

REFERENCE: B-5121

PROJECT: 42263

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5121	1	12

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SHEET NO.	DESCRIPTION
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**STRUCTURE**  
**SUBSURFACE INVESTIGATION**

COUNTY WAKE

PROJECT DESCRIPTION REPLACE BRIDGE NO. 227 ON  
US 70/US 40/NC 50 (CAPITAL BOULEVARD) OVER  
PEACE STREET AND REPLACE BRIDGE NO. 213  
ON US 70/NC 50 (WADE AVENUE) OVER US 401  
(CAPITAL BOULEVARD)

PROJECT DESCRIPTION BRIDGE NO. 227 ON -L-  
US 70/US 40/NC 50 (CAPITAL BOULEVARD)  
OVER PEACE STREET AT STATION 22+06.91

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. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT 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 THE 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.

- NOTES:
1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
  2. 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.

PERSONNEL

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ASHLEY, R. T.

EKLUND, M. A.

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ALEXANDER, M. J.

INVESTIGATED BY TERRACON CONSULTANTS

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SUBMITTED BY TERRACON CONSULTANTS

DATE FEBRUARY 2016

NOT CONSIDERED FINAL UNLESS ALL SIGNATURES ARE COMPLETED



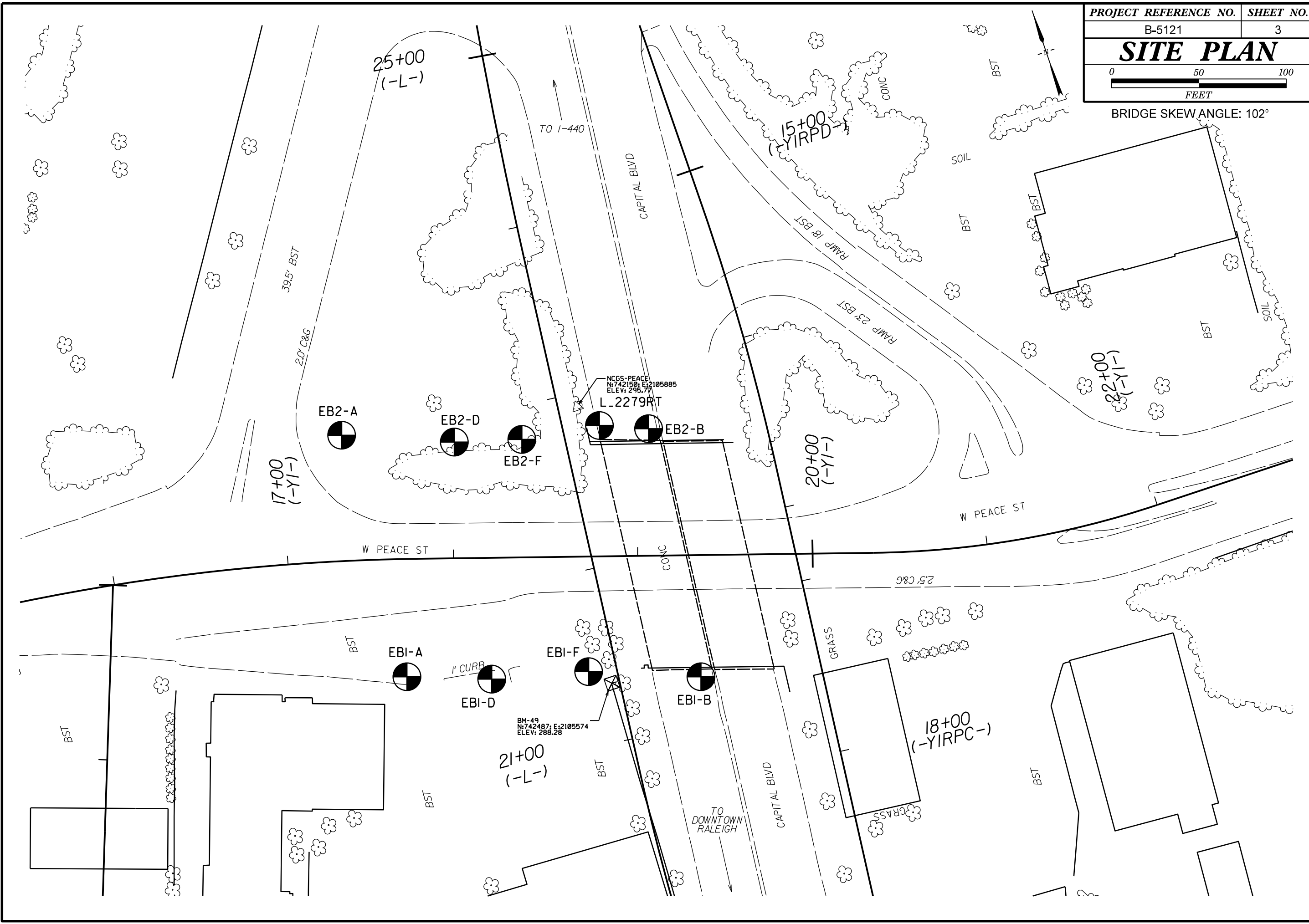
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Matthew J. Alexander 2/5/2016

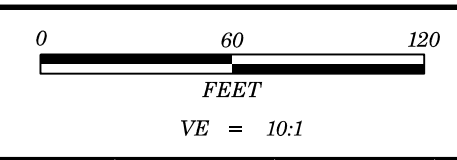
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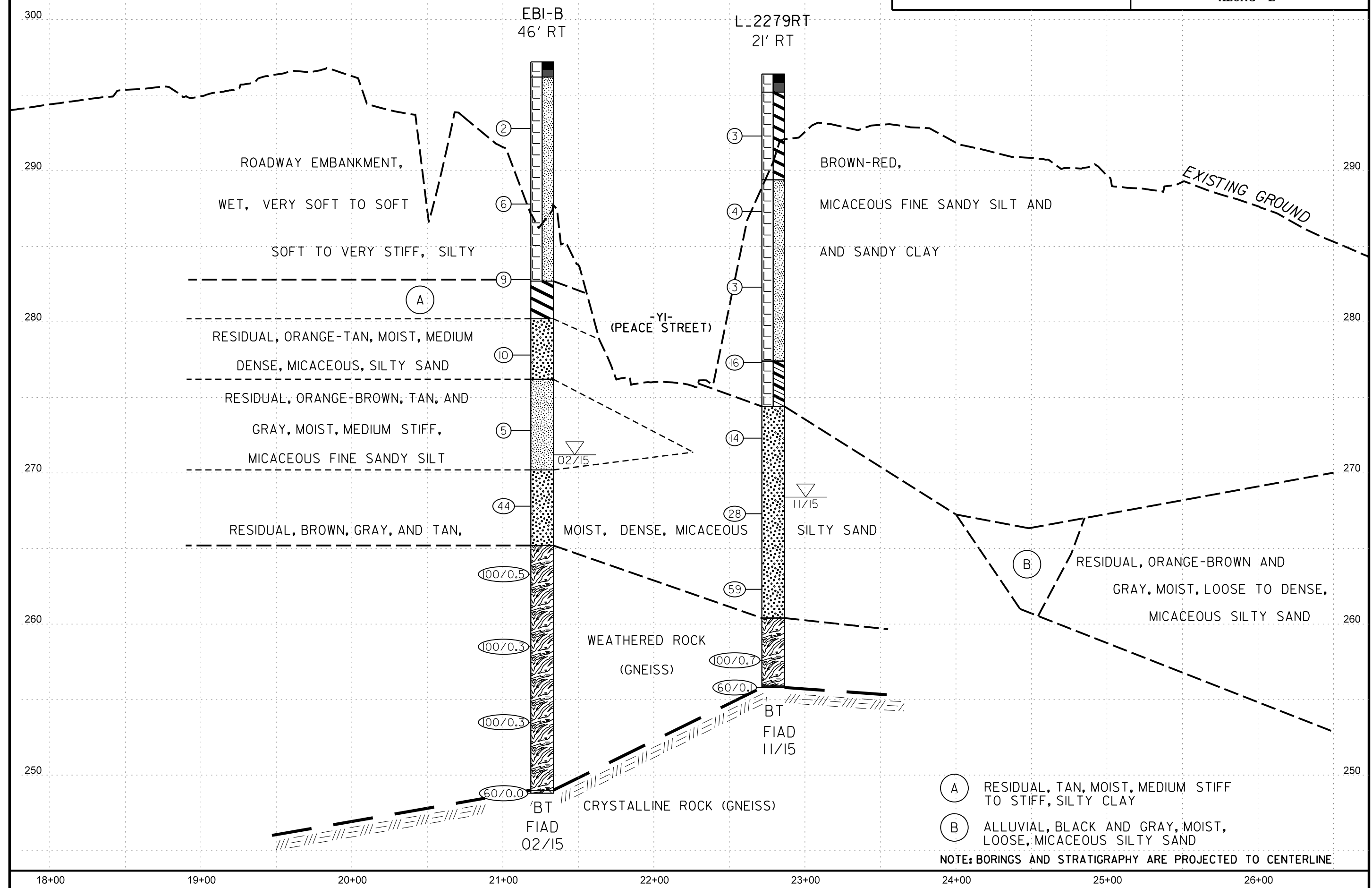
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
**GEOTECHNICAL ENGINEERING UNIT**  
**SUBSURFACE INVESTIGATION**  
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																							
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p><b>WELL GRADED</b> - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. <b>UNIFORMLY GRADED</b> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <b>GAP-GRADED</b> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>										<p><b>ALLUVIUM (ALLUV.)</b> - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. <b>AQUIFER</b> - A WATER BEARING FORMATION OR STRATA. <b>ARENACEOUS</b> - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. <b>ARGILLACEOUS</b> - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. <b>ARTESIAN</b> - 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. <b>CALCAREOUS (CALC.)</b> - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. <b>COLLUVIUM</b> - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. <b>CORE RECOVERY (REC.)</b> - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. <b>DIKE</b> - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. <b>DIP</b> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. <b>DIP DIRECTION (DIP AZIMUTH)</b> - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. <b>FAULT</b> - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. <b>FISSILE</b> - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. <b>FLOAT</b> - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. <b>FLOOD PLAIN (FP)</b> - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. <b>FORMATION (FM)</b> - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. <b>JOINT</b> - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. <b>LEDGE</b> - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. <b>LENS</b> - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. <b>MOTTLED (MOT.)</b> - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. <b>PERCHED WATER</b> - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. <b>RESIDUAL (RES.) SOIL</b> - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. <b>ROCK QUALITY DESIGNATION (RQD)</b> - 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. <b>SAPROLITE (SAP.)</b> - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. <b>SILL</b> - 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. <b>SLICKENSIDE</b> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. <b>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT)</b> - 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. <b>STRATA CORE RECOVERY (SREC.)</b> - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. <b>STRATA ROCK QUALITY DESIGNATION (SROD)</b> - 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. <b>TOPSOIL (TS.)</b> - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																							
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2-4</th> <th>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> </tr> <tr> <th>SYMBOL</th> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN 10 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="5">-</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td>40 MX 11 MN</td> <td>41 MN 11 MN</td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="5">0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td colspan="5">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="5"></td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> </tr> <tr> <td colspan="15">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS &gt; LL - 30</td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					GROUP CLASS.	A-1	A-3	A-2	A-2-4	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	[Pattern]					[Pattern]					[Pattern]					% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT	MATERIAL PASSING #40 LL PI	-					40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					GROUP INDEX	0					0	4 MX	8 MX	12 MX	16 MX	NO MX	HIGHLY ORGANIC SOILS					USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS							GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSATURABLE	PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30															<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <b>ANGULAR</b>, <b>SUBANGULAR</b>, <b>SUBROUNDED</b>, OR <b>ROUNDED</b>.</p>										<p>CRYSTALLINE ROCK (CR)</p> <p>NON-CRYSTALLINE ROCK (NCR)</p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>										<p><b>CR</b> - FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p> <p><b>NCR</b> - 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.</p> <p><b>CP</b> - COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>									
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<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL &lt; 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL &gt; 50</p>										<p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &gt; 100 BPF</i></p> <p>VERY SEVERE (V SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</i></p> <p>COMPLETE - ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>										<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p> <p>TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%</p> <p>LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%</p> <p>MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%</p> <p>HIGHLY ORGANIC &gt; 10% &gt; 20% HIGHLY 35% AND ABOVE</p>																																																																																																																																																							
<b>GROUND WATER</b>										<b>MISCELLANEOUS SYMBOLS</b>										<b>RECOMMENDATION SYMBOLS</b>										<b>ABBREVIATIONS</b>																																																																																																																																																							
<p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p>▽ STATIC WATER LEVEL AFTER 24 HOURS</p> <p>▽ PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p>○ SPRING OR SEEP</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p> <p>SOIL SYMBOL</p> <p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p> <p>INFERRED SOIL BOUNDARY</p> <p>INFERRED ROCK LINE</p> <p>ALLUVIAL SOIL BOUNDARY</p> <p>DIP &amp; DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DMT TEST BORE</p> <p>AUGER BORING</p> <p>CORE BORING</p> <p>MONITORING WELL</p> <p>PIEZOMETER INSTALLATION</p> <p>SLOPE INDICATOR INSTALLATION</p> <p>CONE PENETROMETER TEST</p> <p>SOUNDING ROD</p> <p>TEST BORING WITH CORE</p> <p>SPT N-VALUE</p>										<p>UNDERCUT EXCAVATION</p> <p>SHALLOW UNDERCUT</p> <p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p> <p>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>										<p>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</p> <p>MED. - MEDIUM MICA. - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W<sub>d</sub> - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>																																																																																																																																																							
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<b>PROJECT REFERENCE NO.</b>	<b>SHEET NO.</b>
B-5121	4
<b>CENTERLINE PROFILE ALONG -L-</b>	

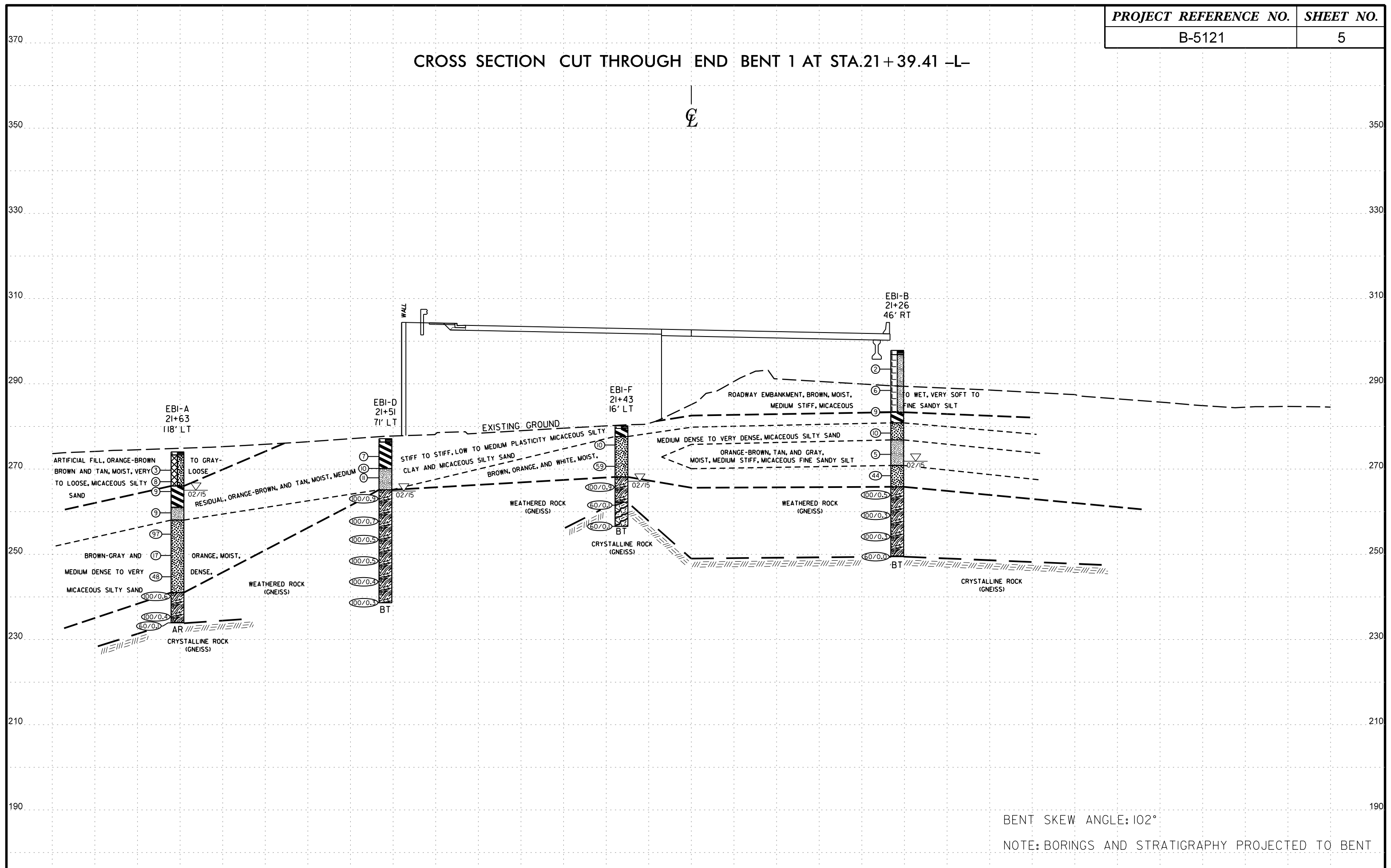


- (A) RESIDUAL, TAN, MOIST, MEDIUM STIFF TO STIFF, SILTY CLAY
- (B) ALLUVIAL, BLACK AND GRAY, MOIST, LOOSE, MICACEOUS SILTY SAND

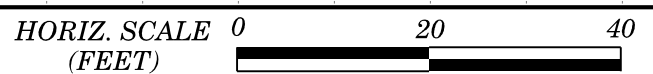
NOTE: BORINGS AND STRATIGRAPHY ARE PROJECTED TO CENTERLINE

18+00      19+00      20+00      21+00      22+00      23+00      24+00      25+00      26+00

**CROSS SECTION CUT THROUGH END BENT 1 AT STA.21+39.41 -L-**



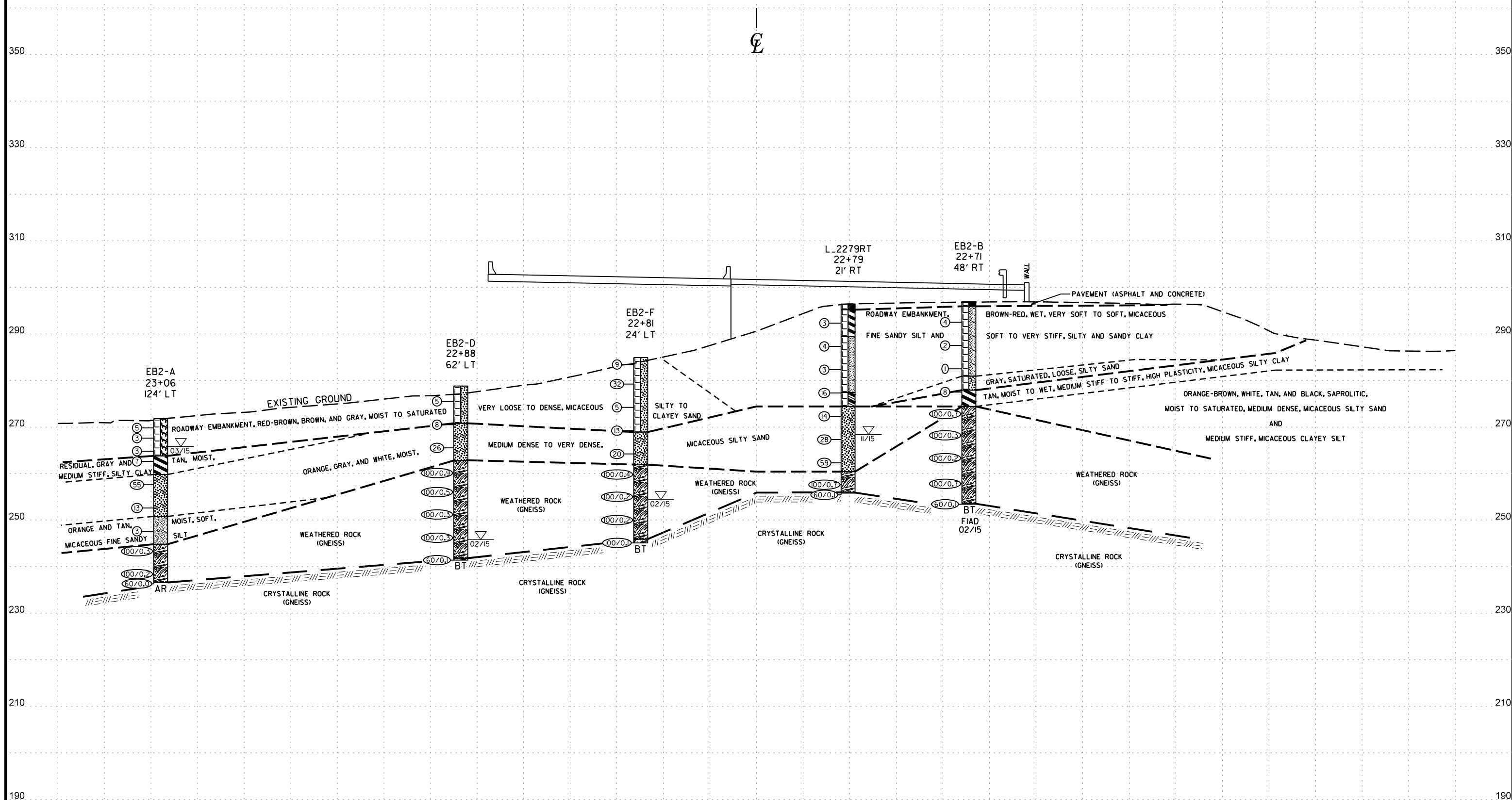
BENT SKEW ANGLE: 102°  
 NOTE: BORINGS AND STRATIGRAPHY PROJECTED TO BENT



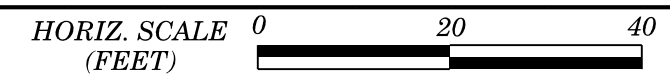
VE = 1:1

**CROSS SECTION ACROSS END BENT 1**

**CROSS SECTION CUT THROUGH END BENT 2 AT STA.22+74.41 -L-**



BENT SKEW ANGLE: 102°  
 NOTE: BORINGS AND STRATIGRAPHY PROJECTED TO BENT



VE = 1:1

**CROSS SECTION ACROSS END BENT 2**

# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.	
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)
BORING NO. EB1-A		STATION 21+63		OFFSET 118 ft LT		ALIGNMENT -L-	
COLLAR ELEV. 273.8 ft		TOTAL DEPTH 40.1 ft		NORTHING 742,036		EASTING 2,105,742	
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 06/04/2013			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic		
DRILLER Trunage, J. R.		START DATE 02/10/15		COMP. DATE 02/11/15		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
275														273.8 GROUND SURFACE 0.0	
														273.1 0.2' ASPHALT, 0.5' AGGREGATE BASE COURSE 0.7	
														ARTIFICIAL FILL ORANGE-BROWN TO GRAY-BROWN AND TAN, SILTY SAND, MICACEOUS	
270	270.5	3.3												RESIDUAL TAN AND GRAY, SILTY CLAY, MICACEOUS	
	267.8	6.0												ORANGE-BROWN AND TAN, FINE SANDY SILT, MICACEOUS	
	265.5	8.3												BROWN-GRAY AND ORANGE, SAPROLITIC, SILTY SAND, MICACEOUS	
265	265.5	8.3												WEATHERED ROCK (GNEISS)	
	260.5	13.3												CRYSTALLINE ROCK (GNEISS)	
260	260.5	13.3												Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 233.7 ft in CRYSTALLINE ROCK (GNEISS)	
	255.5	18.3													
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	240.5	33.3													
240	240.5	33.3													
	235.5	38.3													
235	235.5	38.3													
	233.8	40.0													

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.	
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)
BORING NO. EB1-B		STATION 21+26		OFFSET 46 ft RT		ALIGNMENT -L-	
COLLAR ELEV. 297.2 ft		TOTAL DEPTH 48.4 ft		NORTHING 741,981		EASTING 2,105,902	
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 06/04/2013			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic		
DRILLER Trunage, J. R.		START DATE 02/06/15		COMP. DATE 02/06/15		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
300														297.2 GROUND SURFACE 0.0	
														296.2 0.3' ASPHALT, 0.7' CONCRETE 1.0	
														ROADWAY EMBANKMENT BROWN AND GRAY, FINE SANDY SILT, MICACEOUS	
295	293.8	3.4												RESIDUAL TAN, SILTY CLAY	
	288.8	8.4												ORANGE-TAN, SILTY FINE TO COARSE SAND, MICACEOUS	
290	288.8	8.4												WEATHERED ROCK (GNEISS)	
	283.8	13.4												CRYSTALLINE ROCK (GNEISS)	
285	283.8	13.4												Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 248.8 ft on CRYSTALLINE ROCK (GNEISS)	
	278.8	18.4													
280	278.8	18.4													
	273.8	23.4													
275	273.8	23.4													
	268.8	28.4													
270	268.8	28.4													
	263.8	33.4													
265	263.8	33.4													
	258.8	38.4													
260	258.8	38.4													
	253.8	43.4													
255	253.8	43.4													
	248.8	48.4													
250	248.8	48.4													

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.										
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)									
BORING NO. EB1-D		STATION 21+51		OFFSET 71 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 277.5 ft		TOTAL DEPTH 38.5 ft		NORTHING 742,018		EASTING 2,105,789										
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 06/04/2013			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Trunage, J. R.		START DATE 02/11/15		COMP. DATE 02/11/15		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
280																
275	274.3	3.2	2	3	4											
270	271.5	6.0	3	4	6											
265	269.3	8.2	2	2	9											
260	264.3	13.2	24	76/0.4												
255	259.3	18.2	43	49	51/0.2											
250	254.3	23.2	100/0.5													
245	249.3	28.2	100/0.5													
240	244.3	33.2	100/0.4													
	239.3	38.2	100/0.3													

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.										
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)									
BORING NO. EB1-F		STATION 21+43		OFFSET 16 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 280.4 ft		TOTAL DEPTH 23.6 ft		NORTHING 742,004		EASTING 2,105,842										
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 06/04/2013			DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Trunage, J. R.		START DATE 02/11/15		COMP. DATE 02/11/15		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
285																
280	279.8	0.6														
275	276.9	3.5	2	4	6											
270	271.9	8.5	26	29	30											
265	266.9	13.5	22	78/0.4												
260	261.9	18.5	60/0.1													
	256.9	23.5	60/0.1													

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.									
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 23+06		OFFSET 124 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 271.8 ft		TOTAL DEPTH 35.2 ft		NORTHING 742,178		EASTING 2,105,752									
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 79% 09/11/2013			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER Eklund, M. A.		START DATE 03/02/15		COMP. DATE 03/02/15		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
275															
270	270.8	1.0	1	2	3									271.8	0.0
	268.6	3.2	1	1	2										
265	265.8	6.0	1	2	1										
	263.6	8.2	WOH	3	4									263.8	8.0
260	258.6	13.2	24	18	37									259.8	12.9
255	253.6	18.2	1	2	11									250.8	21.0
250	248.6	23.2	2	1	2									244.8	27.0
245	243.6	28.2	100/0.3												
240	238.6	33.2	100/0.2												
	236.6	35.2	60/0.0											236.6	35.2
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 236.6 ft on CRYSTALLINE ROCK (GNEISS)															

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Alexander, M. J.									
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)								
BORING NO. EB2-B		STATION 22+71		OFFSET 48 ft RT		ALIGNMENT -L-									
COLLAR ELEV. 296.9 ft		TOTAL DEPTH 43.5 ft		NORTHING 742,125		EASTING 2,105,919									
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 91% 06/04/2013			DRILL METHOD Mud Rotary			HAMMER TYPE Automatic									
DRILLER Trunage, J. R.		START DATE 02/05/15		COMP. DATE 02/05/15		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
300															
295	296.9													296.9	0.0
	295.9													295.9	1.0
290	293.5	3.4	1	2	2										
	288.5	8.4	1	1	1										
285	283.5	13.4	WOH	WOH	1										
280	278.5	18.4	7	4	4										
275	273.5	23.4	57	43/0.2											
270	268.5	28.4	100/0.3												
265	263.5	33.4	100/0.2												
260	258.5	38.4	56	42/0.2											
255	253.5	43.4	60/0.1												
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 253.4 ft in CRYSTALLINE ROCK (GNEISS)															

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# GEOTECHNICAL BORING REPORT

## BORE LOG

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Frawley, M. H.										
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)									
BORING NO. EB2-D		STATION 22+88		OFFSET 62 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 278.8 ft		TOTAL DEPTH 37.4 ft		NORTHING 742,153		EASTING 2,105,812										
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 79% 09/11/2013				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Eklund, M. A.		START DATE 02/16/15		COMP. DATE 02/16/15		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
280															278.8	0.0
	276.5	2.3	2	1	4								M	ROADWAY EMBANKMENT BROWN AND GRAY, SILTY FINE SAND, WITH TRACE CLAY		
275																
	271.5	7.3	2	2	6								M	RESIDUAL TAN TO ORANGE-BROWN AND WHITE, SAPROLITIC, SILTY FINE TO COARSE SAND, MICACEOUS	8.0	
270																
	266.5	12.3	5	10	16								M			
265																
	261.5	17.3	43	61	49/0.4									WEATHERED ROCK (GNEISS)	16.0	
260																
	256.5	22.3	100/0.5													
255																
	251.5	27.3	100/0.3													
250																
	246.5	32.3	100/0.3													
245																
	241.5	37.3	60/0.1											CRYSTALLINE ROCK (GNEISS)	37.0	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 241.4 ft in CRYSTALLINE ROCK (GNEISS)	37.4	

WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST Frawley, M. H.										
SITE DESCRIPTION BRIDGE NO. 227 ON US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET							GROUND WTR (ft)									
BORING NO. EB2-F		STATION 22+81		OFFSET 24 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 284.9 ft		TOTAL DEPTH 39.8 ft		NORTHING 742,143		EASTING 2,105,849										
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 79% 09/11/2013				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Eklund, M. A.		START DATE 02/16/15		COMP. DATE 02/16/15		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
285	284.4	0.5	1	1	8										284.9	0.0
													M	ROADWAY EMBANKMENT RED-BROWN, SILTY SAND, MICACEOUS, WITH ASPHALT DEBRIS		
280	280.2	4.7	10	18	14								M			
275	275.2	9.7	6	2	3								M			
270	270.2	14.7	WOH	5	8								M			
265	265.2	19.7	7	10	10								M	RESIDUAL ORANGE TO TAN, SILTY FINE TO COARSE SAND, MICACEOUS	16.0	
260	260.2	24.7	100/0.4											WEATHERED ROCK (GNEISS)	23.0	
255	255.2	29.7	100/0.2													
250	250.2	34.7	100/0.2													
	245.2	39.7	100/0.1											CRYSTALLINE ROCK (GNEISS)	39.0	
														Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 245.1 ft in CRYSTALLINE ROCK (GNEISS)	39.8	

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WBS 42263.1.1		TIP B-5121		COUNTY WAKE		GEOLOGIST ALEXANDER, M. J.								
SITE DESCRIPTION REPLACE BRIDGES NO. 227 AND 213 - TEMPORARY SHORING							GROUND WTR (ft)							
BORING NO. L_2279RT		STATION 22+79		OFFSET 21 ft RT		ALIGNMENT -L-	0 HR. 28.0							
COLLAR ELEV. 296.4 ft		TOTAL DEPTH 40.6 ft		NORTHING 742,136		EASTING 2,105,893	24 HR. FIAD							
DRILL RIG/HAMMER EFF./DATE TER6847 CME-75 93% 05/20/2015				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic								
DRILLER TURNAGE, J. R.		START DATE 11/15/15		COMP. DATE 11/15/15		SURFACE WATER DEPTH N/A								
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				
300														
295														296.4 GROUND SURFACE 0.0
														295.2 PAVEMENT 1.2
	293.3	3.1												0.4' ASPHALT, 0.8' CONCRETE
290			WOH	1	2	3						SS-1	M	RED-BROWN, SILTY CLAY, MICACEOUS
	288.3	8.1		2	2	2							M	289.4 RED-BROWN, SANDY SILT, MICACEOUS 7.0
285														
	283.3	13.1		1	1	2							W	
280														
	278.3	18.1		3	7	9							M	277.4 GRAY-BROWN AND BLACK, SANDY CLAY, MICACEOUS 19.0
275														
	273.3	23.1		6	6	8							M	274.4 RESIDUAL 22.0
270														
	268.3	28.1		13	13	15							Sat.	ORANGE, TAN AND GRAY, SAPROLITIC, SILTY SAND, MICACEOUS
265														
	263.3	33.1		10	17	42							Sat.	
260														
	258.3	38.1		55	45/0.2									260.4 WEATHERED ROCK (GNEISS) 36.0
	255.9	40.5		60/0.1										255.9 CRYSTALLINE ROCK (GNEISS) 40.5
														255.8 CRYSTALLINE ROCK (GNEISS) 40.6
Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 255.8 ft IN CRYSTYALLINE ROCK (GNEISS)														
Other Samples: ST-1 (10.1 - 12.9)														

# SITE PHOTOGRAPH

B-5121

BRIDGE NO. 227 ON -L- US 70/US 401/NC 50 (CAPITAL BOULEVARD) OVER PEACE STREET



LOOKING EAST TOWARD END BENT 2