

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 34497.1.3 (R-2707A) F.A. PROJ. NHF-74(76)
COUNTY CLEVELAND
PROJECT DESCRIPTION SHELBY - US 74 BYPASS FROM WEST OF SR 1162 (PEACHTREE RD) TO EAST OF SR 1315 (PLATO LEE RD)
SITE DESCRIPTION BRIDGE 456 OVER US 74 ON SR 1315 BETWEEN SR 1313 & SR 1161 (STRUCTURE 6)

CAUTION NOTICE

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

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

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

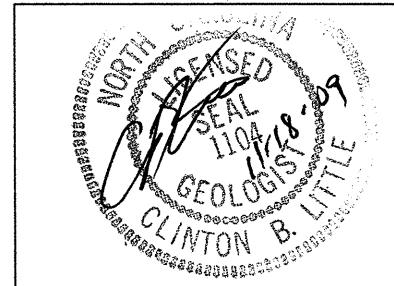
THIS SUBSURFACE INVESTIGATION WAS ORIGINALLY PERFORMED UNDER THE TIP R-2707A, BUT IS BEING LET UNDER TIP R-2707AB

PROJECT: 34497.1.3
ID: R-2707A

PERSONNEL

- R.W. TODD
- M.L. SMITH
- A.C. SMITH
- _____
- _____
- _____
- _____
- _____

INVESTIGATED BY J.P. ROGERS
CHECKED BY C.B. LITTLE
SUBMITTED BY C.B. LITTLE
DATE OCTOBER 2009



DRAWN BY: J.P. ROGERS

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.

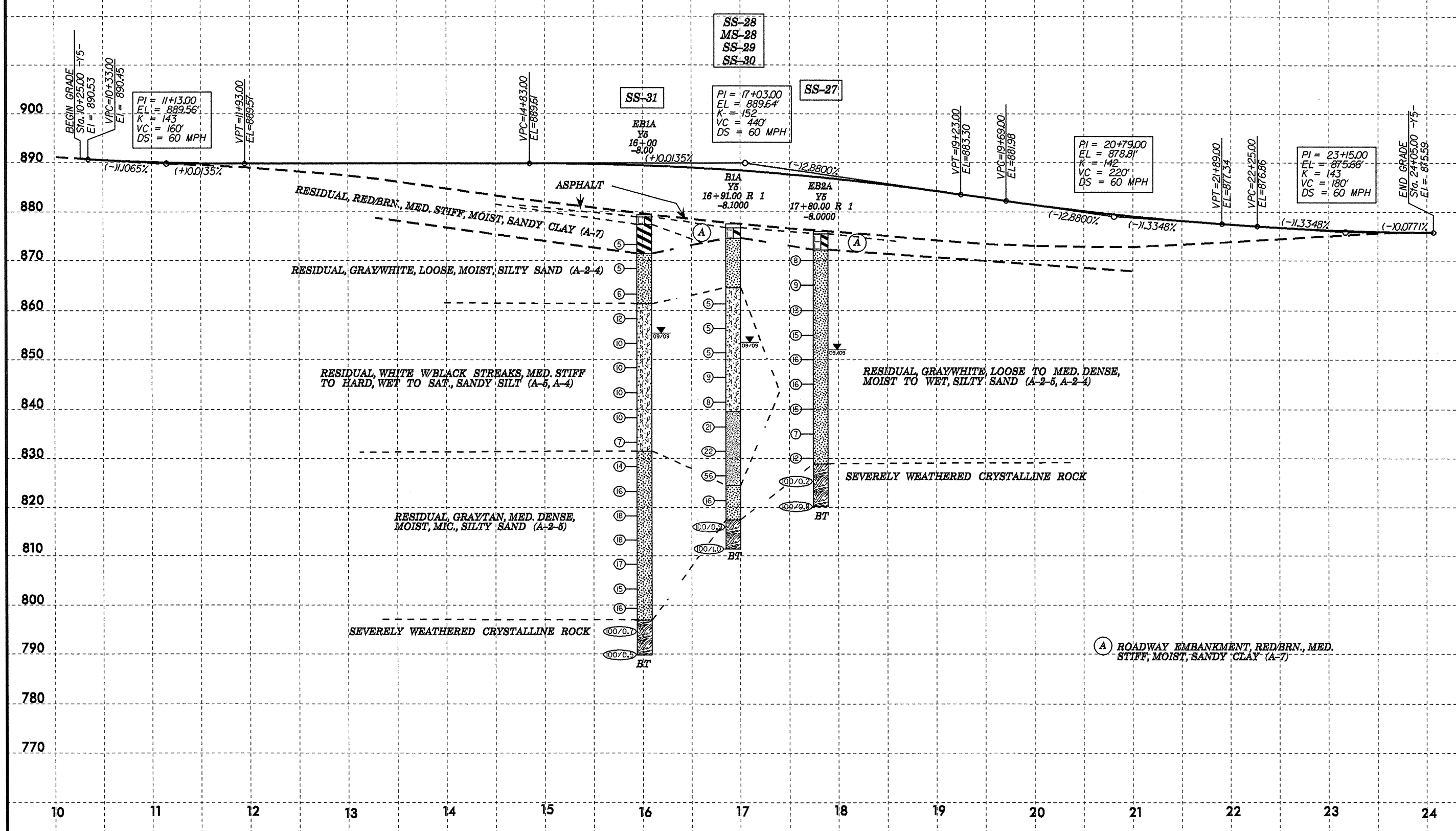
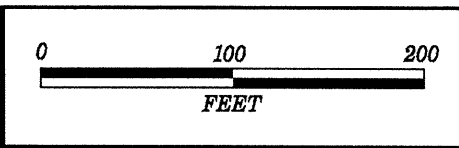
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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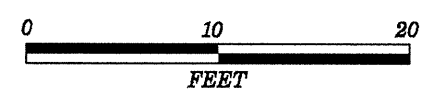
PROJECT REFERENCE NO. 34497.1.3 (R-2707A)	SHEET NO. 2
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SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																								
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GR. SANDY 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. (ALSO POORLY GRADED)</p> <p>POORLY GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 60 BLOWS PER FOOT 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.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 60 BLOWS PER FOOT.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																								
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="2">GRANULAR MATERIALS (<= 35% PASSING #200)</th> <th colspan="2">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th>ORGANIC MATERIALS</th> </tr> <tr> <td>GROUP CLASS.</td> <td>A-1</td><td>A-2</td><td>A-3</td><td>A-4</td><td>A-5</td><td>A-6</td><td>A-7</td> </tr> <tr> <td>SYMBOL</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td>% PASSING</td> <td>10</td><td>40</td><td>200</td> <td>10</td><td>40</td><td>200</td> <td>10</td><td>40</td><td>200</td> </tr> <tr> <td>LIQUID LIMIT</td> <td>6</td><td>10</td><td>15</td> <td>10</td><td>15</td><td>20</td> <td>20</td><td>25</td><td>30</td> </tr> <tr> <td>PLASTIC INDEX</td> <td>0</td><td>1</td><td>2</td> <td>3</td><td>4</td><td>5</td> <td>6</td><td>7</td><td>8</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td><td>1</td><td>2</td> <td>3</td><td>4</td><td>5</td> <td>6</td><td>7</td><td>8</td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS, GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILT OR CLAYEY GRAVEL AND SAND</td> <td>SILT SOILS</td> <td>CLAYEY SOILS</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GENERATING AS A SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="2">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSUITABLE</td> <td></td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>	GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)		SILT-CLAY MATERIALS (> 35% PASSING #200)		ORGANIC MATERIALS	GROUP CLASS.	A-1	A-2	A-3	A-4	A-5	A-6	A-7	SYMBOL								% PASSING	10	40	200	10	40	200	10	40	200	LIQUID LIMIT	6	10	15	10	15	20	20	25	30	PLASTIC INDEX	0	1	2	3	4	5	6	7	8	GROUP INDEX	0	1	2	3	4	5	6	7	8	USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS, GRAVEL, AND SAND	FINE SAND	SILT OR CLAYEY GRAVEL AND SAND	SILT SOILS	CLAYEY SOILS	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT	HIGHLY ORGANIC SOILS	GENERATING AS A SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR		FAIR TO POOR	POOR	UNSUITABLE		<p style="text-align: center;">MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>SLIGHTLY COMPRESSIBLE</td> <td>LIQUID LIMIT LESS THAN 31</td> </tr> <tr> <td>MODERATELY COMPRESSIBLE</td> <td>LIQUID LIMIT EQUAL TO 31-50</td> </tr> <tr> <td>HIGHLY COMPRESSIBLE</td> <td>LIQUID LIMIT GREATER THAN 50</td> </tr> </table> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>	SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31	MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50	HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 50	ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY	<p style="text-align: center;">WEATHERING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>WEATHERED ROCK (WR)</th> <th>CRYSTALLINE ROCK (CR)</th> <th>NON-CRYSTALLINE ROCK (NCR)</th> <th>COASTAL PLAIN SEDIMENTARY ROCK (CP)</th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</td> <td>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</td> <td>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.</td> <td>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</td> </tr> </table> <p style="text-align: center;">WEATHERING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>FRESH</th> <th>VERY SLIGHT (V SLI.)</th> <th>SLIGHT (SLI.)</th> <th>MODERATE (MOD.)</th> <th>MODERATELY SEVERE (MOD. SEV.)</th> <th>SEVERE (SEV.)</th> <th>VERY SEVERE (V SEV.)</th> <th>COMPLETE</th> </tr> <tr> <td>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</td> <td>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.</td> <td>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.</td> <td>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.</td> <td>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></td> <td>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i></td> <td>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i></td> <td>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.</td> </tr> </table> <p style="text-align: center;">ROCK HARDNESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>VERY HARD</th> <th>HARD</th> <th>MODERATELY HARD</th> <th>MEDIUM HARD</th> <th>SOFT</th> <th>VERY SOFT</th> </tr> <tr> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</td> <td>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</td> <td>CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.</td> <td>CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.</td> </tr> </table>	WEATHERED ROCK (WR)	CRYSTALLINE ROCK (CR)	NON-CRYSTALLINE ROCK (NCR)	COASTAL PLAIN SEDIMENTARY ROCK (CP)					NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. 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<p style="text-align: center;">MISCELLANEOUS SYMBOLS</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 & 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 style="text-align: center;">ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>AR - AUGER REFUSAL</td> <td>MED. - MEDIUM</td> <td>VST - VANE SHEAR TEST</td> </tr> <tr> <td>BT - BORING TERMINATED</td> <td>MICA - MICAEOUS</td> <td>WEA. - WEATHERED</td> </tr> <tr> <td>CL - CLAY</td> <td>MOD. - MODERATELY</td> <td>W - UNIT WEIGHT</td> </tr> <tr> <td>CPT - CONE PENETRATION TEST</td> <td>NP - NON PLASTIC</td> <td>W_d - DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE. - COARSE</td> <td>ORG. - ORGANIC</td> <td></td> </tr> <tr> <td>DMT - DILATOMETER TEST</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAMPLE ABBREVIATIONS</td> </tr> <tr> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>SAP. - SAPROLITIC</td> <td>S - BULK</td> </tr> <tr> <td>e - VOID RATIO</td> <td>SD. - SAND, SANDY</td> <td>SS - SPLIT SPOON</td> </tr> <tr> <td>F - FINE</td> <td>SL. - SILT, SILTY</td> <td>ST - SHELBY TUBE</td> </tr> <tr> <td>FOSS. - FOSSILIFEROUS</td> <td>SLI. - SLIGHTLY</td> <td>RS - ROCK</td> </tr> <tr> <td>FRAC. - FRACTURED, FRACTURES</td> <td>TCR - TRICONE REFUSAL</td> <td>RT - RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAGS. - FRAGMENTS</td> <td>w - MOISTURE CONTENT</td> <td>CBR - CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>HI. - HIGHLY</td> <td>V - VERY</td> <td></td> </tr> </table> <p style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%; 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<p style="text-align: center;">BENCH MARK: -BY5 199-</p> <p style="text-align: center;">STA. 12+42 BL</p> <p style="text-align: center;">N 576,630.471 E 1,218,866.393</p> <p style="text-align: right;">ELEVATION: 873.82 FT.</p> <p>NOTES:</p>			<p>REVISED 02/23/06</p>																																																																																																																																																																																																																								





SS-31

EB1A
Y5
16+00
-8.00
879.20

ASPHALT

ROADWAY EMBANKMENT, RED/BRN., MED. STIFF, MOIST, SANDY CLAY (A-7)

875

875

5

RESIDUAL, RED/BRN., MED. STIFF, MOIST, SANDY CLAY (A-7)

865

865

5

RESIDUAL, GRAY/WHITE, LOOSE, MOIST, SILTY SAND (A-2-4)

6

855

855

12

09/09

10

845

845

10

RESIDUAL, BRN., MED. STIFF TO STIFF, MOIST TO WET, SANDY SILT (A-5)

10

835

835

10

7

825

825

14

16

815

815

RESIDUAL, GRAY/TAN, MED. DENSE, MOIST, MIC., SILTY SAND (A-2-5)

18

18

805

805

17

15

795

795

16

SEVERELY WEATHERED CRYSTALLINE ROCK

100/0.7

100/0.5

BT

50

40

30

20

10

0

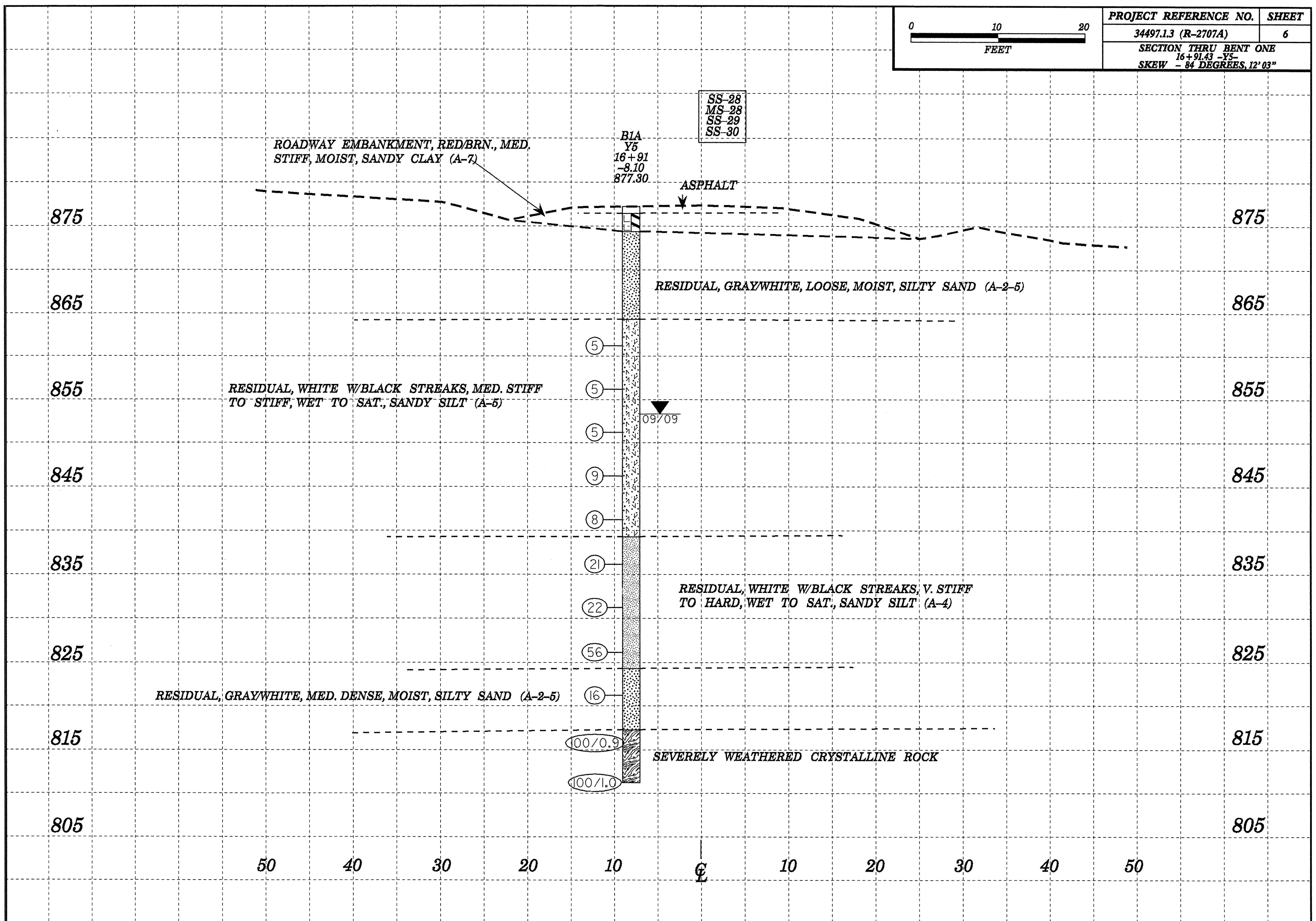
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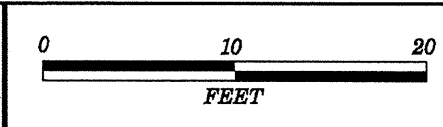
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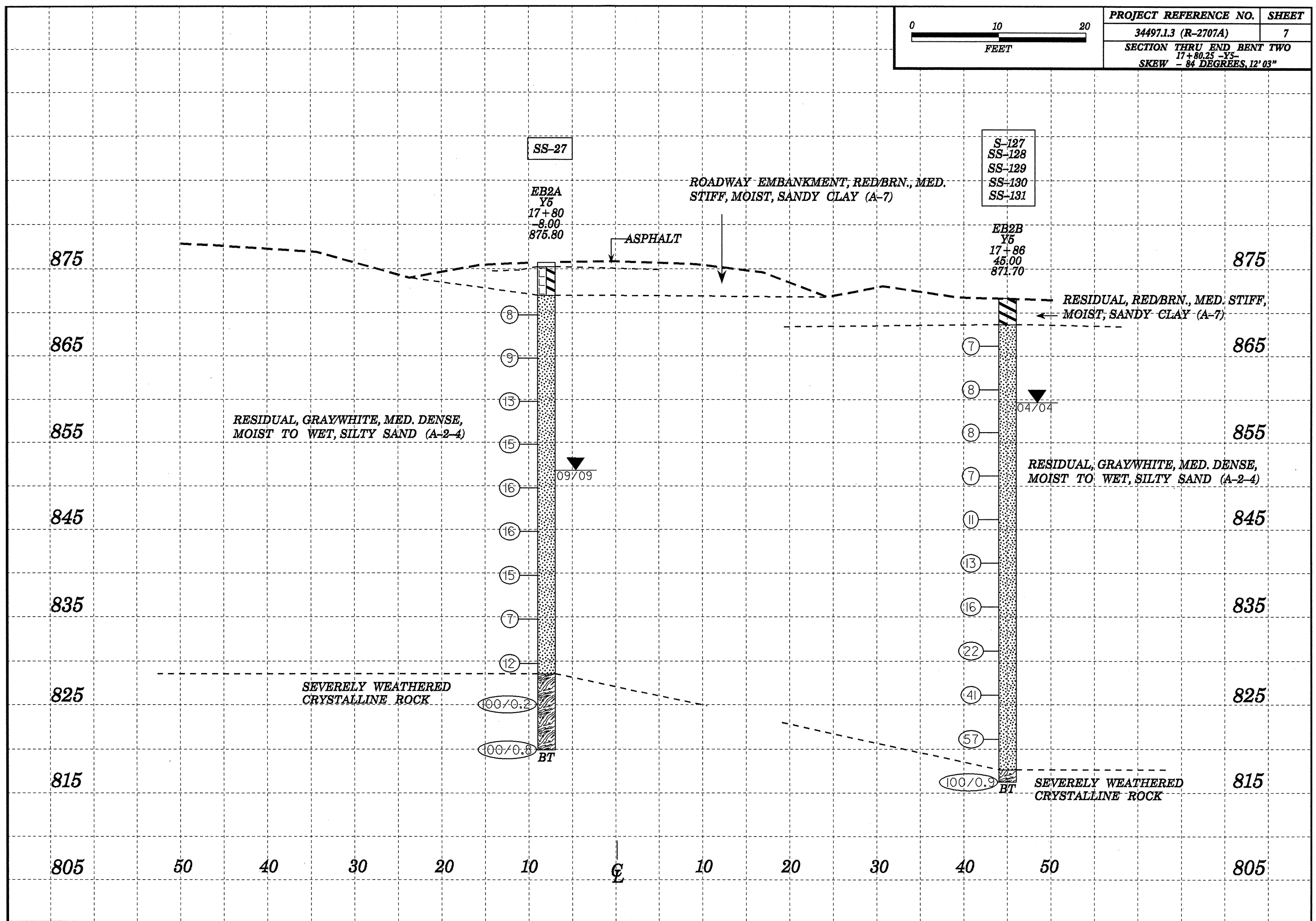
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PROJECT REFERENCE NO.	SHEET
34497.1.3 (R-2707A)	7
SECTION THRU END BENT TWO	
17+80.25 - Y5 -	
SKEW - 84 DEGREES, 12' 03"	



PROJECT NO. 34497.1.3	ID. R2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 456 ON SR 1315 BETWEEN SR 1313 AND SR 1161.			GROUND WTR (ft)
BORING NO. B1A	STATION 16+91	OFFSET 8ft LT	ALIGNMENT Y5
COLLAR ELEV. 877.3 ft	TOTAL DEPTH 66.1 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 09/22/09	COMP. DATE 09/22/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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				
880													GROUND SURFACE 0.0	
875													ASPHALT 0.8	
870													ROADWAY EMBANKMENT 2.9	
													RED/BRN., MED. STIFF, MOIST, SANDY CLAY (A-7)	
													RESIDUAL GRAY/WHITE, LOOSE, MOIST, SILTY SAND (A-2-5)	
865														
860	862.2	15.1	1	2	3							SS-28	RESIDUAL WHITE W/ BLACK STREAKS, MED. STIFF TO STIFF, WET TO SAT., SANDY SILT (A-5)	13.0
855	857.2	20.1	1	2	3									
850	852.2	25.1	1	2	3									
845	847.2	30.1	1	3	6									
840	842.2	35.1	1	2	6									
835	837.2	40.1	3	7	14							SS-29	RESIDUAL WHITE W/ BLACK STREAKS, V. STIFF TO HARD, WET TO SAT., SANDY SILT (A-4)	38.0
830	832.2	45.1	4	7	15									
825	827.2	50.1	8	19	37									
820	822.2	55.1	3	5	11							SS-30	RESIDUAL GRAY/WHITE, MED. DENSE, MOIST, SILTY SAND (A-2-5)	53.0
815	817.2	60.1	11	43	57/4									
810	812.2	65.1	35	65										

Boring Terminated at Elevation 811.2 ft SEVERELY WEATHERED CRYSTALLINE ROCK

Other Samples:
M-28 (15.1 - 15.1)

PROJECT NO. 34497.1.3	ID. R2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 456 ON SR 1315 BETWEEN SR 1313 AND SR 1161.			GROUND WTR (ft)
BORING NO. EB2A	STATION 17+80	OFFSET 8ft LT	ALIGNMENT Y5
COLLAR ELEV. 875.8 ft	TOTAL DEPTH 55.8 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550X	DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic	
START DATE 09/21/09	COMP. DATE 09/21/09	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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				
880													GROUND SURFACE 0.0	
875													asphalt 0.5	
870	870.8	5.0	2	4	4								ROADWAY EMBANKMENT 3.8	
													RED/BRN., MED. STIFF, MOIST, SANDY CLAY (A-7)	
													RESIDUAL GRAY/WHITE, MED. DENSE, MOIST TO WET, SILTY SAND (A-2-4)	
865	865.8	10.0	2	4	5									
860	860.8	15.0	3	6	7									
855	855.8	20.0	2	8	7									
850	850.8	25.0	2	8	8									
845	845.8	30.0	5	8	8									
840	840.8	35.0	4	7	8									
835	835.8	40.0	3	3	4									
830	830.8	45.0	5	6	6									
825	825.8	50.0	27	100/2										
820	820.8	55.0	40	60/3										

Boring Terminated at Elevation 820.0 ft SEVERELY WEATHERED CRYSTALLINE ROCK

NCDOT BORE SINGLE R2707A_GEO_Y5_BH.GPJ_NC_DOT.GDT_10/28/09

NCDOT BORE SINGLE R2707A_GEO_Y5_BH.GPJ_NC_DOT.GDT_10/21/09



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

SHEET

sheet
10

PROJECT NO. 34497.1.3	ID. R2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION BRIDGE NO. 456 ON SR 1315 BETWEEN SR 1313 AND SR 1161.			GROUND WTR (ft)
BORING NO. EB2B	STATION 17+86	OFFSET 45ft RT	ALIGNMENT Y5
COLLAR ELEV. 871.7 ft	TOTAL DEPTH 55.4 ft	NORTHING N/A	EASTING N/A
DRILL MACHINE CME-550X	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 04/01/04	COMP. DATE 04/01/04	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 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					
875															
870														GROUND SURFACE	0.0
											S-127			RESIDUAL RED/BRN., MED. STIFF, MOIST, SANDY CLAY (A-7)	3.0
865	867.2	4.5	2	3	4						SS-128	M		RESIDUAL GRAY AND BROWN, LOOSE TO V. DENSE, MOIST TO WET, SILTY SAND (A-2-4) WITH QTZ. PIECES FROM 44.5' TO 54'.	
860	862.2	9.5	5	5	3							M			
855	857.2	14.5	4	4	4							M			
850	852.2	19.5	4	3	4						SS-129	W			
845	847.2	24.5	4	5	6							W			
840	842.2	29.5	3	5	8						SS-130	W			
835	837.2	34.5	4	7	9							W			
830	832.2	39.5	5	9	13							W			
825	827.2	44.5	12	17	24						SS-131	M			
820	822.2	49.5	24	25	32							M			
815	817.2	54.5	26	74/4										WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	54.0
														Boring Terminated at Elevation 816.3 ft SEVERELY WEATHERED CRYSTALLINE ROCK	55.4
810															
805															
800															
795															

NCDOT BORE SINGLE R2707A_GEO_Y5_BH.GPJ NC_DOT.GDT 10/21/09

11/11

PROJ. NO. - 34497.1.3 (-Y5- OVER SHELBY BYPASS)
ID NO. - R-2707A
COUNTY - CLEVELAND

SHEET OF

SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C.SAND	F.SAND	SILT	CLAY	10	40	200			
MS-28	B1-A	16+91.44	15.1-16.5				0.0	0.0	0.0	0.0		0	0	38.1	-	
SS-27	EB2-A	17+80.25	5.0-6.5	A-2-4(0)	31	NP	41.6	31.5	18.9	8.1	96	69	32	-	-	
SS-28	B1-A	16+91.44	15.1-16.6	A-5(1)	42	6	33.7	23.8	24.3	18.2	96	72	46	-	-	
SS-29	B1-A	16+91.44	40.1-41.6	A-4(0)	40	6	29.7	39.2	19.1	12.1	99	83	39	-	-	
SS-30	B1-A	16+91.44	55.1-56.6	A-2-5(0)	41	7	25.8	45.8	16.2	12.1	97	84	35	-	-	
SS-31	EB1-A	16+00	20.1-21.6	A-5(0)	44	3	22.4	41.0	24.5	12.1	97	85	46	-	-	
SS-127	45RT	17+86	0.0-4.5	A-7-6(9)	44	18	24.1	20.3	11.3	44.3	100	84	60	-	-	
SS-128	45RT	17+86	4.5-6.0	A-2-4(0)	33	NP	40.6	32.0	9.3	18.1	95	68	34	-	-	
SS-129	45RT	17+86	19.5-21.0	A-2-4(0)	34	NP	47.1	31.6	7.2	14.1	95	63	27	-	-	
SS-130	45RT	17+86	29.5-31.0	A-2-4(0)	27	NP	41.0	37.2	7.6	14.1	100	76	29	-	-	
SS-131	45RT	17+86	44.5-46.0	A-2-4(0)	26	NP	46.9	30.4	6.6	16.1	89	59	25	-	-	

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 34497.1.3 (R-2707A) F.A. PROJ. NHF-74(14)
 COUNTY CLEVELAND
 PROJECT DESCRIPTION SHELBY - US 74 BYP FROM WEST OF SR 1162 TO EAST OF SR 1315 (PLATO LEE RD.)

SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 (LEFT AND RIGHT LANE) BETWEEN SR 1315 & SR 1161

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
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CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N.C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

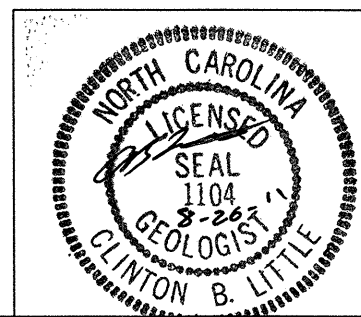
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND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

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

THIS SUBSURFACE INVESTIGATION WAS ORIGINALLY PERFORMED UNDER THE TIP R-2707A, BUT IS BEING LET UNDER TIP R-2707AB

- PERSONNEL
- R. W. TODD
 - J. P. ROGERS
 - J. K. STICKNEY
 - C. L. SMITH
 - M. L. SMITH
 - A. C. SMITH

INVESTIGATED BY J. P. ROGERS
 CHECKED BY C. B. LITTLE
 SUBMITTED BY C. B. LITTLE
 DATE NOVEMBER 2010



PROJECT: 34497.1.3 ID: R-2707A

DRAWN BY: C. E. BURRIS

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

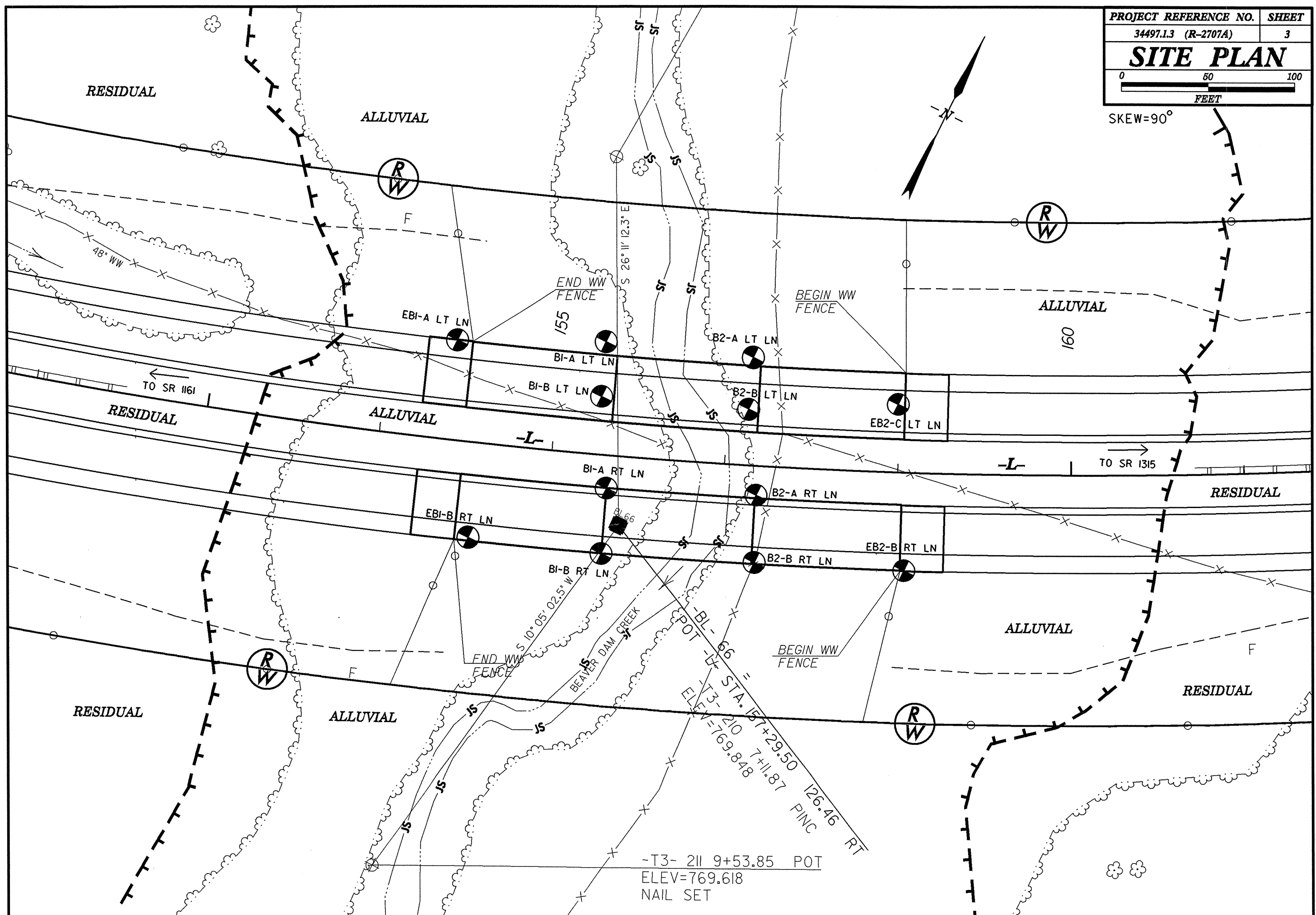
PROJECT REFERENCE NO.
34497.1.3 (R-2707A) SHEET NO.
2

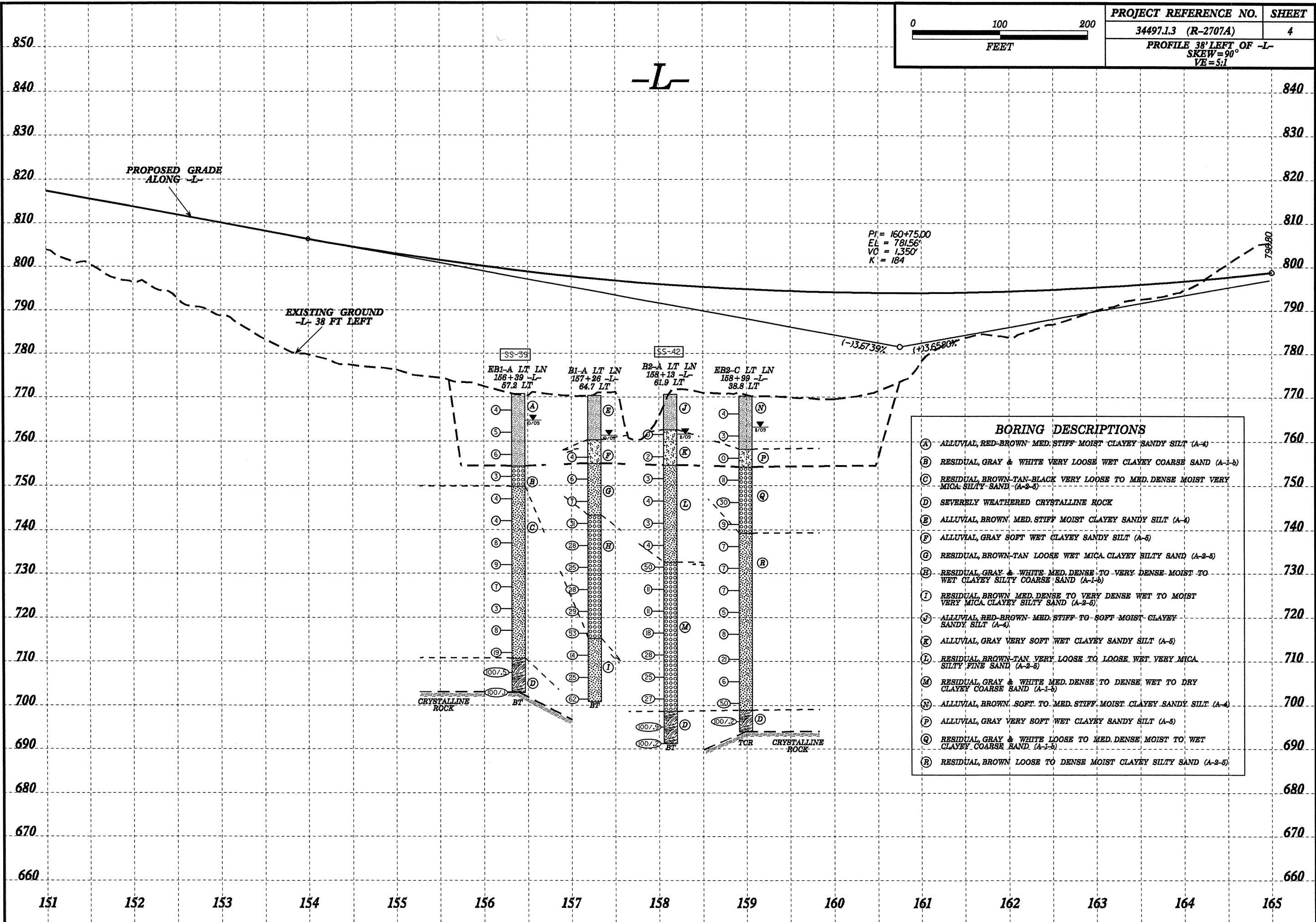
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

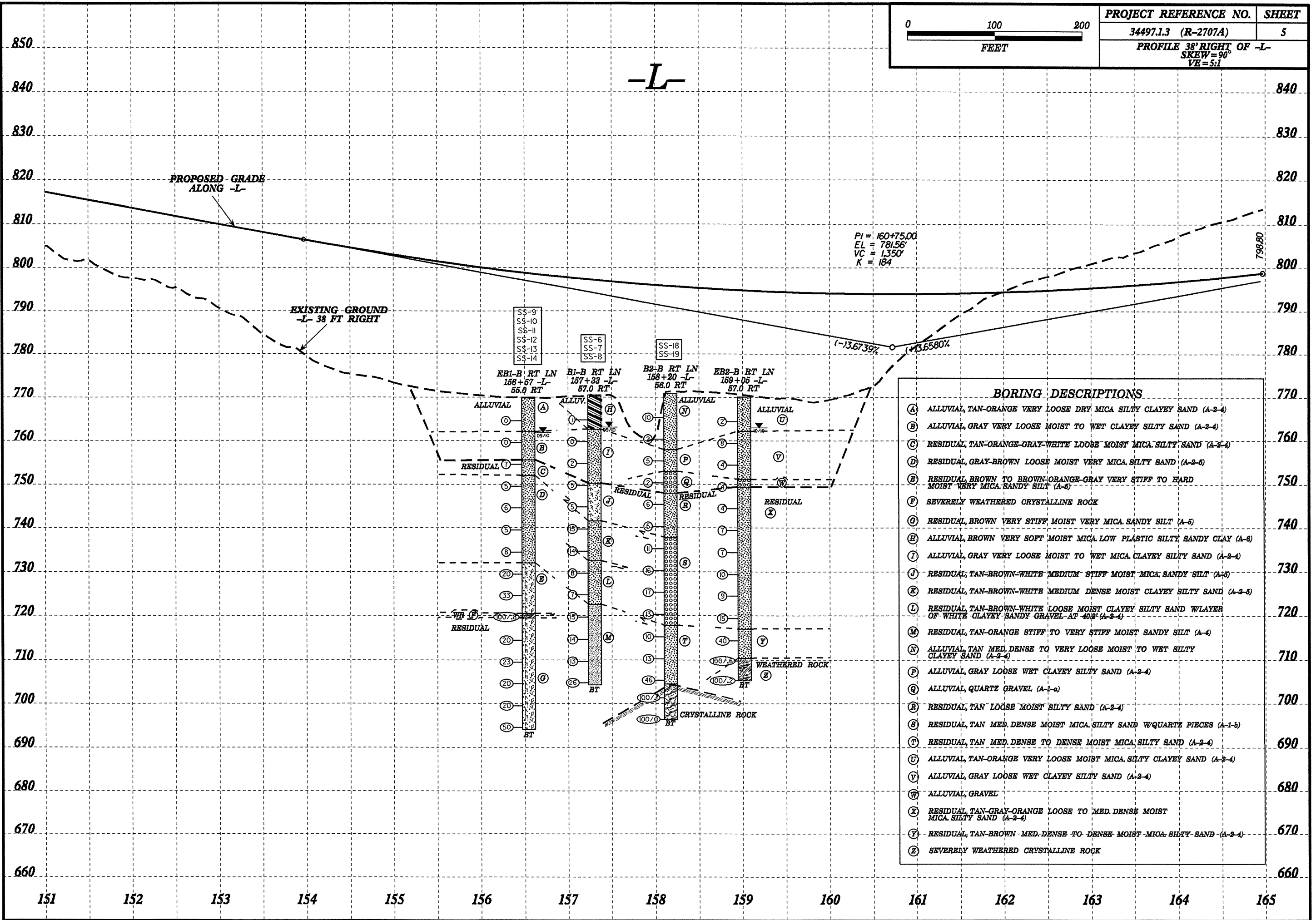
SOIL DESCRIPTION		GRADATION		ROCK DESCRIPTION		TERMS AND DEFINITIONS	
<p>SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HEAVY PLASTIC, A-7-6</i></p>		<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)</p> <p>GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p>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 8.1 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.</p> <p>AQUIFER - A WATER BEARING FORMATION OR STRATA.</p> <p>ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.</p> <p>ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.</p> <p>ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.</p> <p>CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.</p> <p>COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.</p> <p>CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.</p> <p>DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.</p> <p>DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.</p> <p>FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.</p> <p>FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.</p> <p>FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.</p> <p>FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.</p> <p>FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.</p> <p>JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.</p> <p>LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.</p> <p>LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.</p> <p>MOTTLED (MOTJ.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.</p> <p>PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.</p> <p>RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.</p> <p>ROCK QUALITY DESIGNATION (ROQ) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.</p> <p>SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.</p> <p>SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.</p> <p>SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.</p> <p>STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 8.1 FOOT PER 60 BLOWS.</p> <p>STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.</p> <p>STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.</p> <p>TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>	
SOIL LEGEND AND AASHTO CLASSIFICATION		MINERALOGICAL COMPOSITION		WEATHERING		ROCK HARDNESS	
<p>GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p> <p>GROUP CLASS. A-1-a, A-1-b, A-3, 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</p> <p>SYMBOL</p> <p>% PASSING: 10, 40, 200</p> <p>LIQUID LIMIT, PLASTIC INDEX, GROUP INDEX</p> <p>USUAL TYPES OF MAJOR MATERIALS: STONE FRAGS, GRAVEL, AND SAND; FINE SAND; SILTY OR CLAYEY GRAVEL AND SAND; SILTY SOILS; CLAYEY SOILS</p> <p>GEN. RATINGS AS A SUBGRADE: EXCELLENT TO GOOD, FAIR TO POOR, POOR, UNSUITABLE</p> <p>PI OF A-7-5 SUBGROUP IS <= LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30</p>		<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p>COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE, MODERATELY COMPRESSIBLE, HIGHLY COMPRESSIBLE</p> <p>PERCENTAGE OF MATERIAL</p> <p>ORGANIC MATERIAL, GRANULAR SOILS, SILT-CLAY SOILS, OTHER MATERIAL</p> <p>TRACE OF ORGANIC MATTER, LITTLE ORGANIC MATTER, MODERATELY ORGANIC, HIGHLY ORGANIC</p> <p>GROUND WATER</p> <p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING, STATIC WATER LEVEL AFTER 24 HOURS, PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA, SPRING OR SEEP</p>		<p>WEATHERED ROCK (WR), CRYSTALLINE ROCK (CR), NON-CRYSTALLINE ROCK (NCR), COASTAL PLAIN SEDIMENTARY ROCK (CP)</p> <p>FRESH, VERY SLIGHT (V SLI.), SLIGHT (SLI.), MODERATE (MOD.), MODERATELY SEVERE (MOD. SEV.), SEVERE (SEV.), VERY SEVERE (V SEV.), COMPLETE</p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL.</p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, YIELDS SPT N VALUES > 100 BPF.</p> <p>ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF.</p> <p>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>VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT</p> <p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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>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>CAN BE GROVED 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>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>	
CONSISTENCY OR DENSENESS		MISCELLANEOUS SYMBOLS		ROCK HARDNESS		BEDDING	
<p>PRIMARY SOIL TYPE, COMPACTNESS OR CONSISTENCY, RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE), RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/F²)</p> <p>GENERALLY GRANULAR MATERIAL (NON-COHESIVE), GENERALLY SILT-CLAY MATERIAL (COHESIVE)</p>		<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION, SOIL SYMBOL, ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT, INFERRED SOIL BOUNDARY, INFERRED ROCK LINE, ALLUVIAL SOIL BOUNDARY, DIP & DIP DIRECTION OF ROCK STRUCTURES</p> <p>SPT DPT DMT VST PMT TEST BORING, AUGER BORING, CORE BORING, MONITORING WELL, PIEZOMETER INSTALLATION, SLOPE INDICATOR INSTALLATION, CONE PENETROMETER TEST, SOUNDING ROD</p>		<p>VERY HARD, HARD, MODERATELY HARD, MEDIUM HARD, SOFT, VERY SOFT</p> <p>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>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>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>CAN BE GROVED 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>CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>		<p>TERM, SPACING, THICKNESS</p> <p>VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE</p> <p>VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED</p>	
TEXTURE OR GRAIN SIZE		ABBREVIATIONS		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION	
<p>U.S. STD. SIEVE SIZE, OPENING (MM), BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE, SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)</p> <p>GRAIN SIZE: MM, IN.</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, u - UNIT WEIGHT, w - 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>		<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE 2 15/16 TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>		<p>FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>	
SOIL MOISTURE - CORRELATION OF TERMS		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		BENCH MARK	
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE, SL - SHRINKAGE LIMIT</p> <p>- SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</p> <p>- WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</p> <p>- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE</p> <p>- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>		<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE 2 15/16 TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>		<p>FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>BENCH MARK: BL-66 -L- STA. 157+29.50 126.46 RT</p> <p>ELEVATION: 769.848 FT.</p>	
PLASTICITY		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		NOTES	
<p>NONPLASTIC, LOW PLASTICITY, MED. PLASTICITY, HIGH PLASTICITY</p> <p>PLASTICITY INDEX (PI), DRY STRENGTH</p> <p>0-5, 6-15, 16-25, 26 OR MORE</p> <p>VERY LOW, SLIGHT, MEDIUM, HIGH</p>		<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE 2 15/16 TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>		<p>FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>NOTES:</p>	
COLOR		EQUIPMENT USED ON SUBJECT PROJECT		INDURATION		NOTES	
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>		<p>DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST</p> <p>ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE STEEL TEETH, TRICONE 2 15/16 TUNG-CARB., CORE BIT</p> <p>HAMMER TYPE: AUTOMATIC, MANUAL</p> <p>CORE SIZE: B, N, H</p> <p>HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST</p>		<p>FRIABLE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED</p> <p>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>		<p>NOTES:</p>	

SKEW=90°





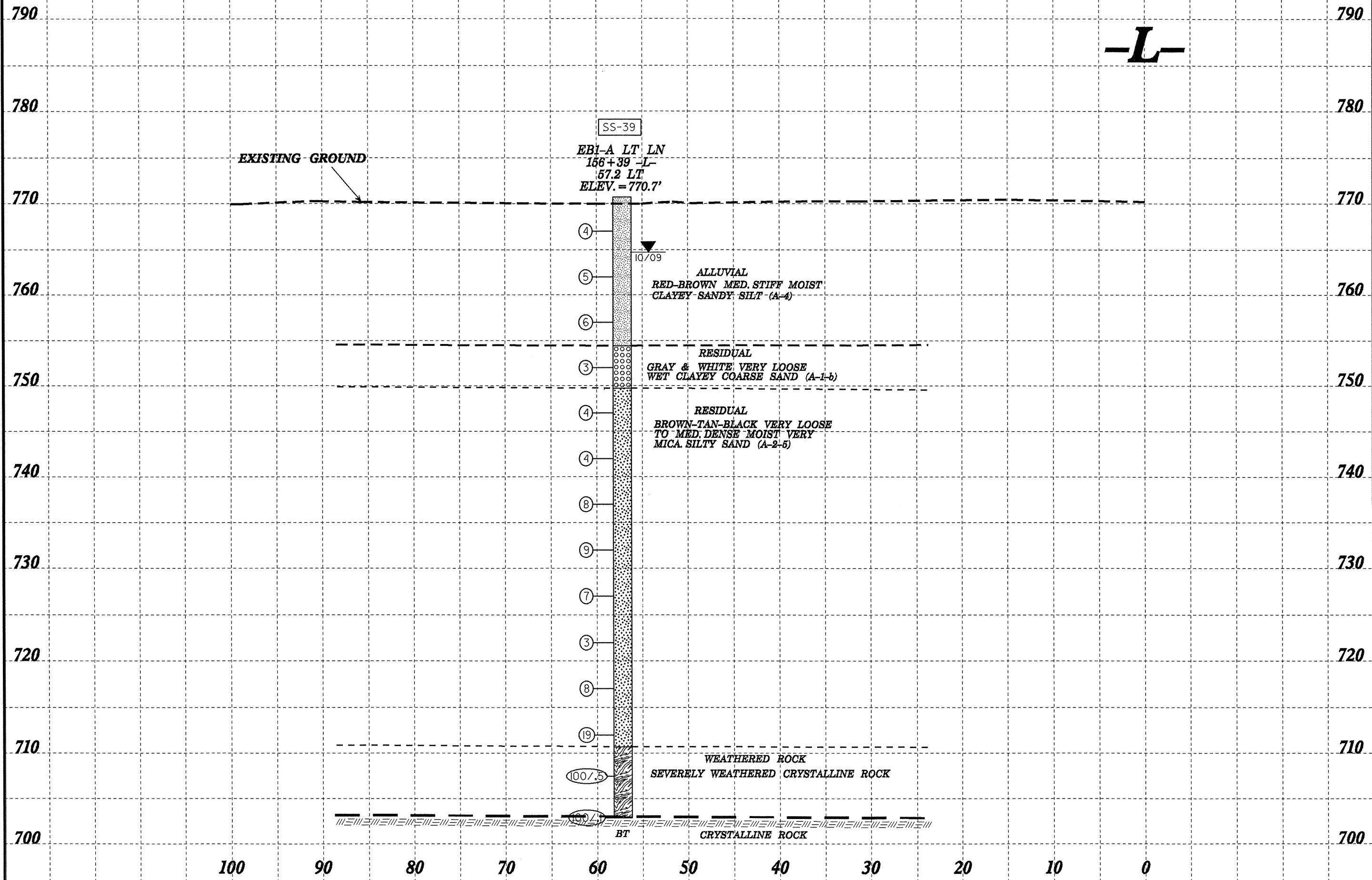
BORING DESCRIPTIONS	
(A)	ALLUVIAL, RED-BROWN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
(B)	RESIDUAL, GRAY & WHITE VERY LOOSE WET CLAYEY COARSE SAND (A-1-b)
(C)	RESIDUAL, BROWN-TAN-BLACK VERY LOOSE TO MED. DENSE MOIST VERY MICA SILTY SAND (A-2-5)
(D)	SEVERELY WEATHERED CRYSTALLINE ROCK
(E)	ALLUVIAL, BROWN, MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
(F)	ALLUVIAL, GRAY SOFT WET CLAYEY SANDY SILT (A-5)
(G)	RESIDUAL, BROWN-TAN LOOSE WET MICA CLAYEY SILTY SAND (A-2-5)
(H)	RESIDUAL, GRAY & WHITE MED. DENSE TO VERY DENSE MOIST TO WET CLAYEY SILTY COARSE SAND (A-1-b)
(I)	RESIDUAL, BROWN MED. DENSE TO VERY DENSE WET TO MOIST VERY MICA CLAYEY SILTY SAND (A-2-5)
(J)	ALLUVIAL, RED-BROWN MED. STIFF TO SOFT MOIST CLAYEY SANDY SILT (A-4)
(K)	ALLUVIAL, GRAY VERY SOFT WET CLAYEY SANDY SILT (A-5)
(L)	RESIDUAL, BROWN-TAN VERY LOOSE TO LOOSE WET VERY MICA SILTY FINE SAND (A-2-5)
(M)	RESIDUAL, GRAY & WHITE MED. DENSE TO DENSE WET TO DRY CLAYEY COARSE SAND (A-1-b)
(N)	ALLUVIAL, BROWN, SOFT TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)
(P)	ALLUVIAL, GRAY VERY SOFT WET CLAYEY SANDY SILT (A-5)
(Q)	RESIDUAL, GRAY & WHITE LOOSE TO MED. DENSE MOIST TO WET CLAYEY COARSE SAND (A-1-b)
(R)	RESIDUAL, BROWN LOOSE TO DENSE MOIST CLAYEY SILTY SAND (A-2-5)

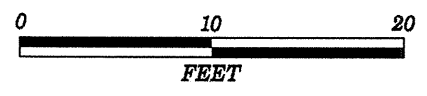


PI = 160+75.00
 EL = 781.56'
 VC = 1,350'
 K = 184

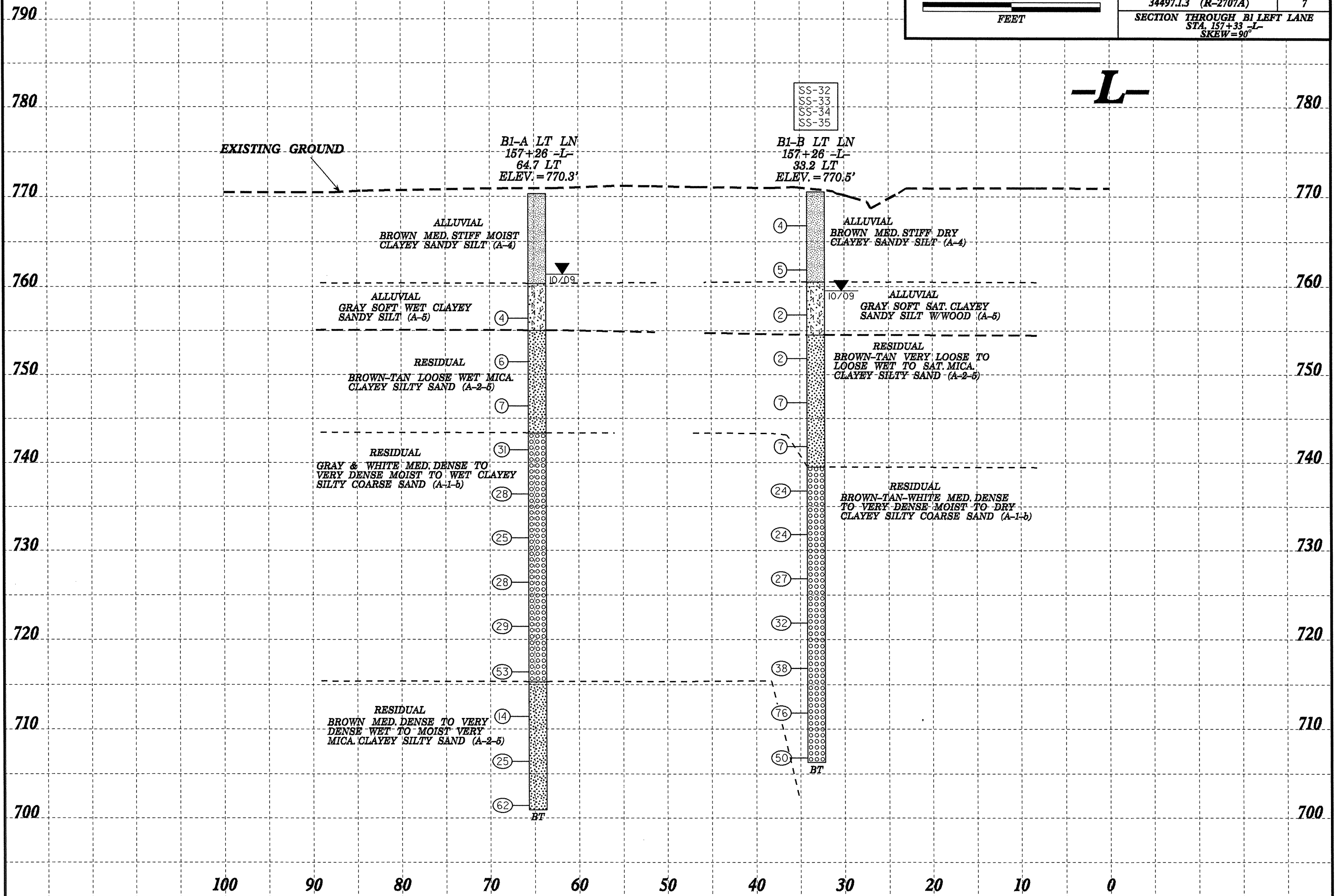
BORING DESCRIPTIONS

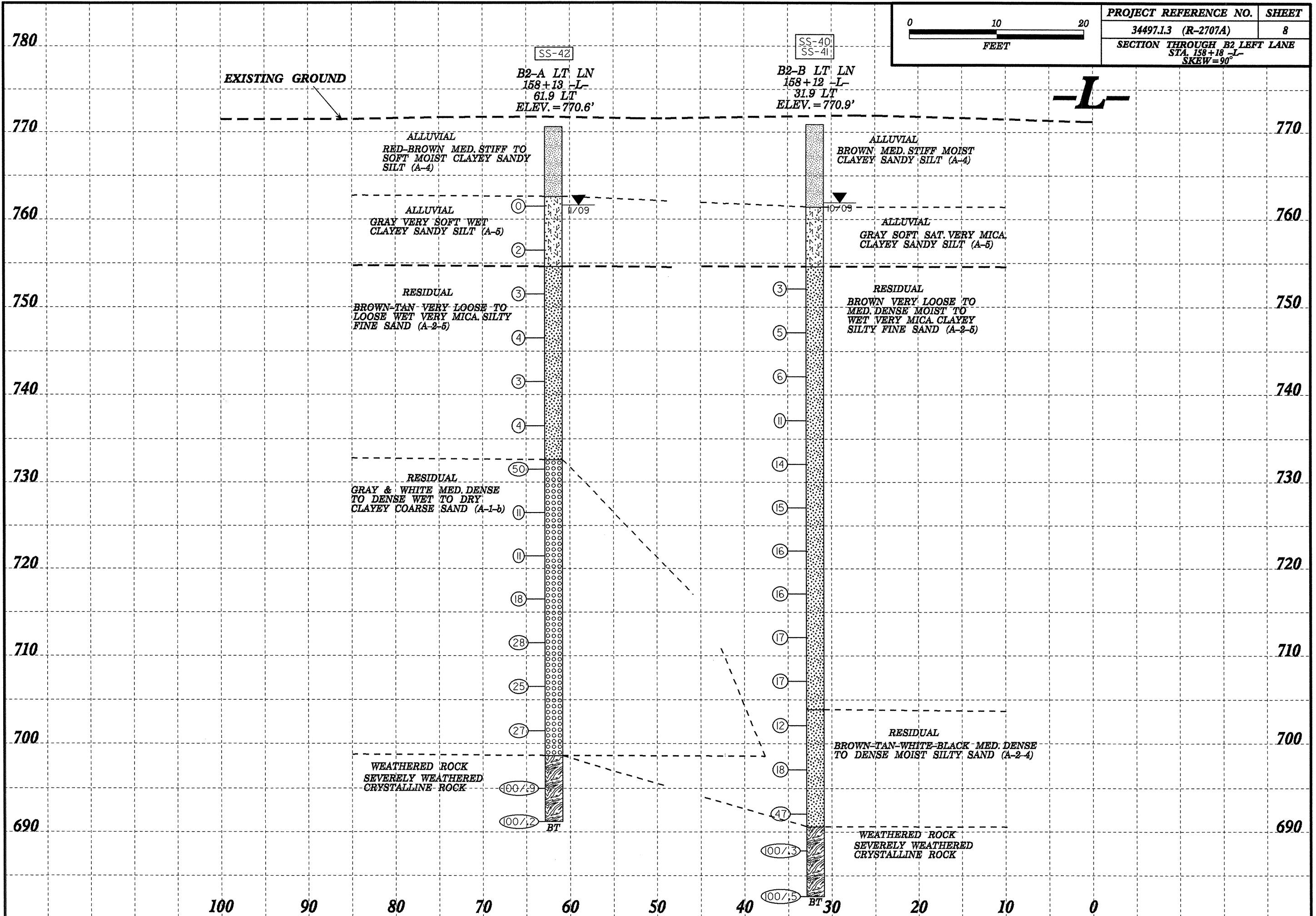
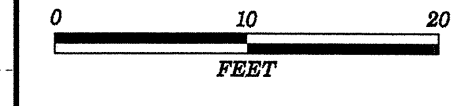
- (A) ALLUVIAL, TAN-ORANGE VERY LOOSE DRY MICA SILTY CLAYEY SAND (A-2-4)
- (B) ALLUVIAL, GRAY VERY LOOSE MOIST TO WET CLAYEY SILTY SAND (A-2-4)
- (C) RESIDUAL, TAN-ORANGE-GRAY-WHITE LOOSE MOIST MICA SILTY SAND (A-2-4)
- (D) RESIDUAL, GRAY-BROWN LOOSE MOIST VERY MICA SILTY SAND (A-2-5)
- (E) RESIDUAL, BROWN TO BROWN-ORANGE-GRAY VERY STIFF TO HARD MOIST VERY MICA SANDY SILT (A-5)
- (F) SEVERELY WEATHERED CRYSTALLINE ROCK
- (G) RESIDUAL, BROWN VERY STIFF MOIST VERY MICA SANDY SILT (A-5)
- (H) ALLUVIAL, BROWN VERY SOFT MOIST MICA LOW PLASTIC SILTY SANDY CLAY (A-6)
- (I) ALLUVIAL, GRAY VERY LOOSE MOIST TO WET MICA CLAYEY SILTY SAND (A-2-4)
- (J) RESIDUAL, TAN-BROWN-WHITE MEDIUM STIFF MOIST MICA SANDY SILT (A-5)
- (K) RESIDUAL, TAN-BROWN-WHITE MEDIUM DENSE MOIST CLAYEY SILTY SAND (A-2-5)
- (L) RESIDUAL, TAN-BROWN-WHITE LOOSE MOIST CLAYEY SILTY SAND W/LAYER OF WHITE CLAYEY SANDY GRAVEL AT 40.8' (A-2-4)
- (M) RESIDUAL, TAN-ORANGE STIFF TO VERY STIFF MOIST SANDY SILT (A-4)
- (N) ALLUVIAL, TAN MED. DENSE TO VERY LOOSE MOIST TO WET SILTY CLAYEY SAND (A-2-4)
- (P) ALLUVIAL, GRAY LOOSE WET CLAYEY SILTY SAND (A-2-4)
- (Q) ALLUVIAL, QUARTZ GRAVEL (A-1-a)
- (R) RESIDUAL, TAN LOOSE MOIST SILTY SAND (A-2-4)
- (S) RESIDUAL, TAN MED. DENSE MOIST MICA SILTY SAND W/QUARTZ PIECES (A-1-b)
- (T) RESIDUAL, TAN MED. DENSE TO DENSE MOIST MICA SILTY SAND (A-2-4)
- (U) ALLUVIAL, TAN-ORANGE VERY LOOSE MOIST MICA SILTY CLAYEY SAND (A-2-4)
- (V) ALLUVIAL, GRAY LOOSE WET CLAYEY SILTY SAND (A-2-4)
- (W) ALLUVIAL, GRAVEL
- (X) RESIDUAL, TAN-GRAY-ORANGE LOOSE TO MED. DENSE MOIST MICA SILTY SAND (A-2-4)
- (Y) RESIDUAL, TAN-BROWN-MED. DENSE TO DENSE MOIST MICA SILTY SAND (A-2-4)
- (Z) SEVERELY WEATHERED CRYSTALLINE ROCK

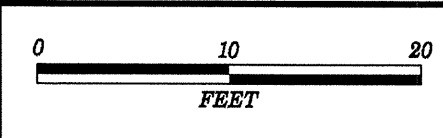




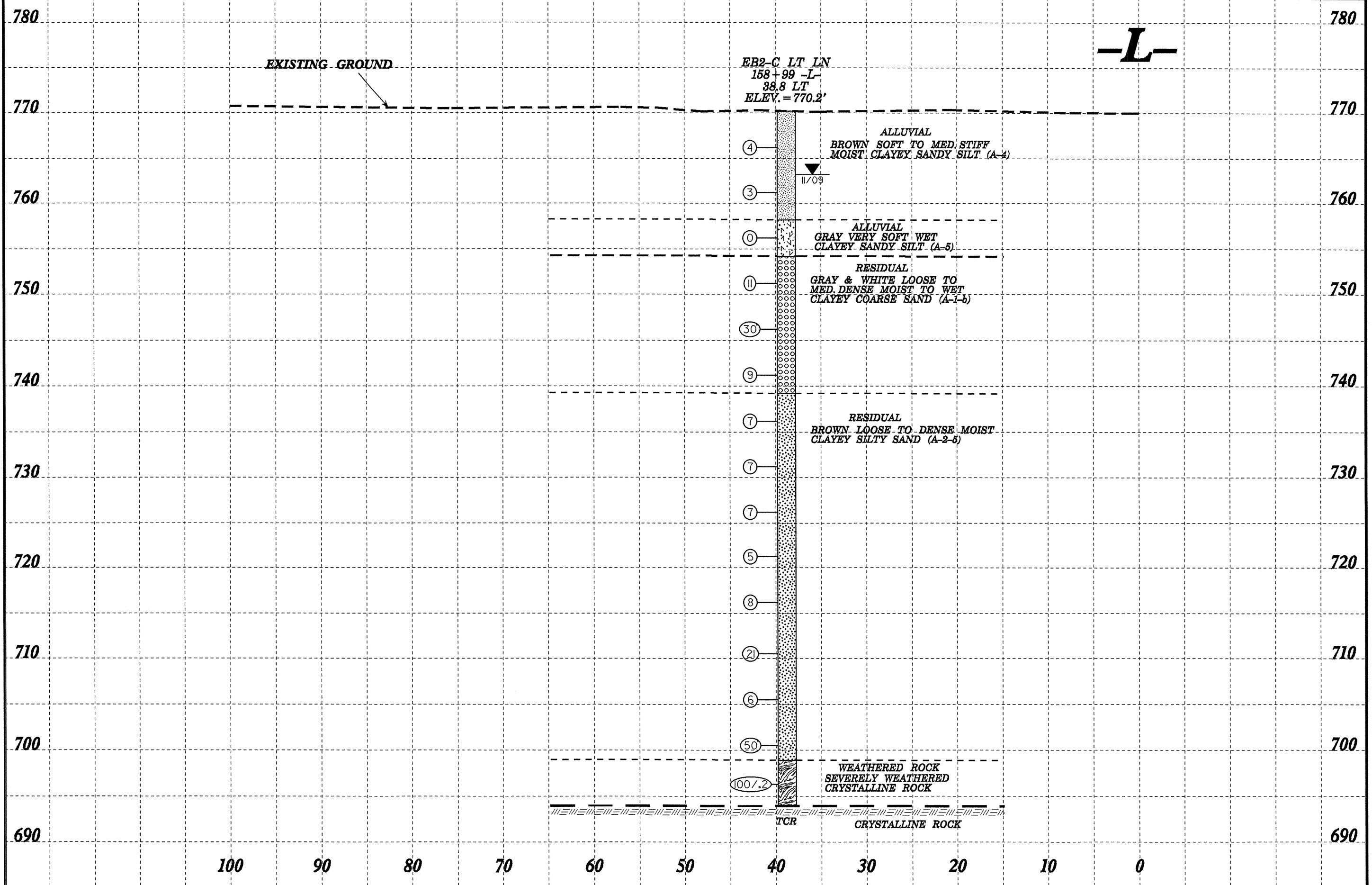
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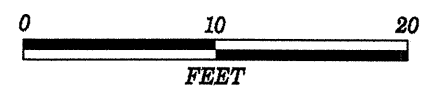




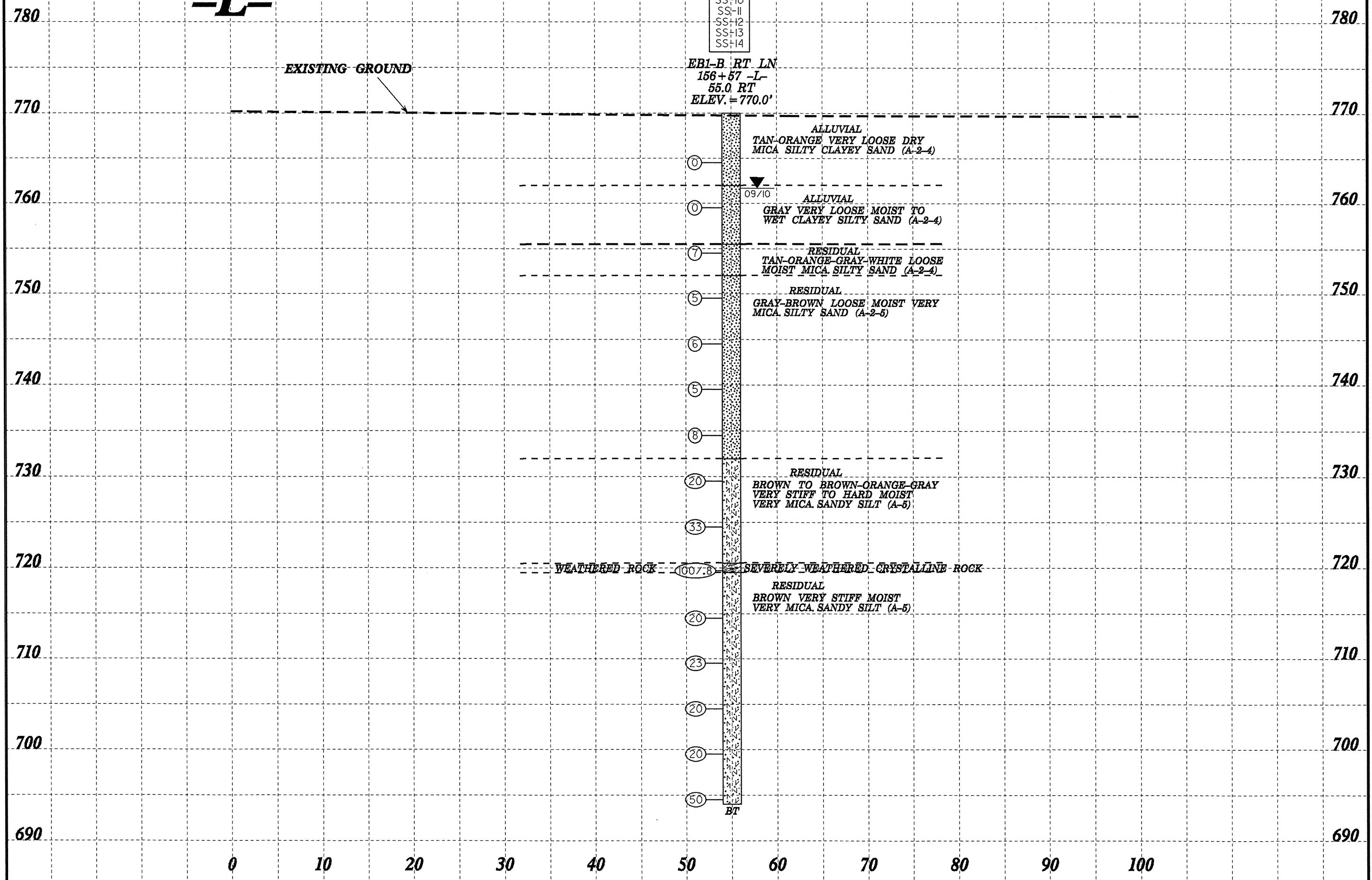


PROJECT REFERENCE NO.	SHEET
34497.1.3 (R-2707A)	9
SECTION THROUGH EB2 LEFT LANE	
STA. 159+03 -L-	
SKEW = 90°	





-L-



- SS+9
- SS+10
- SS+11
- SS+12
- SS+13
- SS+14

EBI-B RT LN
 156+57 -L-
 55.0 RT
 ELEV. = 770.0'

EXISTING GROUND

ALLUVIAL
 TAN-ORANGE VERY LOOSE DRY
 MICA SILTY CLAYEY SAND (A-2-4)

ALLUVIAL
 GRAY VERY LOOSE MOIST TO
 WET CLAYEY SILTY SAND (A-2-4)

RESIDUAL
 TAN-ORANGE-GRAY-WHITE LOOSE
 MOIST MICA SILTY SAND (A-2-4)

RESIDUAL
 GRAY-BROWN LOOSE MOIST VERY
 MICA SILTY SAND (A-2-5)

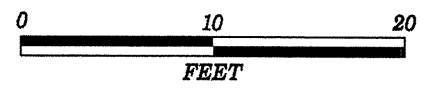
RESIDUAL
 BROWN TO BROWN-ORANGE-GRAY
 VERY STIFF TO HARD MOIST
 VERY MICA SANDY SILT (A-5)

WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK

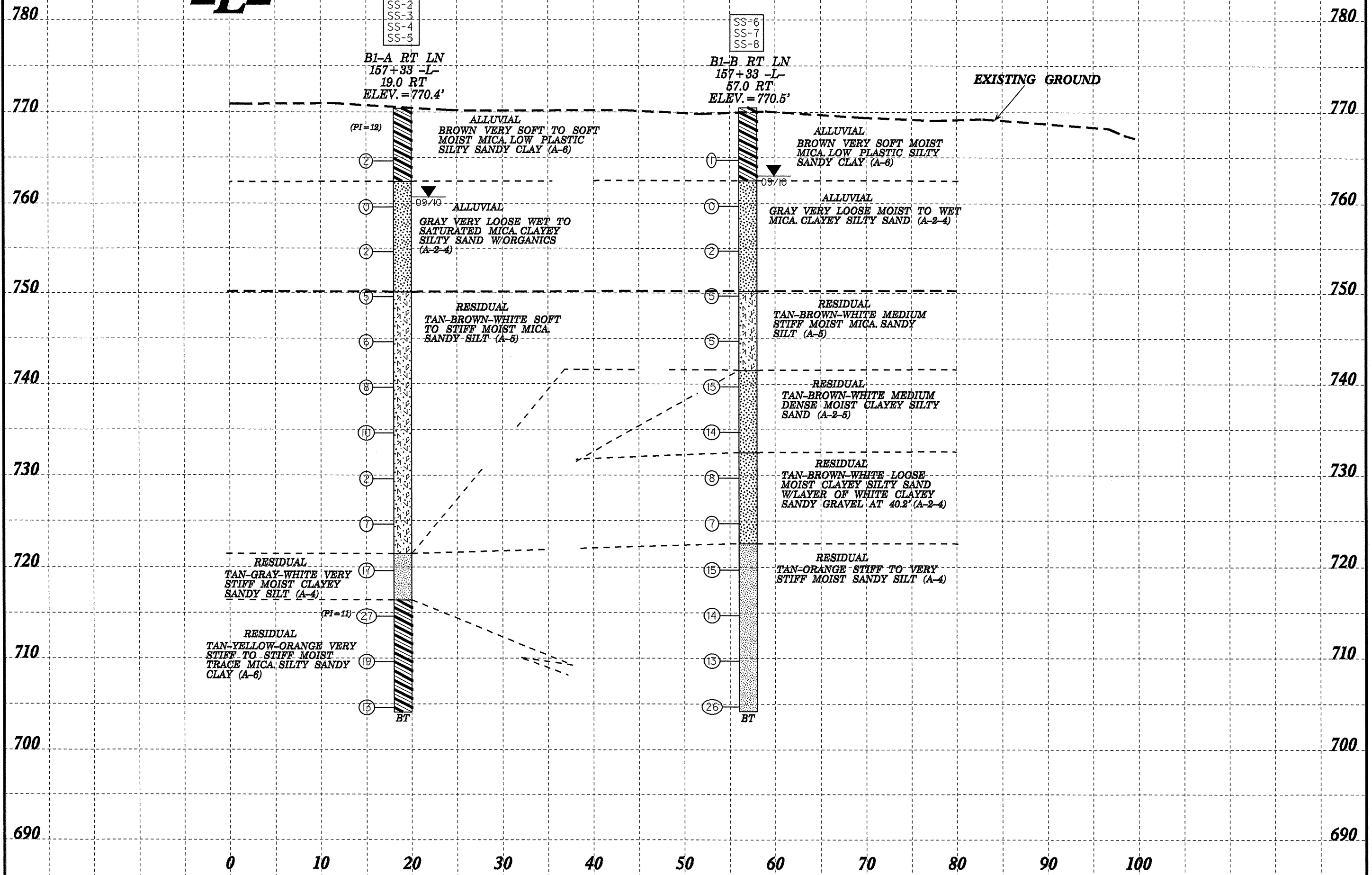
RESIDUAL
 BROWN VERY STIFF MOIST
 VERY MICA SANDY SILT (A-5)

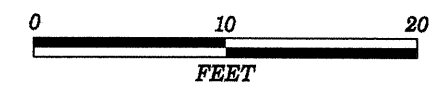
BT

-L-

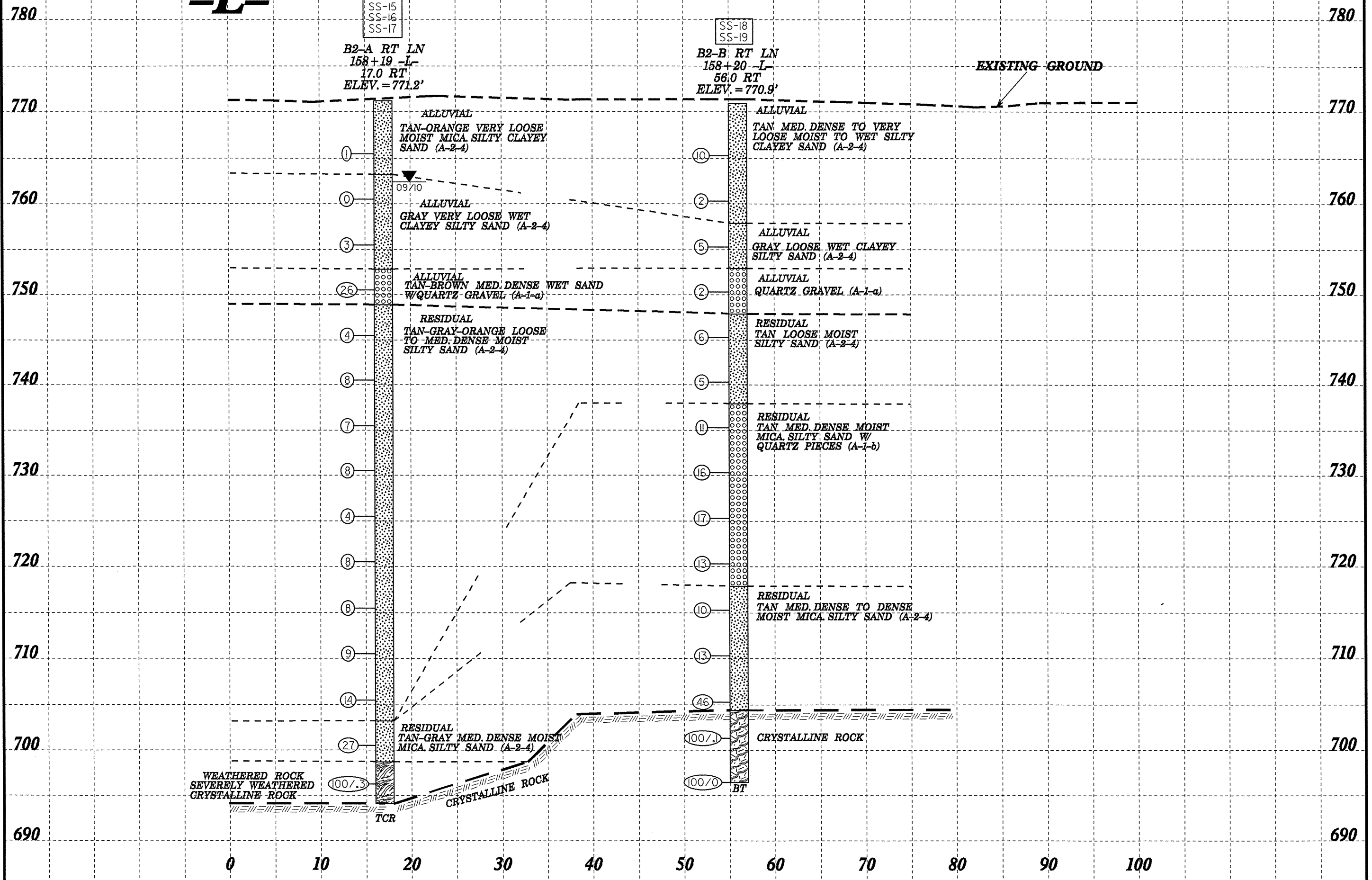


PROJECT REFERENCE NO.	SHEET
34497.1.3 (R-2707A)	11
SECTION THROUGH B1 RIGHT LANE	
STA. 157+33 -L-	
SKEW = 90°	





-L-



SS-15
SS-16
SS-17

B2-A RT LN
158+19 -L-
17.0 RT
ELEV. = 771.2'

SS-18
SS-19

B2-B RT LN
158+20 -L-
56.0 RT
ELEV. = 770.9'

EXISTING GROUND

ALLUVIAL
TAN-ORANGE VERY LOOSE
MOIST MICA SILTY CLAYEY
SAND (A-2-4)

ALLUVIAL
TAN MED. DENSE TO VERY
LOOSE MOIST TO WET SILTY
CLAYEY SAND (A-2-4)

ALLUVIAL
GRAY VERY LOOSE WET
CLAYEY SILTY SAND (A-2-4)

ALLUVIAL
GRAY LOOSE WET CLAYEY
SILTY SAND (A-2-4)

ALLUVIAL
TAN-BROWN MED. DENSE WET SAND
W/QUARTZ GRAVEL (A-1-a)

ALLUVIAL
QUARTZ GRAVEL (A-1-a)

RESIDUAL
TAN-GRAY-ORANGE LOOSE
TO-MED. DENSE MOIST
SILTY SAND (A-2-4)

RESIDUAL
TAN LOOSE MOIST
SILTY SAND (A-2-4)

RESIDUAL
TAN MED. DENSE MOIST
MICA SILTY SAND W/
QUARTZ PIECES (A-1-b)

RESIDUAL
TAN MED. DENSE TO DENSE
MOIST MICA SILTY SAND (A-2-4)

RESIDUAL
TAN-GRAY MED. DENSE MOIST
MICA SILTY SAND (A-2-4)

CRYSTALLINE ROCK

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK

CRYSTALLINE ROCK

TCR

BT

100/3

100/0

27

46

14

13

9

10

8

17

8

16

4

11

8

5

7

6

8

2

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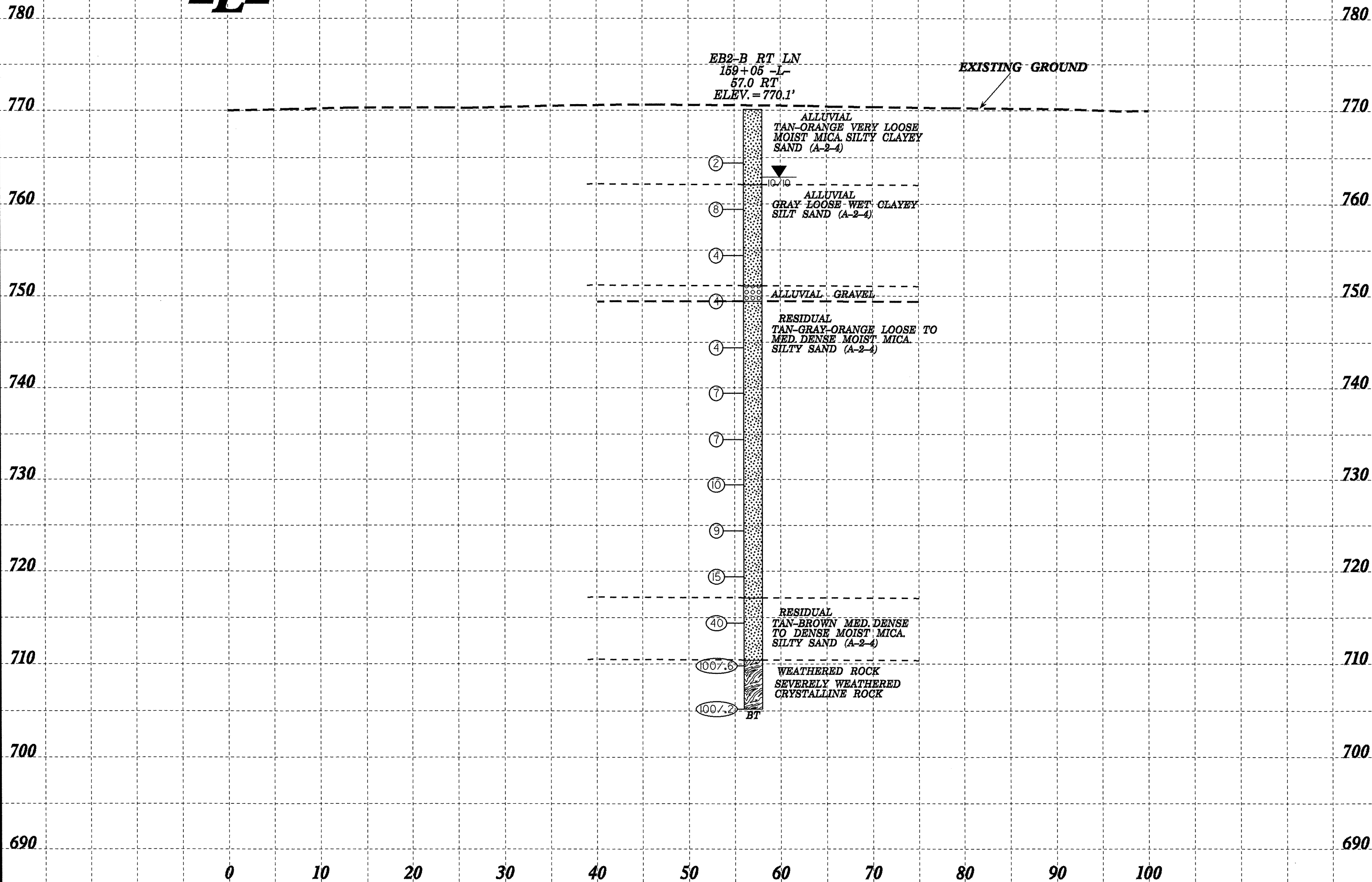
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0 10 20 30 40 50 60 70 80 90 100

780
770
760
750
740
730
720
710
700
690

780
770
760
750
740
730
720
710
700
690

-L-



EB2-B RT LN
159+05 -L-
57.0 RT
ELEV. = 770.1'

EXISTING GROUND

ALLUVIAL
TAN-ORANGE VERY LOOSE
MOIST MICA SILTY CLAYEY
SAND (A-2-4)

ALLUVIAL
GRAY LOOSE WET CLAYEY
SILT SAND (A-2-4)

ALLUVIAL GRAVEL

RESIDUAL
TAN-GRAY-ORANGE LOOSE TO
MED. DENSE MOIST MICA
SILTY SAND (A-2-4)

RESIDUAL
TAN-BROWN MED. DENSE
TO DENSE MOIST MICA
SILTY SAND (A-2-4)

WEATHERED ROCK
SEVERELY WEATHERED
CRYSTALLINE ROCK

BT

②

⑧

④

④

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⑩⑦.⑥

⑩⑦.②

10.7



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34497.1.3		TIP R-2707A		COUNTY CLEVELAND		GEOLOGIST Todd, R. W.									
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161							GROUND WTR (ft)								
BORING NO. EB1-A LT LN		STATION 156+39		OFFSET 57 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 770.7 ft		TOTAL DEPTH 67.8 ft		NORTHING 574,591		EASTING 1,214,725									
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD NW Casing w/ Advancer			HAMMER TYPE Automatic										
DRILLER Smith, M. L.		START DATE 10/27/09		COMP. DATE 10/27/09		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
775															
770													GROUND SURFACE	0.0	
	768.0	2.7	2	2	2	4						M	ALLUVIAL RED-BROWN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)		
765															
	763.0	7.7	2	3	2	5						M			
760															
	758.0	12.7	2	3	3	6						M			
755															
	753.0	17.7	3	1	2	3						W	RESIDUAL GRAY & WHITE VERY LOOSE WET CLAYEY COARSE SAND (A-1-b)	16.3	
750															
	748.0	22.7	2	2	2	3						M	RESIDUAL BROWN-TAN-BLACK VERY LOOSE TO MED. DENSE MOIST VERY MICA. SILTY SAND (A-2-5)	21.0	
745															
	743.0	27.7	3	2	2	4						M			
740															
	738.0	32.7	3	3	5	8						M			
735															
	733.0	37.7	2	3	6	9						M			
730															
	728.0	42.7	2	3	4	7						M			
725															
	723.0	47.7	2	1	2	3						M			
720															
	718.0	52.7	3	4	4	8						M			
715															
	713.0	57.7	9	9	10	19						M			
710															
	708.0	62.7	100/5											WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	60.0
705															
	703.0	67.7	100/1											CRYSTALLINE ROCK	67.7
														Boring Terminated with Standard Penetration Test Refusal at Elevation 702.9 ft in CRYSTALLINE ROCK	67.8

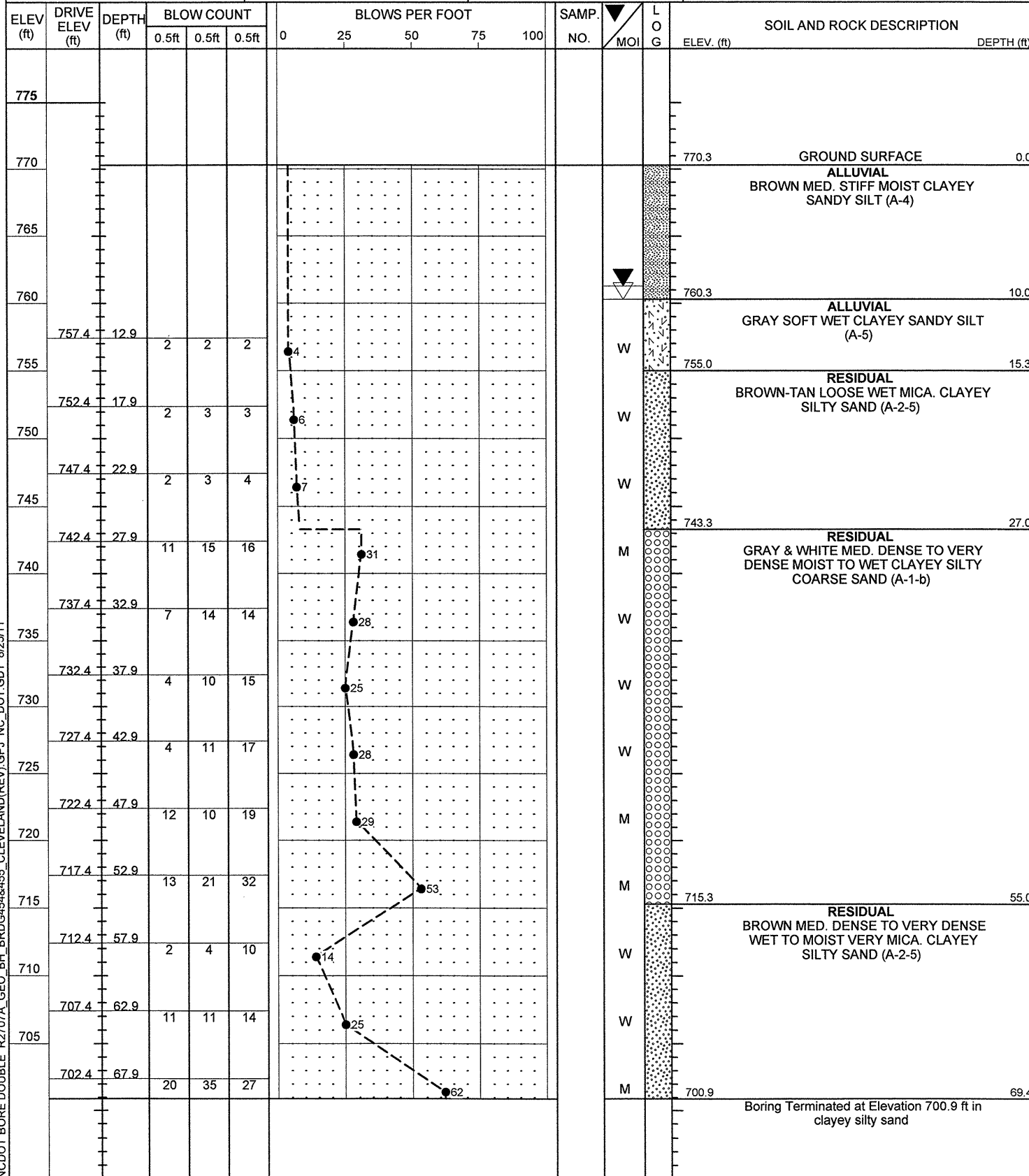
NCDOT BORE DOUBLE R2707A_GEO_BH_BRDG454&455_CLEVELAND(REV).GPJ NC_DOT_GDT 8/25/11



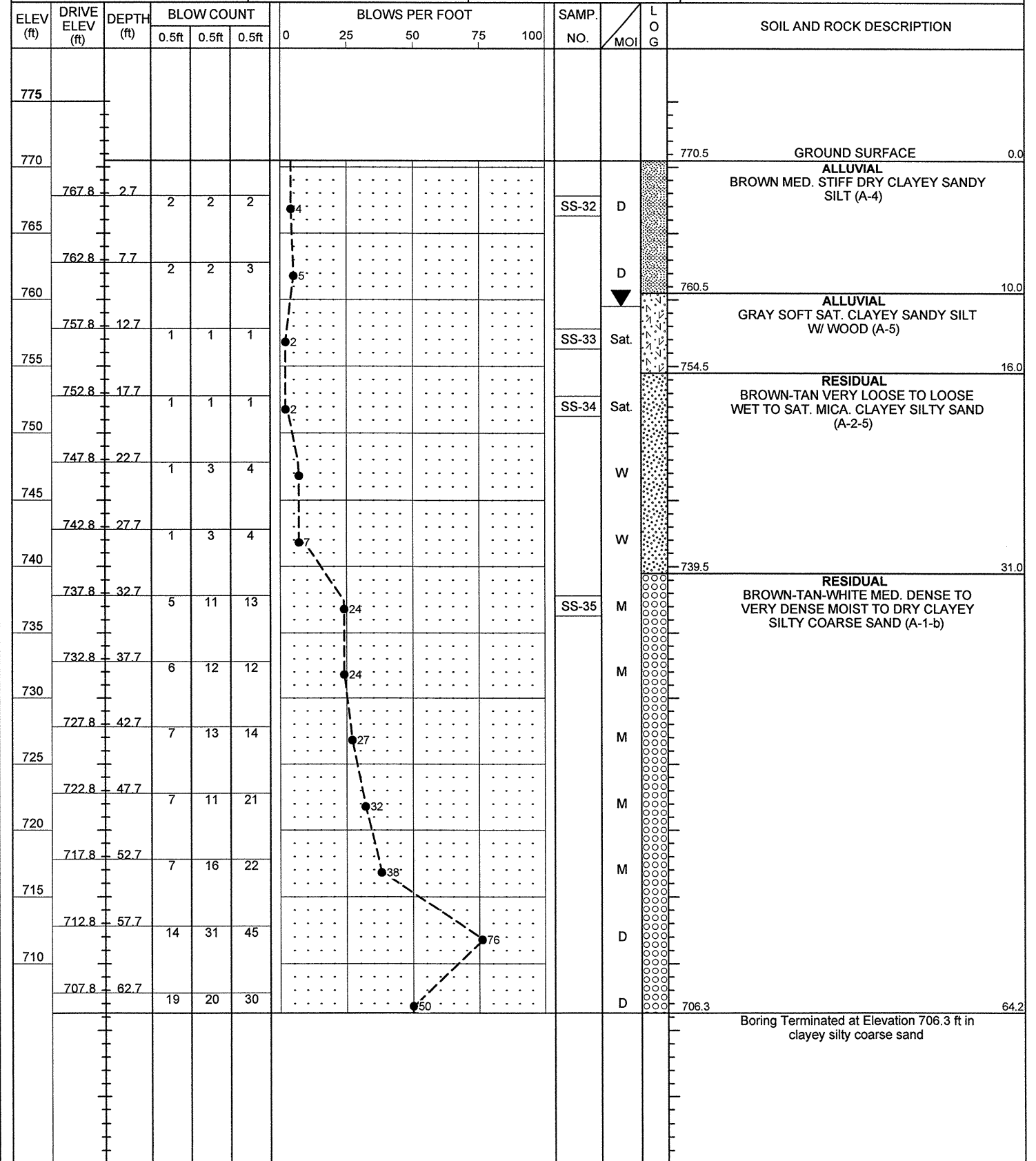
NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.	
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161				GROUND WTR (ft)
BORING NO. B1-A LT LN	STATION 157+26	OFFSET 65 ft LT	ALIGNMENT -L-	0 HR. 10.0
COLLAR ELEV. 770.3 ft	TOTAL DEPTH 69.4 ft	NORTHING 574,628	EASTING 1,214,803	24 HR. 9.0
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Smith, M. L.	START DATE 10/02/09	COMP. DATE 10/02/09	SURFACE WATER DEPTH N/A	



WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.	
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161				GROUND WTR (ft)
BORING NO. B1-B LT LN	STATION 157+26	OFFSET 33 ft LT	ALIGNMENT -L-	0 HR. 11.0
COLLAR ELEV. 770.5 ft	TOTAL DEPTH 64.2 ft	NORTHING 574,599	EASTING 1,214,813	24 HR. 11.0
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic	
DRILLER Smith, M. L.	START DATE 10/01/09	COMP. DATE 10/01/09	SURFACE WATER DEPTH N/A	



NCDOT BORE DOUBLE R2707A_GEO_BH_BRD454&455_CLEVELAND(REV).GPJ_NC_DOT.GDT 8/25/11



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161			GROUND WTR (ft)
BORING NO. B2-B LT LN	STATION 158+12	OFFSET 32 ft LT	ALIGNMENT -L-
COLLAR ELEV. 770.9 ft	TOTAL DEPTH 88.3 ft	NORTHING 574,629	EASTING 1,214,893
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Smith, M. L.	START DATE 10/29/09	COMP. DATE 10/29/09	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				
775														
770													GROUND SURFACE	0.0
765													ALLUVIAL BROWN MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	
760													ALLUVIAL GRAY SOFT SAT. VERY MICA. CLAYEY SANDY SILT (A-5)	9.5
755													RESIDUAL BROWN VERY LOOSE TO MED. DENSE MOIST TO WET VERY MICA. CLAYEY SILTY FINE SAND (A-2-5)	16.3
750	753.1	17.8	2	1	2						3	SS-40		
745	748.1	22.8	1	2	3						4	W		
740	743.1	27.8	2	3	3						5	W		
735	738.1	32.8	4	5	6						6	W		
730	733.1	37.8	3	6	8						7	M		
725	728.1	42.8	3	6	9						8	M		
720	723.1	47.8	3	6	10						9	M		
715	718.1	52.8	3	6	10						10	M		
710	713.1	57.8	3	7	10						11	M		
705	708.1	62.8	3	8	9						12	M		
700	703.1	67.8	3	3	9						13	SS-41	RESIDUAL BROWN-TAN-WHITE-BLACK MED. DENSE TO DENSE MOIST SILTY SAND (A-2-4)	67.0
695	698.1	72.8	3	8	10						14	M		

WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161			GROUND WTR (ft)
BORING NO. B2-B LT LN	STATION 158+12	OFFSET 32 ft LT	ALIGNMENT -L-
COLLAR ELEV. 770.9 ft	TOTAL DEPTH 88.3 ft	NORTHING 574,629	EASTING 1,214,893
DRILL RIG/HAMMER EFF./DATE CME-550X		DRILL METHOD NW Casing w/ Advancer	HAMMER TYPE Automatic
DRILLER Smith, M. L.	START DATE 10/29/09	COMP. DATE 10/29/09	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				
695														
690	693.1	77.8	2	5	42						47	M	RESIDUAL BROWN-TAN-WHITE-BLACK MED. DENSE TO DENSE MOIST SILTY SAND (A-2-4) (continued)	80.3
685	688.1	82.8	100/3								100/3		WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	
	683.1	87.8	100/5								100/5		Boring Terminated at Elevation 682.6 ft in SEVERELY WEATHERED CRYSTALLINE ROCK	88.3

NCDOT BORE DOUBLE R2707A_GEO_BH_BRD454&455_CLEVELAND(REV) GPJ NC_DOT.GDT 8/25/11



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.		GROUND WTR (ft)
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161					0 HR. 11.0
BORING NO. EB2-C LT LN	STATION 158+99	OFFSET 39 ft LT	ALIGNMENT -L-	24 HR. 7.0	
COLLAR ELEV. 770.2 ft	TOTAL DEPTH 76.3 ft	NORTHING 574,670	EASTING 1,214,969		

DRILL RIG/HAMMER EFF./DATE CME-550X	DRILL METHOD NW Casing w/ Advancer / Tri-cone	HAMMER TYPE Automatic
DRILLER Smith, M. L.	START DATE 11/09/09	COMP. DATE 11/09/09
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				
775														
770													GROUND SURFACE	0.0
765	767.2	3.0	1	2	2						4	M	ALLUVIAL BROWN SOFT TO MED. STIFF MOIST CLAYEY SANDY SILT (A-4)	
760	762.2	8.0	1	1	2						3	M		
755	757.2	13.0	1	0	0						0	W	ALLUVIAL GRAY VERY SOFT WET CLAYEY SANDY SILT (A-5)	12.0
750	752.2	18.0	4	5	6						11	W	RESIDUAL GRAY & WHITE LOOSE TO MED. DENSE MOIST TO WET CLAYEY COARSE SAND (A-1-b)	16.0
745	747.2	23.0	11	15	15						30	M		
740	742.2	28.0	1	3	6						9	M		
735	737.2	33.0	1	3	4						7	M	RESIDUAL BROWN LOOSE TO DENSE MOIST CLAYEY SILTY SAND (A-2-5)	31.0
730	732.2	38.0	1	3	4						7	M		
725	727.2	43.0	1	3	4						7	M		
720	722.2	48.0	2	1	4						5	M		
715	717.2	53.0	1	3	5						8	M		
710	711.5	58.7	4	7	14						21	M		
705	706.5	63.7	1	3	3						6	M		
700	701.5	68.7	11	31	19						50	M		
695	696.5	73.7	100/2										WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK	71.3

NCDOT BORE DOUBLE R2707A_GEO_BH_BRDG454&455_CLEVELAND(REV).GPJ_NC_DOT.GDT 8/25/11

WBS 34497.1.3	TIP R-2707A	COUNTY CLEVELAND	GEOLOGIST Todd, R. W.		GROUND WTR (ft)
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161					0 HR. 11.0
BORING NO. EB2-C LT LN	STATION 158+99	OFFSET 39 ft LT	ALIGNMENT -L-	24 HR. 7.0	
COLLAR ELEV. 770.2 ft	TOTAL DEPTH 76.3 ft	NORTHING 574,670	EASTING 1,214,969		

DRILL RIG/HAMMER EFF./DATE CME-550X	DRILL METHOD NW Casing w/ Advancer / Tri-cone	HAMMER TYPE Automatic
DRILLER Smith, M. L.	START DATE 11/09/09	COMP. DATE 11/09/09
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				
695														
													Match Line	
													Boring Terminated by Tri-Cone Roller Bit Refusal at Elevation 693.9 ft on CRYSTALLINE ROCK	76.3



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 34497.1.3		TIP R-2707A		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.											
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161							GROUND WTR (ft)										
BORING NO. EB1-B RT LN		STATION 156+57		OFFSET 55 ft RT		ALIGNMENT -L-											
COLLAR ELEV. 770.0 ft		TOTAL DEPTH 76.0 ft		NORTHING 574,492		EASTING 1,214,780											
DRILL RIG/HAMMER EFF./DATE CME-550X				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic											
DRILLER Smith, C. L.		START DATE 09/27/10		COMP. DATE 09/27/10		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
770															770.0	GROUND SURFACE	0.0
765	765.5	4.5	1	0	0							SS-9	D		762.0	ALLUVIAL TAN-ORANGE VERY LOOSE DRY MICA SILTY CLAYEY SAND (A-2-4)	8.0
760	760.5	9.5	0	0	0							SS-10	W			ALLUVIAL GRAY VERY LOOSE MOIST TO WET CLAYEY SILTY SAND (A-2-4)	
755	755.5	14.5	4	4	3							SS-11	M		755.5	RESIDUAL TAN-ORANGE-GRAY-WHITE LOOSE MOIST MICA. SILTY SAND (A-2-4)	14.5
750	750.5	19.5	1	2	3							SS-12	M		752.0	RESIDUAL GRAY-BROWN LOOSE MOIST VERY MICA. SILTY SAND (A-2-5)	18.0
745	745.5	24.5	1	3	3							SS-13	M				
740	740.5	29.5	1	2	3								M				
735	735.5	34.5	2	3	5								M				
730	730.5	39.5	4	5	15							SS-14	M		732.0	RESIDUAL BROWN TO BROWN-ORANGE-GRAY VERY STIFF TO HARD MOIST VERY MICA. SANDY SILT (A-5)	38.0
725	725.5	44.5	10	15	18								M				
720	720.5	49.5	33	67/3									M		720.5 719.5	WEATHERED ROCK SEVERELY WEATHERED CRYSTALLINE ROCK RESIDUAL BROWN VERY STIFF MOIST VERY MICA. SANDY SILT (A-5)	49.5 50.5
715	715.5	54.5	15	10	10								M				
710	710.5	59.5	7	10	13								M				
705	705.5	64.5	6	8	12								M				
700	700.5	69.5	8	10	10								M				
695	695.5	74.5	7	22	28								M		694.0		76.0
Boring Terminated at Elevation 694.0 ft in sandy silt																	

NCDOT BORE DOUBLE R2707A_GEO_BH_BRDG454&455_CLEVELAND(REV)GPI NC_DOT.GDT 8/25/11

WBS 34497.1.3		TIP R-2707A		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.								
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161							GROUND WTR (ft)							
BORING NO. B1-A RT LN		STATION 157+33		OFFSET 19 ft RT		ALIGNMENT -L-								
						0 HR.	6.4							
COLLAR ELEV. 770.4 ft		TOTAL DEPTH 66.3 ft		NORTHING 574,553		EASTING 1,214,839								
						24 HR.	9.7							
DRILL RIG/HAMMER EFF./DATE CME-550X				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic								
DRILLER Smith, C. L.		START DATE 09/16/10		COMP. DATE 09/16/10		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
775														
770													770.4	GROUND SURFACE 0.0
765	765.6	4.8	0	1	1						SS-1	W	762.4	ALLUVIAL BROWN VERY SOFT TO SOFT MOIST MICA. LOW PLASTIC (PI=12) SILTY SANDY CLAY (A-6) 8.0
760	760.6	9.8	0	0	0					WOH				ALLUVIAL GRAY VERY LOOSE WET TO SATURATED MICA. CLAYEY SILTY SAND W/ ORGANICS (A-2-4)
755	755.6	14.8	0	1	1						SS-2	W		
750	750.6	19.8	1	2	3						SS-3	M	750.1	RESIDUAL TAN-BROWN-WHITE SOFT TO STIFF MOIST MICA. SANDY SILT (A-5) 20.3
745	745.6	24.8	2	3	3							M		
740	740.6	29.8	3	3	5							M		
735	735.6	34.8	3	4	6							M		
730	730.6	39.8	1	1	1							M		
725	725.6	44.8	2	2	5							M		
720	720.6	49.8	5	6	11						SS-4	M	721.4	RESIDUAL TAN-GRAY-WHITE VERY STIFF MOIST CLAYEY SANDY SILT (A-4) 49.0
715	715.6	54.8	6	9	18						SS-5	M	716.4	RESIDUAL TAN-YELLOW-ORANGE VERY STIFF TO STIFF MOIST TRACE MICA. SILTY SANDY CLAY (A-6) 54.0
710	710.6	59.8	6	7	12							M		
705	705.6	64.8	3	4	9							M	704.1	Boring Terminated at Elevation 704.1 ft in silty sandy clay 66.3

NC DOT BORE DOUBLE R2707A_GEO_BH_BRDG454&455_CLEVELAND(REV).GPJ_NC_DOT.GDT 8/25/11

WBS 34497.1.3		TIP R-2707A		COUNTY CLEVELAND		GEOLOGIST Stickney, J. K.								
SITE DESCRIPTION DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161							GROUND WTR (ft)							
BORING NO. B1-B RT LN		STATION 157+33		OFFSET 57 ft RT		ALIGNMENT -L-								
						0 HR.	7.0							
COLLAR ELEV. 770.5 ft		TOTAL DEPTH 66.3 ft		NORTHING 574,517		EASTING 1,214,853								
						24 HR.	7.5							
DRILL RIG/HAMMER EFF./DATE CME-550X				DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic								
DRILLER Smith, C. L.		START DATE 09/20/10		COMP. DATE 09/20/10		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
775														
770													770.5	GROUND SURFACE 0.0
765	765.7	4.8	1	0	1								762.5	ALLUVIAL BROWN VERY SOFT MOIST MICA. LOW PLASTIC SILTY SANDY CLAY (A-6) 8.0
760	760.7	9.8	0	0	0					WOH				ALLUVIAL GRAY VERY LOOSE MOIST TO WET MICA. CLAYEY SILTY SAND (A-2-4)
755	755.7	14.8	1	1	1									
750	750.7	19.8	2	2	3								750.2	RESIDUAL TAN-BROWN-WHITE MEDIUM STIFF MOIST MICA. SANDY SILT (A-5) 20.3
745	745.7	24.8	1	2	3									
740	740.7	29.8	3	6	9									
735	735.7	34.8	3	6	8									
730	730.7	39.8	8	4	4									
725	725.7	44.8	3	4	3									
720	720.7	49.8	5	7	8						SS-6	M	732.5	RESIDUAL TAN-BROWN-WHITE MEDIUM DENSE MOIST CLAYEY SILTY SAND (A-2-5) 38.0
715	715.7	54.8	5	7	7									
710	710.7	59.8	5	5	8									
705	705.7	64.8	10	11	15									
													704.2	Boring Terminated at Elevation 704.2 ft in sandy silt 66.3

TEST RESULTS

PROJECT: 34497.1.3 R-2707A

COUNTY: CLEVELAND

SITE DESCRIPTION: DUAL BRIDGES 454 & 455 OVER BEAVERDAM CREEK ON US 74 BETWEEN SR 1315 & SR 1161

SOIL SAMPLE RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	N	L.L.	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC	UNIT WT. (d)	VOID RATIO
								C. SAND	F. SAND	SILT	CLAY	10	40	200				
EB1-A LT LN																		
SS-39	57.0 LT	156+39	22.70-24.20	A-2-5(0)	4	42	4	24.4	53.3	14.1	8.1	99	89	30				
B1-B LT LN																		
SS-32	33.0 LT	157+26	2.70-4.20	A-4(2)	4	31	8	3.0	52.7	18.0	26.3	100	100	56				
SS-33	33.0 LT	157+26	12.70-14.20	A-5(0)	2	53	NP	28.3	38.8	18.8	14.1	98	87	36				
SS-34	33.0 LT	157+26	17.70-19.20	A-2-5(0)	2	49	NP	22.8	50.9	16.2	10.1	96	83	34				
SS-35	33.0 LT	157+26	32.70-34.20	A-1-b(0)	24	27	4	57.2	20.2	12.5	10.1	87	48	23				
B2-A LT LN																		
SS-42	62.0 LT	158+13	38.10-39.60	A-1-b(0)	50	21	NP	62.3	21.0	6.7	10.1	75	38	15				
B2-B LT LN																		
SS-40	32.0 LT	158+12	17.80-19.30	A-2-5(0)	3	43	NP	19.8	57.5	14.7	8.1	100	95	30				
SS-41	32.0 LT	158+12	67.80-69.30	A-2-4(0)	12	35	5	25.4	46.2	18.3	10.1	90	79	33				
EB1-B RT LN																		
SS-9	55.0 RT	156+57	5.00-6.00	A-2-4(0)	0	23	4	38.1	32.0	13.6	16.3	92	70	32				
SS-10	55.0 RT	156+57	10.00-11.00	A-2-4(0)	0	36	7	35.6	32.4	21.8	10.2	94	74	34				
SS-11	55.0 RT	156+57	15.00-16.00	A-2-4(0)	7	27	2	50.3	29.5	12.0	8.1	97	67	24				
SS-12	55.0 RT	156+57	20.00-21.00	A-2-5(0)	5	42	3	37.5	44.6	13.8	4.1	83	63	22				
SS-13	55.0 RT	156+57	25.00-26.00	A-2-5(0)	6	43	1	56.6	31.6	9.8	2.0	94	63	15				
SS-14	55.0 RT	156+57	40.00-41.00	A-5(0)	20	41	5	23.8	49.7	20.4	6.1	99	86	36				
B1-A RT LN																		
SS-1	19.0 RT	157+33	5.30-6.30	A-6(4)	2	32	12	15.5	34.4	23.6	26.5	100	96	56				
SS-2	19.0 RT	157+33	15.30-16.30	A-2-4(0)	2	26	NP	19.3	54.6	13.8	12.2	100	97	32				
SS-3	19.0 RT	157+33	20.30-21.30	A-5(0)	5	48	5	25.3	47.0	19.6	8.1	92	76	36				
SS-4	19.0 RT	157+33	50.30-51.30	A-4(2)	17	38	10	21.4	42.2	26.3	10.2	98	90	44				
SS-5	19.0 RT	157+33	55.30-56.30	A-6(2)	27	36	11	22.8	43.2	23.8	10.2	100	90	43				
B1-B RT LN																		
SS-6	57.0 RT	157+33	30.30-31.30	A-2-5(0)	15	42	5	36.3	35.4	16.1	12.2	92	71	32				
SS-7	57.0 RT	157+33	40.30-41.30	A-2-4(0)	8	35	5	43.0	33.0	15.9	8.1	76	53	23				
SS-8	57.0 RT	157+33	50.30-51.30	A-4(0)	15	33	3	26.1	47.3	20.6	6.1	100	94	37				
B2-A RT LN																		
SS-15	17.0 RT	158+19	20.20-21.20	A-1-a(0)	26	26	NP	64.6	24.4	6.9	4.1	48	24	7				
SS-16	17.0 RT	158+19	25.20-26.20	A-2-4(0)	4	37	4	23.2	49.1	19.6	8.1	97	90	35				
SS-17	17.0 RT	158+19	70.20-71.20	A-2-4(0)	27	39	4	31.2	47.5	15.3	6.1	84	68	24				
B2-B RT LN																		
SS-18	56.0 RT	158+20	14.60-16.10	A-2-4(0)	5	26	4	24.8	46.6	14.3	14.3	100	93	34				
SS-19	56.0 RT	158+20	39.60-41.10	A-1-b(0)	16	31	3	45.6	32.6	15.7	6.1	72	50	20				
CREEK																		
S-20			0.00-1.00	A-1-b(0)		26	NP	82.3	17.2	0.5	0.0	91	44	1				



FIELD SCOUR REPORT

WBS: 34497.1.3 TIP: R-2707A COUNTY: CLEVELAND

DESCRIPTION(1): DUAL STRUCTURES (454 & 455) OVER BEAVERDAM CREEK.

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel pos:
 Other (explain)

Bridge No.: N/A Length: Total Bents: Bents in Channel: Bents in Floodplain:
 Foundation Type:

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: N/A

Interior Bents: N/A

Channel Bed: NONE

Channel Bank: SOME SLOUGHING OF BANKS ON EASTERN SIDE OF CREEK.

EXISTING SCOUR PROTECTION

Type(3): NONE

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): N/A

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): COARSE SILTY SAND (A-1-b) AS S-20.

Channel Bank Material(8): SILTY/CLAYEY FINE SAND (A-2-4) AS SS-18.

Channel Bank Cover(9): TREES OF VARIOUS DIAMETERS, SMALL BUSHES AND VINES.

Floodplain Width(10): APPROXIMATELY 500'

Floodplain Cover(11): SHORT GRASSES AND TREES.

Stream is(12): Aggrading Degrading Static

Channel Migration Tendency(13): MODERATE TENDENCY FOR EASTWARD MIGRATION.

Observations and Other Comments: NONE

DESIGN SCOUR ELEVATIONS(14) Feet Meters

	BENTS									
	B1	B2								
EASTBOUND	765.3	766								
WESTBOUND	765.3	766								
			ELEVS.	SHOWN	ARE	FOR	100 YR	EVENT		

Comparison of DSE to Hydraulics Unit theoretical scour:
 THE GEOTECHNICAL DSE'S MATCH THE HYDRAULICS UNIT THEORETICAL SCOUR FOR THE 100 YR. EVENT.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

Bed or Bank									
Sample No.									
Retained #4									
Passed #10		SEE	SAMPLE	RESULTS					
Passed #40									
Passed #200									
Coarse Sand									
Fine Sand									
Silt									
Clay									
LL									
PI									
AASHTO									
Station									
Offset									
Depth									

Reported by: JP ROGERS Date: 9/30/2010