R.W. TODD
SITE DESCRIPTION: -Y1REV- (NC 73) OVER -L- (NC 49)	BORING LOCATION (STA): 14+36.81		DRILLER: R.J. TUCKER
BORING NO: B1-A	PERSONNEL:		OFFSET: 14.20m LT.
COLLAR ELEV: 188.76m	DRILL MACHINE: CME-550		CORE SIZE: NXWL
TOTAL DEPTH: 10.01m	DRILL EQUIP:		DATE STARTED: 9/1/99
TOTAL RUN: 4.31m			DATE COMPLETED: 9/1/99

ELEV. (M)	DEPTH (M)	DRILL RATE (MIN./3 m)	RUN NO.	REC % (M)	RQD % (M)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
183.06	5.70		1	97	79	RS-1	GRAY-WHITE, MOD. WEATH, & FRAC. META-GRANODIORITE.  14 NEAR HOR. (0-5 DEG.) BREAKS IN FOLIATION PLANES. ADS = 0.10m ADT= 0.006m
181.60	7.16		2	99	46	RS-2	GRAY-WHITE, MOD. WEATH, & FRAC. META-GRANODIORITE & MAFIC META-VOLCANICS. 5 SHALLOW (0-10 DEG.) BREAKS IN FOLIATION PLANES. ADS=0.29m ADT=0.006m 3 70 DEG. JT. BREAKS BETWEEN 7.55-8.55m ADS = 0.49m ADT = 0.006m
180.13	8.63		3	93	81	RS-3	GRAY/GREEN, SLI. WEATH & FRAC. MAFIC META-VOLCANICS.
178.75	10.01						9 NEAR HOR. (0-5 DEG.) BREAKS IN FOLIATION PLANES. ADS = 0.15m ADT = 0.006m
<b>NOTES</b> JT. = JOINT							



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG SHEET 13 OF 25

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.							
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER						
BORING NO. BI-C		BORING LOCATION 14+30.00		OFFSET 0.000		ALIGNMENT YIREV	0 HR.						
COLLAR ELEV. 188.80		NORTHING		EASTING		24 HR. DRY							
TOTAL DEPTH 9.6		DRILL MACHINE CME-550		DRILL METHOD NW CAS/NXWL		HAMMER TYPE AUTOMATIC							
START DATE 8/31/99		COMPLETION DATE 9/1/99		SURFACE WATER DEPTH		DEPTH TO ROCK 5.86							
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75				100
188.80													
188.00													(RESIDUAL) RED-BRN MED. STIFF CSE. SANDY SILTY CLAY
186.00	2.86	12	100	0.09									SOFT WEATHERED ROCK (SEV. WEATH. META-GRANODIORITE) W/ HARD ROCK @ 2.79-3.80
184.00													
182.00	5.86									CORE1 RS-4			GRAY-WHITE FRESH SOUND META-GRANODIORITE REC=100% RQD=91%
180.00	7.38									CORE2 RS-5			GRAY-WHITE FRESH SOUND META-GRANODIORITE REC=93% RQD=93%
178.00	8.9									CORE3 RS-6			GRAY-WHITE FRESH SOUND META-GRANODIORITE REC=100% RQD=100%
176.00													
174.00													
172.00													
170.00													TERMINATED BORING AT ELEV. 179.20 IN FRESH SOUND

# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO: 8.1661001	PROJECT ID: R-2533CA	COUNTY: CABARRUS	GEOLOGIST: R.W. TODD
SITE DESCRIPTION: -Y1REV- (NC 73) OVER -L- (NC 49)	BORING LOCATION (STA): 14+30 -Y1REV-		DRILLER: R.J. TUCKER
BORING NO: B1-C	PERSONNEL:		OFFSET: 0
COLLAR ELEV: 188.80m	DRILL MACHINE: CME-550		CORE SIZE: NXWL
TOTAL DEPTH: 9.60m	DRILL EQUIP:		DATE STARTED: 9/1/99
TOTAL RUN: 3.74m			DATE COMPLETED: 9/1/99

ELEV. (M)	DEPTH (M)	DRILL RATE (MIN/3 m)	RUN NO.	REC % (M)	RQD % (M)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
182.94	5.86		1	100	91	RS-4	GRAY-WHITE, FRESH, SOUND, META-GRANODIORITE. 7.12m - 7.24m - ROCK CHEWED UP BY CORE BARREL. NO ADS OR ADT.
181.42	7.38		2	93	93	RS-5	GRAY-WHITE, FRESH, SOUND, META-GRANODIORITE. TWO NEAR HOR. (0-5) BREAKS IN FOLIATION PLANE. ADS = 0.76m            ADT = .003m
179.90	8.90		3	100	100	RS-6	GRAY-WHITE, FRESH, SOUND, META-GRANODIORITE
179.20	9.60						NO ADS OR ADT.
<b>NOTES</b>							



# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

## DIVISION OF HIGHWAYS

### GEOTECHNICAL UNIT CORE BORING REPORT

PROJECT NO: 8.1661001	PROJECT ID: R-2533CA	COUNTY: CABARRUS	GEOLOGIST: R.W. TODD
SITE DESCRIPTION: -Y1REV- (NC 73) OVER -L- (NC 49)			DRILLER: R.J. TUCKER
BORING NO: B1-B	BORING LOCATION (STA): 14+23.76 -Y1REV-		OFFSET: 10.6m RT.
COLLAR ELEV: 189.23	PERSONNEL:		CORE SIZE: NXWL
TOTAL DEPTH: 10.40m	DRILL MACHINE: CME-550		DATE STARTED: 8/31/99
TOTAL RUN: 4.98m	DRILL EQUIP:		DATE COMPLETED: 8/31/99

ELEV. (M)	DEPTH (M)	DRILL RATE (MIN/3 m)	RUN NO.	REC % (M)	RQD % (M)	SAMPLE NO.	FIELD CLASSIFICATION AND REMARKS
183.73	5.50		1	87	0		GRAY-WHITE, MOD. SEV. WEATH. & MOD. TO EXT. FRAC. META-GRANODIORITE.  ADS, ADT - UNDETERMINABLE
182.19	7.04		2	100	94	RS-7	GRAY-WHITE, SLI. WEATH. & FRAC., META-GRANODIORITE.  6 SHALLOW (0-10 DEG.) BREAKS ALONG FOLIATION PLANES. ADS=0.21m ADT= 0.006m
180.93	8.30		3	100	74	RS-8	GRAY-WHITE, SLI. WEATH. & FRAC., META-GRANODIORITE. 9.08-9.24 - ONE 70 DEG. JT. BREAK. ADS = 0.006m 13 (0-5 DEG.) BREAKS ALONG FOLIATION PLANES. ADS = 0.14m ADT = 0.006 - 0.009m
179.05	10.48						
<b>NOTES</b> JT. = JOINT							

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

17 25  
 SHEET 15(A) OF 24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.								
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER							
BORING NO. BI-B(2)		BORING LOCATION 14+23.76		OFFSET 11.50		ALIGNMENT YIREV								
COLLAR ELEV. 189.38		NORTHING		EASTING		0 HR.								
TOTAL DEPTH 7.16		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC								
START DATE 11/2/99		COMPLETION DATE 11/2/99		SURFACE WATER DEPTH		DEPTH TO ROCK 7.16								
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm					SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
189.38														(RESIDUAL) RED BRN-BRN MED. STIFF SANDY SILTY CLAY
188.00														BRN-TAN-GRAY TO OLIVE-GRAY-BRN MED. STIFF TO HARD CLAYEY SANDY SILT
186.00	3.68	3	3	4	0.3	X 7								
	4.44	3	7	8	0.3	X 15								
184.00	5.2	1	4	5	0.3	X 9								
	5.96	6	6	29	0.3									
	6.72	4	50	50	0.8									
182.00														SOFT WEATHERED ROCK (SEV. WEATH. META-GRANODIORITE)
180.00														
178.00														
176.00														
174.00														
172.00														
170.00														AUGER REFUSAL AT ELEV. 182.22 ON HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

18 25  
 SHEET 17 OF 24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.						
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER					
BORING NO. EB2-A		BORING LOCATION 14+74.21		OFFSET -14.3		ALIGNMENT YIREV						
COLLAR ELEV. 190.96		NORTHING 0.00		EASTING 0.00		0 HR.						
TOTAL DEPTH 5.61		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC						
START DATE 9/2/99		COMPLETION DATE 9/2/99		SURFACE WATER DEPTH		DEPTH TO ROCK 5.61						
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
190.96												
190.00	1.35	3	3	4	0.3	X 7				ST-1 SS-7	M	(RESIDUAL) RED-BRN MED. STIFF TO STIFF F. SANDY SILTY CLAY W/ 0.00-0.5 MULCH, WOOD CHIPS, ETC.
188.00	2.82	3	3	5	0.3	X 8					M	
186.00	4.34	3	4	4	0.3	X 8				SS-8	M	GRAY STIFF F. SANDY SILTY CLAY
184.00												
182.00												
180.00												
178.00												
176.00												
174.00												
172.00												AUGER REFUSAL AT ELEV. 185.35 ON HARD ROCK

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET <sup>19</sup>18 OF <sup>25</sup>24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.								
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER							
BORING NO. EB2-C		BORING LOCATION 14+67.40		OFFSET -1.80		ALIGNMENT YIREV								
COLLAR ELEV. 191.16		NORTHING 0.00		EASTING 0.00		0 HR.								
TOTAL DEPTH 3.83		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC								
START DATE 9/2/99		COMPLETION DATE 9/2/99		SURFACE WATER DEPTH		DEPTH TO ROCK 3.83								
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm					SAMPLE NUMBER	LOG MOI.	SOIL AND ROCK DESCRIPTION	
		15cm	15cm	15cm		0	25	50	75	100				
191.16														
190.00	1.3	2	2	3	0.3	X5					SS-6	M	(RESIDUAL) RED-BRN-TAN MED. STIFF SILTY SANDY CLAY	
188.00	2.82	3	3	3	0.3	X6						M	BRN-TAN MED. STIFF CLAYEY SANDY SILT	
													SOFT WEATHERED ROCK (BRN-TAN V. DENSE SILTY SAND)	
186.00														
184.00														
182.00														
180.00														
178.00														
176.00														
174.00														
172.00													AUGER REFUSAL AT ELEV. 187.33 ON HARD ROCK	

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
 GEOTECHNICAL UNIT BORING LOG

SHEET 19 OF 24

PROJECT NO. 8.1661001		ID. R-2533CA		COUNTY CABARRUS		GEOLOGIST TODD R.W.						
SITE DESCRIPTION -YI- REV. (NC 73) OVER -L- (NC 49)							GROUND WATER					
BORING NO. EB2-B		BORING LOCATION 14+60.81		OFFSET 10.50	ALIGNMENT YIREV		0 HR.					
COLLAR ELEV. 191.25		NORTHING 0.00		EASTING 0.00		24 HR. DRY						
TOTAL DEPTH 6.08		DRILL MACHINE CME-550		DRILL METHOD H.S. AUGERS		HAMMER TYPE AUTOMATIC						
START DATE 9/2/99		COMPLETION DATE 9/2/99		SURFACE WATER DEPTH		DEPTH TO ROCK 6.08						
ELEV.	DEPTH	BLOW COUNT			PEN. (m)	BLOWS PER 30cm				SAMPLE NUMBER	LOG	SOIL AND ROCK DESCRIPTION
		15cm	15cm	15cm		0	25	50	75			
191.25												(ROADWAY FILL) RED-BRN MED. STIFF CSE. SANDY SILTY CLAY
190.00	1.2	3	3	3	0.3	X6				SS-3	M	(RESIDUAL) RED-BRN MED. STIFF CSE. SANDY SILTY CLAY
188.00	2.72	3	5	5	0.3	X10				SS-4	M	BRN-TAN STIFF CLAYEY SANDY SILT
186.00	4.24	4	4	5	0.3	X9				SS-5	M	BRN W/ BLACK STREAKS STIFF CLAYEY F. SANDY SILT
185.00	5.76	4	31	69	0.37				100 X		D	SOFT WEATHERED ROCK (BRN-TAN-WHITE V. DENSE SILTY CSE. SAND)
184.00												
182.00												
180.00												
178.00												
176.00												
174.00												
172.00												AUGER REFUSAL AT ELEV. 185.17 ON HARD ROCK



PROJECT: 8.1661001 R-2533CA

COUNTY: CABARRUS

SITE DESCRIPTION: BRIDGE ON -Y1- REV. (NC 73) OVER -L- (NC 49)

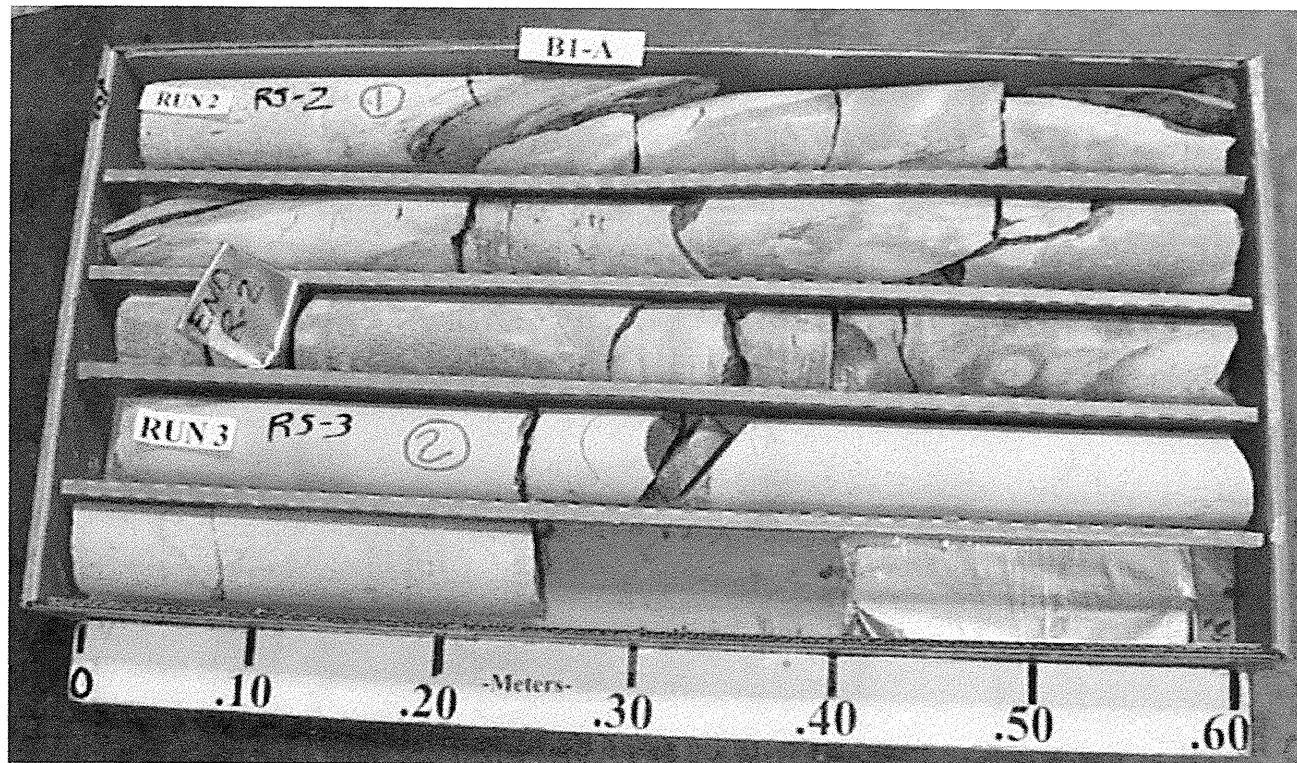
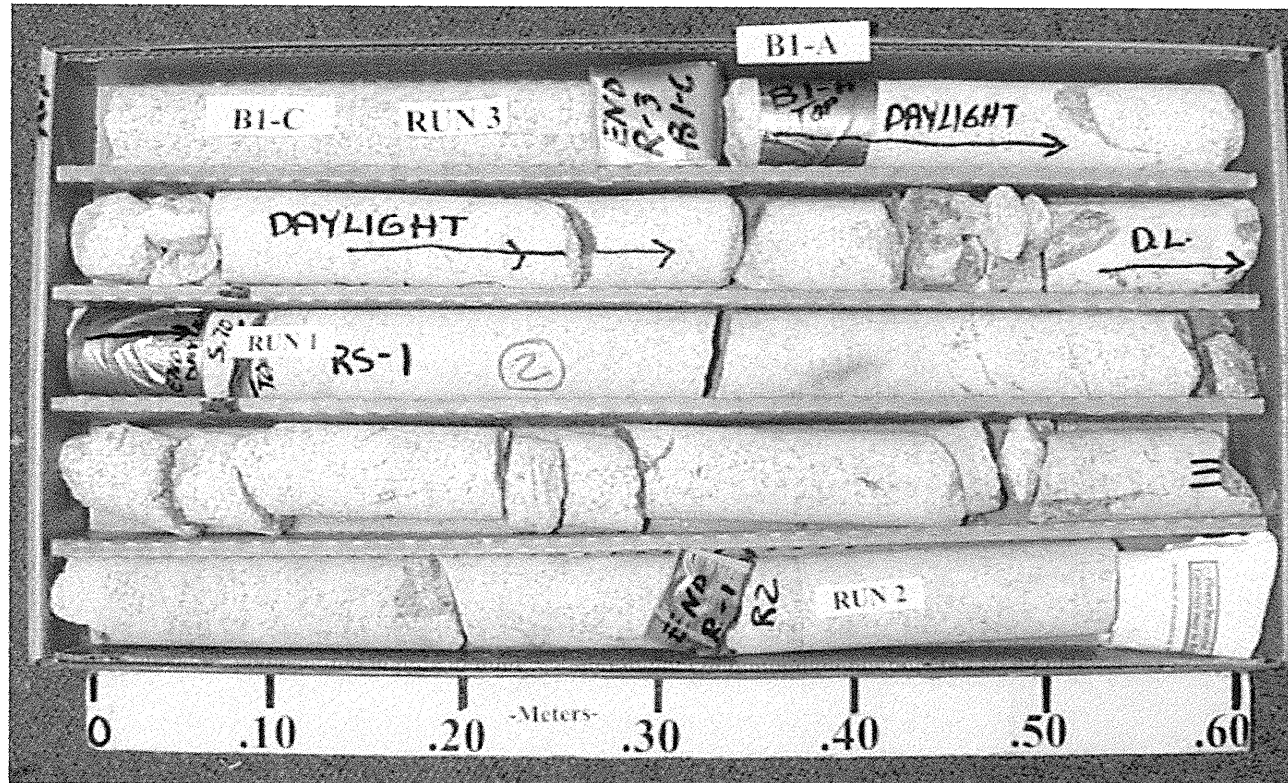
SOIL TEST RESULTS

21 25  
SHEET 20 OF 24

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	N	L.L.	P.I.	% BY WEIGHT			% PASSING SIEVES		% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10		
SS-1	11.80 LT.	14+00 (EB1-A)	0.00-1.35	A-4(0)		24	6	41.6	22.2	24	12.1	97	68	39
SS-2	6.50 RT.	13+90.41 (EB1-B)	0.00-1.10	A-4(0)		22	6	40.8	20.2	22.8	16.2	94	66	39
ST-1	14.30 LT.	14+74.21 (EB2-A)	0.90-1.35	A-7-6(24)		51	23	2.4	12.3	36.8	48.5	100	98	91
SS-7	14.30 LT.	14+74.21 (EB2-A)	1.35-1.81	A-7-6(14)	7	43	14	3.2	14.7	47.7	34.3	100	98	88
SS-8	14.30 LT.	14+74.21 (EB2-A)	4.34-4.80	A-6(10)	8	40	11	5.1	21	61.8	12.1	98	95	80
SS-6	1.80 LT.	14+67.40 (EB2-C)	1.30-1.76	A-7-6(9)	5	47	20	27.5	20.4	23.8	28.3	100	81	55
SS-3	10.50 RT.	14+60.81 (EB2-B)	1.20-1.66	A-7-5(22)	3	62	31	22.2	9.5	27.9	40.4	100	84	70
SS-4	10.50 RT.	14+60.81 (EB2-B)	2.72-3.18	A-4(1)	10	38	3	29.1	23	37.8	10.1	100	79	54
SS-5	10.50 RT.	14+60.81 (EB2-B)	4.24-4.70	A-5(12)	9	52	10	4.4	26.3	55.2	14.1	100	97	80

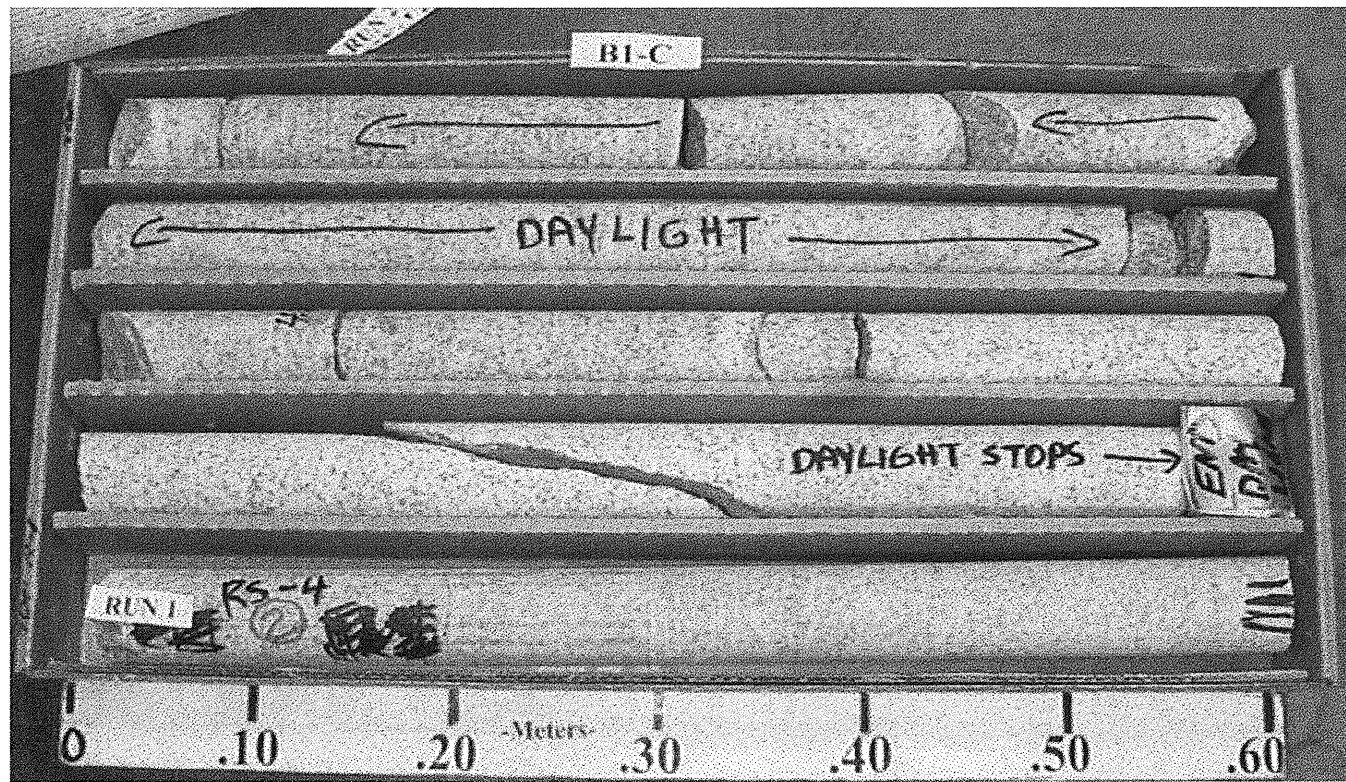
8.1661001 R-2533CA  
CABARRUS COUNTY  
-Y1- REV. (NC 73) OVER -L- (NC 49)

**B1-A CORE PHOTO'S**



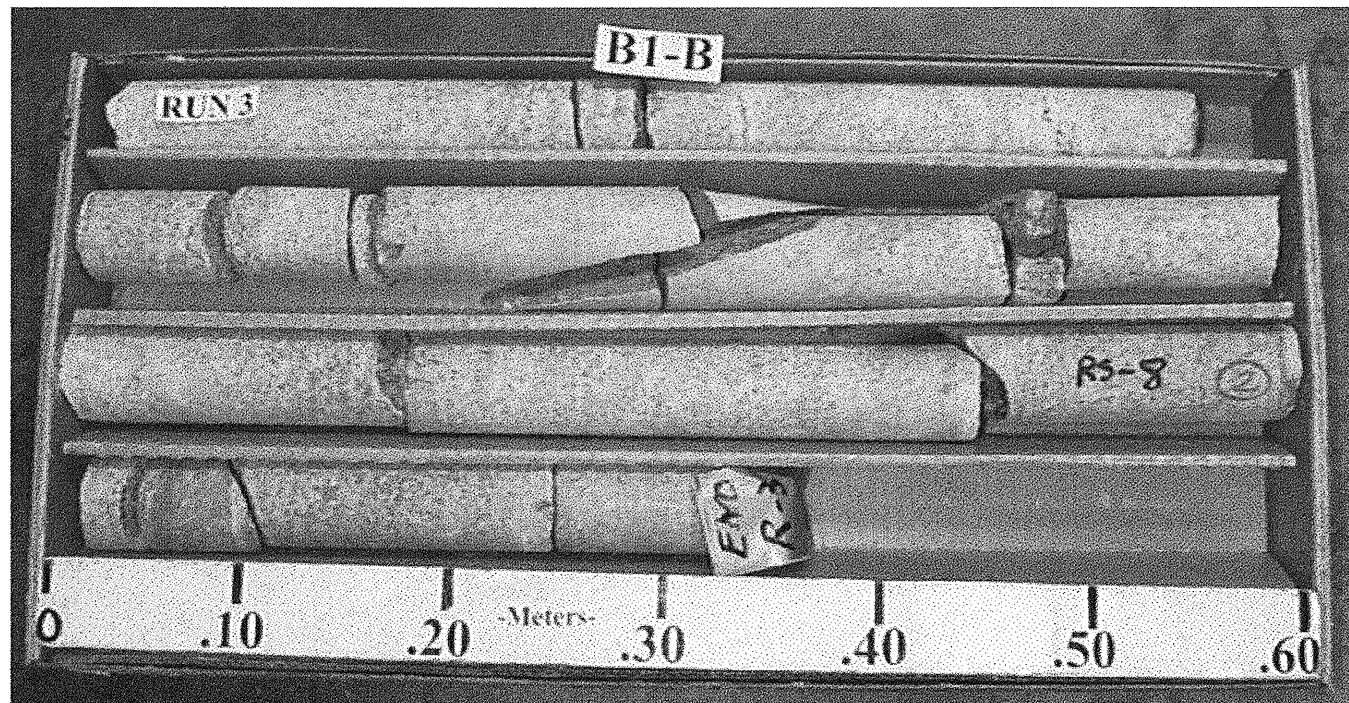
8.1661001 R-2533CA  
CABARRUS COUNTY  
-Y1- REV. (NC 73) OVER -L- (NC 49)

**B1-C CORE PHOTO'S**



8.1661001 R-2533CA  
CABARRUS COUNTY  
-Y1- REV. (NC 73) OVER -L- (NC 49)

**B1-B CORE PHOTO'S**



8.1661001 R-2533CA  
CABARRUS COUNTY  
-Y1- REV. (NC 73) OVER -L- (NC 49)

**SITE PHOTO'S**



SURVEY DIRECTION -Y1- REV. →  
SURVEY DIRECTION -L- →