

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

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	52400.1.STR03T1B (P-5204)	1	32
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
		P.E.	
		RW & UTIL.	

CONTENTS

LINE	STATION	PLAN	PROFILE	XSECT
-L-	10+00.00 - 36+50.00	4-5	6	9-17
-Y1-	10+00.00 - 26+87.43	4	7	-
-Y2-	12+00.00 - 23+00.00	4	8	-
-Y3-	11+03.98 - 13+85.27	5	8	-
-Y4-	10+80.00 - 13+85.27	5	-	-

ROADWAY  
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 52400.1.STR03T1B(P-5204) F.A. PROJ. FRA-FR-HSR-0086-10-01-00  
COUNTY GUILFORD  
PROJECT DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCR RAILROAD NORTH OF US 70

INVENTORY

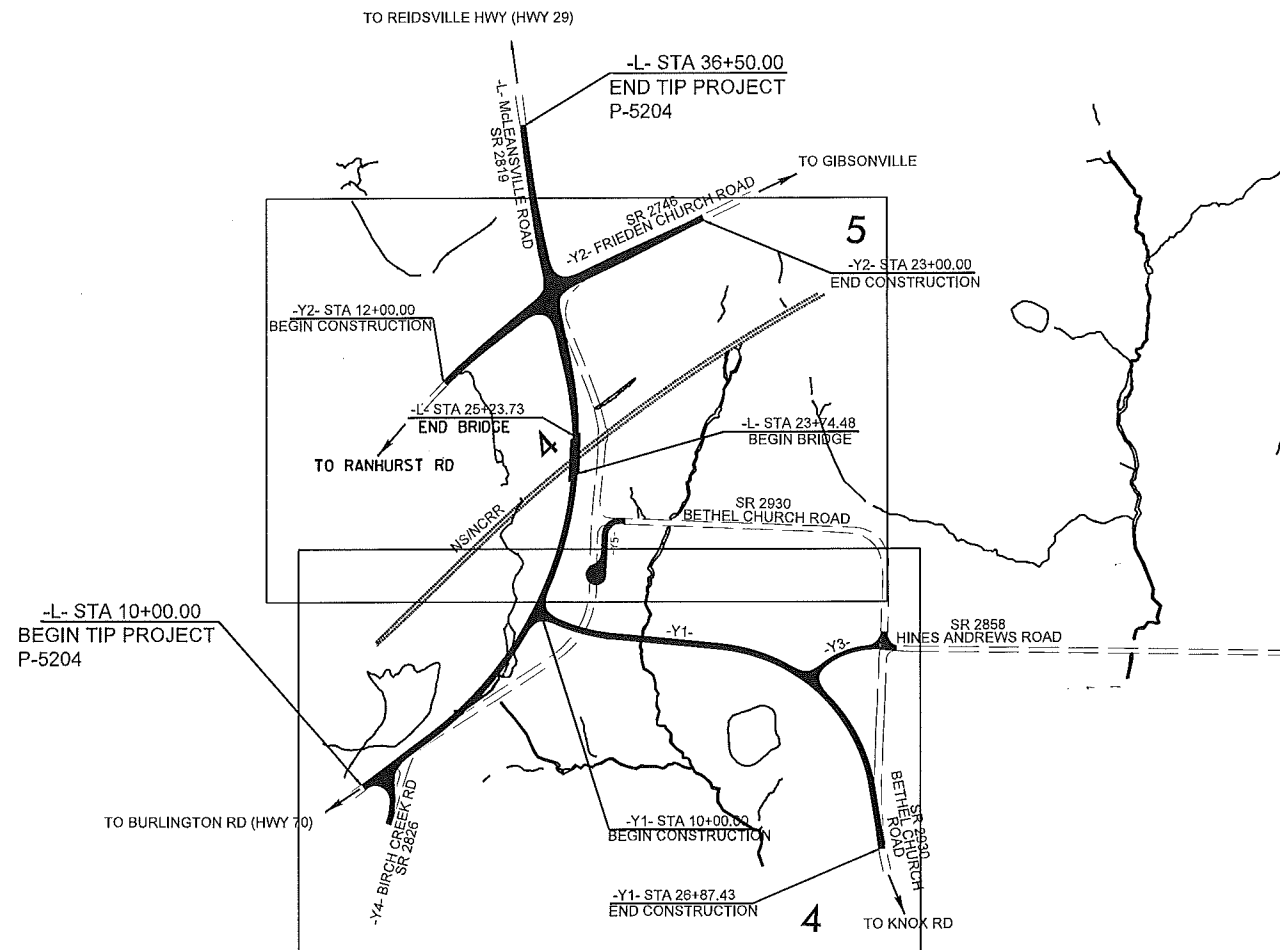
**CAUTION NOTICE**  
THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 707-6650. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

ID: P-5204

CONTRACT:



PERSONNEL  
C. V. NORVILLE  
J. R. HAMM  
W. S. HUNSBERGER  
T. E. EVANS

INVESTIGATED BY WSH  
CHECKED BY CVN  
SUBMITTED BY FALCON  
DATE JULY 2014



DRAWN BY: WSH

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

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

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 52400.1STR03T1B (P-5204)  
SHEET NO. 2

SUBSURFACE INVESTIGATION

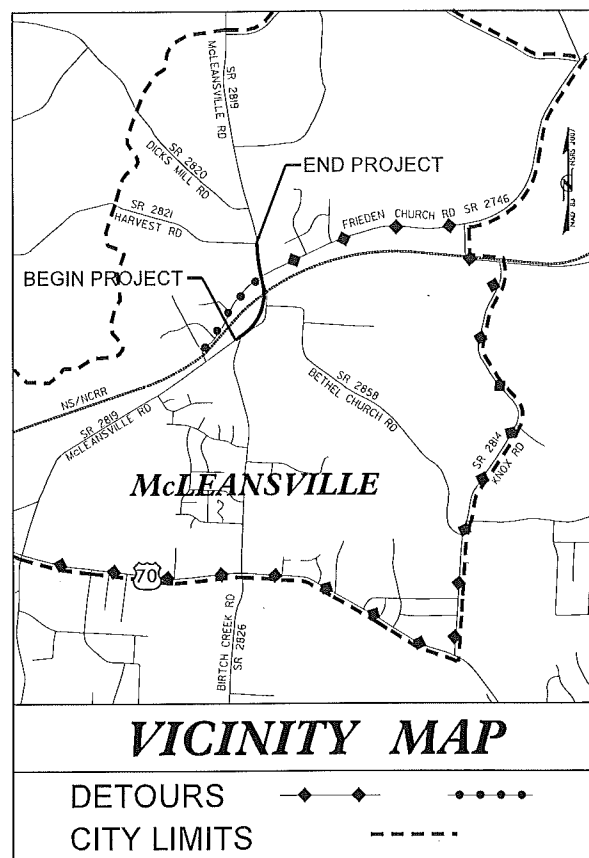
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS																																																																																																												
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, DRY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HARD 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. (M50 POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</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 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 INTRODUCED 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 (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>																																																																																																												
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERED ROCK (WR)		WEATHERING																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="4">GRANULAR MATERIALS (&lt;= 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (&gt; 35% PASSING #200)</th> <th colspan="2">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-1-b</th> <th>A-3</th> <th>A-2</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>SYMBOL</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> </tr> <tr> <td>LIQUID LIMIT</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> <td>50</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> <td>6</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</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="2">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GEN. RATING AS A SUBGRADE</td> <td colspan="4">EXCELLENT TO GOOD</td> <td colspan="2">FAIR TO POOR</td> <td colspan="2">FAIR TO POOR</td> <td colspan="2">POOR</td> <td>UNSATURATED</td> </tr> </tbody> </table>		GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		GROUP CLASS.	A-1	A-1-b	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7	SYMBOL												% PASSING	10	10	10	10	10	10	10	10	10	10	10	LIQUID LIMIT	50	50	50	50	50	50	50	50	50	50	50	PLASTIC INDEX	6	6	6	6	6	6	6	6	6	6	6	GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0	USUAL TYPES OF MAJOR MATERIALS	FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS	GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD				FAIR TO POOR		FAIR TO POOR		POOR		UNSATURATED	<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p>		<p>WEATHERED ROCK (WR) </p> <p>CRYSTALLINE ROCK (CR) </p> <p>NON-CRYSTALLINE ROCK (NCR) </p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP) </p>		<p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p> <p>VERY SLIGHT (V SL.) - ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.</p> <p>SLIGHT (SL.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>MODERATE (MOD.) - SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.</p> <p>MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &gt; 100 BPF</i></p> <p>VERY SEVERE (V SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES &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>	
GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)				SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS																																																																																																									
GROUP CLASS.	A-1	A-1-b	A-3	A-2	A-4	A-5	A-6	A-7	A-1, A-2	A-4, A-5	A-6, A-7																																																																																																							
SYMBOL																																																																																																																		
% PASSING	10	10	10	10	10	10	10	10	10	10	10																																																																																																							
LIQUID LIMIT	50	50	50	50	50	50	50	50	50	50	50																																																																																																							
PLASTIC INDEX	6	6	6	6	6	6	6	6	6	6	6																																																																																																							
GROUP INDEX	0	0	0	0	0	0	0	0	0	0	0																																																																																																							
USUAL TYPES OF MAJOR MATERIALS	FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS																																																																																																							
GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD				FAIR TO POOR		FAIR TO POOR		POOR		UNSATURATED																																																																																																							
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS		FRACTURE SPACING																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>&lt; 4 4 TO 10 10 TO 30 30 TO 50 &gt; 50</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>&lt; 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 &gt; 30</td> <td>&lt; 0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 &gt; 4</td> </tr> </tbody> </table>		PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )	GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A	GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	<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 TEST BORING </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>VERY HARD - CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>SOFT - CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</p> <p>VERY SOFT - CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>&gt; 4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>&lt; 0.008 FEET</td> </tr> </tbody> </table>		TERM	SPACING	THICKNESS	VERY WIDE	MORE THAN 10 FEET	> 4 FEET	WIDE	3 TO 10 FEET	1.5 - 4 FEET	MODERATELY CLOSE	1 TO 3 FEET	0.16 - 1.5 FEET	CLOSE	0.16 TO 1 FEET	0.03 - 0.16 FEET	VERY CLOSE	LESS THAN 0.16 FEET	< 0.008 FEET																																																																													
PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )																																																																																																															
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A																																																																																																															
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 > 4																																																																																																															
TERM	SPACING	THICKNESS																																																																																																																
VERY WIDE	MORE THAN 10 FEET	> 4 FEET																																																																																																																
WIDE	3 TO 10 FEET	1.5 - 4 FEET																																																																																																																
MODERATELY CLOSE	1 TO 3 FEET	0.16 - 1.5 FEET																																																																																																																
CLOSE	0.16 TO 1 FEET	0.03 - 0.16 FEET																																																																																																																
VERY CLOSE	LESS THAN 0.16 FEET	< 0.008 FEET																																																																																																																
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		BEDDING		INDURATION																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CS. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270	BOULDER (BLDR.)							COBBLE (COB.)							GRAVEL (GR.)							COARSE SAND (CS. SD.)							FINE SAND (F. SD.)							SILT (SL.)							CLAY (CL.)							<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 HL - 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>S - BULK SS - SPLIT SPOON ST - SHELVE TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>		<p>VERY WIDE - MORE THAN 10 FEET</p> <p>WIDE - 3 TO 10 FEET</p> <p>MODERATELY CLOSE - 1 TO 3 FEET</p> <p>CLOSE - 0.16 TO 1 FEET</p> <p>VERY CLOSE - LESS THAN 0.16 FEET</p>		<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>BENCH MARK: BORING ELEVATIONS OBTAINED FROM TOPOGRAPHICAL DATA AS CONTAINED IN ".TIN" FILE ELEVATION: _____ FT.</p> <p>NOTES: FIAD - FILLED-IN AFTER DRILLING</p>																																																		
U.S. STD. SIEVE SIZE OPENING (MM)	4	10	40	60	200	270																																																																																																												
BOULDER (BLDR.)																																																																																																																		
COBBLE (COB.)																																																																																																																		
GRAVEL (GR.)																																																																																																																		
COARSE SAND (CS. SD.)																																																																																																																		
FINE SAND (F. SD.)																																																																																																																		
SILT (SL.)																																																																																																																		
CLAY (CL.)																																																																																																																		
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <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> </tbody> </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>DRILL UNITS:</p> <p><input type="checkbox"/> MOBILE B- _____</p> <p><input type="checkbox"/> BK-51</p> <p><input type="checkbox"/> CME-45C</p> <p><input checked="" type="checkbox"/> CME-550</p> <p><input type="checkbox"/> PORTABLE MOIST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>ADVANCING TOOLS:</p> <p><input type="checkbox"/> CLAY BITS</p> <p><input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</p> <p><input type="checkbox"/> 6" HOLLOW AUGERS</p> <p><input type="checkbox"/> HARD FACED FINGER BITS</p> <p><input type="checkbox"/> TUNG-CARBIDE INSERTS</p> <p><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</p> <p><input type="checkbox"/> TRICONE _____ * STEEL TEETH</p> <p><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</p> <p><input type="checkbox"/> CORE BIT</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>HAMMER TYPE:</p> <p><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE:</p> <p><input type="checkbox"/> -B _____</p> <p><input type="checkbox"/> -H _____</p> <p><input type="checkbox"/> -H _____</p> <p>HAND TOOLS:</p> <p><input type="checkbox"/> POST HOLE DIGGER</p> <p><input type="checkbox"/> HAND AUGER</p> <p><input type="checkbox"/> SOUNDING ROD</p> <p><input type="checkbox"/> VANE SHEAR TEST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																											
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																																																																																																																
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION																																																																																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NONPLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>LOW PLASTICITY</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MED. PLASTICITY</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGH PLASTICITY</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>		NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH	LOW PLASTICITY	0-5	VERY LOW	MED. PLASTICITY	6-15	SLIGHT	HIGH PLASTICITY	16-25	MEDIUM		26 OR MORE	HIGH	<p>DRILL UNITS:</p> <p><input type="checkbox"/> MOBILE B- _____</p> <p><input type="checkbox"/> BK-51</p> <p><input type="checkbox"/> CME-45C</p> <p><input checked="" type="checkbox"/> CME-550</p> <p><input type="checkbox"/> PORTABLE MOIST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>ADVANCING TOOLS:</p> <p><input type="checkbox"/> CLAY BITS</p> <p><input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</p> <p><input type="checkbox"/> 6" HOLLOW AUGERS</p> <p><input type="checkbox"/> HARD FACED FINGER BITS</p> <p><input type="checkbox"/> TUNG-CARBIDE INSERTS</p> <p><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</p> <p><input type="checkbox"/> TRICONE _____ * STEEL TEETH</p> <p><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</p> <p><input type="checkbox"/> CORE BIT</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>HAMMER TYPE:</p> <p><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE:</p> <p><input type="checkbox"/> -B _____</p> <p><input type="checkbox"/> -H _____</p> <p><input type="checkbox"/> -H _____</p> <p>HAND TOOLS:</p> <p><input type="checkbox"/> POST HOLE DIGGER</p> <p><input type="checkbox"/> HAND AUGER</p> <p><input type="checkbox"/> SOUNDING ROD</p> <p><input type="checkbox"/> VANE SHEAR TEST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																											
NONPLASTIC	PLASTICITY INDEX (PI)	DRY STRENGTH																																																																																																																
LOW PLASTICITY	0-5	VERY LOW																																																																																																																
MED. PLASTICITY	6-15	SLIGHT																																																																																																																
HIGH PLASTICITY	16-25	MEDIUM																																																																																																																
	26 OR MORE	HIGH																																																																																																																
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		INDURATION																																																																																																												
<p>DESIGNATIONS 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>DRILL UNITS:</p> <p><input type="checkbox"/> MOBILE B- _____</p> <p><input type="checkbox"/> BK-51</p> <p><input type="checkbox"/> CME-45C</p> <p><input checked="" type="checkbox"/> CME-550</p> <p><input type="checkbox"/> PORTABLE MOIST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>ADVANCING TOOLS:</p> <p><input type="checkbox"/> CLAY BITS</p> <p><input checked="" type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</p> <p><input type="checkbox"/> 6" HOLLOW AUGERS</p> <p><input type="checkbox"/> HARD FACED FINGER BITS</p> <p><input type="checkbox"/> TUNG-CARBIDE INSERTS</p> <p><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</p> <p><input type="checkbox"/> TRICONE _____ * STEEL TEETH</p> <p><input type="checkbox"/> TRICONE _____ * TUNG-CARB.</p> <p><input type="checkbox"/> CORE BIT</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>HAMMER TYPE:</p> <p><input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE:</p> <p><input type="checkbox"/> -B _____</p> <p><input type="checkbox"/> -H _____</p> <p><input type="checkbox"/> -H _____</p> <p>HAND TOOLS:</p> <p><input type="checkbox"/> POST HOLE DIGGER</p> <p><input type="checkbox"/> HAND AUGER</p> <p><input type="checkbox"/> SOUNDING ROD</p> <p><input type="checkbox"/> VANE SHEAR TEST</p> <p><input type="checkbox"/> _____</p> <p><input type="checkbox"/> _____</p>		<p>INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																										

**TIP PROJECT: P-5204**

**CONTRACT:**

See Sheet 1-A For Index of Sheets



THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF McLEANSVILLE

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

STATE OF NORTH CAROLINA  
RAIL DIVISIONS

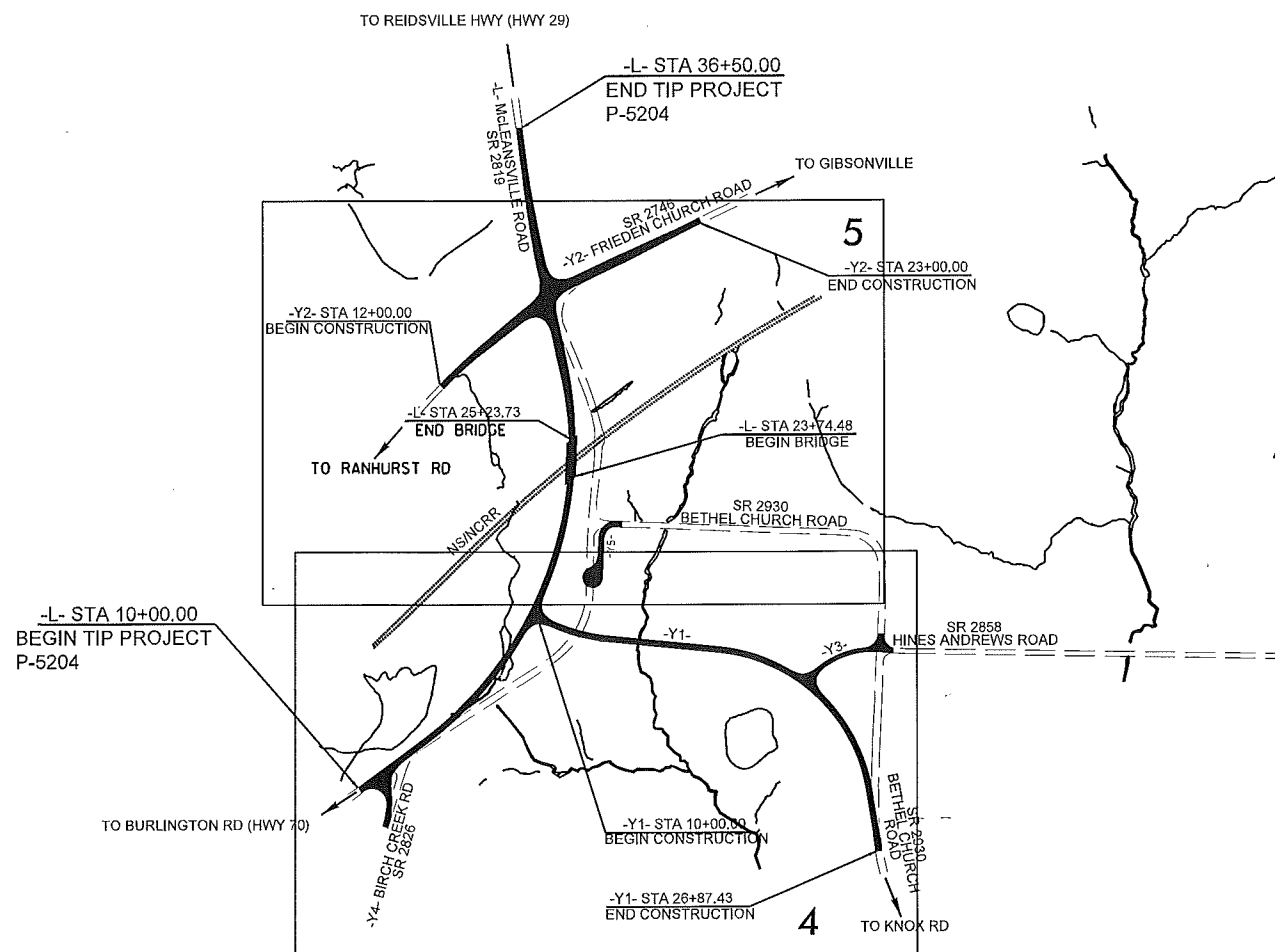
**GUILFORD COUNTY**

LOCATION: SR 2819 (McLEANSVILLE ROAD) GRADE SEPARATION OVER NS/NCRR RAILROAD FROM SR 2826 TO NORTH OF SR 2746

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURE

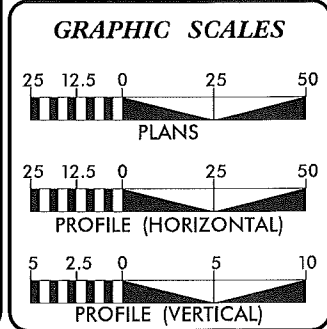


STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	52400.1.STR03TIB (P-5204)	2A	32
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
52400.1.STR03TIB	FRA-FR-HSR-0086-10-01-00	PE	



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

**SUBMITTAL: STRUCTURE RECOMMENDATIONS**  
DATE: SEPTEMBER 6, 2013



**DESIGN DATA**

ADT 2012 =	6,600
ADT 2035 =	10,000
DHV =	10 %
D =	70 %
T =	8 % *
V =	50 MPH
*TTST =	1% DUAL=7%
FUNC CLASS =	COLLECTOR
SUB-REGIONAL TIER	

**PROJECT LENGTH**

LENGTH ROADWAY TIP PROJECT P-5204 =	0.474 MILES
LENGTH STRUCTURE TIP PROJECT P-5204 =	0.028 MILES
TOTAL LENGTH TIP PROJECT P-5204 =	0.502 MILES

NCDOT CONTACT:  
SANDRA STEPNEY, PE  
PROJECT ENGINEER

Prepared In the Office of:

**ATKINS**  
1616 EAST MILLBROOK ROAD, SUITE 310  
RALEIGH, NORTH CAROLINA 27609  
(919) 876-6888 NCBES #F-0326

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:  
OCTOBER 2013

LETTING DATE:  
SEPTEMBER 2014

DAVID BASS, PE  
PROJECT ENGINEER

BRYAN LAMBETH, PE  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: \_\_\_\_\_ P.E.

NC DEPARTMENT OF TRANSPORTATION  
**RAIL DIVISION**  
PLANNING AND DEVELOPMENT



## Roadway Subsurface Investigation Report - Inventory

SR 2819 (McLeansville Road) over NS/NCRR  
Railroad North of US 70  
Guilford County, North Carolina  
WBS: 52400.1.STR03T1B, TIP: P-5204  
Falcon Project No.: G13047.00

**Prepared for:**

N.C. Department of Transportation  
Professional Services Unit  
1589 Mail Service Center  
Raleigh, NC 27699-1589

**Submitted by:**

Falcon Engineering, Inc.  
1210 Trinity Road, Suite 110  
Raleigh, North Carolina 27607  
(919) 871-0800  
www.falconengineers.com

## PREFACE

This roadway subsurface investigation was conducted in July 2013. The recommendations provided in this report are based on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of this data, and generally accepted soil and foundation engineering practices and principles.

A total of sixteen (16) Standard Penetration Test (SPT) borings were drilled for the new roadway alignments. All borings were drilled using a CME-55 all-terrain-vehicle (ATV) mounted drill rig equipped with 2 1/4-inch inside diameter hollow-stem augers and an automatic hammer. Representative soil samples, collected with a split-barrel sampler, were selected for laboratory testing to verify visual field classifications.

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

## FALCON ENGINEERING, INC.

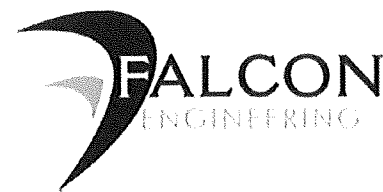
Report Prepared By:

Report Reviewed By:

Jeremy R. Hamm, PE  
Geotechnical Engineering Manager

Christopher V. Norville, PE  
Director of Geotechnical Services





July 1, 2014

**TIP:** P-5204  
**COUNTY:** Guilford  
**DESCRIPTION:** SR 2819 (McLeansville Road) over NS/NCRR Railroad North of US 70  
**SUBJECT:** Roadway Subsurface Investigation – Inventory

### PROJECT DESCRIPTION

This project consists of the realignment and grade separation of McLeansville Road at the crossing with the NS/NCRR corridor, widening of Frieden Church Road, and the realignment of Bethel Church Road, Hines Andrew Road and Birch Creek Road, as well as various driveway and property access modifications.

The following alignments, totaling approximately 6,025 feet (1.1 miles) are included. Subsurface profiles and cross sections of these alignments are included in this report.

<u>Alignment</u>	<u>Station</u>
McLeansville Road (-L-)	10+00.00 – 36+50.00
Bethel Church Road (-Y1-)	10+00.00 – 26+87.43
Hines Andrew Road (-Y3-)	11+03.98 – 13+85.27

Subsurface profiles and cross sections showing the existing and proposed grades along these alignments are included in this report.

### AREAS OF SPECIAL GEOTECHNICAL INTEREST

The following proposed fill areas contained soft/loose, wet, and/or moderately to highly plastic soils which may not support fill placement and fill slopes adequately:

<u>Station</u>	<u>Offset</u>
15+00 to 23+74 -L-	LT and RT
25+38 to 28+00 -L-	LT and RT
21+00 to 23+00 -Y1-	LT and RT

In addition, a stream crosses the proposed roadway at the following location. No borings were performed in this area, but soft/loose alluvial soils are anticipated based on topography.

<u>Station</u>	<u>Offset</u>
14+20 to 15+00 -Y1-	LT and RT

Ponds are present at the following locations near the construction limits.

<u>Station</u>	<u>Offset</u>
11+85 to 16+00 -L-	40 to 300 ft LT
20+00 -Y1-	130 to 350 ft RT

### PHYSIOGRAPHY AND GEOLOGY

The project site is in the Piedmont Physiographic Province of North Carolina. According to the **Geologic Map of North Carolina** (1985), the site is underlain by Metamorphosed Granitic Rock (CZg) noted as megacrystic, well foliated, and locally containing hornblende.

The alignments cross a relatively wide and shallow floodplain, agricultural fields, wooded areas, existing roadways (widening as well as realignment), and the NS/NCRR rail corridor.

Existing site topography is gently rolling, with railroad and roadway fills generally not exceeding 5 feet. To the left of -L-, the rail embankment approaches 10 feet and a small concrete box culvert conveys a small stream beneath the railroad.

### SOIL PROPERTIES

In general, the subsurface soil conditions encountered across the site consist of artificial fills, roadway embankments, or alluvial soils at the ground surface, and residual soils at the ground surface or underlying fills, embankments; or alluvial soils. Residual soils transition to weathered rock and crystalline rock at moderate depth, with some localized occurrences of shallow weathered rock or crystalline rock. Some thin layers of weathered rock were also penetrated within the residual soil strata well above crystalline rock.

Artificial fill between 1.9 and 3.0 feet deep was encountered on site. This was generally associated with grading of building pads and parking areas for buildings adjacent to the existing roadway. Fills encountered in our borings consisted of clayey and silty sands (A-2-4 and A-2-6) with trace organics.

Between 0.6 and 0.9 feet of Roadway Embankment soils were encountered on site. These were located at the ground surface beneath and nearby to existing roadways and consisted of silty sands (A-2-4) and fine sandy clays (A-6) apparently of local origin. High variability of roadway embankments at other locations not investigation should be expected.





Alluvial soils were encountered at the ground surface in a few low lying areas near existing streams and wetlands. Alluvial soils consisted of up to 7 feet of silty and clayey sands (A-2-4, A-2-6) and sandy clays (A-6) with plasticity indexes ranging from non-plastic (NP) to 16, and varying amounts of organics and gravel.

Residual soils were encountered at the ground surface or underlying fills, embankments, or alluvial soils. Residual soils consisted predominantly of silty sands (A-2-4) with interlayered concentrations of sandy silts (A-4, A-5), and a surficial cap and/or thinner concentrations of sandy and silty clays (A-6, A-7). Plasticity Indexes of residual soils ranged from non-plastic (NP) to 29. Dense to very dense concentrations of rock fragments and thin layers of weathered rock were encountered variably throughout the residual soils at depths well above crystalline rock.

Weathered rock was encountered in the borings at depths of 6 to 34 feet (between 706.4 ft and 735.3 ft NAVD), consisting of weathered metamorphosed granitic rock. Crystalline rock was encountered at depths of 13 to 43 feet (between 702.4ft and 713.4 ft NAVD), consisting of metamorphosed granitic rock, and typically beneath a significant amount of weathered rock. However, in a few instances, little to no weathered rock was present above crystalline rock.

## **GROUNDWATER PROPERTIES**

Groundwater levels were measured at the time of boring completion, and in some cases after a waiting period of at least 24 hours. Borings drilled in and along existing roadways were backfilled immediately after completion due to safety considerations. Groundwater was observed at shallow depths throughout a majority of the project. However, based on proposed site grades, groundwater is not anticipated within 6 feet of finished roadway grades. Detailed groundwater measurements are included in the attached boring logs and subsurface profiles.

The project alignment crosses a few shallow streams, wetlands, and low-lying, seasonally wet areas. Groundwater was noted to be very shallow in these areas and will likely impact grading operations, particularly during the wetter months of the year. The ground surface was very wet in these areas at the time of construction.

Two ponds are located near the project right of way. They are listed by alignment, station and offsets in the "Areas of Special Geotechnical Interest". These ponds are down gradient from the project area and may be subject to increased sedimentation. Additionally, artificial fill associated with a dam may be impacted at the location of the pond along -L-.



### EARTHWORK SUMMARIES

PROJECT:                   P-5204                  

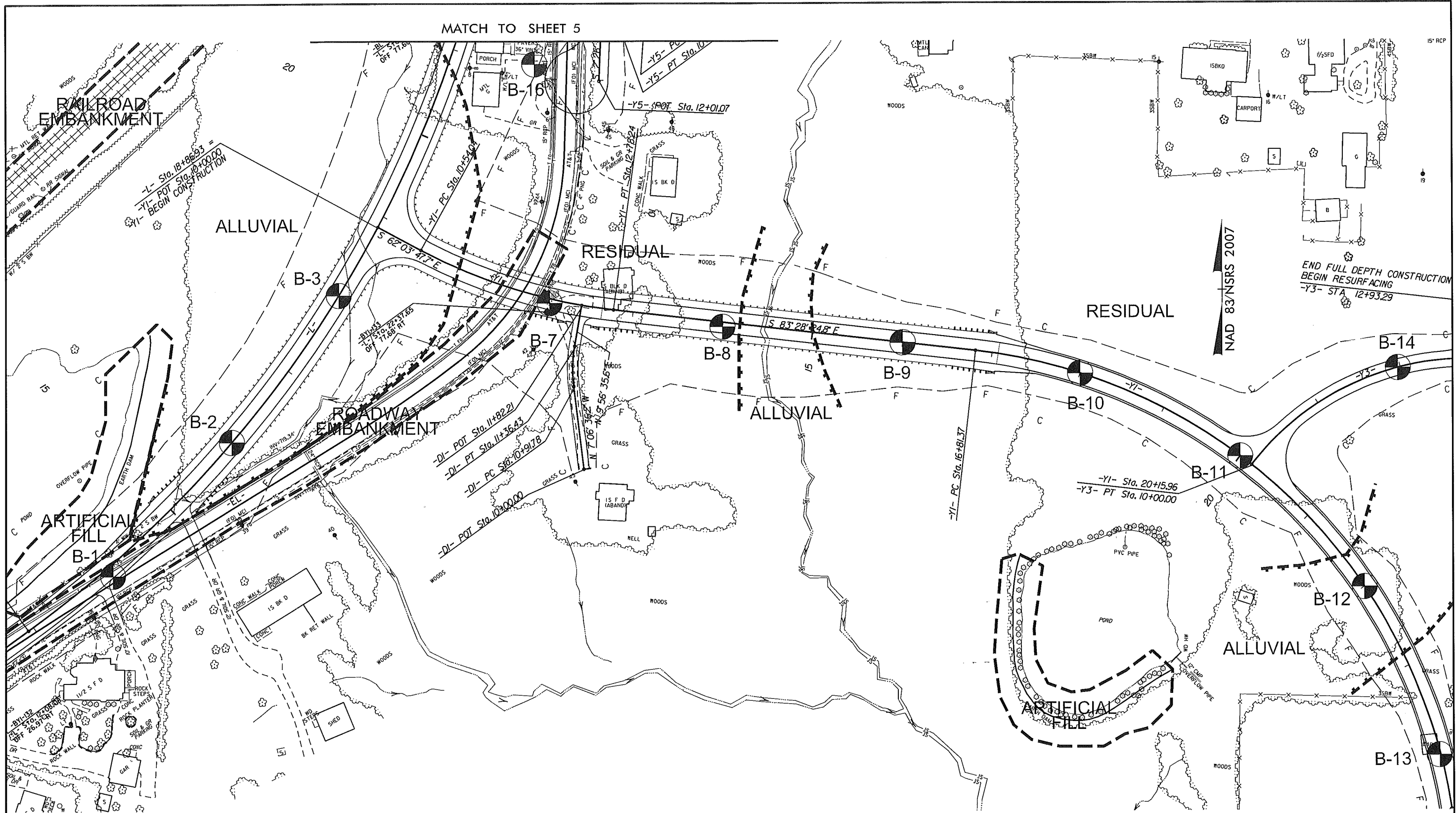
COUNTY           Guilford          

DATE           18-Jun-14          

          1 of 1           SHEETS

LINE	STATION	STATION	TOTAL EXCAV. (UNCL.)	UNDERCUT EXCAV.	UNSUIT. (UNCL.) EXCAV.	SUITABLE (UNCL.) EXCAV.	TOTAL EMB.	EARTH EMB.	EMB. +20%	BORROW	SUITABLE WASTE	UNSUIT. WASTE	TOTAL WASTE
L	10+00.00	23+74.04	1,043	2,000	0	1,043	99,807	99,807	119,768	118,725	0	2,000	2,000
Y1	10+12.00	26+50.87	1,042	0	0	1,042	61,577	61,577	73,892	72,850	0	0	0
Y3	10+12.00	13+80.00	1,541	0	0	1,541	0	0	0	0	1,541	0	1,541
Y4	10+80.00	12+50.00	977	0	0	977	6	6	7	0	970	0	970
Y5	10+00.00	12+31.00	196	0	0	196	80	80	96	0	100	0	100
SR1	10+00.00	12+40.00	3	0	0	3	338	338	406	403	0	0	0
D1	10+00.00	11+62.00	17	0	0	17	2,058	2,058	2,470	2,453	0	0	0
<b>SUBTOTAL #1</b>			<b>4,819</b>	<b>2,000</b>	<b>0</b>	<b>4,819</b>	<b>163,866</b>	<b>163,866</b>	<b>196,639</b>	<b>194,431</b>	<b>2,611</b>	<b>2,000</b>	<b>4,611</b>
L	25+23.73	36+50.00	914	0	0	914	37,948	37,948	45,538	44,624	0	0	0
Y2	12+00.00	23+00.00	697	0	0	697	961	961	1,153	456	0	0	0
<b>SUBTOTAL #2</b>			<b>1,611</b>	<b>0</b>	<b>0</b>	<b>1,611</b>	<b>38,909</b>	<b>38,909</b>	<b>46,691</b>	<b>45,080</b>	<b>0</b>	<b>0</b>	<b>0</b>
DETOUR1	10+00.00	17+50.80	154	0	0	154	784	784	941	787	0	0	0
DETOUR2	10+00.00	11+75.00	3	0	0	3	75	75	90	87	0	0	0
<b>SUBTOTAL #3</b>			<b>157</b>	<b>0</b>	<b>0</b>	<b>157</b>	<b>859</b>	<b>859</b>	<b>1,031</b>	<b>874</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>TOTAL</b>			<b>6,587</b>	<b>2,000</b>	<b>0</b>	<b>6,587</b>	<b>203,634</b>	<b>203,634</b>	<b>244,361</b>	<b>240,385</b>	<b>2,611</b>	<b>2,000</b>	<b>4,611</b>
ADDITIONAL UNDERCUT EXCAVATION				1,500								1,500	1,500
ESTIMATED SHOULDER MATERIAL							3,450	3,450	4,140	4,140			
AGGREGATE FOR MSE BACKFILL							-4,200	-4,200	-5,040	-5,040			
WASTE TO REPLACE BORROW									-2,611	-2,611			-2,611
<b>PROJECT TOTAL</b>			<b>6,587</b>	<b>3,500</b>	<b>0</b>	<b>6,587</b>	<b>202,884</b>	<b>202,884</b>	<b>243,461</b>	<b>236,874</b>	<b>0</b>	<b>3,500</b>	<b>3,500</b>
REPLACE TOP SOIL ON BORROW PIT (5%)										11,844			
<b>GRAND TOTAL</b>			<b>6,587</b>	<b>3,500</b>	<b>0</b>	<b>6,587</b>	<b>202,884</b>	<b>202,884</b>	<b>243,461</b>	<b>248,717</b>	<b>0</b>	<b>3,500</b>	<b>3,500</b>
<b>SAY</b>			<b>6,600</b>	<b>3,500</b>						<b>248,800</b>			
SELECT GRANULAR MATERIAL = 4,500 CY DDE = 7,050 CY													

MATCH TO SHEET 5



**NOTES:**

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM ATKINS IN OCTOBER 2013.

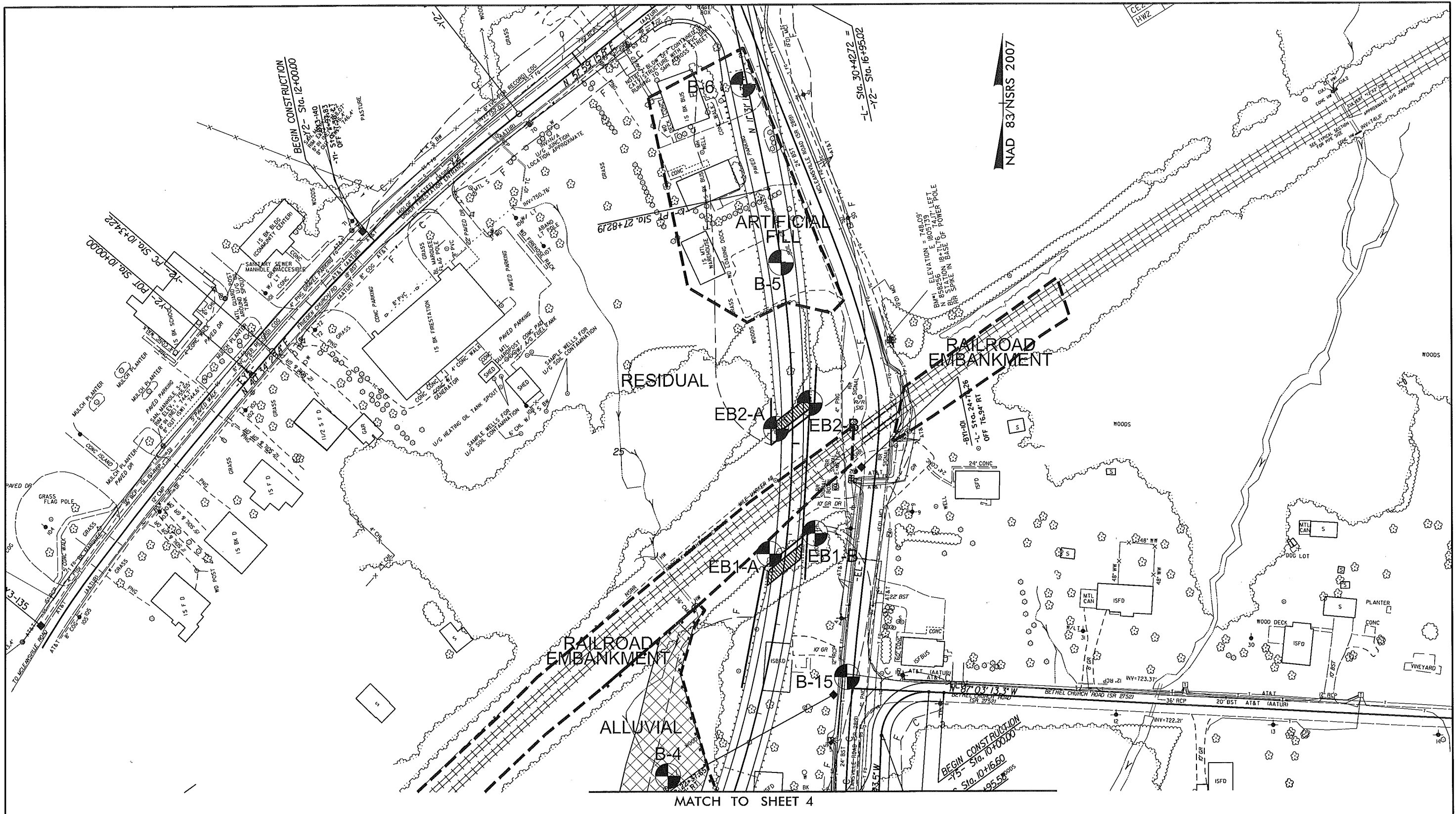


FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 RALEIGH, NC 27607  
 PHONE: 919.871.0800  
 FAX: 919.871.0803

**SITE PLAN**

SR 2819 (McLEANSVILLE ROAD) OVER  
 NSNCRR RAILROAD NORTH OF US 70  
 GUILFORD COUNTY, NORTH CAROLINA  
 WBS NO.: 52400.1.STR03T1B, TIP NO.: P-5204  
 FALCON PROJECT NO.: G13047.00

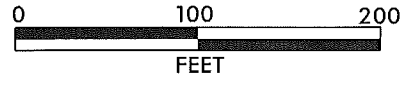




MATCH TO SHEET 4

**NOTES:**

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM ATKINS IN OCTOBER 2013.



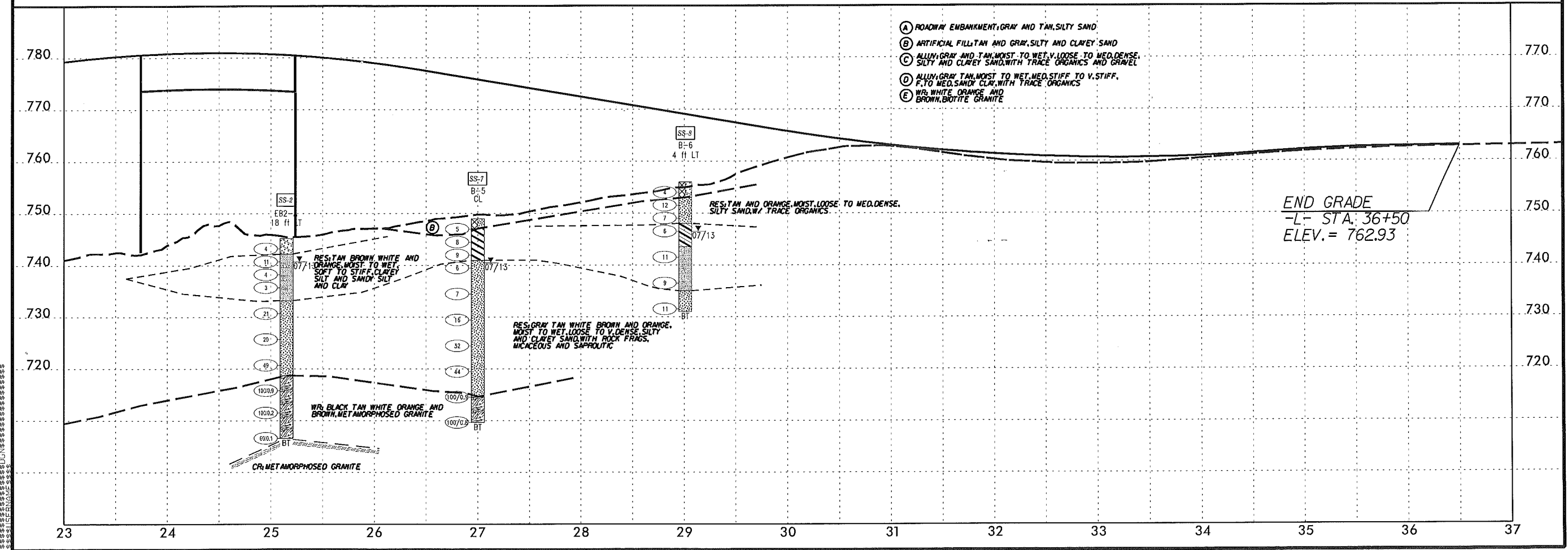
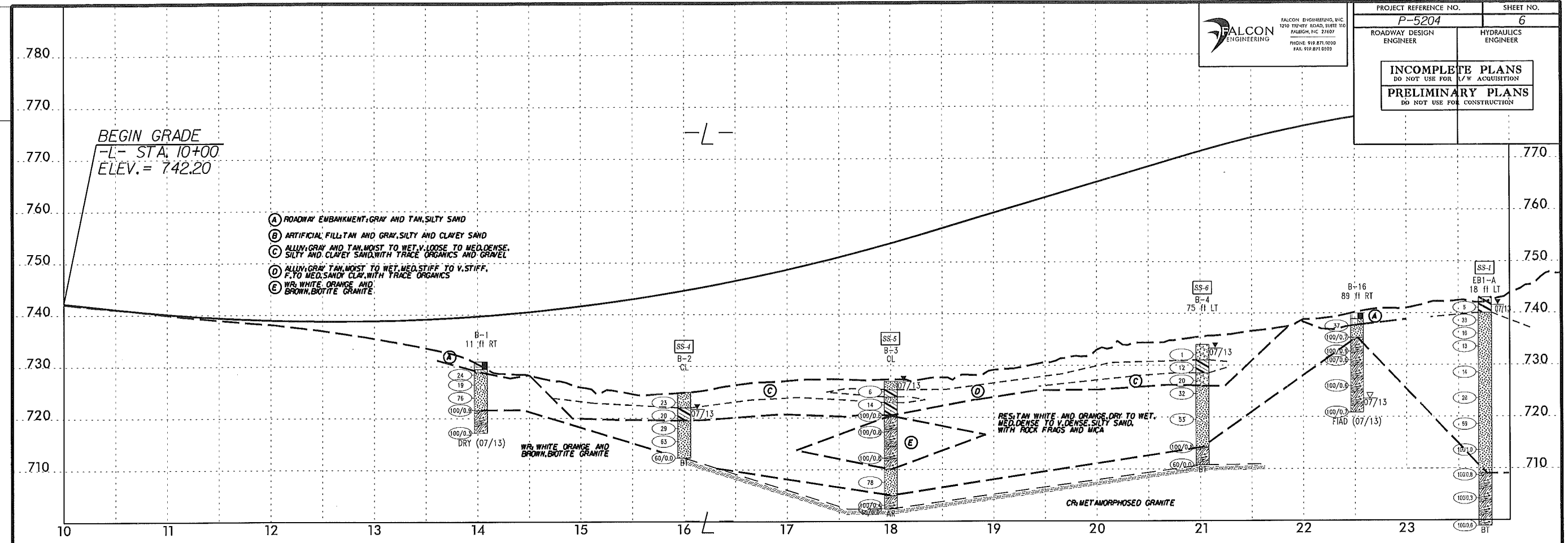
FALCON ENGINEERING, INC.  
 1210 TRINITY ROAD, SUITE 110  
 RALEIGH, NC 27607  
 PHONE: 919.871.0800  
 FAX: 919.871.0803

**SITE PLAN**

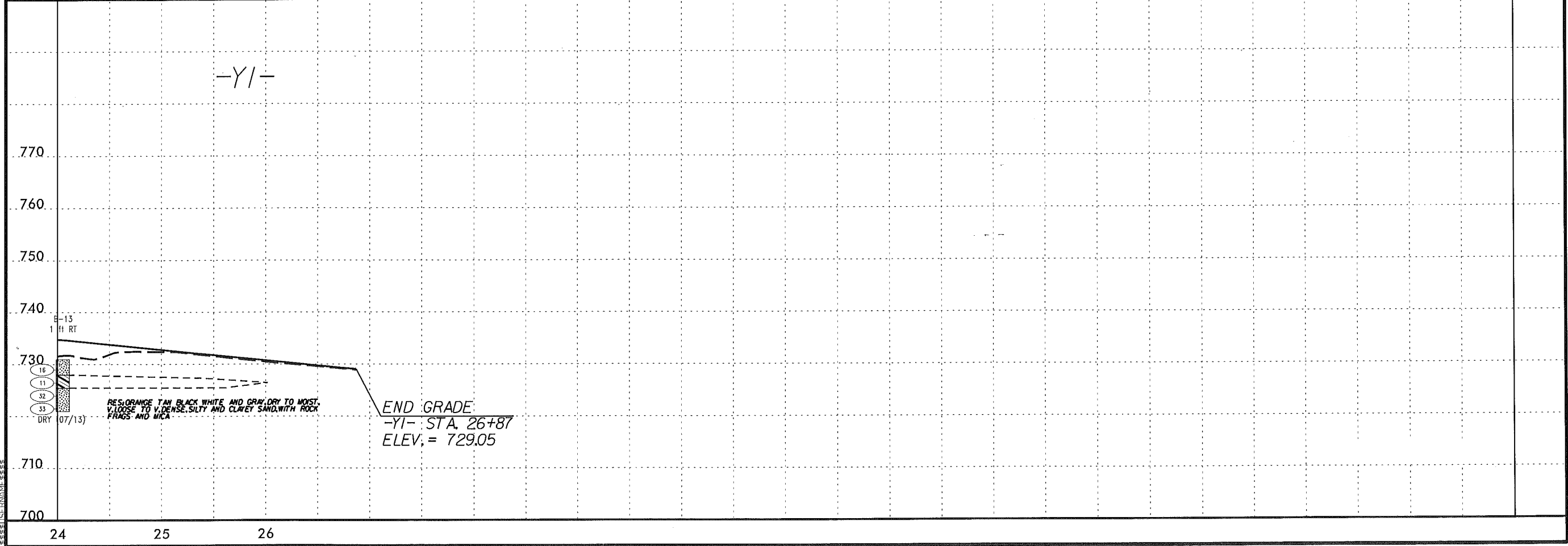
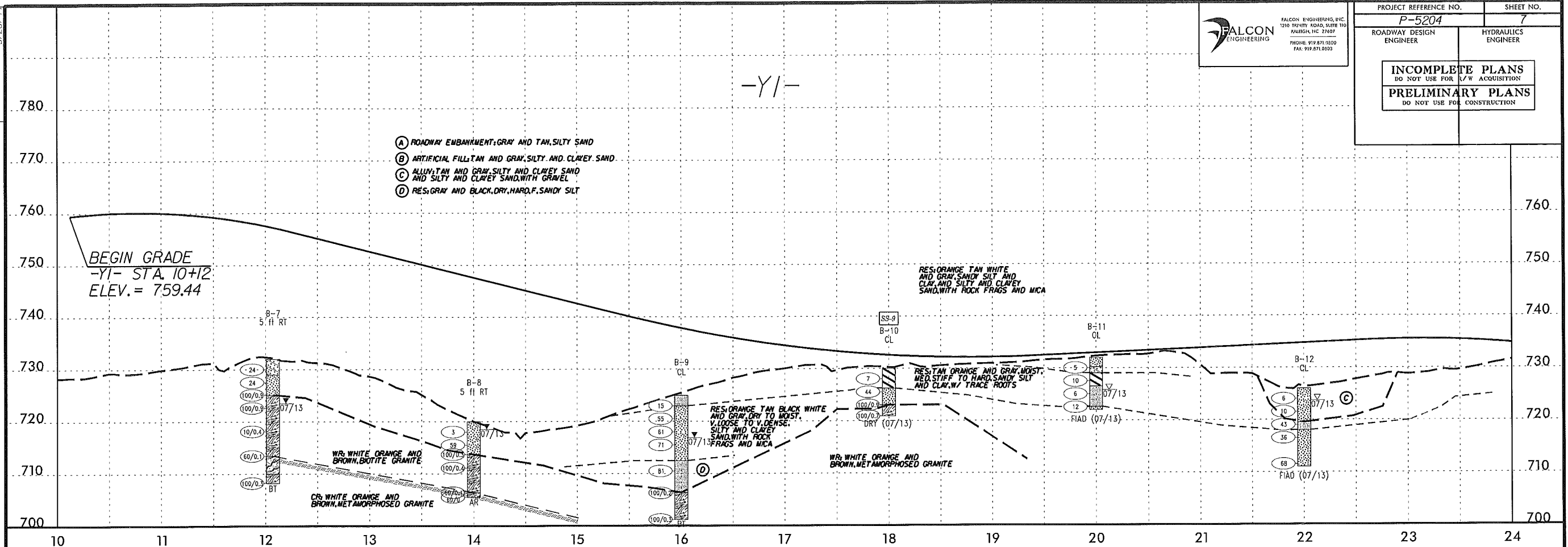
SR 2819 (McLEANSVILLE ROAD) OVER  
 NSNCRR RAILROAD NORTH OF US 70  
 GUILFORD COUNTY, NORTH CAROLINA  
 WBS NO.: 52400.1.STR03T1B, TIP NO.: P-5204  
 FALCON PROJECT NO.: G13047.00



PROJECT REFERENCE NO. <b>P-5204</b>	SHEET NO. <b>6</b>
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR ACQUISITION	
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	



10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37



5/28/08

DATE

TIME

DRAWN

CHECKED

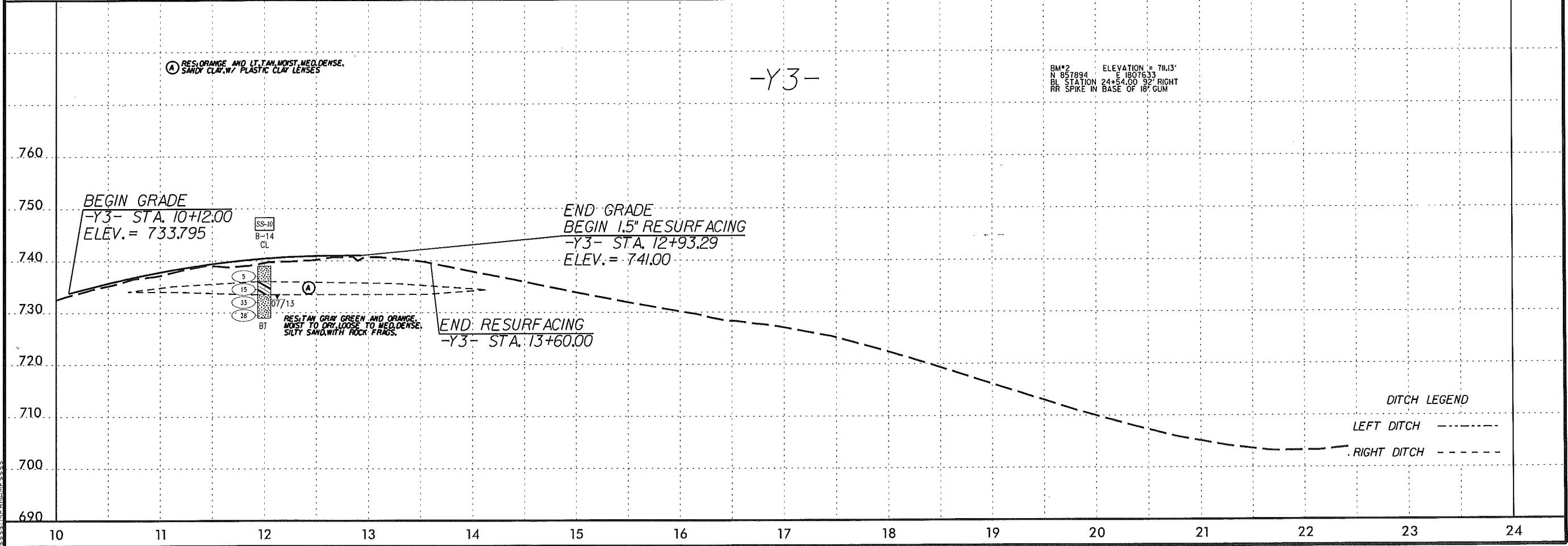
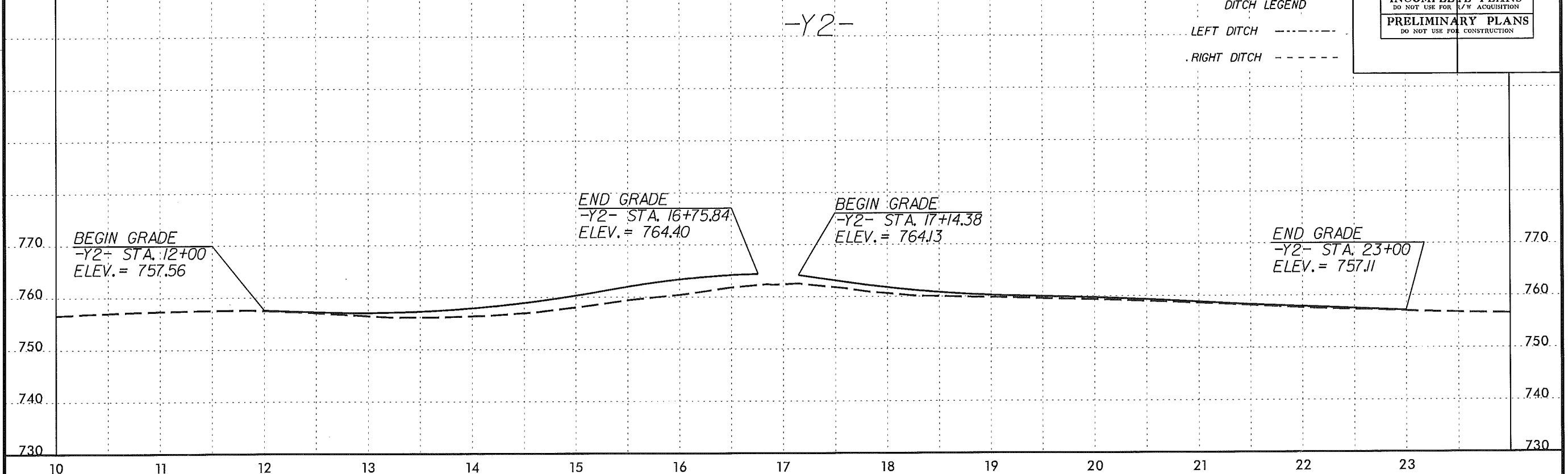
APPROVED

5/28/99



PROJECT REFERENCE NO. P-5204		SHEET NO. 8	
ROADWAY DESIGN ENGINEER		HYDRAULICS ENGINEER	
INCOMPLETE PLANS DO NOT USE FOR ACQUISITION		PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	

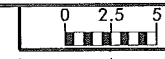
DITCH LEGEND  
 LEFT DITCH - - - - -  
 RIGHT DITCH - - - - -



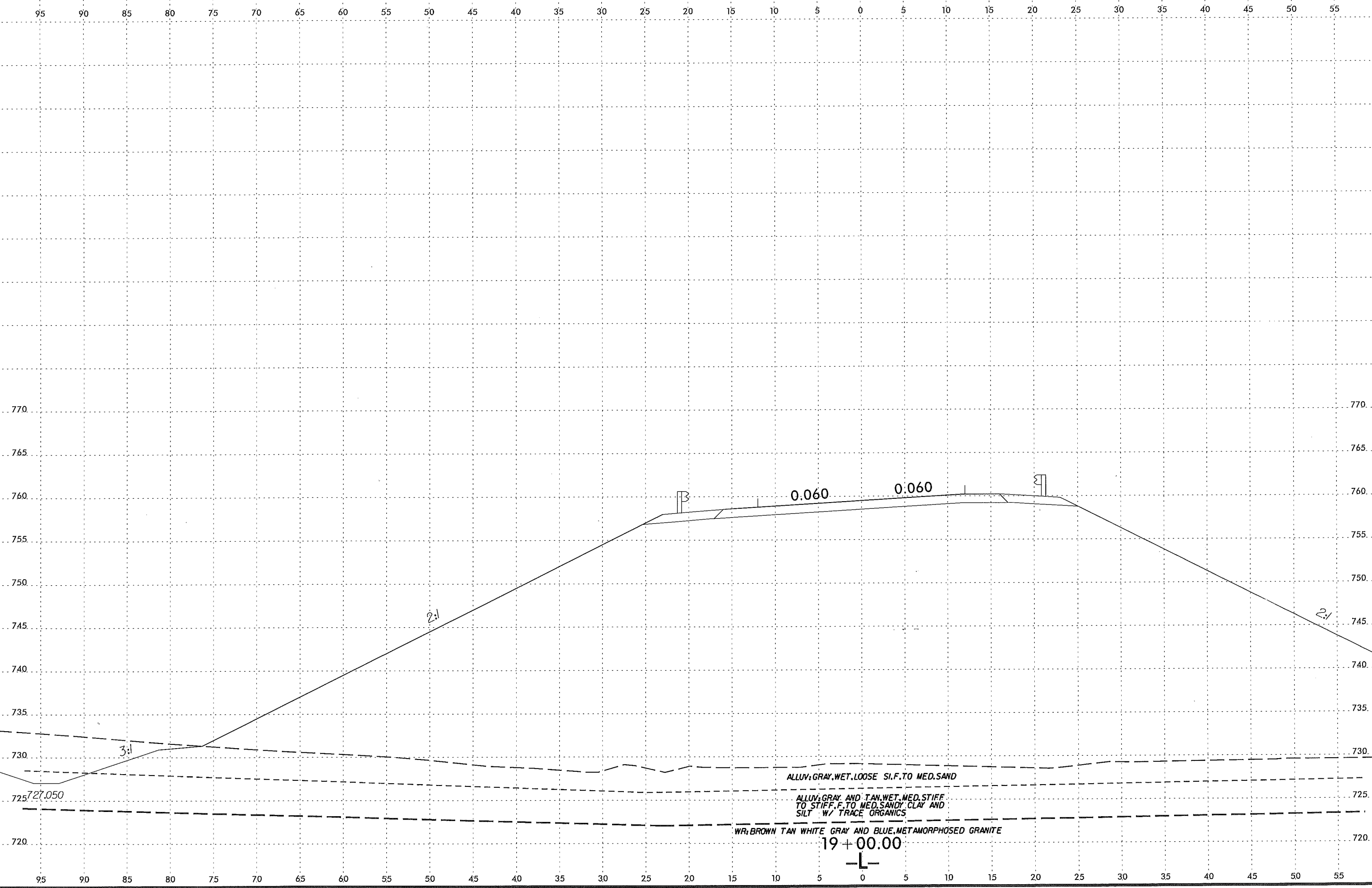
DITCH LEGEND  
 LEFT DITCH - - - - -  
 RIGHT DITCH - - - - -

SYSTEMS DESIGN

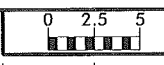
8/23/99



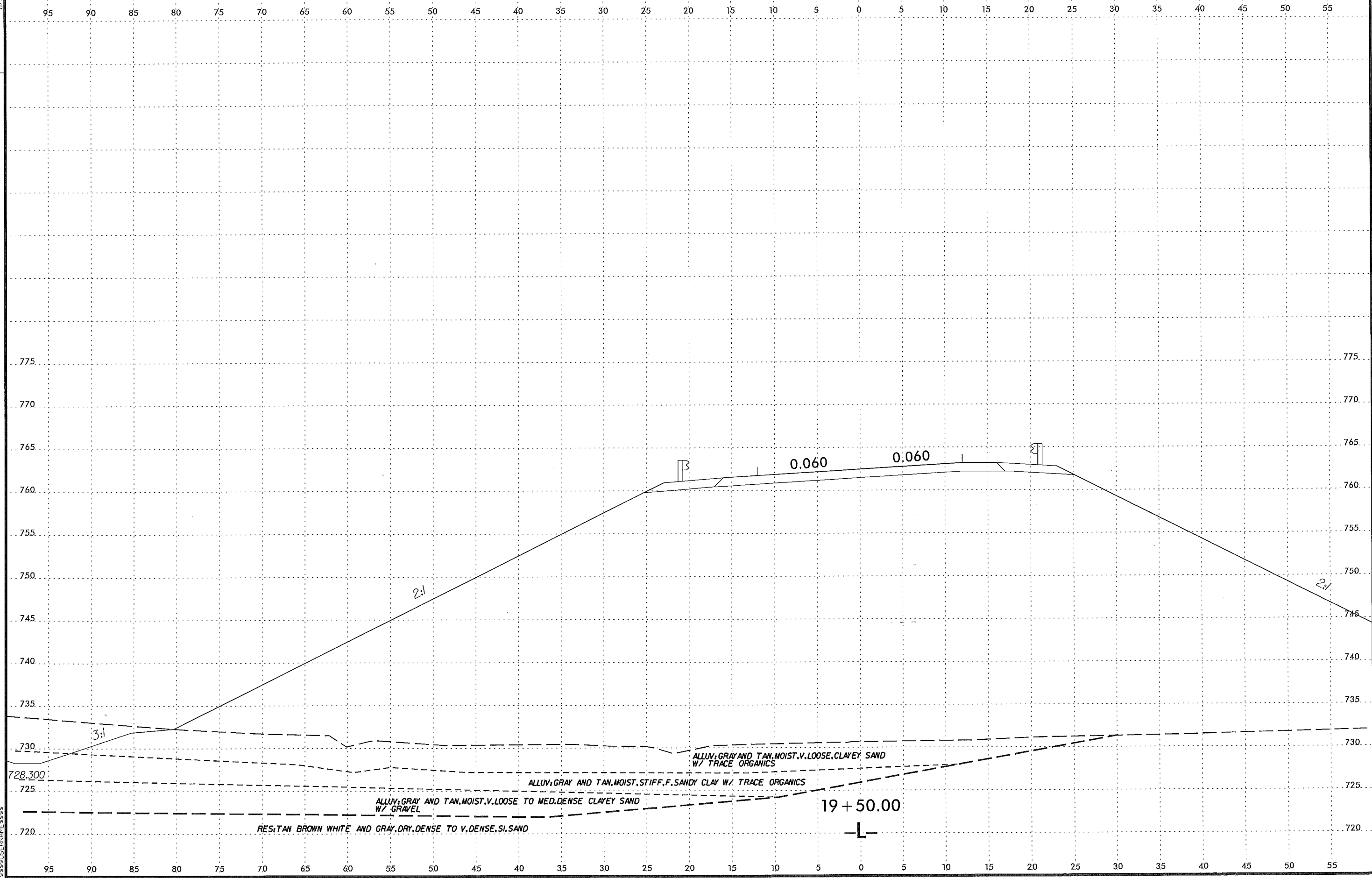
PROJ. REFERENCE NO.	SHEET NO.
P-5204	9



8/23/99

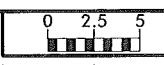


PROJ. REFERENCE NO.	SHEET NO.
P-5204	10

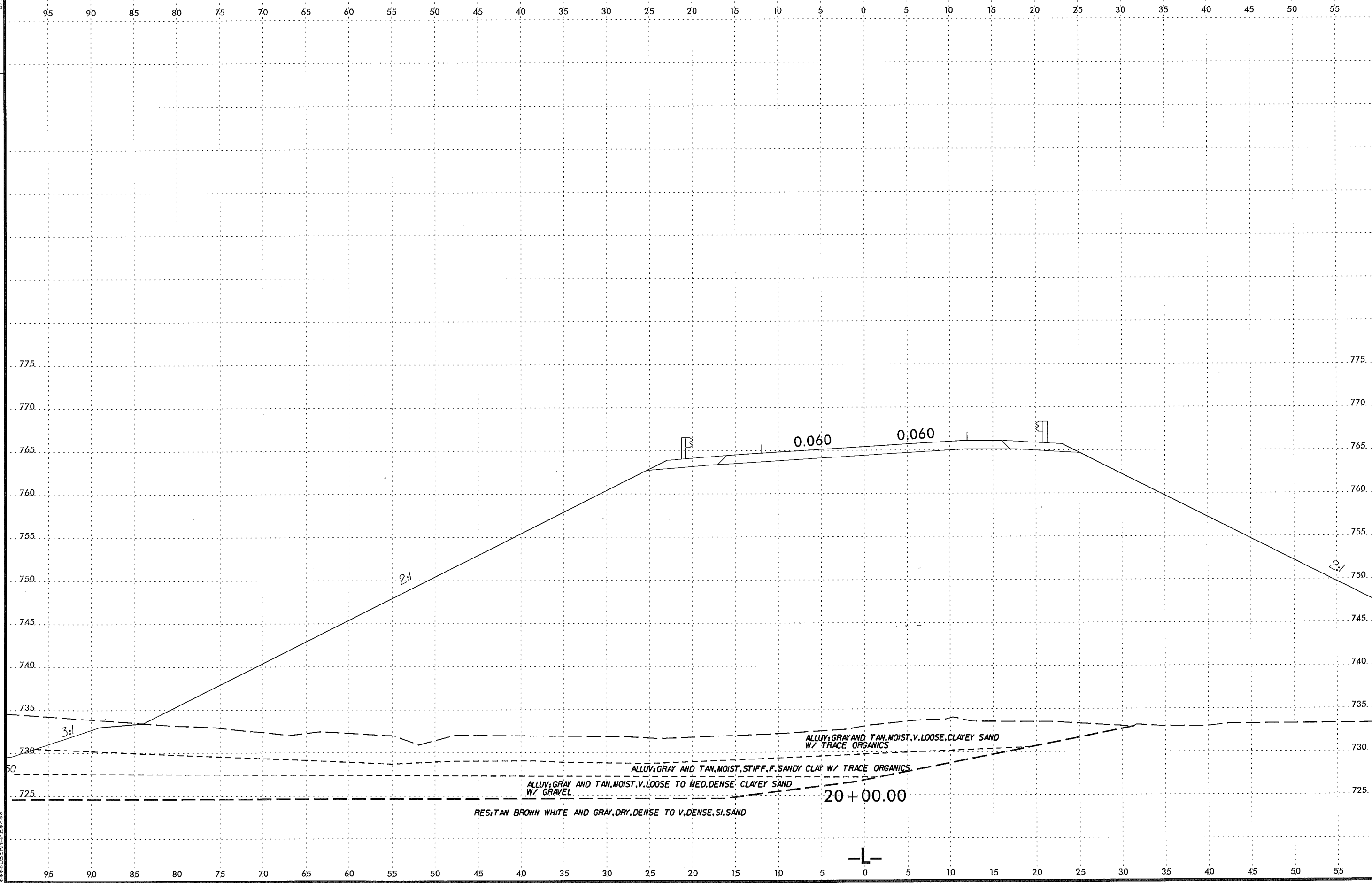


DATE TIME 8/23/99 10:00 AM

8/23/99



PROJ. REFERENCE NO.	SHEET NO.
P-5204	11



RES: TAN BROWN WHITE AND GRAY, DRY, DENSE TO V. DENSE, SI. SAND

ALLUV: GRAY AND TAN, MOIST, V. LOOSE TO MED. DENSE, CLAYEY SAND W/ GRAVEL

ALLUV: GRAY AND TAN, MOIST, V. LOOSE, CLAYEY SAND W/ TRACE ORGANICS

ALLUV: GRAY AND TAN, MOIST, V. LOOSE, CLAYEY SAND W/ TRACE ORGANICS

0.060

0.060

2:1

2:1

3:1

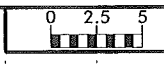
20+00.00







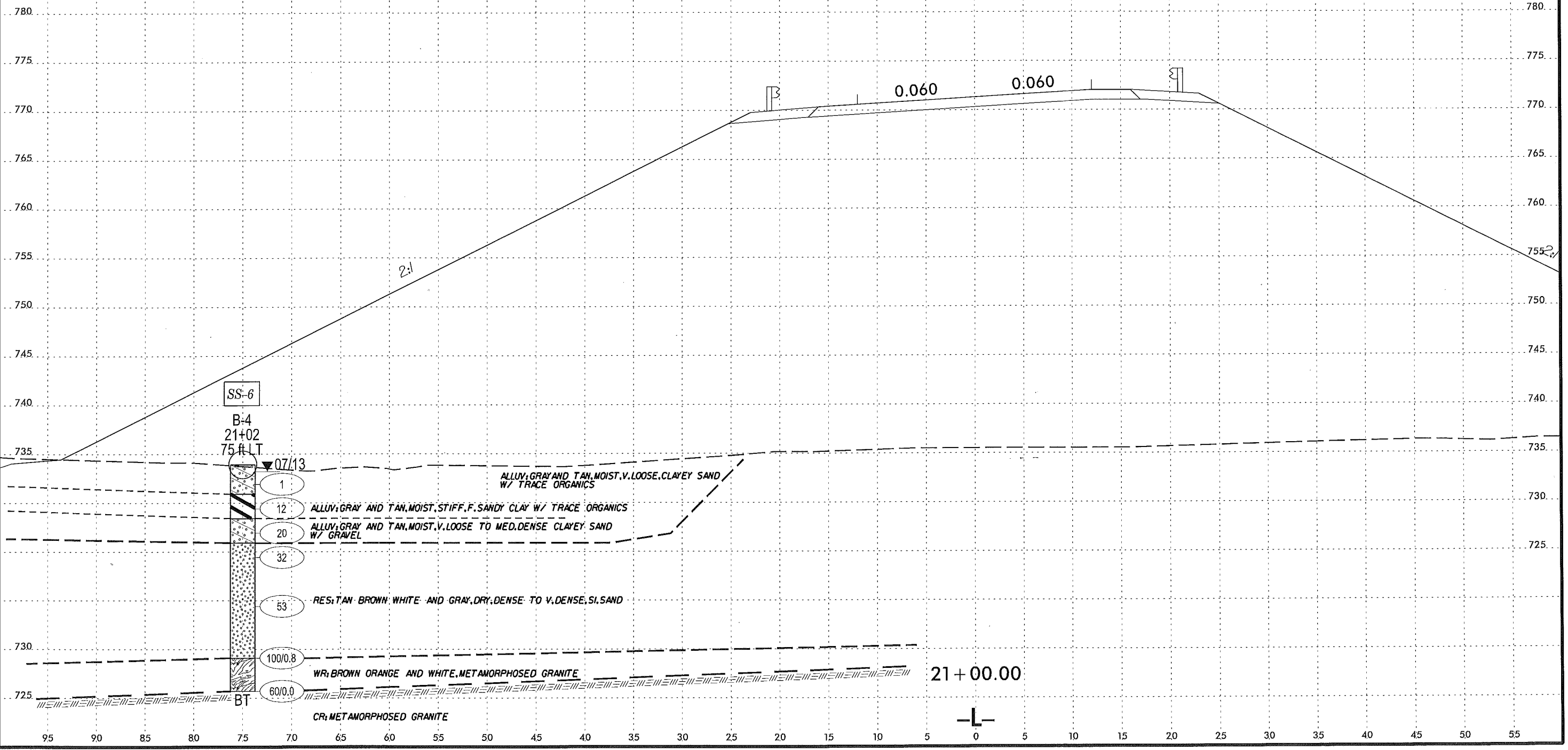
8/23/99



PROJ. REFERENCE NO.  
P-5204

SHEET NO.  
13

95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55



SS-6

B-4  
21+02  
75 ft LT

▽ 07/13

1

ALLUV. GRAY AND TAN. MOIST. V. LOOSE. CLAYEY SAND  
W/ TRACE ORGANICS

12

ALLUV. GRAY AND TAN. MOIST. STIFF. F. SANDY CLAY W/ TRACE ORGANICS

20

ALLUV. GRAY AND TAN. MOIST. V. LOOSE TO MED. DENSE CLAYEY SAND  
W/ GRAVEL

32

53

RES. TAN. BROWN. WHITE AND GRAY. DRY. DENSE TO V. DENSE. SI. SAND

100/0.8

WR. BROWN ORANGE AND WHITE. METAMORPHOSED GRANITE

60/0.0

CR. METAMORPHOSED GRANITE

21 + 00.00



US TIME ZONE CONVERSION

8/23/99

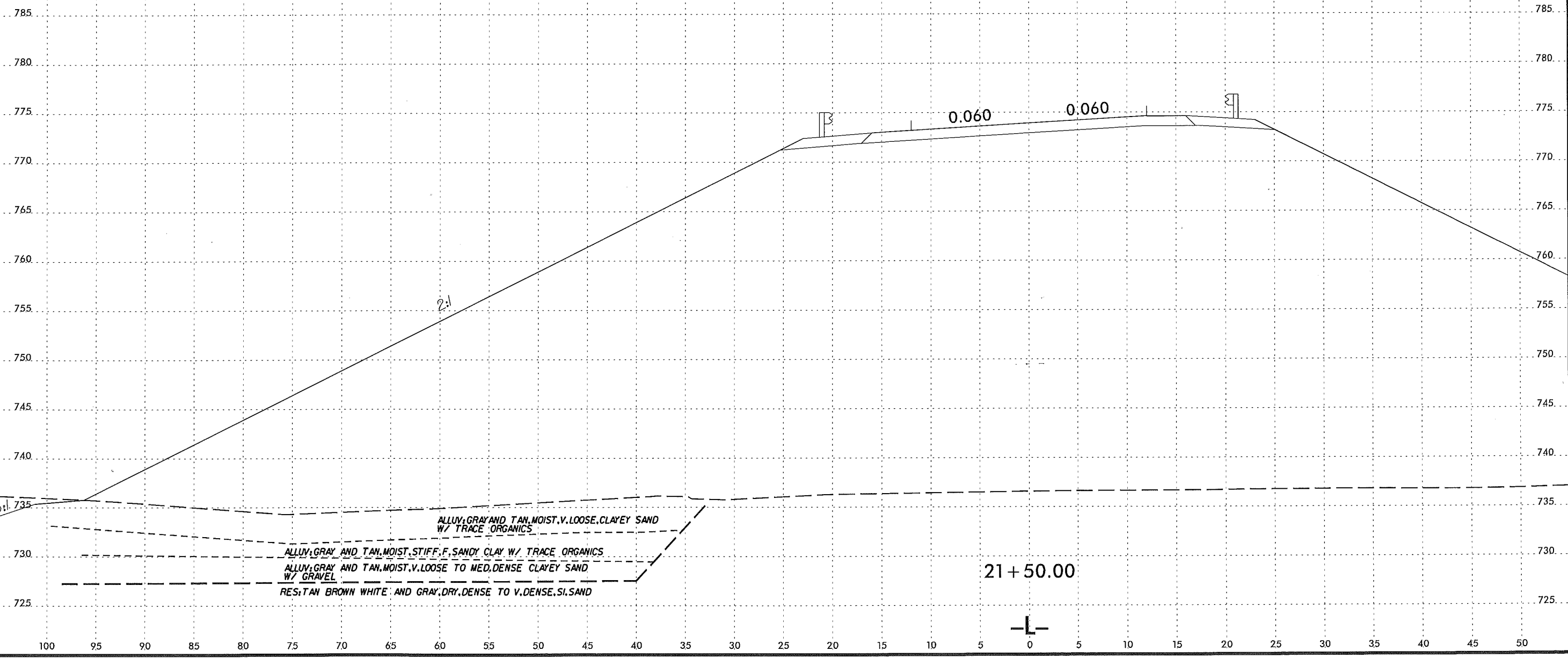
BOX



PROJ. REFERENCE NO.  
P-5204

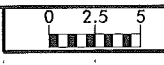
SHEET NO.  
14

95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50

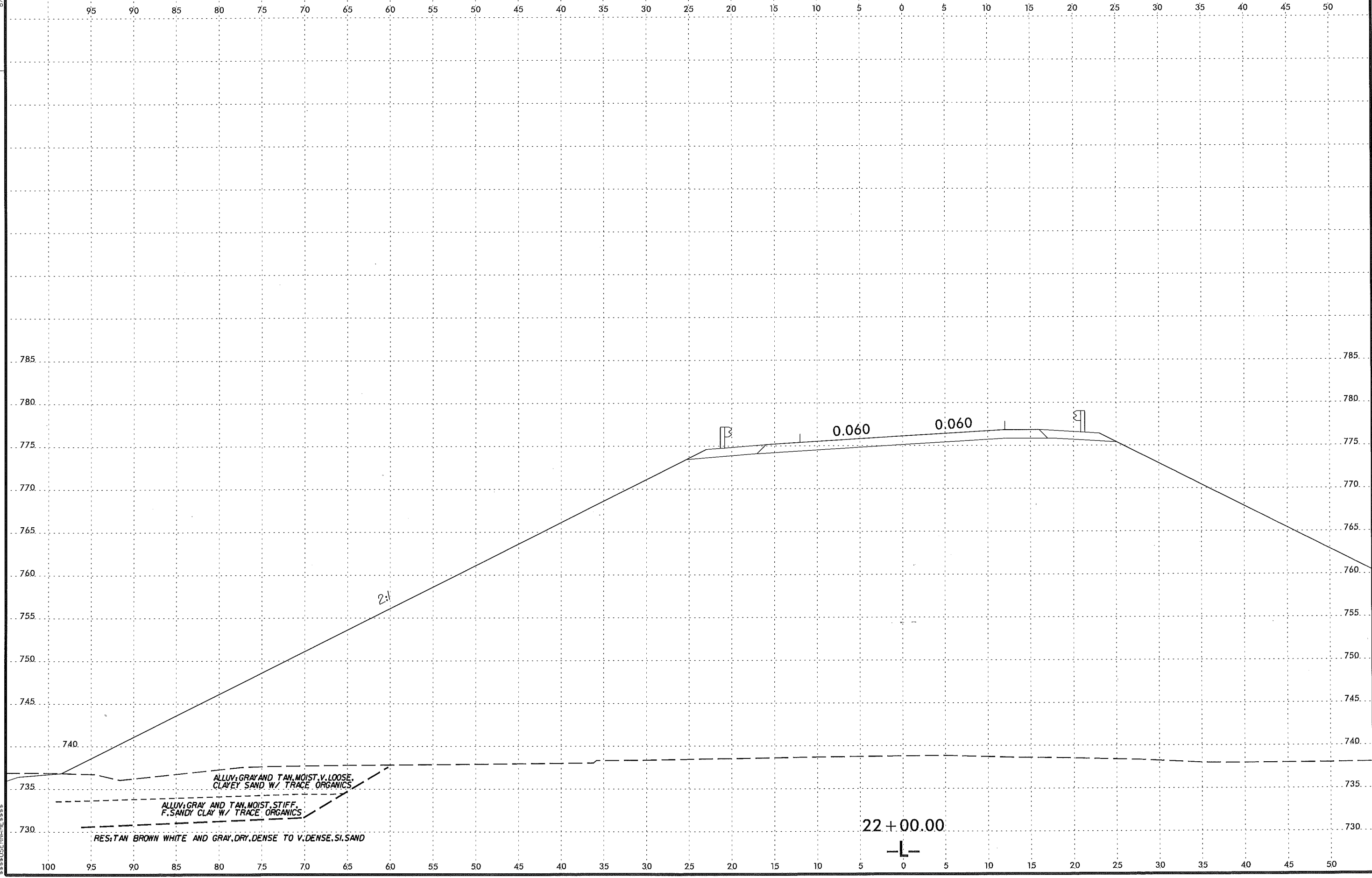


8/23/99

FOOT



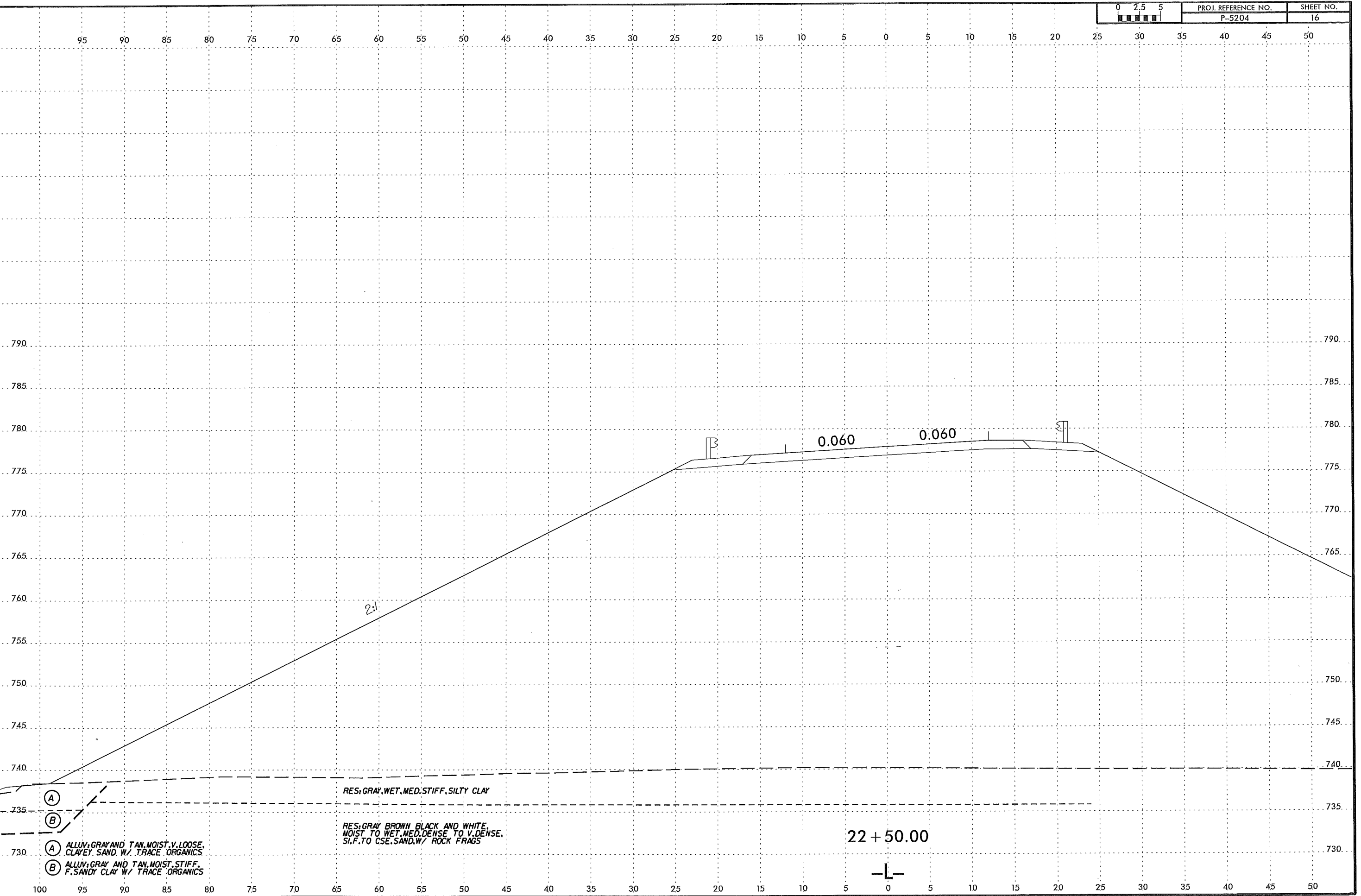
PROJ. REFERENCE NO.	SHEET NO.
P-5204	15



SYSTEM  
 TIME  
 MEASUREMENTS  
 ON  
 CONSTRUCTION  
 OF  
 THE  
 PROJECT  
 AND  
 THE  
 LOCATION  
 OF  
 THE  
 POINTS  
 SHOWN  
 HEREON  
 ARE  
 SUBJECT  
 TO  
 CHANGE  
 WITHOUT  
 NOTICE  
 AND  
 WITHOUT  
 LIABILITY  
 OF  
 THE  
 ENGINEER  
 OR  
 ARCHITECT  
 THEREFOR

B/23/99  
PICK  
SYSTEMS  
SHEETS  
CONDITIONS

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	P-5204	16







WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.										
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)									
BORING NO. B-3		STATION 18+00		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 727.2 ft		TOTAL DEPTH 24.6 ft		NORTHING 857,479		EASTING 1,805,436										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Wichard, W.		START DATE 07/24/13		COMP. DATE 07/24/13		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						
730																
725	726.2	1.0	1	2	4											727.2 GROUND SURFACE: 4" TOPSOIL 0.0
	723.7	3.5	4	6	8											725.6 ALLUVIAL 1.8
	721.2	6.0	84	16/0.1												724.2 GRAY, SI. F. TO MED. SAND (A-2-4) 3.0
	718.7	8.5	32	56	44/0.3											723.1 TAN AND GRAY, F. TO MED. SANDY SILT (A-4) 4.1
	713.7	13.5	16	49	51/0.3											720.6 GRAY AND TAN, F. SANDY CLAY (A-6) W/ ORGANICS 8.8
	708.7	18.5	38	29	49											WEATHERED ROCK 17.0
	703.7	23.5	100/0.4													RESIDUAL 22.0
	702.6	24.6	60/0.0													WEATHERED ROCK 24.6
																Boring Terminated at Elevation 702.6 ft on CR: METAMORPHOSED GRANITE

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.										
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)									
BORING NO. B-4		STATION 21+02		OFFSET 75 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 734.0 ft		TOTAL DEPTH 23.2 ft		NORTHING 857,776		EASTING 1,805,492										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Wichard, W.		START DATE 07/25/13		COMP. DATE 07/25/13		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						
735																
	733.0	1.0	WOH	WOH	1											734.0 GROUND SURFACE: 7" ROOTMAT 0.0
	730.5	3.5	4	5	7											ALLUVIAL 3.0
	728.0	6.0	8	9	11											GRAY AND TAN, CLAYEY SAND (A-2-6) W/ TRACE ORGANICS 3.9
	725.5	8.5	7	13	19											GRAY AND TAN, F. SANDY CLAY (A-6) W/ TRACE ORGANICS 5.5
	720.5	13.5	31	31	22											GRAY AND TAN, CLAYEY MED. TO CSE. SAND (A-2-6) W/ GRAVEL 8.0
	715.5	18.5	16	39	61/0.3											RESIDUAL 19.8
	710.8	23.2	60/0													TAN BROWN WHITE AND LT. GRAY, SI. F. SAND (A-2-4) 23.2
																Boring Terminated at Elevation 710.8 ft on CR: METAMORPHOSED GRANITE

NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hamm, J.R.								
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)							
BORING NO. EB1-A		STATION 23+76		OFFSET 18 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 742.9 ft		TOTAL DEPTH 44.1 ft		NORTHING 858,020		EASTING 1,805,605								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/26/13		COMP. DATE 07/26/13		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				
745														742.9 GROUND SURFACE: 4" TOPSOIL 0.0
740	741.9	1.0	WOH	2	3							SS-1	33%	739.9 RESIDUAL GRAY, SI. CLAY (A-7-6) 3.0
	739.4	3.5		9	14	19								GRAY BROWN BLACK AND WHITE, DENSE, SI. F. TO CSE. SAND (A-2-4) W/ ROCK FRAGS
735	736.9	6.0		12	8	8								
	734.4	8.5		4	7	6								
730	729.4	13.5		6	6	8								
725	724.4	18.5		7	10	16								
720	719.4	23.5		20	26	33								
715	714.4	28.5		33	67/0.5									
710	709.4	33.5		64	36/0.3									
705	704.4	38.5		100/0.3										
700	699.4	43.5		77	23/0.1									
														100/0.6 Boring Terminated at Elevation 698.8 ft in WR: METAMORPHOSED GRANITE

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hamm, J.R.								
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)							
BORING NO. EB1-B		STATION 24+04		OFFSET 30 ft RT		ALIGNMENT -L-								
COLLAR ELEV. 742.3 ft		TOTAL DEPTH 43.6 ft		NORTHING 858,044		EASTING 1,805,655								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/26/13		COMP. DATE 07/26/13		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				
745														742.3 GROUND SURFACE: 5" TOPSOIL 0.0
740	741.3	1.0		4	9	8								739.9 RESIDUAL GRAY TAN BROWN AND PURPLE, SI. F. TO CSE. SAND (A-2-4) 3.0
	738.8	3.5		4	7	8								
735	736.3	6.0		6	8	9								
	733.8	8.5		6	6	10								
730	728.8	13.5		7	9	15								
725	723.8	18.5		8	17	27								
720	718.8	23.5		26	41	51								
715	713.8	28.5		29	9	8								
710	708.8	33.5		78	22/0.1									
705	703.8	38.5		100/0.3										
700	698.8	43.5		60/0.1										
														60/0.1 Boring Terminated at Elevation 698.7 ft in CR: METAMORPHOSED GRANITE

NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14

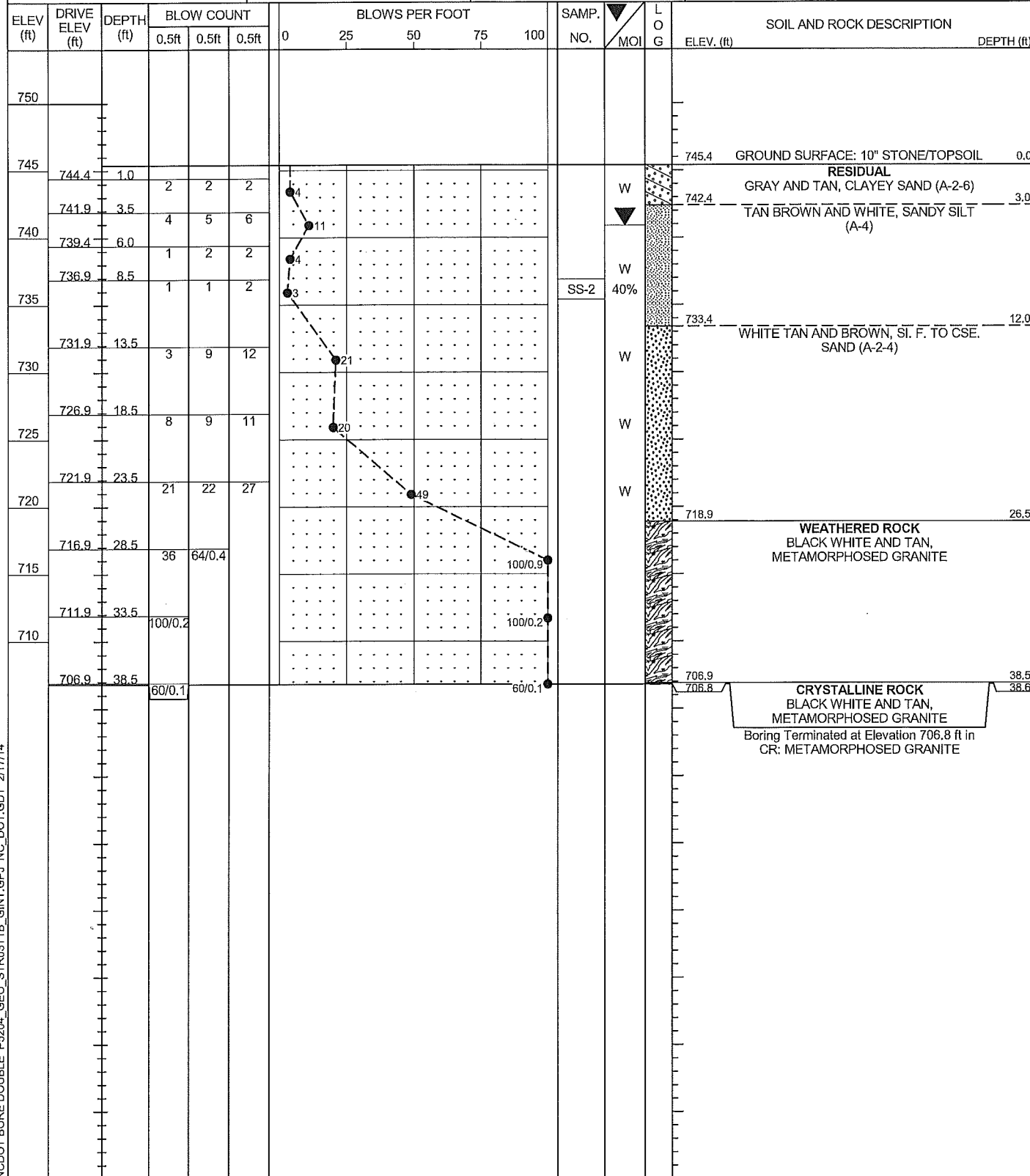




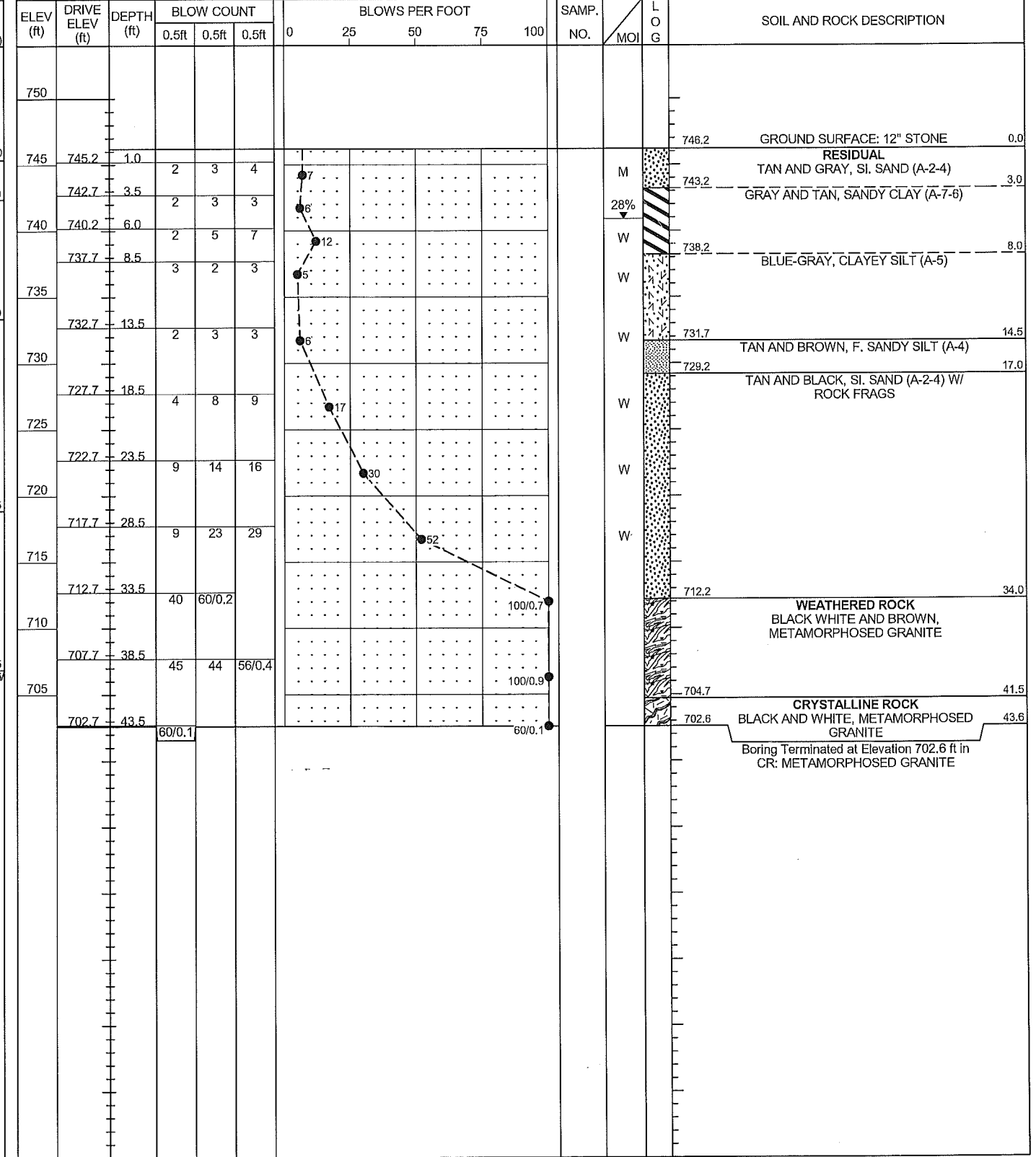
# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 52100.0.STR03T1B	TIP P-5204	COUNTY GUILFORD	GEOLOGIST Hamm, J.R.	
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70				GROUND WTR (ft)
BORING NO. EB2-A	STATION 25+16	OFFSET 18 ft LT	ALIGNMENT -L-	0 HR. 7.0
COLLAR ELEV. 745.4 ft	TOTAL DEPTH 38.6 ft	NORTHING 858,159	EASTING 1,805,612	24 HR. 4.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Wichard, W.	START DATE 07/26/13	COMP. DATE 07/26/13	SURFACE WATER DEPTH N/A	



WBS 52100.0.STR03T1B	TIP P-5204	COUNTY GUILFORD	GEOLOGIST Hamm, J.R.	
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70				GROUND WTR (ft)
BORING NO. EB2-B	STATION 25+44	OFFSET 18 ft RT	ALIGNMENT -L-	0 HR. 8.9
COLLAR ELEV. 746.2 ft	TOTAL DEPTH 43.6 ft	NORTHING 858,187	EASTING 1,805,649	24 HR. 5.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER Wichard, W.	START DATE 07/25/13	COMP. DATE 07/25/13	SURFACE WATER DEPTH N/A	



NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14





**NCDOT GEOTECHNICAL ENGINEERING UNIT**  
**BORELOG REPORT**

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.									
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)								
BORING NO. B-7		STATION 12+07		OFFSET 5 ft RT		ALIGNMENT -Y1-									
COLLAR ELEV. 732.0 ft		TOTAL DEPTH 23.8 ft		NORTHING 857,471		EASTING 1,805,668									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Wichard, W.		START DATE 07/23/13		COMP. DATE 07/23/13		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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
735															
	731.0	1.0	3	9	15									732.0	0.0
730														729.0	3.0
	728.5	3.5	6	12	12									725.1	6.9
725															
	726.0	6.0	31	69/0.4											
	723.5	8.5	40	60/0.4											
720															
	718.5	13.5	100/0.4												
715															
	713.5	18.5	60/0.1												
710															
	708.5	23.5	100/0.3												

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.									
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)								
BORING NO. B-8		STATION 14+00		OFFSET 5 ft RT		ALIGNMENT -Y1-									
COLLAR ELEV. 720.0 ft		TOTAL DEPTH 14.5 ft		NORTHING 857,444		EASTING 1,805,860									
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Wichard, W.		START DATE 07/24/13		COMP. DATE 07/24/13		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	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
720														720.0	0.0
	719.0	1.0	1	1	2										
	716.5	3.5	4	9	50										
715														713.7	6.3
	714.0	6.0	100/0.3												
	711.5	8.5	100/0.4												
710															
	706.5	13.5	60/0.1											706.5	13.5
	705.5	14.5	60/0.0											705.5	14.5

NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14



WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.								
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)							
BORING NO. B-11		STATION 20+00		OFFSET CL		ALIGNMENT -Y1-								
COLLAR ELEV. 732.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 857,301		EASTING 1,806,433								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/22/13		COMP. DATE 07/22/13		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				
735														
	731.0	1.0	2	3	2									732.0 GROUND SURFACE: 4" TOPSOIL 0.0
730	728.5	3.5	3	4	6									730.2 RESIDUAL TAN, SI. MED. SAND (A-2-4) W/ TRACE ORGANICS 1.8
	726.0	6.0	1	2	4									729.0 TAN ORANGE AND BROWN, CLAYEY SAND (A-2-6) 3.0
725	723.5	8.5	3	5	7									726.5 TAN AND ORANGE, SANDY CLAY (A-7-6) 5.5
														722.6 TAN AND ORANGE, SANDY SILT (A-4) 9.4
														722.0 WHITE TAN AND ORANGE, SI. SAND (A-2-4) 10.0
														Boring Terminated at Elevation 722.0 ft in RES: SILTY SAND

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.								
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)							
BORING NO. B-12		STATION 22+00		OFFSET CL		ALIGNMENT -Y1-								
COLLAR ELEV. 726.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 857,156		EASTING 1,806,570								
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/23/13		COMP. DATE 07/23/13		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				
730														
	725.0	1.0	2	2	4									726.0 GROUND SURFACE: 5.5" TOPSOIL 0.0
725	722.5	3.5	2	5	5									ALLUVIAL GRAY AND TAN, SI. CSE. TO MED. SAND (A-2-4) W/ GRAVEL, TRACE ORGANICS
720	720.0	6.0	3	15	28									719.5 RESIDUAL TAN ORANGE AND WHITE, F. SANDY SILT (A-4) 6.5
	717.5	8.5	13	16	20									718.0 TAN ORANGE AND WHITE, F. SANDY SILT (A-4) 8.0
715			20	36	32									TAN ORANGE AND WHITE, SI. SAND (A-2-4)
	712.5	13.5												Boring Terminated at Elevation 711.0 ft in RES: SILTY SAND

NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14



# NCDOT GEOTECHNICAL ENGINEERING UNIT

## BORELOG REPORT

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.										
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)									
BORING NO. B-13		STATION 24+05		OFFSET 1 ft RT		ALIGNMENT -Y1-										
COLLAR ELEV. 731.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 856,970		EASTING 1,806,652										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/22/13		COMP. DATE 07/22/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
735																
730	730.0	1.0														731.0 GROUND SURFACE: 4" TOPSOIL 0.0
	727.5	3.5	2	8	8								M			RESIDUAL TAN AND RED, SI. MED. SAND (A-2-4) W/ TRACE ROOTS 3.0
	725.0	6.0	3	4	7								M			WHITE AND TAN, F. SANDY CLAY (A-6) 5.5
	722.5	8.5	9	15	17								D			TAN ORANGE AND BROWN, SI. SAND (A-2-4) 5.5
			10	15	18								D			721.0 Boring Terminated at Elevation 721.0 ft in RES: SILTY SAND 10.0

WBS 52100.0.STR03T1B		TIP P-5204		COUNTY GUILFORD		GEOLOGIST Hunsberger, W.S.										
SITE DESCRIPTION SR 2819 (MCLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70							GROUND WTR (ft)									
BORING NO. B-14		STATION 12+00		OFFSET CL		ALIGNMENT -Y3-										
COLLAR ELEV. 739.0 ft		TOTAL DEPTH 10.0 ft		NORTHING 857,397		EASTING 1,806,607										
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 74% 02/15/2013				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Wichard, W.		START DATE 07/22/13		COMP. DATE 07/22/13		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
740																
	738.0	1.0	2	3	2											739.0 GROUND SURFACE: 4" TOPSOIL 0.0
	735.5	3.5	2	6	9								M			RESIDUAL TAN AND GRAY, SI. SAND (A-2-4) W/ TRACE ROOTS 3.0
	733.0	6.0	11	15	18								SS-10	20%		ORANGE AND LT. TAN, SANDY CLAY (A-6) W/ PLASTIC CLAY LENSES 5.5
	730.5	8.5	8	12	16								D			GREEN TAN AND ORANGE, SI. SAND (A-2-4) W/ ROCK FRAGS 5.5
													D			729.0 Boring Terminated at Elevation 729.0 ft in RES: SILTY SAND 10.0

NCDOT BORE DOUBLE P5204\_GEO\_STR03T1B\_GINT.GPJ NC\_DOT.GDT 2/17/14



FALCON

1210 TRINITY ROAD, SUITE 110, RALEIGH, NORTH CAROLINA 27607

AASHTO SOIL CLASSIFICATION AND GRADATION SHEET

SR 2819 (McLEANSVILLE ROAD) OVER NS/NCRR RAILROAD NORTH OF US 70

WBS: 52400.1.STR03T1B, TIP NO.: P-5204

GUILFORD COUNTY, NORTH CAROLINA

FALCON ENGINEERING, INC. PROJECT NO: G13047.00

BORING			SAMPLE			TOTAL SAMPLE			Atterberg Limit Test Results			Natural Moisture Content
AASHTO Classification			PERCENT PASSING			LL	PL	PI				
STATION	OFFSET (FEET)	DEPTH (FEET)	#10	#40	#200				%			
EB1-A			SS-1			94	88	73	67	24	43	33.3
A-7-6(32)												
23+76	18 ft LT	0-1.0										
EB2-A			SS-2			97	73	45	49	NP	NP	39.8
A-4(0)												
25+16	18 ft LT	8.5-10.0										
EB2-B			SS-3			96	87	70	81	28	53	27.6
A-7-6(38)												
25+44	18 ft RT	3.5-5.0										
B-2			SS-4			99	72	29	14	NP	NP	11.9
A-2-4(0)												
16+00 -L-	CL	1.0-3.5										
B-3			SS-5			99	76	42	17	NP	NP	13.1
A-4(0)												
18+00 -L-	CL	3.5-4.1										
B-4			SS-6			100	81	49	29	13	16	14.7
A-6(4)												
21+02 -L-	75 ft LT	3.5-5.0										
B-5			SS-7			95	73	55	51	27	24	24.9
A-7-6(11)												
27+00 -L-	CL	3.5-5.0										
B-6			SS-8			100	96	51	35	NP	NP	24.8
A-4(0)												
29+01 -L-	4 ft LT	6.4-7.9										
B-10			SS-9			97	81	63	48	19	29	21.7
A-7-6(16)												
18+00 -Y1-	CL	6.2-7.7										
B-14			SS-10			96	68	49	37	23	14	19.6
A-6(4)												
12+00 -Y3-	CL	4-5.5										

SIGNATURE *[Handwritten Signature]*

105-03-0803

Notes: LL = Liquid limit  
 PL = Plastic limit  
 PI = Plasticity index = LL - PL