

CONTRACT: 17BP.3.R.18 ID: SF-300351

NOTE: SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	11+00 TO 24+75	4	5

ROADWAY SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.3.R.18 (SF-300351) F.A. PROJ. _____
 COUNTY DUPLIN
 PROJECT DESCRIPTION BRIDGE NO. 140 AND BRIDGE NO. 351 ON
SR 1554 (MAXWELL MILL RD.)

RECOMMENDATIONS

CROSS SECTIONS

LINE	STATION	SHEET
-L-	19+00 TO 22+50	6-7

DRAWN BY: C.P. TURNER

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.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-300351	1	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		RW & UTIL.	

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 1901 TOT-6850. 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 UN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

PERSONNEL
C.M. WRIKE

R.E. SMITH

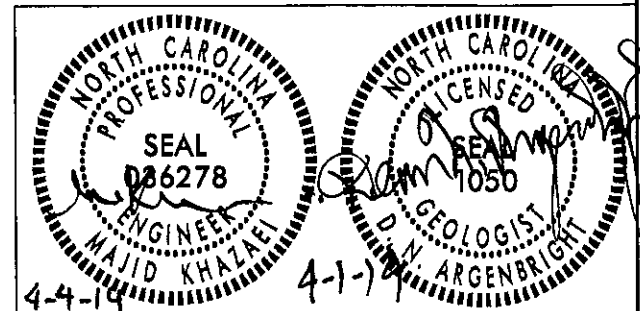
D.G. PINTER

INVESTIGATED BY D.N. ARGENBRIGHT

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT

DATE APRIL 2014



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

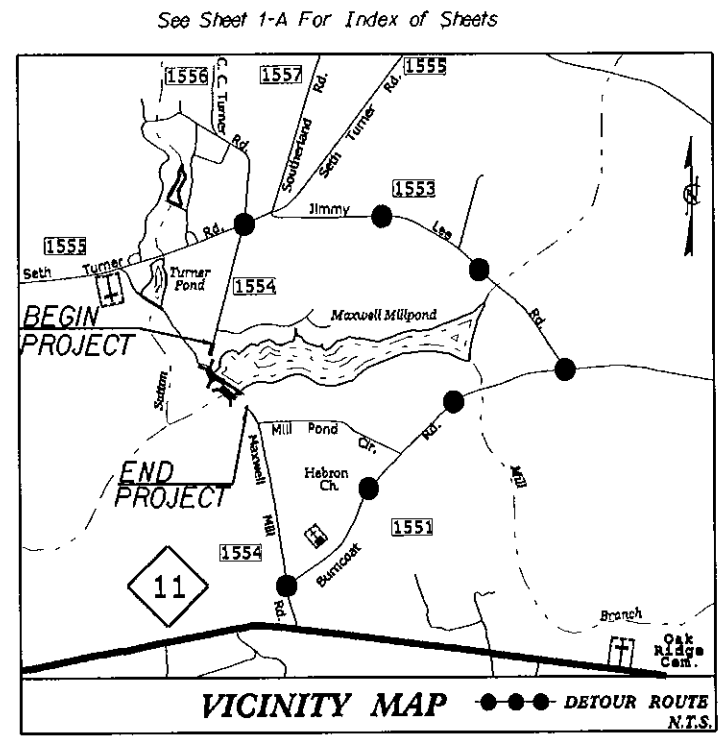
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																																																																																																																																																													
<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 (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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, MOD. 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) 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>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SPEC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</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 colspan="2">A-2-5</th> <th>A-2-6</th> <th>A-2-7</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> <tr> <td>GROUP CLASS.</td> <td>A-1</td> <td>A-3</td> <td colspan="2">A-2</td> <td colspan="2">A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td colspan="2"></td> <td colspan="2"></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LIQUID LIMIT</td> <td>5</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td>10</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PLASTIC INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td colspan="3">GRANULAR SOILS</td> <td colspan="3">SILT-CLAY SOILS</td> <td colspan="3">MUCK, PEAT</td> </tr> <tr> <td>GENERAL INDEX</td> <td colspan="7">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="3">UNSATURABLE</td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS ≥ LL - 30</p>		GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			A-1	A-3	A-2		A-2-5		A-2-6	A-2-7	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-3	A-2		A-2-5		A-2-6	A-2-7	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	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				LIQUID LIMIT	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10				PLASTIC INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY GRAVEL AND SAND		SILTY SOILS	CLAYEY SOILS	GRANULAR SOILS			SILT-CLAY SOILS			MUCK, PEAT			GENERAL INDEX	EXCELLENT TO GOOD							FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE			<p style="text-align: center;">CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th rowspan="2">PRIMARY SOIL TYPE</th> <th rowspan="2">COMPACTNESS OR CONSISTENCY</th> <th colspan="2">RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th rowspan="2">RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> <tr> <th><4</th> <th>4 TO 10</th> </tr> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>4 TO 10</td> <td>10 TO 30</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td>2 TO 4</td> <td>4 TO 8</td> <td><0.25 0.25 TO 1.0 1 TO 2 2 TO 4 >4</td> </tr> </table>		PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)	<4	4 TO 10	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	4 TO 10	10 TO 30	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	2 TO 4	4 TO 8	<0.25 0.25 TO 1.0 1 TO 2 2 TO 4 >4	<p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <table border="0" style="width: 100%;"> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>TEST BORING</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>AUGER BORING</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>CORE BORING</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>MONITORING WELL</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>SOUNDING ROD</td> <td></td> <td>SPT N-VALUE</td> </tr> <tr> <td></td> <td>SPT REFUSAL</td> <td></td> <td>SPT REFUSAL</td> </tr> </table>			ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		TEST BORING		SOIL SYMBOL		AUGER BORING		ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		CORE BORING		INFERRED SOIL BOUNDARY		MONITORING WELL		INFERRED ROCK LINE		PIEZOMETER INSTALLATION		ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION		DIP & DIP DIRECTION OF ROCK STRUCTURES		CONE PENETROMETER TEST		SOUNDING ROD		SPT N-VALUE		SPT REFUSAL		SPT REFUSAL	<p style="text-align: center;">ROCK HARDNESS</p> <table border="0" style="width: 100%;"> <tr> <td>VERY HARD</td> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> </tr> <tr> <td>HARD</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> </tr> <tr> <td>MODERATELY HARD</td> <td>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.</td> </tr> <tr> <td>MEDIUM HARD</td> <td>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.</td> </tr> <tr> <td>SOFT</td> <td>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.</td> </tr> <tr> <td>VERY SOFT</td> <td>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 FINGERNAIL.</td> </tr> </table>		VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	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.	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.	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.	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 FINGERNAIL.
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS																																																																																																																																																																																																																																				
	A-1	A-3	A-2		A-2-5		A-2-6	A-2-7	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-3	A-2		A-2-5		A-2-6	A-2-7	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	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																																																																																																																																																																																																																			
LIQUID LIMIT	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10																																																																																																																																																																																																																																			
PLASTIC INDEX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																																																																																																																																																																																																																			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY GRAVEL AND SAND		SILTY SOILS	CLAYEY SOILS	GRANULAR SOILS			SILT-CLAY SOILS			MUCK, PEAT																																																																																																																																																																																																																																				
GENERAL INDEX	EXCELLENT TO GOOD							FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE																																																																																																																																																																																																																																						
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)																																																																																																																																																																																																																																															
		<4	4 TO 10																																																																																																																																																																																																																																																
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	4 TO 10	10 TO 30	N/A																																																																																																																																																																																																																																															
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	2 TO 4	4 TO 8	<0.25 0.25 TO 1.0 1 TO 2 2 TO 4 >4																																																																																																																																																																																																																																															
	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		TEST BORING																																																																																																																																																																																																																																																
	SOIL SYMBOL		AUGER BORING																																																																																																																																																																																																																																																
	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT		CORE BORING																																																																																																																																																																																																																																																
	INFERRED SOIL BOUNDARY		MONITORING WELL																																																																																																																																																																																																																																																
	INFERRED ROCK LINE		PIEZOMETER INSTALLATION																																																																																																																																																																																																																																																
	ALLUVIAL SOIL BOUNDARY		SLOPE INDICATOR INSTALLATION																																																																																																																																																																																																																																																
	DIP & DIP DIRECTION OF ROCK STRUCTURES		CONE PENETROMETER TEST																																																																																																																																																																																																																																																
	SOUNDING ROD		SPT N-VALUE																																																																																																																																																																																																																																																
	SPT REFUSAL		SPT REFUSAL																																																																																																																																																																																																																																																
VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.																																																																																																																																																																																																																																																		
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																																																																																																																																																																																																																																																		
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.																																																																																																																																																																																																																																																		
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.																																																																																																																																																																																																																																																		
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.																																																																																																																																																																																																																																																		
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 FINGERNAIL.																																																																																																																																																																																																																																																		
<p style="text-align: center;">TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>U.S. STD. SIEVE SIZE</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> <tr> <th>OPENING (MM)</th> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td></td> <td>BOULDER (BLD.)</td> <td>COBBLE (COB.)</td> <td>GRAVEL (GR.)</td> <td>COARSE SAND (CS. SD.)</td> <td>FINE SAND (F. SD.)</td> <td>SILT (SL.)</td> <td>CLAY (CL.)</td> </tr> <tr> <td>GRAIN MM</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>SIZE IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		U.S. STD. SIEVE SIZE	4	10	40	60	200	270	OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053		BOULDER (BLD.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CS. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)	GRAIN MM	305	75	2.0	0.25	0.05	0.005	SIZE IN.	12	3					<p style="text-align: center;">ABBREVIATIONS</p> <table border="0" style="width: 100%;"> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICAEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL - CLAY</td> <td>MOD. - MODERATELY</td> <td>U - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>U_d - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td></td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td></td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td></td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td></td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td></td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TDR - TRICONE REFUSAL</td> <td></td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td></td> </tr> <tr> <td>HL - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </table>		AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST	BT - BORING TERMINATED	MICA - MICAEOUS	WEA. - WEATHERED	CL - CLAY	MOD. - MODERATELY	U - UNIT WEIGHT	CPT - CONE PENETRATION TEST	NP - NON PLASTIC	U _d - DRY UNIT WEIGHT	CSE - COARSE	ORG. - ORGANIC		DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST		DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC		e - VOID RATIO	SD. - SAND, SANDY		F - FINE	SL. - SILT, SILTY		FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY		FRAC. - FRACTURED, FRACTURES	TDR - TRICONE REFUSAL		FRAGS. - FRAGMENTS	w - MOISTURE CONTENT		HL - HIGHLY	V - VERY		<p style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="0" style="width: 100%;"> <tr> <td> <p>DRILL UNITS:</p> <input type="checkbox"/> MOBILE B-_____</td> <td> <p>ADVANCING TOOLS:</p> <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/4" STEEL TEETH <input type="checkbox"/> TRICONE _____ TUNG-CARB. <input type="checkbox"/> CORE BIT</td> <td> <p>HAMMER TYPE:</p> <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</td> </tr> <tr> <td> <p>CHE-45C</p> <input type="checkbox"/> CHE-550</td> <td> <p>PORTABLE HOIST</p> <input type="checkbox"/></td> <td> <p>CORE SIZE:</p> <input type="checkbox"/> B-_____</td> </tr> <tr> <td> <p>POST HOLE DIGGER</p> <input type="checkbox"/></td> <td> <p>HAND TOOLS:</p> <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</td> <td> <p>INDURATION</p> <input type="checkbox"/></td> </tr> </table>		<p>DRILL UNITS:</p> <input type="checkbox"/> MOBILE B-_____	<p>ADVANCING TOOLS:</p> <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/4" STEEL TEETH <input type="checkbox"/> TRICONE _____ TUNG-CARB. <input type="checkbox"/> CORE BIT	<p>HAMMER TYPE:</p> <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL	<p>CHE-45C</p> <input type="checkbox"/> CHE-550	<p>PORTABLE HOIST</p> <input type="checkbox"/>	<p>CORE SIZE:</p> <input type="checkbox"/> B-_____	<p>POST HOLE DIGGER</p> <input type="checkbox"/>	<p>HAND TOOLS:</p> <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	<p>INDURATION</p> <input type="checkbox"/>																																																																																																																																																										
U.S. STD. SIEVE SIZE	4	10	40	60	200	270																																																																																																																																																																																																																																													
OPENING (MM)	4.75	2.00	0.42	0.25	0.075	0.053																																																																																																																																																																																																																																													
	BOULDER (BLD.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CS. SD.)	FINE SAND (F. SD.)	SILT (SL.)	CLAY (CL.)																																																																																																																																																																																																																																												
GRAIN MM	305	75	2.0	0.25	0.05	0.005																																																																																																																																																																																																																																													
SIZE IN.	12	3																																																																																																																																																																																																																																																	
AR - AUGER REFUSAL	MED. - MEDIUM	VST - VANE SHEAR TEST																																																																																																																																																																																																																																																	
BT - BORING TERMINATED	MICA - MICAEOUS	WEA. - WEATHERED																																																																																																																																																																																																																																																	
CL - CLAY	MOD. - MODERATELY	U - UNIT WEIGHT																																																																																																																																																																																																																																																	
CPT - CONE PENETRATION TEST	NP - NON PLASTIC	U _d - DRY UNIT WEIGHT																																																																																																																																																																																																																																																	
CSE - COARSE	ORG. - ORGANIC																																																																																																																																																																																																																																																		
DMT - DILATOMETER TEST	PMT - PRESSUREMETER TEST																																																																																																																																																																																																																																																		
DPT - DYNAMIC PENETRATION TEST	SAP. - SAPROLITIC																																																																																																																																																																																																																																																		
e - VOID RATIO	SD. - SAND, SANDY																																																																																																																																																																																																																																																		
F - FINE	SL. - SILT, SILTY																																																																																																																																																																																																																																																		
FOSS. - FOSSILIFEROUS	SLI. - SLIGHTLY																																																																																																																																																																																																																																																		
FRAC. - FRACTURED, FRACTURES	TDR - TRICONE REFUSAL																																																																																																																																																																																																																																																		
FRAGS. - FRAGMENTS	w - MOISTURE CONTENT																																																																																																																																																																																																																																																		
HL - HIGHLY	V - VERY																																																																																																																																																																																																																																																		
<p>DRILL UNITS:</p> <input type="checkbox"/> MOBILE B-_____	<p>ADVANCING TOOLS:</p> <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/4" STEEL TEETH <input type="checkbox"/> TRICONE _____ TUNG-CARB. <input type="checkbox"/> CORE BIT	<p>HAMMER TYPE:</p> <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL																																																																																																																																																																																																																																																	
<p>CHE-45C</p> <input type="checkbox"/> CHE-550	<p>PORTABLE HOIST</p> <input type="checkbox"/>	<p>CORE SIZE:</p> <input type="checkbox"/> B-_____																																																																																																																																																																																																																																																	
<p>POST HOLE DIGGER</p> <input type="checkbox"/>	<p>HAND TOOLS:</p> <input checked="" type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST	<p>INDURATION</p> <input type="checkbox"/>																																																																																																																																																																																																																																																	
<p style="text-align: center;">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </table>		SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION	LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE	SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	<p style="text-align: center;">FRACTURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>SPACING</th> </tr> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </table>		TERM	SPACING	VERY WIDE	MORE THAN 10 FEET	WIDE	3 TO 10 FEET	MODERATELY CLOSE	1 TO 3 FEET	CLOSE	0.16 TO 1 FEET	VERY CLOSE	LESS THAN 0.16 FEET	<p style="text-align: center;">BEDDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> <tr> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </table>		TERM	THICKNESS	VERY THICKLY BEDDED	> 4 FEET	THICKLY BEDDED	1.5 - 4 FEET	THINLY BEDDED	0.16 - 1.5 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET	THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																																																					
SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION																																																																																																																																																																																																																																																	
LL - LIQUID LIMIT	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE																																																																																																																																																																																																																																																	
PL - PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																	
OM - OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																																																																																	
SL - SHRINKAGE LIMIT	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																																																	
TERM	SPACING																																																																																																																																																																																																																																																		
VERY WIDE	MORE THAN 10 FEET																																																																																																																																																																																																																																																		
WIDE	3 TO 10 FEET																																																																																																																																																																																																																																																		
MODERATELY CLOSE	1 TO 3 FEET																																																																																																																																																																																																																																																		
CLOSE	0.16 TO 1 FEET																																																																																																																																																																																																																																																		
VERY CLOSE	LESS THAN 0.16 FEET																																																																																																																																																																																																																																																		
TERM	THICKNESS																																																																																																																																																																																																																																																		
VERY THICKLY BEDDED	> 4 FEET																																																																																																																																																																																																																																																		
THICKLY BEDDED	1.5 - 4 FEET																																																																																																																																																																																																																																																		
THINLY BEDDED	0.16 - 1.5 FEET																																																																																																																																																																																																																																																		
VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																																																																																																																																																																																		
THICKLY LAMINATED	0.008 - 0.03 FEET																																																																																																																																																																																																																																																		
THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																																																																																																		
<p style="text-align: center;">PLASTICITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>		PLASTICITY INDEX (PI)	DRY STRENGTH	0-5	VERY LOW	6-15	SLIGHT	16-25	MEDIUM	26 OR MORE	HIGH	<p style="text-align: center;">INDURATION</p> <table border="0" style="width: 100%;"> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </table>		FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																																																																																																																																																																														
PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																																																																																																																																																																																		
0-5	VERY LOW																																																																																																																																																																																																																																																		
6-15	SLIGHT																																																																																																																																																																																																																																																		
16-25	MEDIUM																																																																																																																																																																																																																																																		
26 OR MORE	HIGH																																																																																																																																																																																																																																																		
FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																																																																																																																																																																																																																																																		
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																																																																																																																																																																																																																																																		
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																																																																																																																																																																																																																																																		
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																																																																																																																																																																																																																																		
<p style="text-align: center;">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>		<p style="text-align: center;">NOTES:</p> <p></p> <p></p>																																																																																																																																																																																																																																																	

STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	17BP.3.R.18	3	7
STATE PROJ. NO.	DESCRIPTION		
17BP.3.R.18	CONST		
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			

PROJECT: 17BP.3.R.18

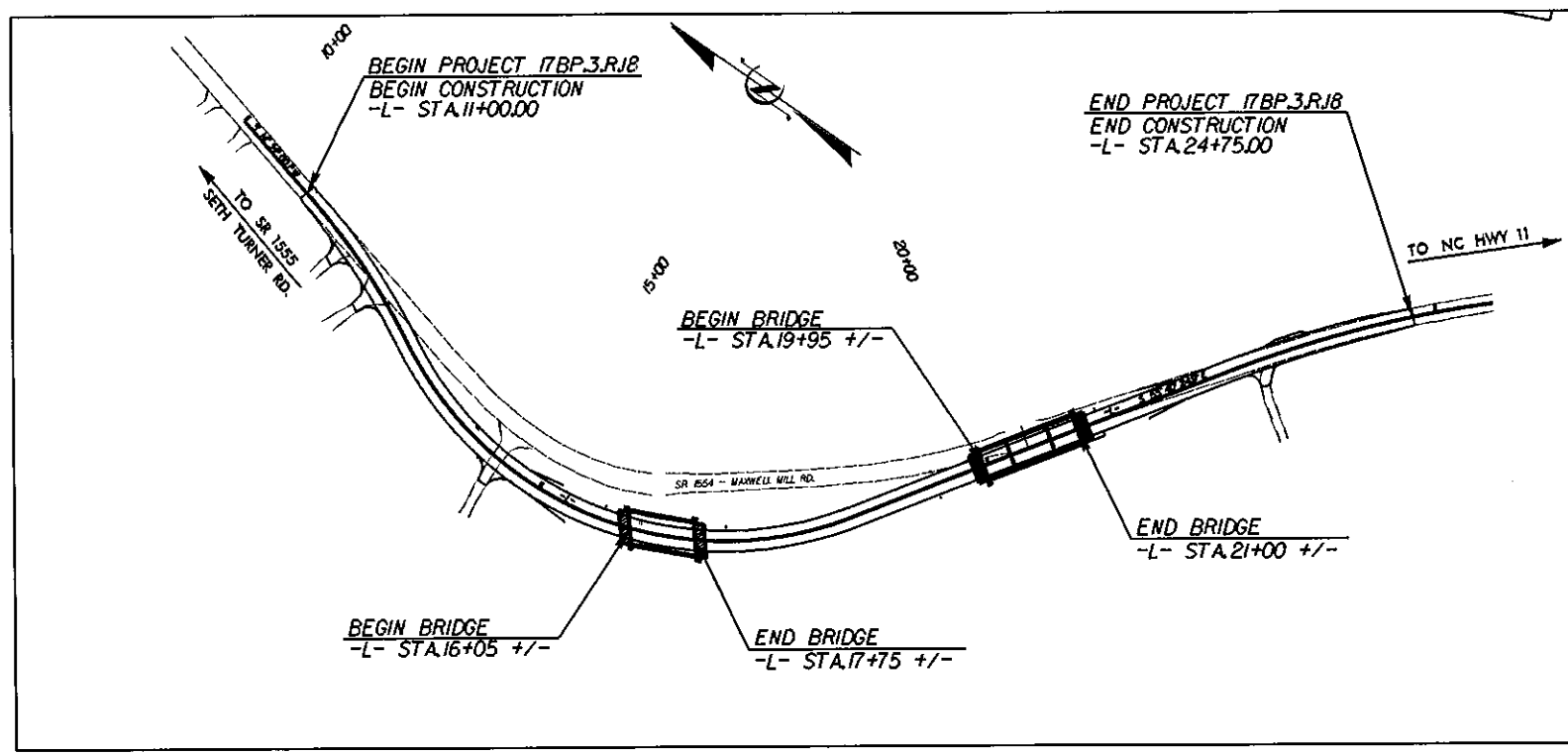


ROW SUBMITTAL

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DUPLIN COUNTY

LOCATION: BRIDGE NO. 140 OVER BURNT COAT CREEK & BRIDGE NO. 351 OVER MAXWELL MILLPOND ON SR1554 (MAXWELL MILL RD.)

TYPE OF WORK: GRADING, PAVING, GUARDRAIL, DRAINAGE & STRUCTURES



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

CONTRACT:

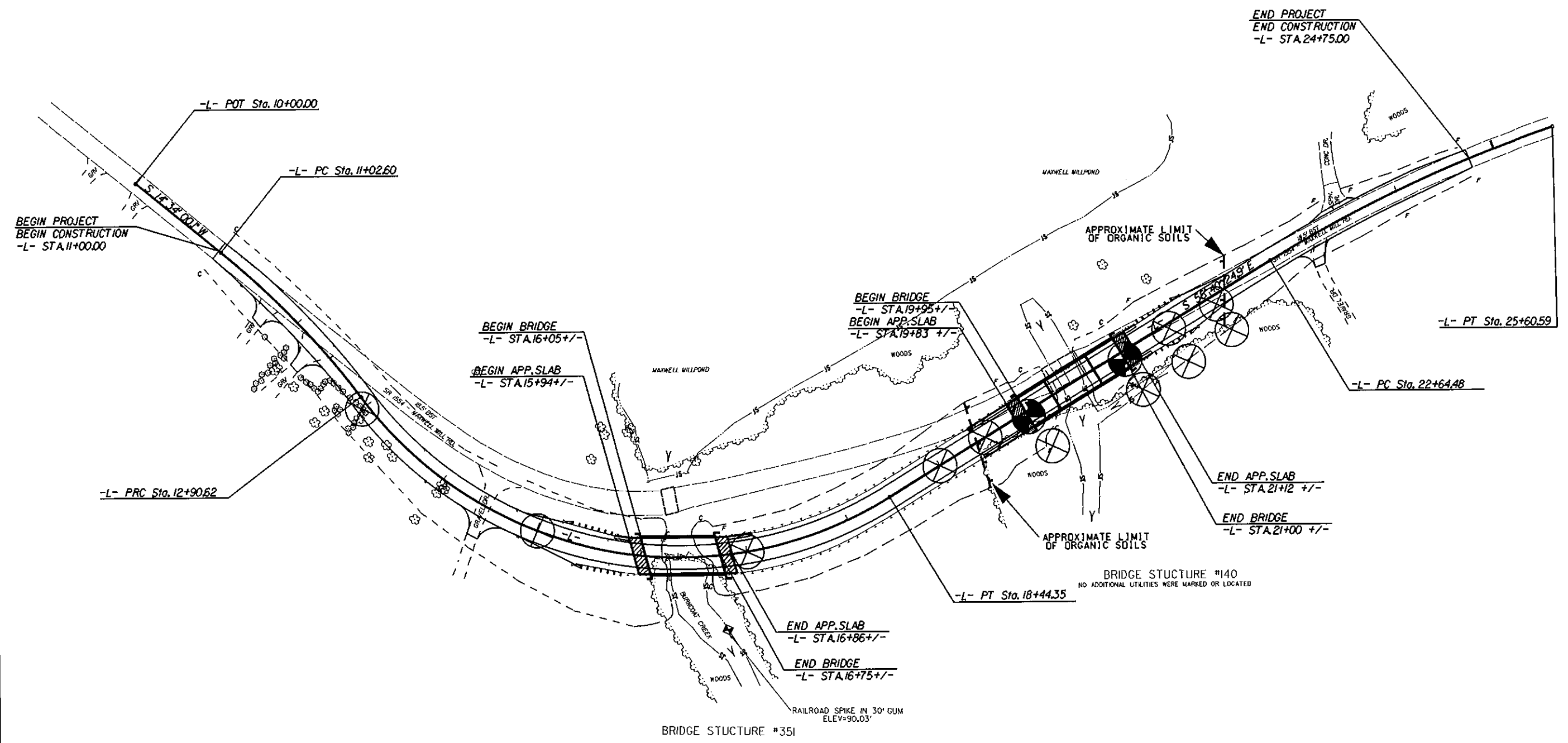
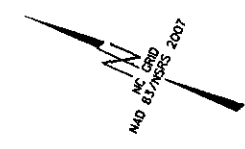
<p>GRAPHIC SCALES</p> <p>50 25 0 50 100 PLANS</p> <p>50 25 0 50 100 PROFILE (HORIZONTAL)</p> <p>10 5 0 10 20 PROFILE (VERTICAL)</p>	<p>DESIGN DATA</p> <p>ADT 2005 = 440 ADT 2035 = 880 DHV = 10% D = 60% T = 6% *</p> <p>STATUTORY = 55 MPH ADVISORY = 35 MPH * TTST 1% DUAL 2%</p>	<p>PROJECT LENGTH</p> <p>LENGTH OF ROADWAY PROJECT 17BP.3.R.18 = 0.226 MI. LENGTH OF STRUCTURE PROJECT 17BP.3.R.18 = 0.033 MI. TOTAL LENGTH OF PROJECT 17BP.3.R.18 = 0.259 MI.</p>	<p>Prepared in the Office of:</p> <p>HNTB HNTB NORTH CAROLINA, P.C. 345 E. Six Forks Road, Suite 200 Raleigh, North Carolina 27609 NC License No: C-1654</p>	<p>HYDRAULICS ENGINEER</p> <p>SIGNATURE: _____ P.E.</p>	<p>DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA</p> <p>STATE HIGHWAY DESIGN ENGINEER P.E.</p>
			<p>2012 STANDARD SPECIFICATIONS</p> <p>RIGHT OF WAY DATE: FEBRUARY 06, 2014</p> <p>LETTING DATE: MAY 15, 2014</p>	<p>ENRICO A. ROQUE, P.E. PROJECT ENGINEER</p> <p>BRIAN BLACKWELL, E.I. PROJECT DESIGNER</p> <p>AMANDA GLYNN, P.E. NCDOT CONTACT</p>	

 01-APR-2014 08:28
 L:\ERO\Greenville_investigation\TIP_SF300351_GEO_RDWY\CADD\CADD\TECH\Site&Sub\SF300351_GEO_RDY_TITLE.dgn

PROJECT REFERENCE NO. SF-300351	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

-L-		
PI Sta 11+97.10	PI Sta 16+31.86	PI Sta 23+72.38
$\Delta = 14^{\circ} 21' 48.5''$ (RT)	$\Delta = 84^{\circ} 36' 13.6''$ (LT)	$\Delta = 9^{\circ} 29' 20.8''$ (RT)
D = 7' 38" 22.0"	D = 15' 16" 43.9"	D = 4' 24" 26.5"
L = 188.02'	L = 553.73'	L = 215.30'
T = 94.50'	T = 341.25'	T = 107.90'
R = 750.00'	R = 375.00'	R = 1,300.00'

PLAN



REVISIONS

8/17/99

D:\APR-2014 08:35 L:\PROJ\0300351\TIP\SF300351\GEO\RDY\CADD\GEO\TECH\Sub\SF300351\GEO.RDY.dgn
 L:\PROJ\0300351\TIP\SF300351\GEO\RDY\CADD\GEO\TECH\Sub\SF300351\GEO.RDY.dgn

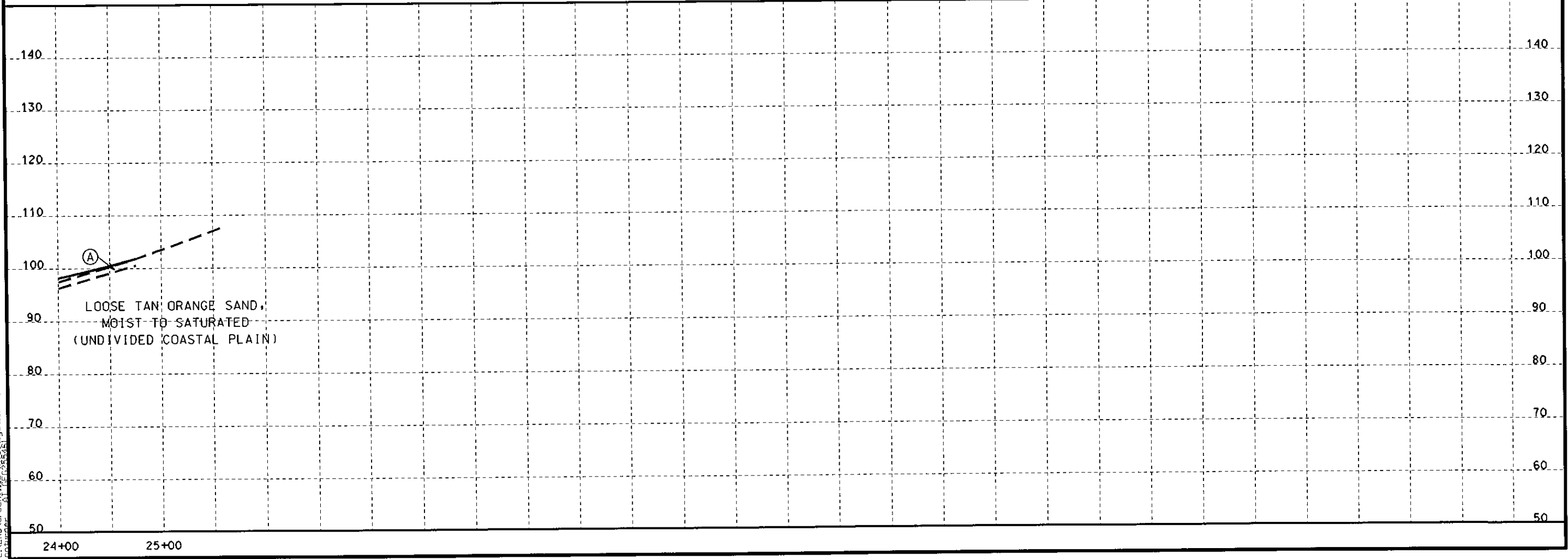
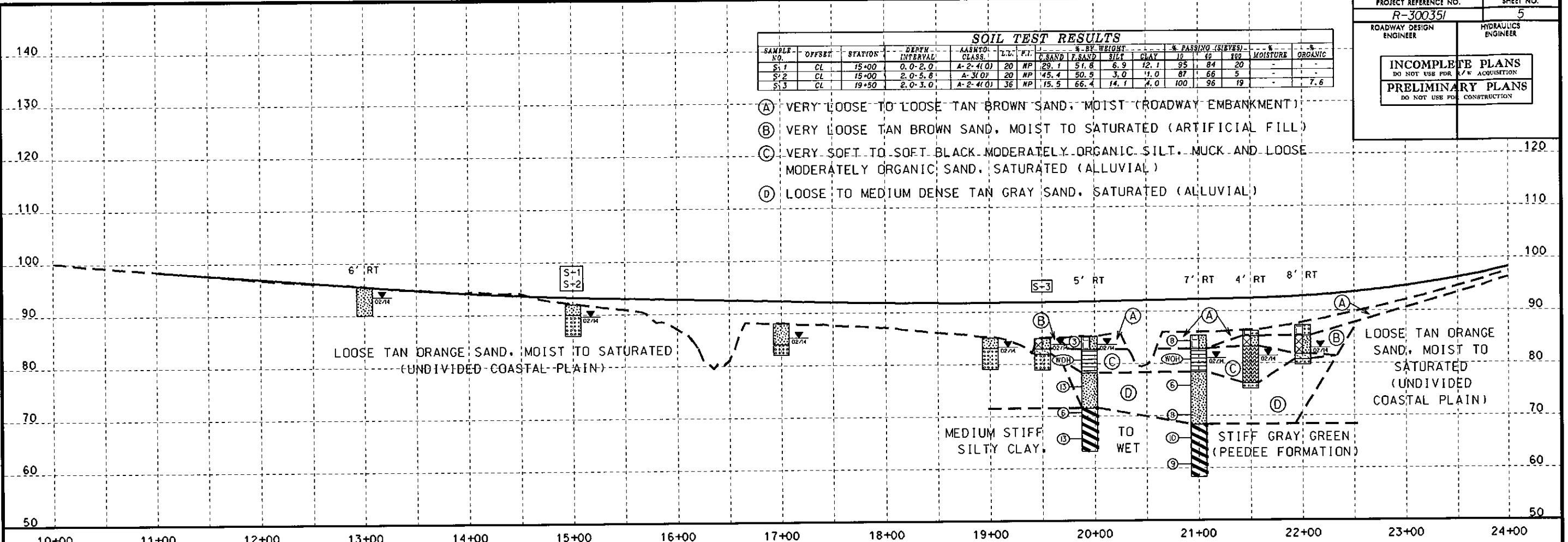
5/28/99

D:\APR-2014 08:37 Investigation\TIP\SF300351.GEO\RDY\CADD_GEO\TECH\Plan\Prof\SF300351.GEO_RDY_L_PP11.dgn

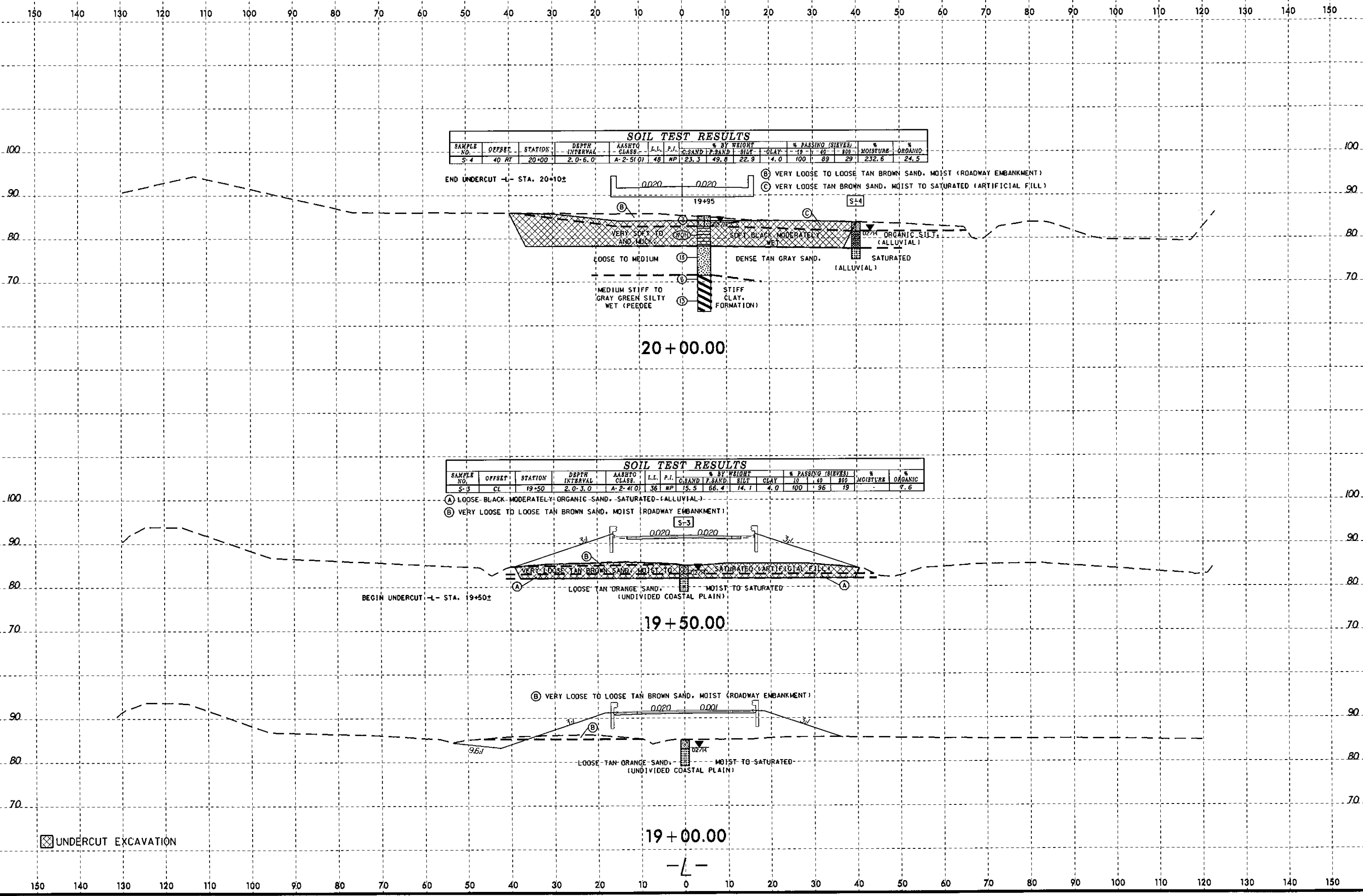
PROJECT REFERENCE NO. R-300351	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS														
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.L.	% BY WEIGHT				% PASSING (SIEVES)		% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40		
S-1	CL	15+00	0.0-2.0	A-2-4(0)	20	MP	29.1	51.8	6.9	12.1	95	84	20	-
S-2	CL	15+00	2.0-5.8	A-3(0)	20	MP	45.4	50.9	3.0	11.0	87	66	5	-
S-3	CL	19+50	2.0-3.0	A-2-4(0)	36	MP	15.5	66.4	14.1	4.0	100	96	19	7.8

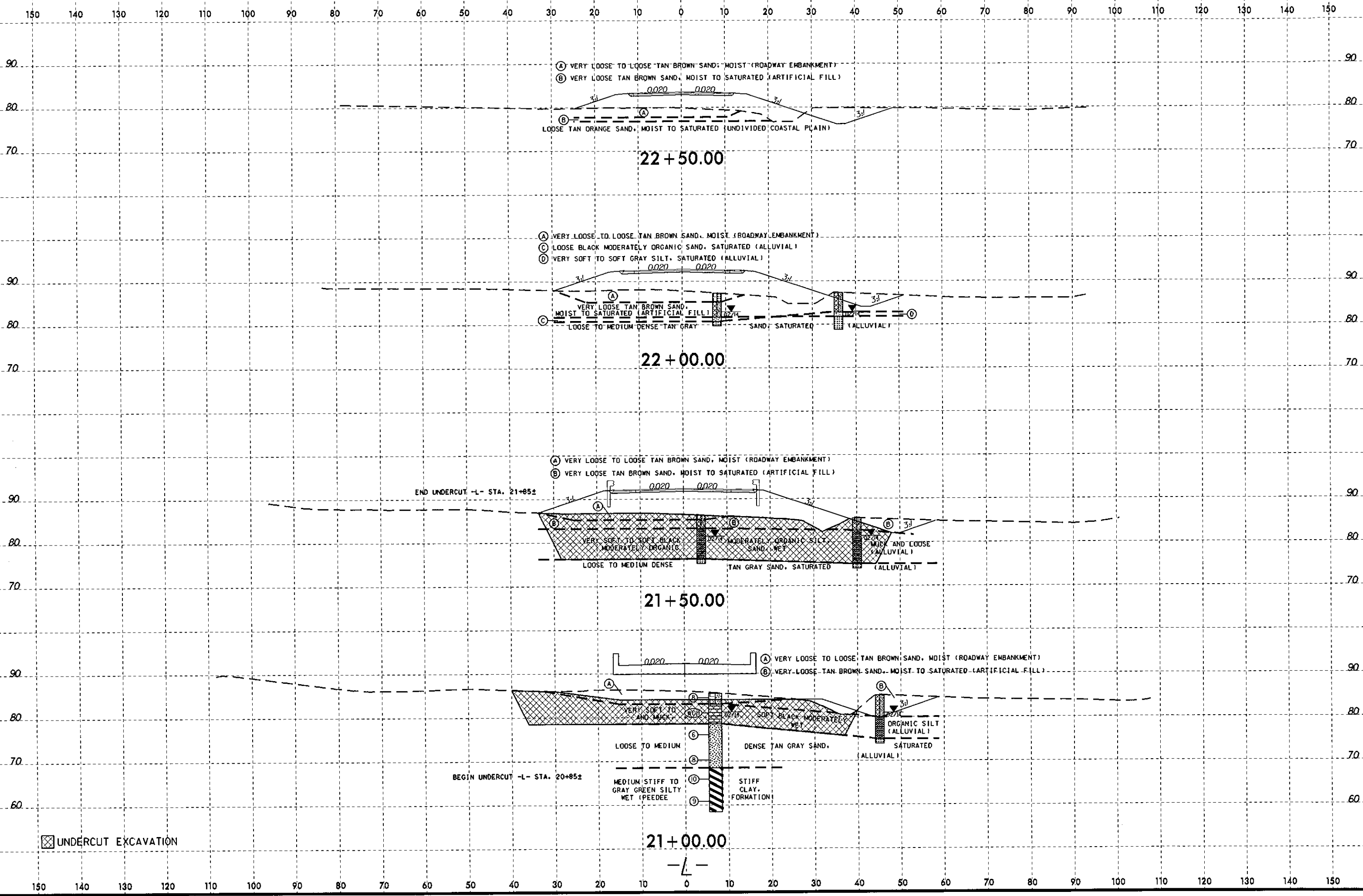
- (A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
- (B) VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
- (C) VERY SOFT TO SOFT BLACK MODERATELY ORGANIC SILT, MUCK AND LOOSE MODERATELY ORGANIC SAND, SATURATED (ALLUVIAL)
- (D) LOOSE TO MEDIUM DENSE TAN GRAY SAND, SATURATED (ALLUVIAL)



8/23/99
 01-APR-2014 07:16
 L:\EFG\Green\118_105\investigation\TIP\SF300351.GEO\RDY_CADD_GEO\TECH\use\SF300351.GEO.RDY_xar-L.dgn
 spurner - AT 160255461



8/23/99
01-APR-2014 07:16
L:\VFD\Gravel\11g\Investigation\TIP\SF300351-GEO-ROADWAY-CADD\GEO\TECH\wsc\SF300351-GEO-RDWAY-XREF-L.dgn
gpturner AT GEO255461



CONTRACT: 17BP.3.R.18 ID: SF-300351

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	11+00 TO 24+75	4	5

CROSS SECTIONS

LINE	STATION	SHEET
-L-	19+00 TO 22+50	6-7

DRAWN BY: C.P. TURNER

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

**ROADWAY
SUBSURFACE INVESTIGATION**

PROJ. REFERENCE NO. 17BP.3.R.18 (SF-300351) F.A. PROJ. _____
 COUNTY DUPLIN
 PROJECT DESCRIPTION BRIDGE NO. 140 AND BRIDGE NO. 351 ON
 SR 1554 (MAXWELL MILL RD.)

INVENTORY

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.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-300351	1	7
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		RW & UTIL.	

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) 707-6850. 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 (H-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

C.M. WRIKE

R.E. SMITH

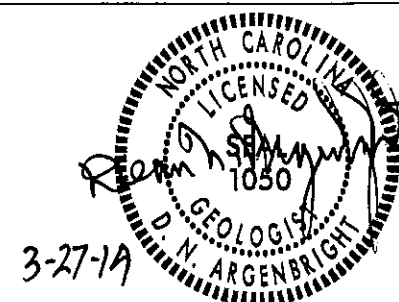
D.G. PINTER

INVESTIGATED BY D.N. ARGENBRIGHT

CHECKED BY D.N. ARGENBRIGHT

SUBMITTED BY D.N. ARGENBRIGHT






DATE MARCH 2014



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

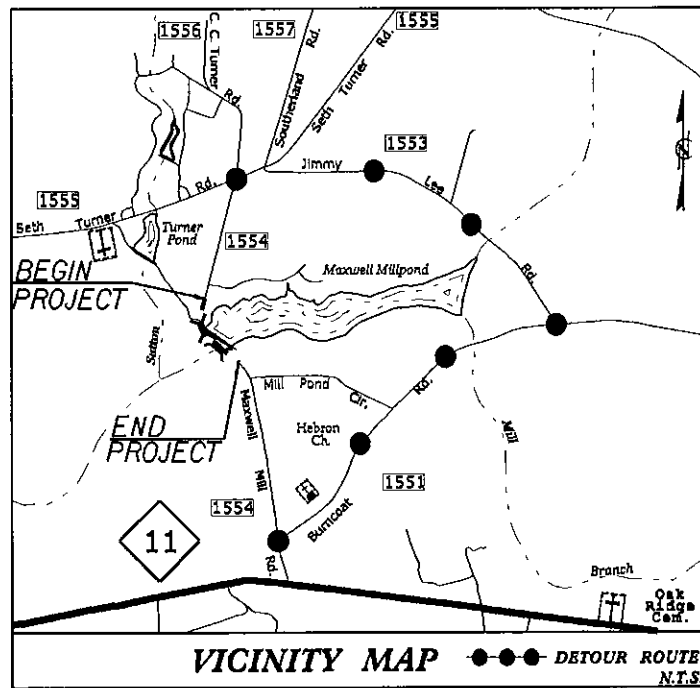
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED 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 (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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD PLASTIC, A-7-6</i>	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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 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:  WEATHERED ROCK (WR)  CRYSTALLINE ROCK (CR)  NON-CRYSTALLINE ROCK (NCR)  COASTAL PLAIN SEDIMENTARY ROCK (CPS)	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOOED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 60 BLOWS. STRATA CORE RECOVERY (SCREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	WEATHERING	
GENERAL CLASS. GRANULAR MATERIALS (< 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLT.) - 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 (SLT.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (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. 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. IF TESTED, YIELDS SPT N VALUES < 100 BPF. 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 > 100 BPF. 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 < 100 BPF. 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.	
COMPRESSIONIBILITY	PERCENTAGE OF MATERIAL	GROUND WATER	
SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	
	MISCELLANEOUS SYMBOLS		
	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES	SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD	TEST BORING W/ CORE SPT N-VALUE SPT REFUSAL
CONSISTENCY OR DENSENESS		ABBREVIATIONS	
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PNT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY	VST - VANE SHEAR TEST WEA. - WEATHERED X - UNIT WEIGHT Y - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO
GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE			
GENERALLY SILT-CLAY MATERIAL (COHESIVE) VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD			
TEXTURE OR GRAIN SIZE			
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053			
BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.)			
GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3			
SOIL MOISTURE - CORRELATION OF TERMS			
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- SATURATED - (SAT.) - WET - (W) - MOIST - (M) - DRY - (D)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	
PLASTICITY			
NONPLASTIC LOW PLASTICITY MED. PLASTICITY HIGH PLASTICITY	PLASTICITY INDEX (PI) 0-5 6-15 16-25 26 OR MORE	DRY STRENGTH VERY LOW SLIGHT MEDIUM HIGH	
COLOR			
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			
	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING	BEDDING
DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55B <input type="checkbox"/> PORTABLE HOIST	ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING w/ ADVANCER <input checked="" type="checkbox"/> TRICONE 2 1/8" STEEL TEETH <input type="checkbox"/> TRICONE " TUNG.-CARB. <input type="checkbox"/> CORE BIT	TERM SPACING THICKNESS VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET	TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET
		INDURATION	
		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	
			NOTES:  APPROXIMATE LIMIT OF ORGANIC SOILS

STATE	PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
NC	17BP.3.R.18	2A	7
STATE PROJ. NO.		DESCRIPTION	
17BP.3.R.18		CONST	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION			
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION			

PROJECT: 17BP.3.R.18

See Sheet 1-A For Index of Sheets

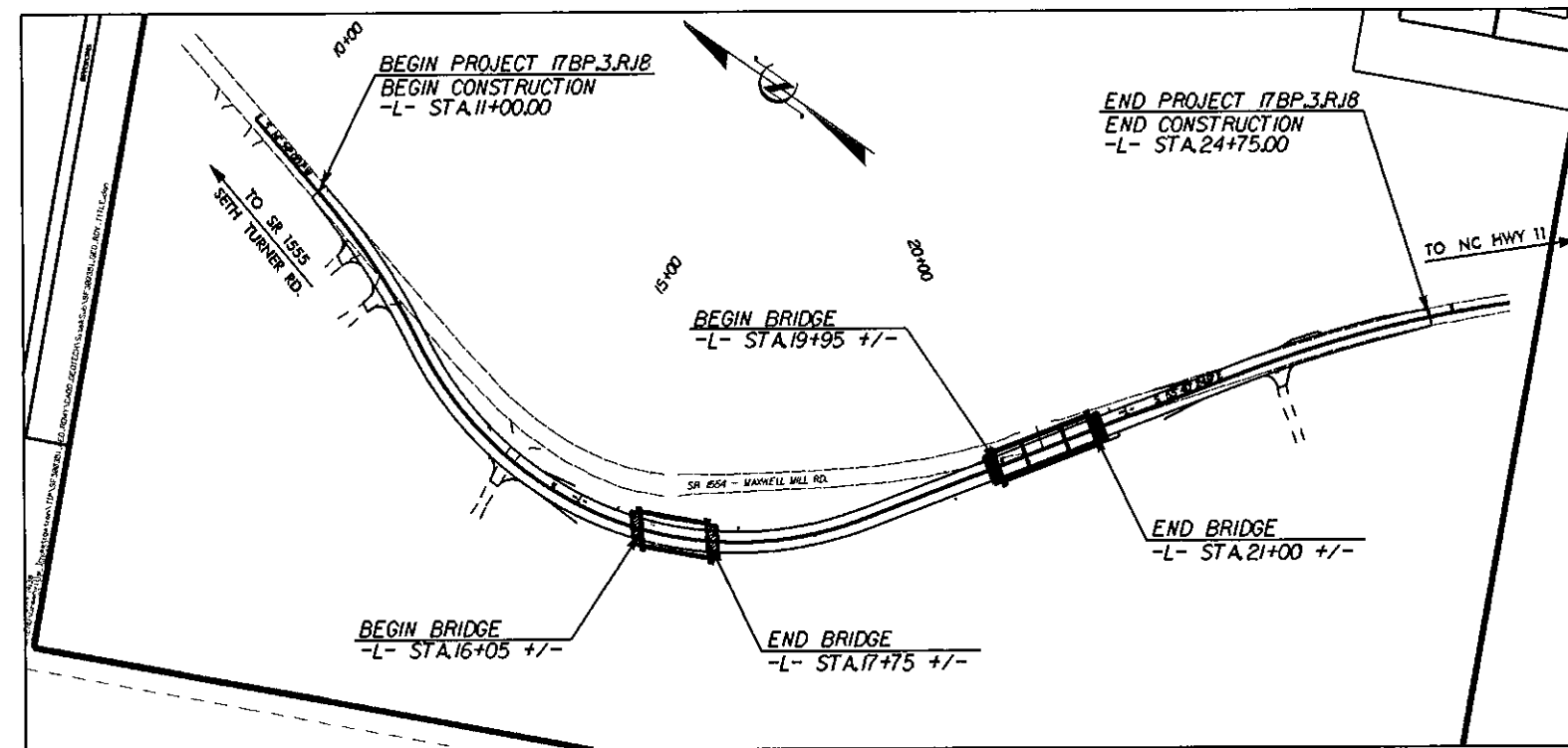


ROW SUBMITTAL

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
DUPLIN COUNTY


LOCATION: BRIDGE NO. 140 OVER BURNT COAT CREEK & BRIDGE NO. 351 OVER MAXWELL MILLPOND ON SR1554 (MAXWELL MILL RD.)

TYPE OF WORK: GRADING, PAVING, GUARDRAIL, DRAINAGE & STRUCTURES



CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.

CONTRACT:

<p>GRAPHIC SCALES</p> <p>50 25 0 50 100 PLANS</p> <p>50 25 0 50 100 PROFILE (HORIZONTAL)</p> <p>10 5 0 10 20 PROFILE (VERTICAL)</p>	<p>DESIGN DATA</p> <p>ADT 2005 = 440 ADT 2035 = 880 DHV = 10% D = 60% T = 6% * STATUTORY ADVISORY = 55 MPH = 35 MPH * TTST 1% DUAL 2%</p>	<p>PROJECT LENGTH</p> <p>LENGTH OF ROADWAY PROJECT 17BP.3.R.18 = 0.226 MI. LENGTH OF STRUCTURE PROJECT 17BP.3.R.18 = 0.033 MI. TOTAL LENGTH OF PROJECT 17BP.3.R.18 = 0.259 MI.</p>	<p>Prepared in the Office of:</p> <p>HNTB HNTB NORTH CAROLINA, P.O. 343 E. SIX FORKS ROAD, SUITE 200 RALEIGH, NORTH CAROLINA 27809 NC LICENSE NO: 0-1654</p> <p>2012 STANDARD SPECIFICATIONS</p> <p>RIGHT OF WAY DATE: FEBRUARY 06, 2014</p> <p>LETTING DATE: MAY 15, 2014</p> <p>ENRICO A. ROQUE, P.E. PROJECT ENGINEER BRIAN BLACKWELL, E.I. PROJECT DESIGNER AMANDA GLYNN, P.E. NCDOT CONTACT</p>	<p>HYDRAULICS ENGINEER</p> <p>SIGNATURE: _____ P.E.</p> <p>ROADWAY DESIGN ENGINEER</p> <p>SIGNATURE: _____ P.E.</p>	<p>DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA</p>  <p>STATE HIGHWAY DESIGN ENGINEER</p>
--	--	---	---	---	---

\$\$\$DATE\$\$\$
 26-MAR-2014 14:38
 L:\ERO\Greenville Investigation\TIP\SF300351.GEO_RDWY\CADD\GEO\TECH\SI+e&Sub\SF300351.GEO_RDWY_TITLE.dgn



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

March 27, 2014

STATE PROJECT: 17BP.3.R.18 (SF-300351)
 F.A. PROJECT: N/A
 COUNTY: Duplin
 DESCRIPTION: Bridge No. 140 over Burnt Coat Creek and Bridge No. 351 over Maxwell Millpond Overflow on SR 1554
 SUBJECT: Geotechnical Inventory

Project Description

This project is located in Duplin County on SR 1554 beginning south of SR 1555 and ending north of SR 1551. Proposed construction consists of widening as well as new location and raising the grade to accommodate the bridge replacements over Burnt Coat Creek and Maxwell Millpond. This geotechnical investigation was confined to the areas of proposed construction.

Fieldwork for this project was conducted in February of 2014. Hand auger borings were completed and representative soil samples were collected for visual classification in the field and for laboratory analysis by the Materials and Tests Unit.

The following alignments were investigated. Subsurface profile and selected cross sections are included in this report.

<u>Line</u>	<u>Station(±)</u>
-L-	11+00 to 24+75

Areas of Special Geotechnical Interest

- 1) The following section contains organic soils which have the potential to cause embankment stability and/or long term settlement problems:

<u>Line</u>	<u>Station(±)</u>
-L-	19+30 to 22+30

- 2) The entire project was found to exhibit seasonal high ground water.

Physiography and Geology

This project corridor is located within the Coastal Plain Physiographic Province. Topography along the project is nearly flat to moderately sloping. Natural ground elevations range from 78± feet above sea level along the bed of the Burnt Coat Creek to 103± feet above sea level along existing SR 1554.

Surficial soils in this area are generally classified as alluvial and undivided coastal plain sediments.

Ground Water

Ground water data was collected in February of 2014, during a time of normal precipitation. Ground water elevations ranged from 81± to 93± feet above sea level.

Soils

Soils within this project area have been divided into five categories: roadway embankment, artificial fill, undivided coastal plain, alluvial and formational.

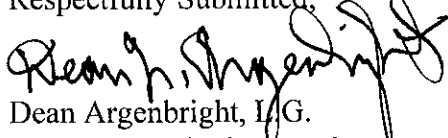
Roadway Embankment soils were encountered along existing SR 1554. These soils are comprised of 1 to 2 feet of very loose to loose sand (A-2-4).

Artificial fill was encountered adjacent to Burnt Coat creek in the vicinity of the abandoned mill. These soils consist of 1 to 5± feet of very loose to loose sand (A-2-4).

Undivided coastal plain soils were encountered along the upland portions of the project and consist of loose sand (A-2-4, A-3).

Alluvial soils were encountered beneath the embankment and/or artificial fill within the floodplain of Burnt Coat Creek. Alluvial sediments are comprised of 1± to 8± feet of very soft to soft moderately organic silt, muck and loose moderately organic sand. Laboratory analysis of these soils indicates organic percentages of 8% to 25%. Approximately 7± to 10± feet of alluvial sand underlies the organic soils adjacent to Burnt Coat Creek.

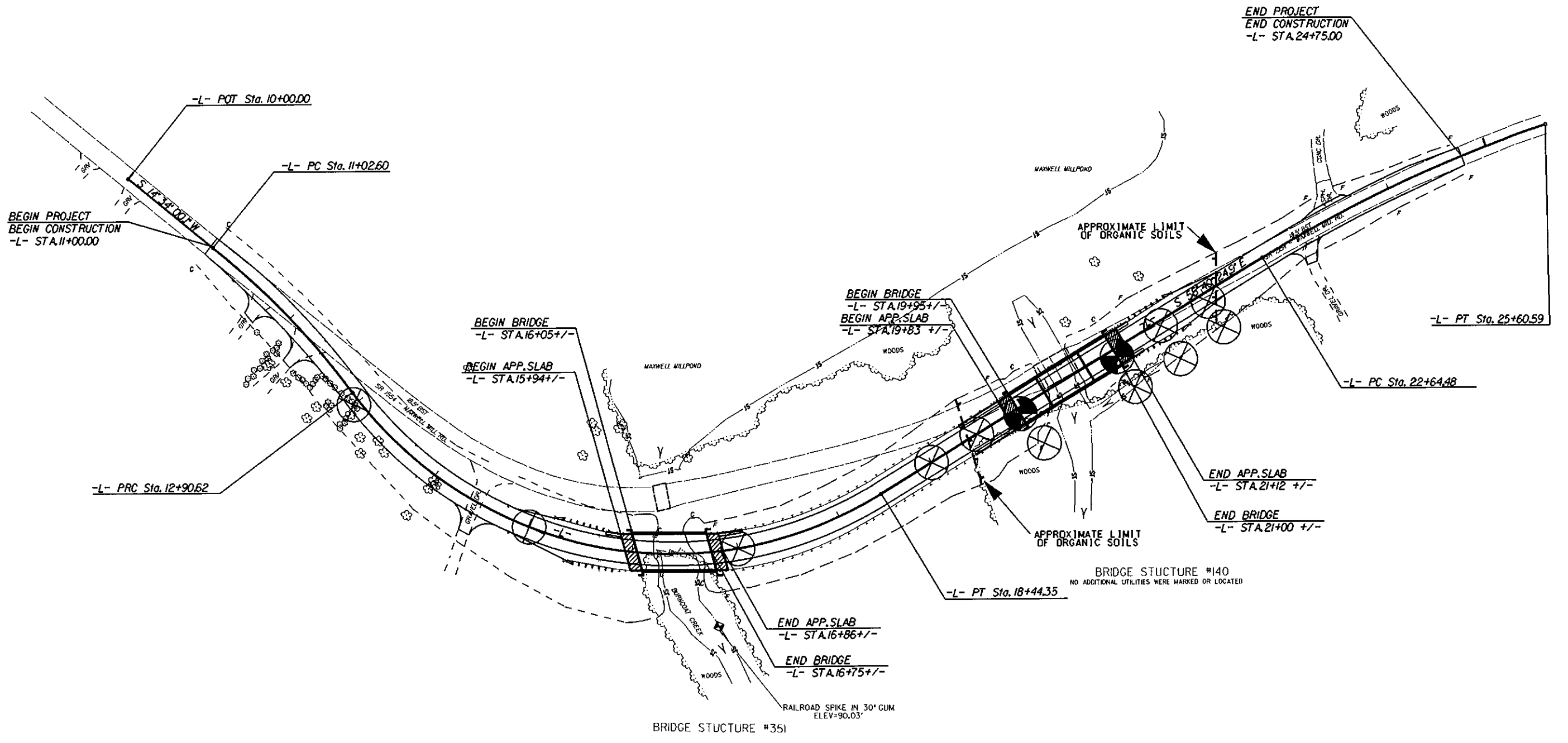
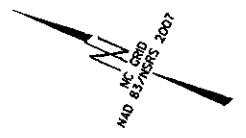
Formational soils belonging to the Peedee Formation were encountered near elevation 70± in deeper borings for bridge foundation design and consist of medium stiff to stiff silty clay (A-7-6).

Respectfully Submitted,

Dean Argenbright, I/G.
Regional Geological Engineer

EARTHWORK BALANCE SHEET

PLAN

-L-		
PI Sta 11+97.10	PI Sta 16+31.86	PI Sta 23+72.38
$\Delta = 14^{\circ} 21' 48.5" (RT)$	$\Delta = 84^{\circ} 36' 13.6" (LT)$	$\Delta = 9^{\circ} 29' 20.8" (RT)$
D = 7' 38" 22.0"	D = 15' 16" 43.9"	D = 4' 24" 26.5"
L = 188.02'	L = 553.73'	L = 215.30'
T = 94.50'	T = 341.25'	T = 107.90'
R = 750.00'	R = 375.00'	R = 1,300.00'



B.017/59

REVISIONS

26-MAR-2014 16:55 I:\projects\get\on\TIP\SF300351.GEO.ROAD\Drawings\TIP\SF300351.GEO.ROAD\CADD.GEOTECH\Site&Sub\SF300351.GEO.ROAD.dwg

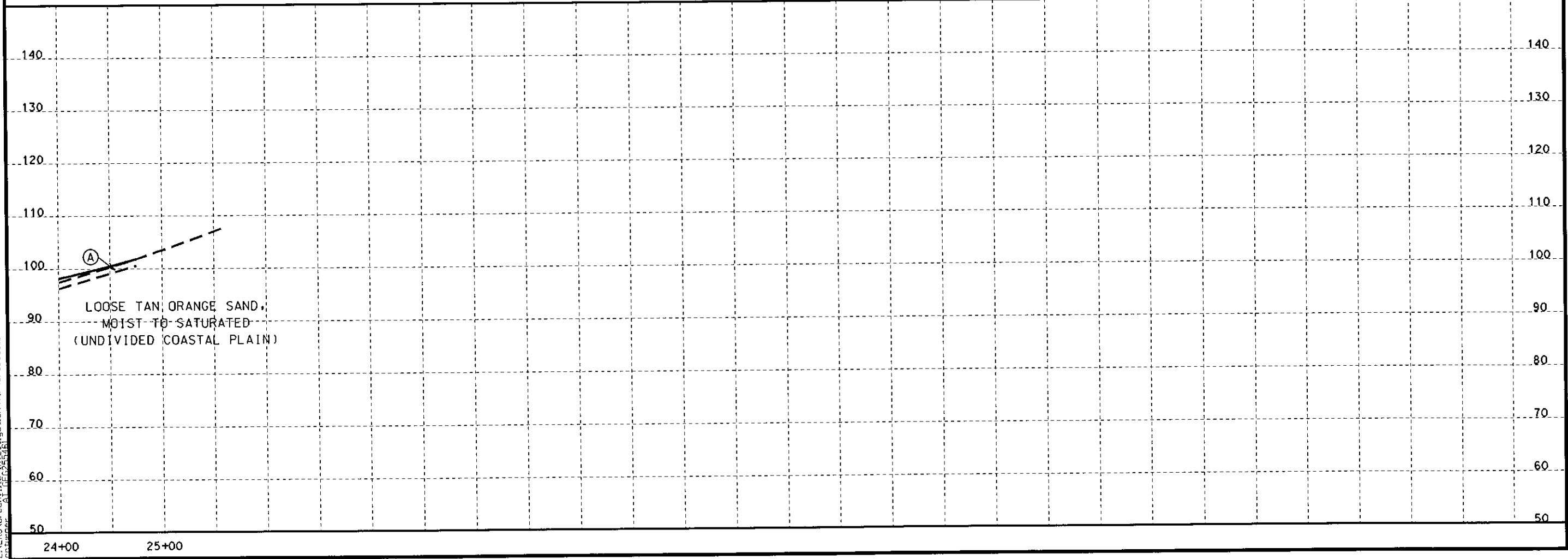
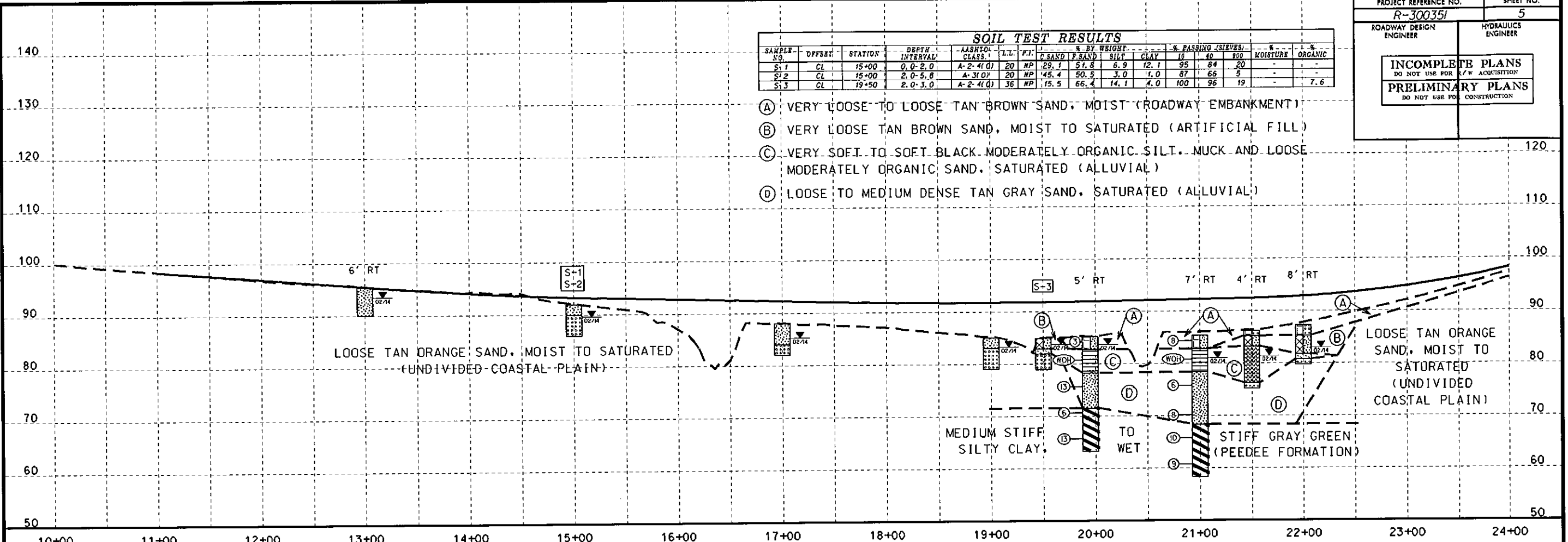
5/26/99

26-MAR-2014 16:21 L:\ERON\green\111\TIP\SF300351.GEO\RDWY\CADD_GEO\TECH\PLAN\PROJ\SF300351.GEO.RDY_L_PFT1.dgn

PROJECT REFERENCE NO. R-300351	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

SOIL TEST RESULTS														
SAMPLER NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)		MOISTURE	% ORGANIC
							F SAND	F SAND	SILT	CLAY	#10	#20		
S-1	CL	15+00	0.0-2.0	A-2-4(0)	20	NP	29.1	51.8	6.9	12.1	95	84	20	-
S-2	CL	15+00	2.0-5.8	A-3(0)	20	NP	45.4	50.5	3.0	1.0	87	66	5	-
S-3	CL	19+50	2.0-3.0	A-2-4(0)	36	NP	15.5	66.4	14.1	4.0	100	96	19	7.6

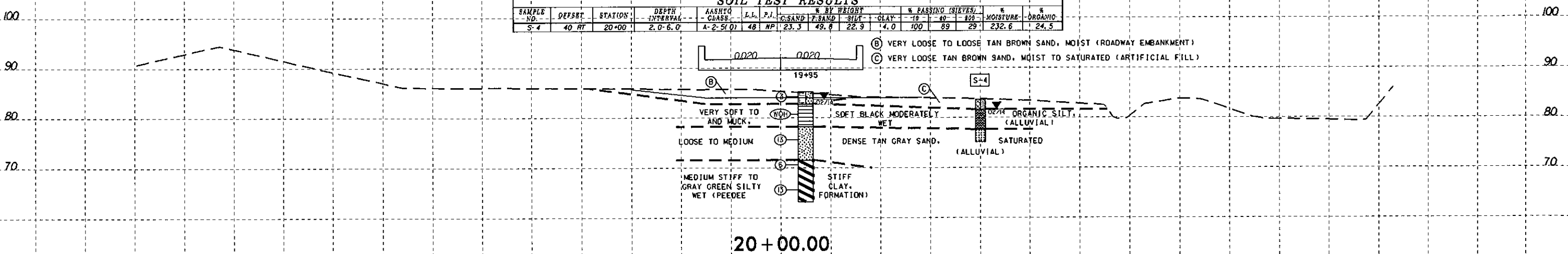
- (A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
- (B) VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
- (C) VERY SOFT TO SOFT BLACK MODERATELY ORGANIC SILT, MUCK AND LOOSE MODERATELY ORGANIC SAND, SATURATED (ALLUVIAL)
- (D) LOOSE TO MEDIUM DENSE TAN GRAY SAND, SATURATED (ALLUVIAL)



150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SOIL TEST RESULTS

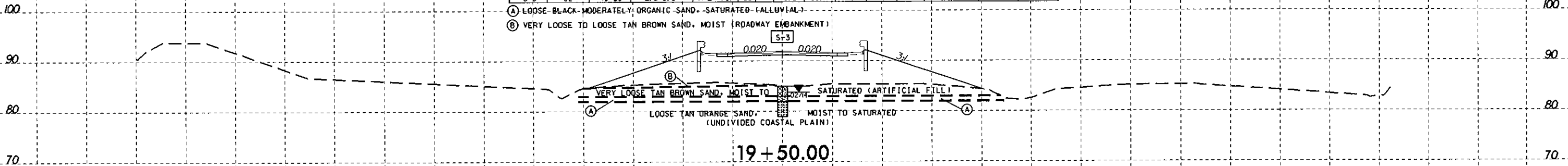
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-4	40 RT	20+00	2.0-6.0	A-2-5(0)	48	NP	23.3	49.8	22.9	4.0	100	89	29	232.6	24.5



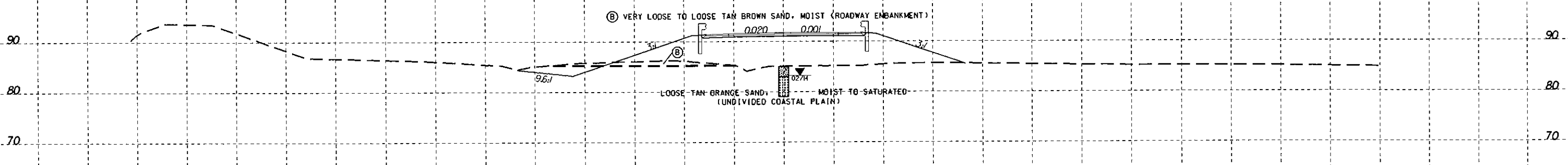
20 + 00.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-3	CL	19+50	2.0-3.0	A-2-4(0)	36	NP	15.5	66.4	14.1	4.0	100	96	19	-	7.6



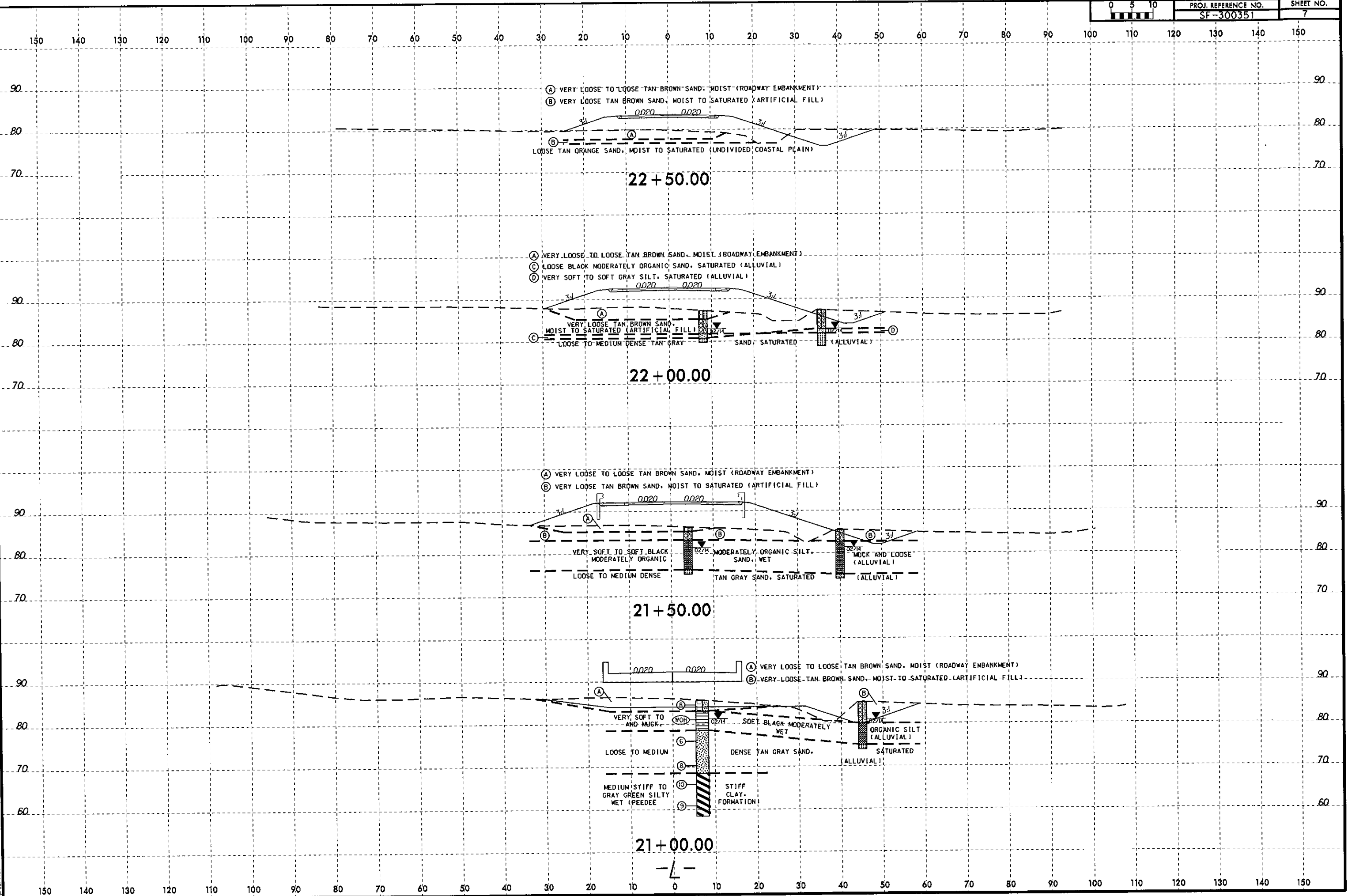
19 + 50.00



19 + 00.00

-L-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



(A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
(B) VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TAN ORANGE SAND, MOIST TO SATURATED (UNDIVIDED COASTAL PLAIN)

22 + 50.00

(A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
(C) LOOSE BLACK MODERATELY ORGANIC SAND, SATURATED (ALLUVIAL)
(D) VERY SOFT TO SOFT GRAY SILT, SATURATED (ALLUVIAL)
VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
LOOSE TO MEDIUM DENSE TAN GRAY SAND, SATURATED (ALLUVIAL)

22 + 00.00

(A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
(B) VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
VERY SOFT TO SOFT BLACK MODERATELY ORGANIC
LOOSE TO MEDIUM DENSE
MODERATELY ORGANIC SILT, SAND, WET
TAN GRAY SAND, SATURATED
MUCK AND LOOSE (ALLUVIAL)
(ALLUVIAL)

21 + 50.00

(A) VERY LOOSE TO LOOSE TAN BROWN SAND, MOIST (ROADWAY EMBANKMENT)
(B) VERY LOOSE TAN BROWN SAND, MOIST TO SATURATED (ARTIFICIAL FILL)
VERY SOFT TO AND MUCK
SOFT BLACK MODERATELY WET
ORGANIC SILT (ALLUVIAL)
LOOSE TO MEDIUM
DENSE TAN GRAY SAND, SATURATED (ALLUVIAL)
MEDIUM STIFF TO GRAY GREEN SILTY WET (PEEDEE)
STIFF CLAY FORMATION

21 + 00.00

8/23/99
26-MAR-2014 16:06
C:\ERON\Greenville\Drawings\Stationing\TIP\SF300351_GEO_RDWY\CADD_GEO\TECH\XSC\SF300351_GEO_RDWY_xsi.L-dgn
SP Turner

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-300140	1	7

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.3.R.18 (SF-300140) F.A. PROJ. _____
COUNTY DUPLIN
PROJECT DESCRIPTION BRIDGE NO.140 ON SR 1554 (MAXWELL MILL RD.) OVER BURN COAT CREEK AT -L- STA. 20+47.50

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-7	BORE LOGS

CAUTION NOTICE

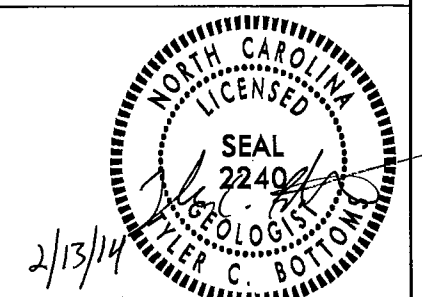
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1901 TOT-6850. 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
D.N. ARGENBRIGHT
FOR PERSONNEL

INVESTIGATED BY T.C. BOTTOMS
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE FEBRUARY 2014



PROJECT: 17BP.3.R.18 ID: SF-300140

DRAWN BY: C.P. TURNER

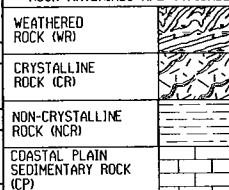
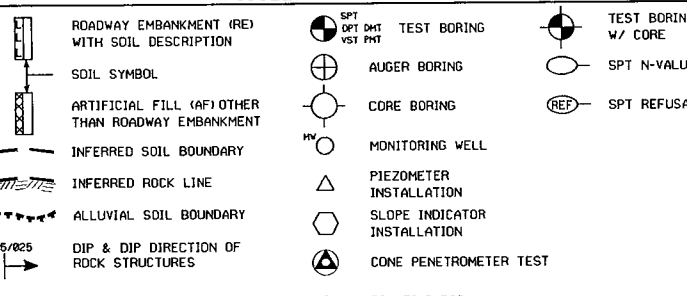
NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

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.

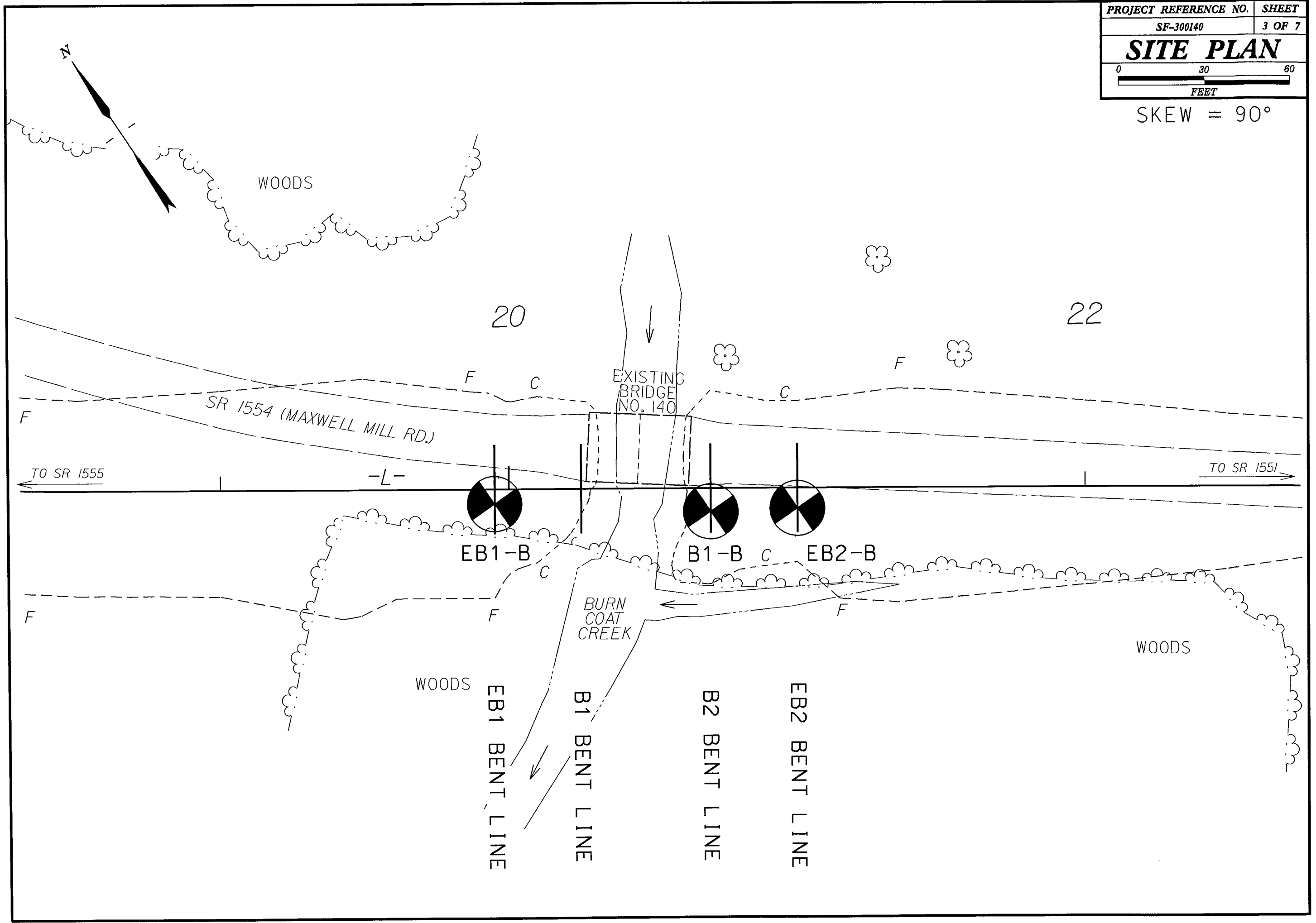
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

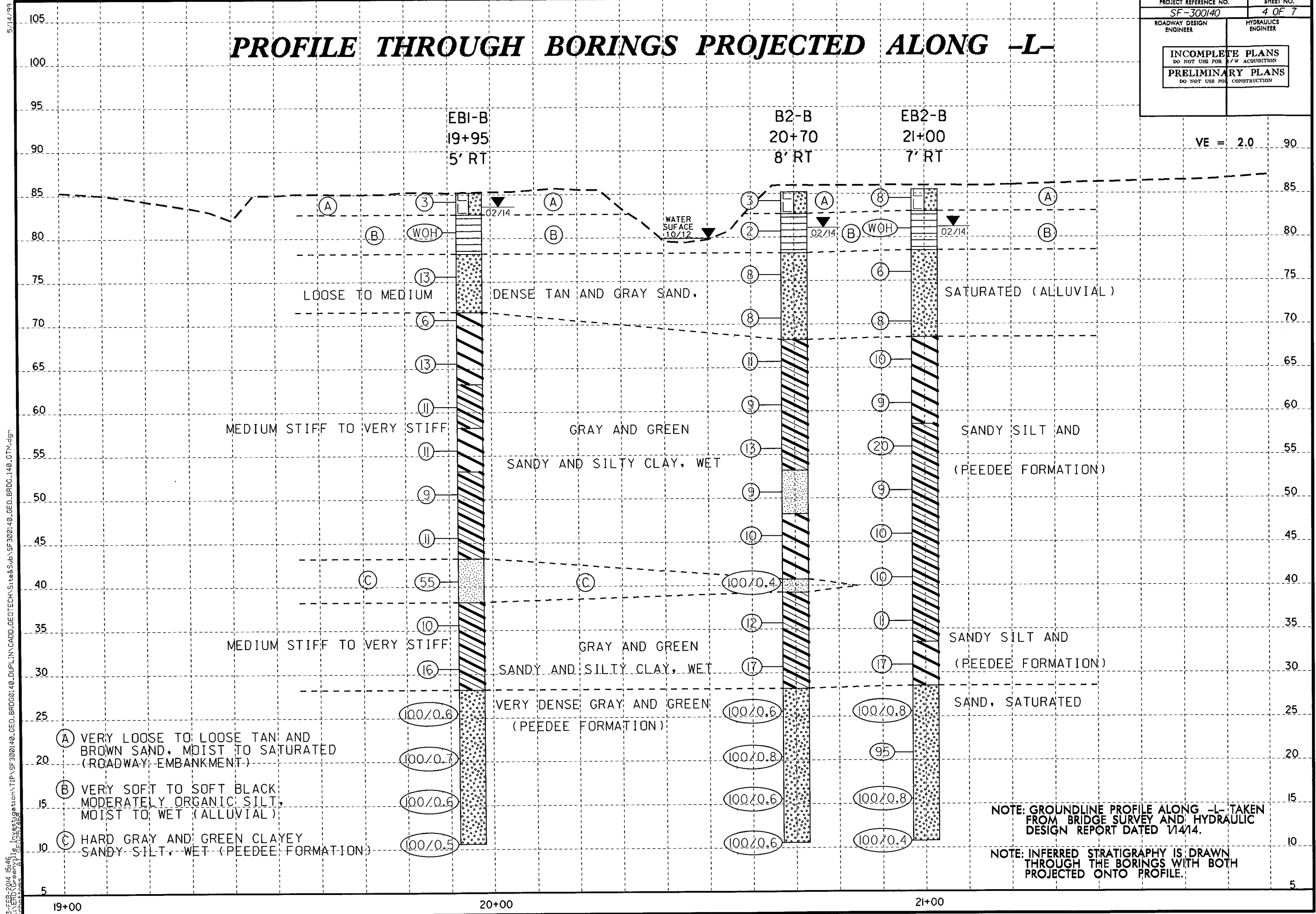
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION			GRADATION			ROCK DESCRIPTION			TERMS AND DEFINITIONS											
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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>			WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED). GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.			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: 			ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOADED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOTT) - IRRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SHALL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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. STRATA CORE RECOVERY (SREC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.											
SOIL LEGEND AND AASHTO CLASSIFICATION			MINERALOGICAL COMPOSITION			WEATHERING			ROCK HARDNESS											
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS			MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.			FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. SLIGHT (SL.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1/4 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. 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. 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> 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> 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> 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.			COMPRESSIBILITY SLIGHTLY COMPRESSIBLE - LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE - LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE - LIQUID LIMIT GREATER THAN 50			PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT-CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE			GROUND WATER ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ 24 STATIC WATER LEVEL AFTER 24 HOURS ▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP			MISCELLANEOUS SYMBOLS 		
CONSISTENCY OR DENSENESS			TEXTURE OR GRAIN SIZE			ABBREVIATIONS			EQUIPMENT USED ON SUBJECT PROJECT											
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F ²)			U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053			AR - AUGER REFUSAL MED. - MEDIUM MICA - MICACEOUS BT - BORING TERMINATED CL - CLAY MOD. - MODERATELY CPT - CONE PENETRATION TEST CSE - COARSE DRG. - ORGANIC DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY			DRILL UNITS: <input type="checkbox"/> MOBILE B- <input type="checkbox"/> BK-51 <input checked="" type="checkbox"/> CME-95 <input type="checkbox"/> CME-550 <input type="checkbox"/> PORTABLE HOIST											
SOIL MOISTURE - CORRELATION OF TERMS			SOIL MOISTURE SCALE (ATTERBERG LIMITS)			ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG.-CARBIDE INSERTS <input checked="" type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input checked="" type="checkbox"/> TRICONE <input type="checkbox"/> 2 1/16" STEEL TEETH <input type="checkbox"/> TRICONE * TUNG.-CARB. <input type="checkbox"/> CORE BIT			SOIL MOISTURE SCALE (ATTERBERG LIMITS)											
FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION			HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL			FRACTURE SPACING											
- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE			CORE SIZE: <input type="checkbox"/> B <input type="checkbox"/> N <input type="checkbox"/> H			SPACING											
- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE			- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE			HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST			TERM											
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE			- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE			INDURATION			THICKNESS											
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE			- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE			FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.			VERY WIDE MORE THAN 10 FEET											
PLASTICITY			PLASTICITY			FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.			WIDE 3 TO 10 FEET											
NONPLASTIC 0-5 DRY STRENGTH VERY LOW			NONPLASTIC 0-5 DRY STRENGTH VERY LOW			MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.			MODERATELY CLOSE 1 TO 3 FEET											
LOW PLASTICITY 6-15 DRY STRENGTH SLIGHT			LOW PLASTICITY 6-15 DRY STRENGTH SLIGHT			INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.			CLOSE 0.16 TO 1 FEET											
MED. PLASTICITY 16-25 DRY STRENGTH MEDIUM			MED. PLASTICITY 16-25 DRY STRENGTH MEDIUM			EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.			VERY CLOSE LESS THAN 0.16 FEET											
HIGH PLASTICITY 26 OR MORE DRY STRENGTH HIGH			HIGH PLASTICITY 26 OR MORE DRY STRENGTH HIGH						DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.											

SKEW = 90°



PROFILE THROUGH BORINGS PROJECTED ALONG -L-



5/14/99
 13-FEB-2014 15:46
 L:\PROJ\Greenwell\14\140140\140140.dgn
 C:\Users\jgreenwell\AppData\Local\Temp\140140\140140.dgn
 C:\Users\jgreenwell\AppData\Local\Temp\140140\140140.dgn
 C:\Users\jgreenwell\AppData\Local\Temp\140140\140140.dgn

- (A) VERY LOOSE TO LOOSE TAN AND BROWN SAND, MOIST TO SATURATED (ROADWAY EMBANKMENT)
- (B) VERY SOFT TO SOFT BLACK, MODERATELY ORGANIC SILT, MOIST TO WET (ALLUVIAL)
- (C) HARD GRAY AND GREEN CLAYEY SANDY SILT, WET (PEEDEE FORMATION)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 1/14/14.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

VE = 2.0

WBS 17BP.3.R.18		TIP SF-300140		COUNTY DUPLIN		GEOLOGIST Argenbright, D. N.						
SITE DESCRIPTION BRIDGE NO. 140 ON -L- (SR 1554) OVER BURNT COAT CREEK										GROUND WTR (ft)		
BORING NO. EB2-B		STATION 21+00		OFFSET 7 ft RT		ALIGNMENT -L-		0 HR. N/A		24 HR. 4.3		
COLLAR ELEV. 85.5 ft		TOTAL DEPTH 74.7 ft		NORTHING 482,551		EASTING 2,362,834		DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 12/14/2012		DRILL METHOD Mud Rotary HAMMER TYPE Automatic		
DRILLER Contract Driller		START DATE 02/06/14		COMP. DATE 02/06/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		
95												
90												
85	85.5	0.0	2	4	4							
80	82.0	3.5	WOH	WOH	WOH							
75	77.0	8.5	5	3	3							
70	71.3	14.2	2	3	5							
65	66.9	18.6	3	4	6							
60	61.9	23.6	3	4	5							
55	56.9	28.6	4	9	11							
50	51.9	33.6	3	4	5							
45	46.9	38.6	4	4	6							
40	41.9	43.6	5	5	5							
35	36.9	48.6	5	5	6							
30	31.9	53.6	5	7	10							
25	26.9	58.6	36	55	45/0.3							
20	21.9	63.6	35	40	55							
15	16.9	68.6	31	52	48/0.3							

WBS 17BP.3.R.18		TIP SF-300140		COUNTY DUPLIN		GEOLOGIST Argenbright, D. N.						
SITE DESCRIPTION BRIDGE NO. 140 ON -L- (SR 1554) OVER BURNT COAT CREEK										GROUND WTR (ft)		
BORING NO. EB2-B		STATION 21+00		OFFSET 7 ft RT		ALIGNMENT -L-		0 HR. N/A		24 HR. 4.3		
COLLAR ELEV. 85.5 ft		TOTAL DEPTH 74.7 ft		NORTHING 482,551		EASTING 2,362,834		DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 84% 12/14/2012		DRILL METHOD Mud Rotary HAMMER TYPE Automatic		
DRILLER Contract Driller		START DATE 02/06/14		COMP. DATE 02/06/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION
			0.5ft	0.5ft	0.5ft	0	25	50	75	100		
15												
	85.5	0.0	2	4	4							
	83.0	2.5										
	78.5	7.0										
	68.5	17.0										
	58.5	27.0										
	33.5	52.0										
	28.5	57.0										

NCDOT BORE DOUBLE SF-300140 GEO_BRDS.GPJ NC_DOT.GDT 2/13/14

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	SF-300351	1	6

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 17BP.3.R.18 (SF-300351) F.A. PROJ. _____
COUNTY DUPLIN
PROJECT DESCRIPTION BRIDGE NO. 351 ON SR 1554 (MAXWELL MILL RD.) OVER MAXWELL MILL POND OVERFLOW AT -L- STA. 16 + 40

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILES
5-6	BORE LOGS

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 1991 TOL-6850. 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.

PROJECT: 17BP.3.R.18 ID: SF-300351

PERSONNEL
D.N. ARGENBRIGHT
FOR PERSONNEL

INVESTIGATED BY J.L. STONE
CHECKED BY D.N. ARGENBRIGHT
SUBMITTED BY D.N. ARGENBRIGHT
DATE FEBRUARY 2014



DRAWN BY: C.P. TURNER

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.

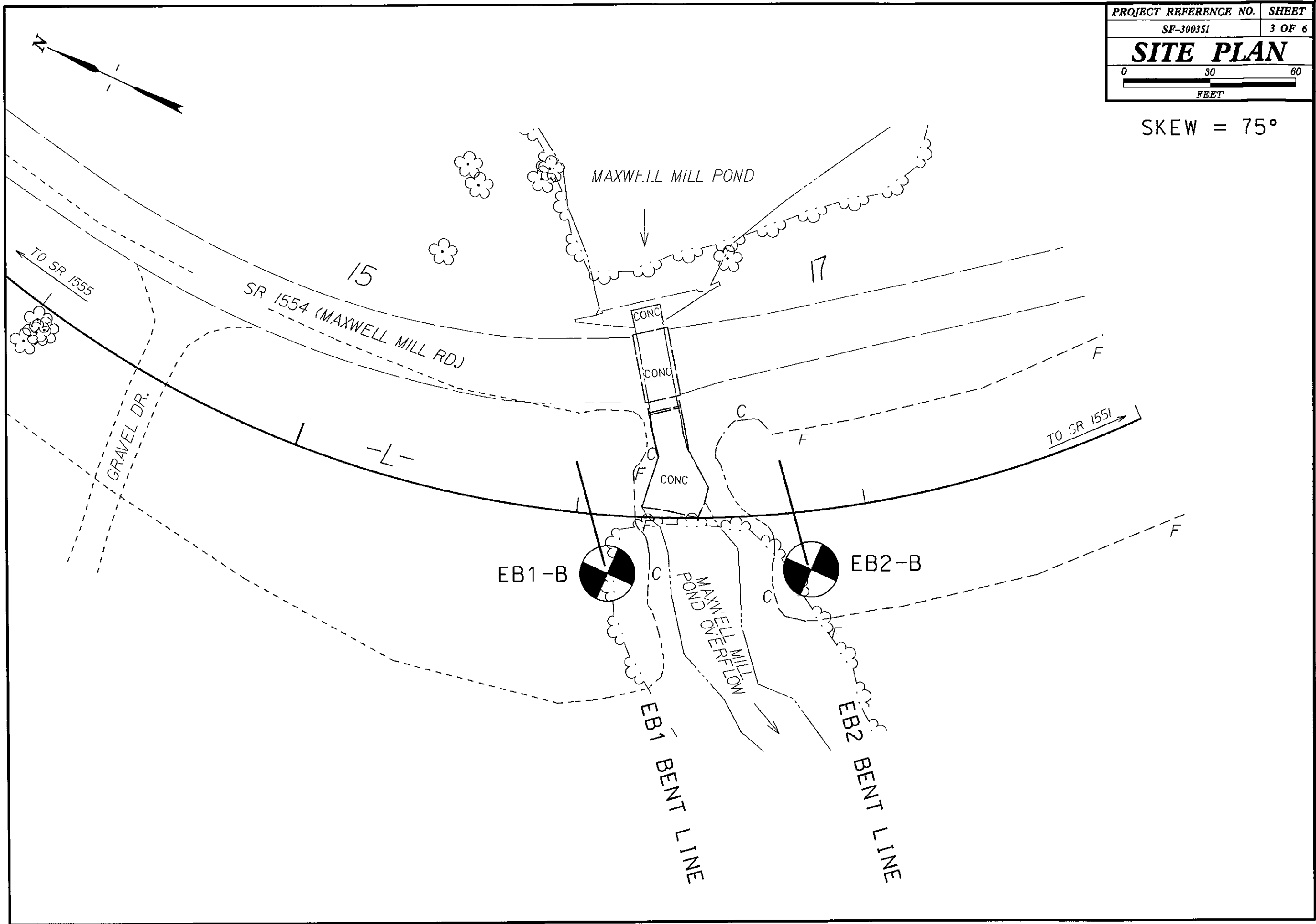
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																							
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 (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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, MORE PLASTIC, A-7-6</i>										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										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: NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC. FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLDAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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. SAPROLITE (SAP) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																							
SOIL LEGEND AND AASHTO CLASSIFICATION										MINERALOGICAL COMPOSITION										WEATHERING										ROCK HARDNESS																																							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. 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. 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. 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. 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. IF TESTED, WOULD YIELD SPT REFUSAL. 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 > 100 BPF. 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 < 100 BPF. 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.										COMPRESSIONIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50										PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% LITTLE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% SOME 20 - 35% MODERATELY ORGANIC 5 - 10% 12 - 20% HIGHLY 35% AND ABOVE HIGHLY ORGANIC >10% >20%										GROUND WATER ▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ 24 STATIC WATER LEVEL AFTER 24 HOURS ▽ PM PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP										ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. 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. 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. 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. 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 FINGERNAIL.									
CONSISTENCY OR DENSITY										MISCELLANEOUS SYMBOLS										FRACTURE SPACING										BEDDING																																							
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION TEST BORING SOIL SYMBOL AUGER BORING ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT CORE BORING INFERRED SOIL BOUNDARY MONITORING WELL INFERRED ROCK LINE PIEZOMETER INSTALLATION ALLUVIAL SOIL BOUNDARY SLOPE INDICATOR INSTALLATION DIP & DIP DIRECTION OF ROCK STRUCTURES CONE PENETROMETER TEST SOUNDING ROD										VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET										TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET																																							
TEXTURE OR GRAIN SIZE										ABBREVIATIONS										INDURATION										NOTES:																																							
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICAEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC DRG. - ORGANIC DRY UNIT WEIGHT CSE. - COARSE PMT - PRESSUREMETER TEST DMT - DILATOMETER TEST SAP. - SAPROLITIC DPT - DYNAMIC PENETRATION TEST SD. - SAND, SANDY e - VOID RATIO SL. - SILT, SILTY F - FINE SLL. - SLIGHTLY FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL FRAC. - FRACTURED, FRACTURES w - MOISTURE CONTENT FRAG. - FRAGMENTS V - VERY HL. - HIGHLY										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										BENCH MARK: RAILROAD SPIKE IN 30' GUM TREE AT -L- STA. 16+74.95, 69.1' RT ELEVATION: 90.03 FT.																																							
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										PLASTICITY										COLOR																																							
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										DRILL UNITS: MOBILE B- BK-51 CHE-55 CHE-550 PORTABLE HOIST ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG. CARBIDE INSERTS CASING w/ ADVANCER TRICONE 2 1/8" STEEL TEETH TRICONE TUNG. CARB. CORE BIT HAMMER TYPE: AUTOMATIC MANUAL CORE SIZE: B N H HAND TOOLS: POST HOLE DIGGER HAND AUGER SOUNDING ROD VANE SHEAR TEST										LL LIQUID LIMIT SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL PLASTIC LIMIT WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM OPTIMUM MOISTURE MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH										DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																													

SKEW = 75°

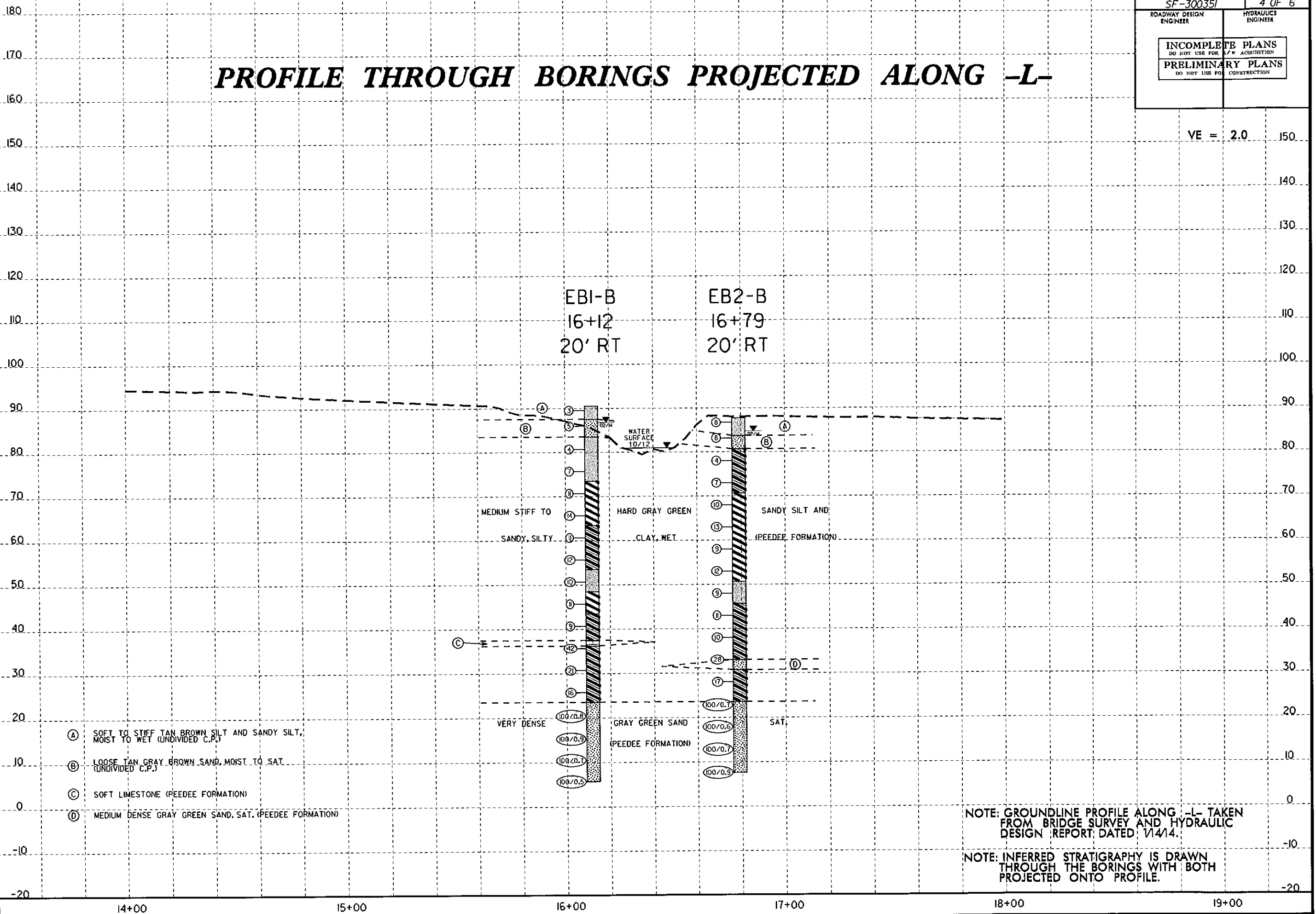


07-FEB-2014 08:18
 I:\projects\geotech\TIP\SF300351\GEO\BRD0351\DUPL\IN\CADD\GEO\TECH\S1\Sub\SF300351\GEO\BRD0351.LDTM.dgn
 5/14/99

PROJECT REFERENCE NO. <i>SF-300351</i>	SHEET NO. <i>4 OF 6</i>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION	
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

PROFILE THROUGH BORINGS PROJECTED ALONG -L-

VE = 2.0



- (A) SOFT TO STIFF TAN BROWN SILT AND SANDY SILT, MOIST TO WET (UNDIVIDED C.P.)
- (B) LOOSE TAN GRAY BROWN SAND, MOIST TO SAT. (UNDIVIDED C.P.)
- (C) SOFT LIMESTONE (PEEDEE FORMATION)
- (D) MEDIUM DENSE GRAY GREEN SAND, SAT. (PEEDEE FORMATION)

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM BRIDGE SURVEY AND HYDRAULIC DESIGN REPORT DATED 1/14/14.

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.



WBS 17BP.3.R.18	TIP SF-300351	COUNTY DUPLIN	GEOLOGIST Argenbright, D. N.	
SITE DESCRIPTION BRIDGE NO. 351 ON -L- (SR 1554) OVER MAXWELL MILL POND OVERFLOW				GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+12	OFFSET 20 ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 90.5 ft	TOTAL DEPTH 84.8 ft	NORTHING 482,875	EASTING 2,362,468	24 HR. 3.7
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
DRILLER Contract Driller	START DATE 02/03/14	COMP. DATE 02/03/14	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
95																
90	90.5	0.0	1	1	2										90.5	GROUND SURFACE
	87.0	3.5	4	3	2										87.5	UNDIVIDED COASTAL PLAIN BROWN SANDY SILT, MOIST
85															83.5	UNDIVIDED COASTAL PLAIN TAN GRAY SAND, MOIST TO SAT.
	81.7	8.8	1	2	2										83.5	COASTAL PLAIN GRAY GREEN SANDY SILT, WET (PEEDEE FORMATION)
80															73.5	COASTAL PLAIN GRAY GREEN SILTY AND SANDY CLAY, WET (PEEDEE FORMATION)
	76.7	13.8	3	3	4										63.5	COASTAL PLAIN GRAY GREEN SILTY AND SANDY CLAY, WET (PEEDEE FORMATION)
75															53.5	COASTAL PLAIN GRAY GREEN SANDY SILT, WET (PEEDEE FORMATION)
	71.7	18.8	3	5	6										48.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
70															43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
	66.7	23.8	4	6	8										37.5	COASTAL PLAIN GRAY LIMESTONE
65															36.2	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
	61.7	28.8	3	4	7										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
60															37.5	COASTAL PLAIN GRAY LIMESTONE
	56.7	33.8	4	5	7										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
55															37.5	COASTAL PLAIN GRAY LIMESTONE
	51.7	38.8	4	4	6										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
50															37.5	COASTAL PLAIN GRAY LIMESTONE
	46.7	43.8	4	5	6										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
45															37.5	COASTAL PLAIN GRAY LIMESTONE
	41.7	48.8	4	4	5										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
40															37.5	COASTAL PLAIN GRAY LIMESTONE
	36.7	53.8	65	23	19										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
35															37.5	COASTAL PLAIN GRAY LIMESTONE
	31.7	58.8	6	11	10										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
30															37.5	COASTAL PLAIN GRAY LIMESTONE
	26.7	63.8	5	7	9										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
25															37.5	COASTAL PLAIN GRAY LIMESTONE
	21.7	68.8	25	51	49/0.3										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
20															37.5	COASTAL PLAIN GRAY LIMESTONE
	16.7	73.8	52	59	41/0.4										43.5	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)
15															37.5	COASTAL PLAIN GRAY LIMESTONE

NCDOT BORE DOUBLE BORINGS.GPJ NC_DOT_GDT_2/7/14

WBS 17BP.3.R.18	TIP SF-300351	COUNTY DUPLIN	GEOLOGIST Argenbright, D. N.	
SITE DESCRIPTION BRIDGE NO. 351 ON -L- (SR 1554) OVER MAXWELL MILL POND OVERFLOW				GROUND WTR (ft)
BORING NO. EB1-B	STATION 16+12	OFFSET 20 ft RT	ALIGNMENT -L-	0 HR. N/A
COLLAR ELEV. 90.5 ft	TOTAL DEPTH 84.8 ft	NORTHING 482,875	EASTING 2,362,468	24 HR. 3.7
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD Mud Rotary	HAMMER TYPE Automatic	
DRILLER Contract Driller	START DATE 02/03/14	COMP. DATE 02/03/14	SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
15																
	11.7	78.8	42	40	60/0.2										100/0.7	Match Line
10															100/0.5	
	6.7	83.8	23	100/0.5											100/0.5	
															5.7	Boring Terminated at Elevation 5.7 ft IN VERY DENSE SAND



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 17BP.3.R.18		TIP SF-300351		COUNTY DUPLIN		GEOLOGIST Argenbright, D. N.											
SITE DESCRIPTION BRIDGE NO. 351 ON -L- (SR 1554) OVER MAXWELL MILL POND OVERFLOW							GROUND WTR (ft)										
BORING NO. EB2-B		STATION 16+79		OFFSET 20 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 87.7 ft		TOTAL DEPTH 80.1 ft		NORTHING 482,811		EASTING 2,362,498											
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic													
DRILLER Contract Driller		START DATE 02/03/14		COMP. DATE 02/04/14		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
90	87.7	0.0	3	5	3										87.7	GROUND SURFACE	0.0
85	84.2	3.5	3	5	3										83.7	UNDIVIDED COASTAL PLAIN TAN BROWN SILT, MOIST TO WET	4.0
80	79.0	8.7	1	1	3										80.7	UNDIVIDED COASTAL PLAIN TAN BROWN SAND, SAT.	7.0
75	74.0	13.7	2	3	4										70.7	COASTAL PLAIN GRAY GREEN SILTY AND SANDY CLAY, WET (PEEDEE FORMATION)	17.0
70	69.0	18.7	4	4	6										50.7	COASTAL PLAIN GRAY GREEN SANDY SILT, WET (PEEDEE FORMATION)	37.0
65	64.0	23.7	4	6	7										45.7	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)	42.0
60	59.0	28.7	3	4	5										33.0	COASTAL PLAIN GRAY GREEN SAND, SAT. (PEEDEE FORMATION)	57.0
55	54.0	33.7	4	5	7										30.7	COASTAL PLAIN GRAY GREEN SANDY CLAY, WET (PEEDEE FORMATION)	64.2
50	49.0	38.7	4	4	5										23.5	COASTAL PLAIN GRAY GREEN SAND, SAT. (PEEDEE FORMATION)	
45	44.0	43.7	3	5	6												
40	39.0	48.7	4	4	6												
35	34.0	53.7	5	8	20												
30	29.0	58.7	5	8	9												
25	24.0	63.7	10	63	37/0.2												
20	19.0	68.7	21	81	19/0.1												
15	14.0	73.7	41	55	45/0.2												
10																	

WBS 17BP.3.R.18		TIP SF-300351		COUNTY DUPLIN		GEOLOGIST Argenbright, D. N.											
SITE DESCRIPTION BRIDGE NO. 351 ON -L- (SR 1554) OVER MAXWELL MILL POND OVERFLOW							GROUND WTR (ft)										
BORING NO. EB2-B		STATION 16+79		OFFSET 20 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 87.7 ft		TOTAL DEPTH 80.1 ft		NORTHING 482,811		EASTING 2,362,498											
DRILL RIG/HAMMER EFF./DATE F&R3495 CME-55 82% 01/17/2014		DRILL METHOD Mud Rotary		HAMMER TYPE Automatic													
DRILLER Contract Driller		START DATE 02/03/14		COMP. DATE 02/04/14		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
10	9.0	78.7	23	44	56/0.4										7.6	Boring Terminated at Elevation 7.6 ft IN VERY DENSE SAND	80.1

NCDOT BORE DOUBLE BORINGS GP.1 NC_DOT_GDT_2/7/14