

REFERENCE: BR-0042

PROJECT: 67042

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM COUNTY
PROJECT DESCRIPTION REPLACE BRIDGE NO. 116 ON
SR 2600 OVER US 29

INVENTORY

CONTENTS

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>
-L-	11+54.68 - 29+04.98	4-5
-Y-	10+00.00 - 18+00.00	4-5
-Y1-	11+70.00 - 12+80.97	4
-Y2-	10+12.08 - 11+45.00	4
-Y3-	10+18.54 - 12+55.00	4
-Y4-	11+50.00 - 14+08.71	4

CROSS SECTIONS

<u>LINE</u>	<u>STATION</u>	<u>SHEETS</u>
-L-	12+50.00 - 28+50.00	6-15
-Y-	11+00.00 - 16+50.00	16-24
-Y1-	11+70.00 - 12+50.00	25
-Y2-	10+50.00 - 12+50.00	26-27
-Y3-	10+50.00 - 12+50.00	28
-Y4-	13+50.00	29

APPENDICES

<u>APPENDIX</u>	<u>TITLE</u>	<u>SHEETS</u>
A	LABORATORY RESULTS	30-43

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0042	1	45

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

- NOTES:
- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

C. DRISCOLL

TRIGON EXPLORATIONS

INVESTIGATED BY C. DRISCOLL

DRAWN BY T. WELLS

CHECKED BY T. WELLS

SUBMITTED BY KLEINFELDER, INC.

DATE AUGUST 2019

Prepared in the Office of:



DocuSigned by:
Thomas R. Wells 8/27/2019

7DA5D2D05187480 SIGNATURE DATE

**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

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

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-1-b</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> </tr> <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> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>35 MX 35 MX</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>36 MN 36 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>- 6 MX</td> <td>- 40 MX</td> <td>41 MN 10 MX</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>40 MX 10 MX</td> <td>41 MN 11 MN</td> <td>40 MX 10 MX</td> <td>SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td>HIGHLY ORGANIC SOILS</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="3">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> </tr> <tr> <td colspan="4" style="text-align: center;">CONSISTENCY OR DENSENESS</td> </tr> <tr> <td colspan="4"> <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/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 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>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">TEXTURE OR GRAIN SIZE</td> </tr> <tr> <td colspan="4"> <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> <tr> <th></th> <th>4.75</th> <th>2.00</th> <th>0.42</th> <th>0.25</th> <th>0.075</th> <th>0.053</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.E. 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> </td> </tr> <tr> <td colspan="4" style="text-align: center;">SOIL MOISTURE - CORRELATION OF TERMS</td> </tr> <tr> <td colspan="4"> <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 SHRINKAGE LIMIT</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> </td> </tr> <tr> <td colspan="4" style="text-align: center;">PLASTICITY</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">COLOR</td> </tr> <tr> <td colspan="4"> <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> </td> </tr> <tr> <td colspan="4" style="text-align: center;">GRADATION</td> </tr> <tr> <td colspan="4"> <p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">ANGULARITY OF GRAINS</td> </tr> <tr> <td colspan="4"> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">MINERALOGICAL COMPOSITION</td> </tr> <tr> <td colspan="4"> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">COMPRESSIBILITY</td> </tr> <tr> <td colspan="4"> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">PERCENTAGE OF MATERIAL</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">GROUND WATER</td> </tr> <tr> <td colspan="4"> <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> </td> </tr> <tr> <td colspan="4" style="text-align: center;">MISCELLANEOUS SYMBOLS</td> </tr> <tr> <td colspan="4"> <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</p> <p> DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">RECOMMENDATION SYMBOLS</td> </tr> <tr> <td colspan="4"> <p> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADED ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">ABBREVIATIONS</td> </tr> <tr> <td colspan="4"> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - COARSE 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 % - UNIT WEIGHT %g - 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> </td> </tr> <tr> <td colspan="4" style="text-align: center;">EQUIPMENT USED ON SUBJECT PROJECT</td> </tr> <tr> <td colspan="4"> <p>DRILL UNITS: <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input type="checkbox"/> TRICONE _____ * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">ROCK HARDNESS</td> </tr> <tr> <td colspan="4"> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">ROCK HARDNESS</td> </tr> <tr> <td colspan="4"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;">INDURATION</td> </tr> <tr> <td colspan="4"> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">TERMS AND DEFINITIONS</td> </tr> <tr> <td colspan="4"> <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, SUCH 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 (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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> </td> </tr> <tr> <td colspan="4" style="text-align: center;">BENCH MARK: N/A</td> </tr> <tr> <td colspan="4" style="text-align: right;">ELEVATION: N/A FEET</td> </tr> <tr> <td colspan="4" style="text-align: center;">NOTES:</td> </tr> <tr> <td colspan="4">BORING ELEVATIONS OBTAINED FROM PROJECT TIN FILE BR0042.tin, RECEIVED ON MAY 3, 2019.</td> </tr> <tr> <td colspan="4" style="text-align: right;">DATE: 8-15-14</td> </tr> </tbody> </table>				GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS			A-1	A-1-b	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	SYMBOL															% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX	35 MX 35 MX	35 MX 35 MX	35 MX 35 MX	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	36 MN 36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT	MATERIAL PASSING #40 LL PI	- 6 MX	- 40 MX	41 MN 10 MX	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 10 MX	41 MN 11 MN	40 MX 10 MX	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER	HIGHLY ORGANIC SOILS	GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX					USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS								GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD			FAIR TO POOR			FAIR TO POOR	POOR	UNSATURABLE				PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30				CONSISTENCY OR DENSENESS				<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/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td>< 4 4 TO 10 10 TO 30 30 TO 50 > 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>< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30</td> <td>< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 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 ²)	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 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4	TEXTURE OR GRAIN SIZE				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. 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MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>				GRADATION				<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>				ANGULARITY OF GRAINS				<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>				MINERALOGICAL COMPOSITION				<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>				COMPRESSIBILITY				<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>				PERCENTAGE OF MATERIAL				<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </tbody> </table>				ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE	GROUND WATER				<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>				MISCELLANEOUS SYMBOLS				<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</p> <p> DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>				RECOMMENDATION SYMBOLS				<p> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADED ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>				ABBREVIATIONS				<p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - COARSE 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 % - UNIT WEIGHT %g - 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>				EQUIPMENT USED ON SUBJECT PROJECT				<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input type="checkbox"/> TRICONE _____ * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>				ROCK HARDNESS				<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. 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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 (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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>				BENCH MARK: N/A				ELEVATION: N/A FEET				NOTES:				BORING ELEVATIONS OBTAINED FROM PROJECT TIN FILE BR0042.tin, RECEIVED ON MAY 3, 2019.				DATE: 8-15-14			
GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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<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</p> <p> DIP & DIP DIRECTION OF ROCK STRUCTURES TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADED ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - COARSE 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 % - UNIT WEIGHT %g - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input checked="" type="checkbox"/> CME-55 <input type="checkbox"/> CME-550 <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> w/ ADVANCER <input type="checkbox"/> TRICONE _____ * STEEL TEETH <input type="checkbox"/> TRICONE _____ * TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B _____ <input type="checkbox"/> -H _____ <input type="checkbox"/> -N _____</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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<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, SUCH 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 (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. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (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 (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. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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TIP PROJECT: BR-0042

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

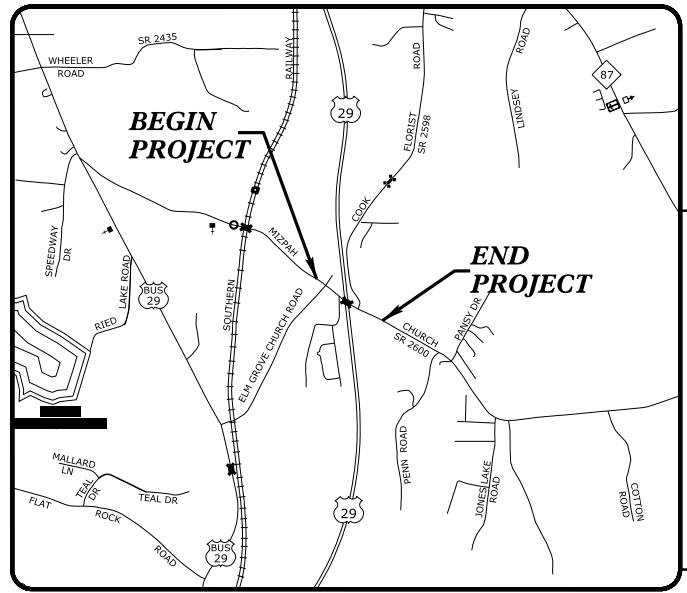
ROCKINGHAM COUNTY

LOCATION: SR 2600 (MIZPAH CHURCH RD)
OVER US-29

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

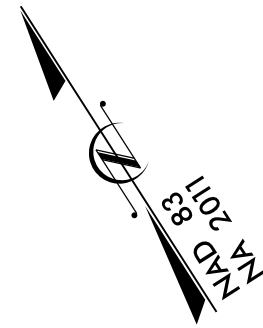
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0042	3	45
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
67042.1.1		PE	

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

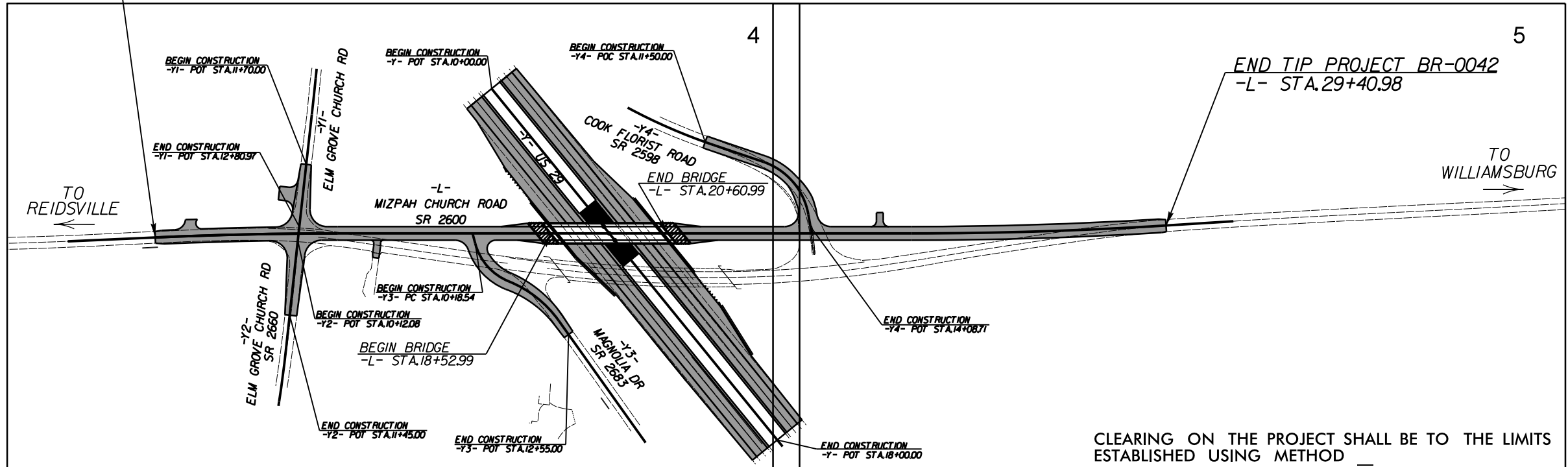


VICINITY MAP

25% ROADWAY PLANS
MARCH 20, 2019

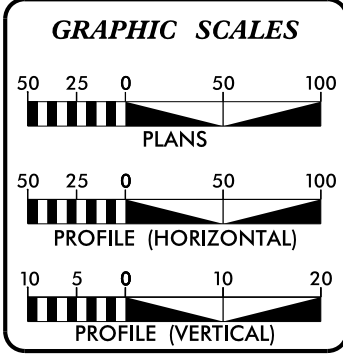


BEGIN TIP PROJECT BR-0042
-L- STA.11+54.68



CLEARING ON THE PROJECT SHALL BE TO THE LIMITS
ESTABLISHED USING METHOD _____

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES



DESIGN DATA

ADT 2020 =	1,530
ADT 2040 =	1,700
K =	8 %
D =	60 %
T =	4 %
V =	50 MPH
*(TTST= 1%+ DUAL 3%)	
FUNC CLASS=	MINOR COLLECTOR
SUB-REGIONAL TIER	

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR-0042 =	0.299 MI
LENGTH STRUCTURE TIP PROJECT BR-0042 =	0.039 MI
TOTAL LENGTH TIP PROJECT BR-0042 =	0.338 MI

AECOM
NC FIRM LICENSE No: F-0342
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607
(919) 854-6200 - (919) 854-6259(FAX)

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
MAY 21, 2019

LETTING DATE:
MAY 21, 2020

NEIL J. DEAN, P.E.
PROJECT ENGINEER

RADHA ATTALURI, P.E.
PROJECT DESIGN ENGINEER

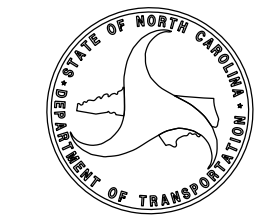
TIERRE PETERSON, P.E.
NCDOT PROJECT MANAGER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.





August 20, 2019

STATE PROJECT: 67042.1.1 (BR-0042)
 COUNTY: Rockingham
 DESCRIPTION: Replace Bridge No. 116 on SR 2600 over US 29

SUBJECT: GEOTECHNICAL REPORT - INVENTORY

PROJECT DESCRIPTION

This project consists of a realignment of existing SR 2600 (-L-) and replacement of Bridge No. 116 over US 29. Retaining walls will be constructed at each end bent for Bridge No. 116. This project will also include a widening of US 29 (-Y-), Elm Grove Church Road (-Y1-, -Y2-), Magnolia Drive (-Y3-), and Cook Florist Road (-Y4-).

The geotechnical investigation was conducted between May and June 2019. Standard Penetration Test borings were advanced with a CME-55 drill rig with an automatic hammer. Hand Augers were also performed in areas where the use of a drill rig was restricted due to underground and overhead utility conflicts. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by Geotechnics, Inc.

The following alignments, totaling 0.63 miles, were investigated. Plan sheets and cross sections of these alignments are included in this report.

<u>LINE</u>	<u>STATIONS</u>
-L-	11+55 to 29+41
-Y-	10+00 to 18+00
-Y1-	11+70 to 12+81
-Y2-	10+12 to 11+45
-Y3-	10+18 to 12+55
-Y4-	11+50 to 14+09

PHYSIOGRAPHY AND GEOLOGY

The project is located in the Piedmont Physiographic Province. The project corridor is comprised primarily of residential properties, agricultural fields, and undeveloped wooded areas. The general topography along the project is generally flat to gently sloping.

Geologically, the project is located within the Milton Belt. Soils are derived from the underlying metamorphic bedrock primarily consisting of biotite gneiss.

Surface water is drained from the corridor by the existing roadway ditches.

SOIL PROPERTIES

Soils encountered during this investigation are separated into two categories based on origin. They consist of roadway embankment and residual soils.

Roadway Embankment soils are present along the existing roadways on the project. The roadway embankment encountered generally consist of dry to moist, loose, gravels and moist, medium stiff to stiff, coarse to fine sandy silts and clayey silts (A-4, A-5) with trace gravel and moist, medium stiff, highly plastic, coarse to fine sandy, silty clays (A-7). The plasticity index of the roadway embankment clays tested is 27.

Residual soils are derived from the weathering of underlying biotite gneiss. The majority of the residual soils encountered consist of dry to moist, medium stiff to hard, sandy silts (A-4), moist, medium stiff to very stiff, slightly plastic, sandy, clayey silts (A-5), dry to moist, soft to very stiff, slightly to highly plastic, sandy, silty clays (A-7), and dry to moist, loose to very dense, silty sands (A-2-4) with variable amounts of mica. The plasticity index of the residual silt tested was 9. The plasticity index of the residual clays tested ranged from 12 to 48.

ROCK PROPERTIES

Weathered rock was encountered along the existing roadways (-L-, -Y-) at elevations ranging from 697.8 to 724.5 feet (MSL). Crystalline bedrock was encountered along the existing roadways (-L-) at elevations ranging from 697.6 to 710.7 feet (MSL). The weathered rock and crystalline bedrock consists of biotite gneiss.

GROUNDWATER

Groundwater was encountered at elevations ranging from 724.6 to 732.5 feet and typically ranges from 14.5 to 29.9 feet below the existing ground surface.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

1) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following locations:

<u>LINE</u>	<u>STATIONS</u>	<u>OFFSETS</u>
-L-	23+75 to 25+75	LT, RT
-Y-	14+25 to 15+75	RT
-Y1-	11+85 to 12+25	LT, RT
-Y2-	10+75 to 11+25	LT, RT
-Y3-	10+75 to 12+25	LT

A discussion of these highly plastic clay soils is located in the section titled "Soil Properties."

Prepared by,
KLEINFELDER, INC.
NC License No. F-1312



Daniel H. Kubinski, PE
Staff Professional



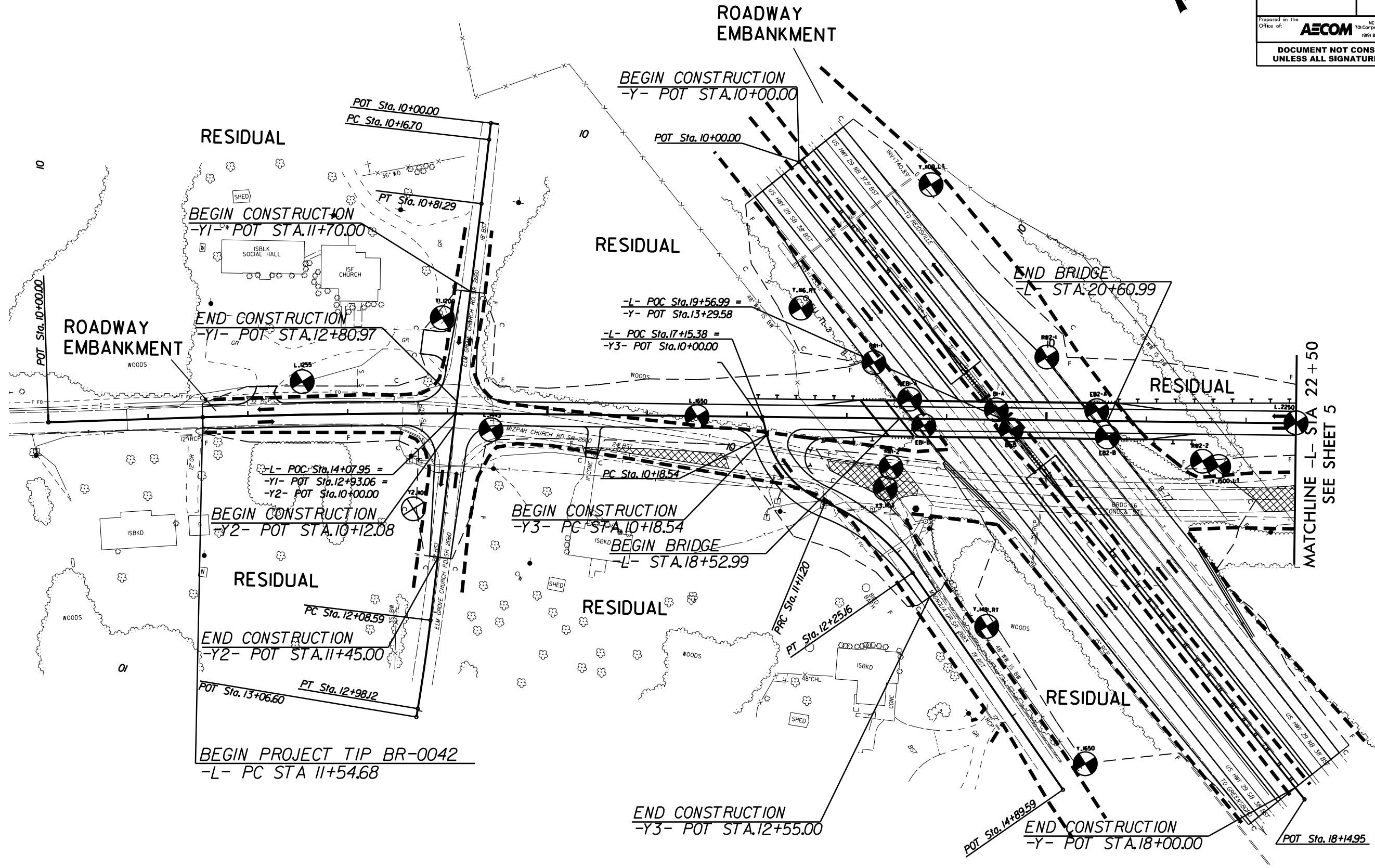
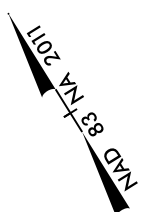
Thomas R. Wells, PE
Senior Professional

DHK/TRW

Bulk Sample
Shelby Tube

<u>Sample No.</u>	<u>Alignment</u>	<u>STA.</u>	<u>Offset</u>	<u>Depth (ft)</u>	<u>Tests Performed</u>
ST-1	-L-	18+77	7' RT	5.0 – 7.0	Consolidation
BS-1	-Y-	14+81	142' RT	8.5 – 18.5	Standard Proctor, CBR

PROJECT REFERENCE NO. BR-0042	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR R/W ACQUISITION	
Prepared at the Office of: AECOM NC FIRM LICENSE No. F-0342 70 Corporate Center Drive, Suite 475 Raleigh, NC 27607 (919) 854-6200 • (919) 854-6259 FAX	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS

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MATCHLINE -L- STA 22 + 50
SEE SHEET 5

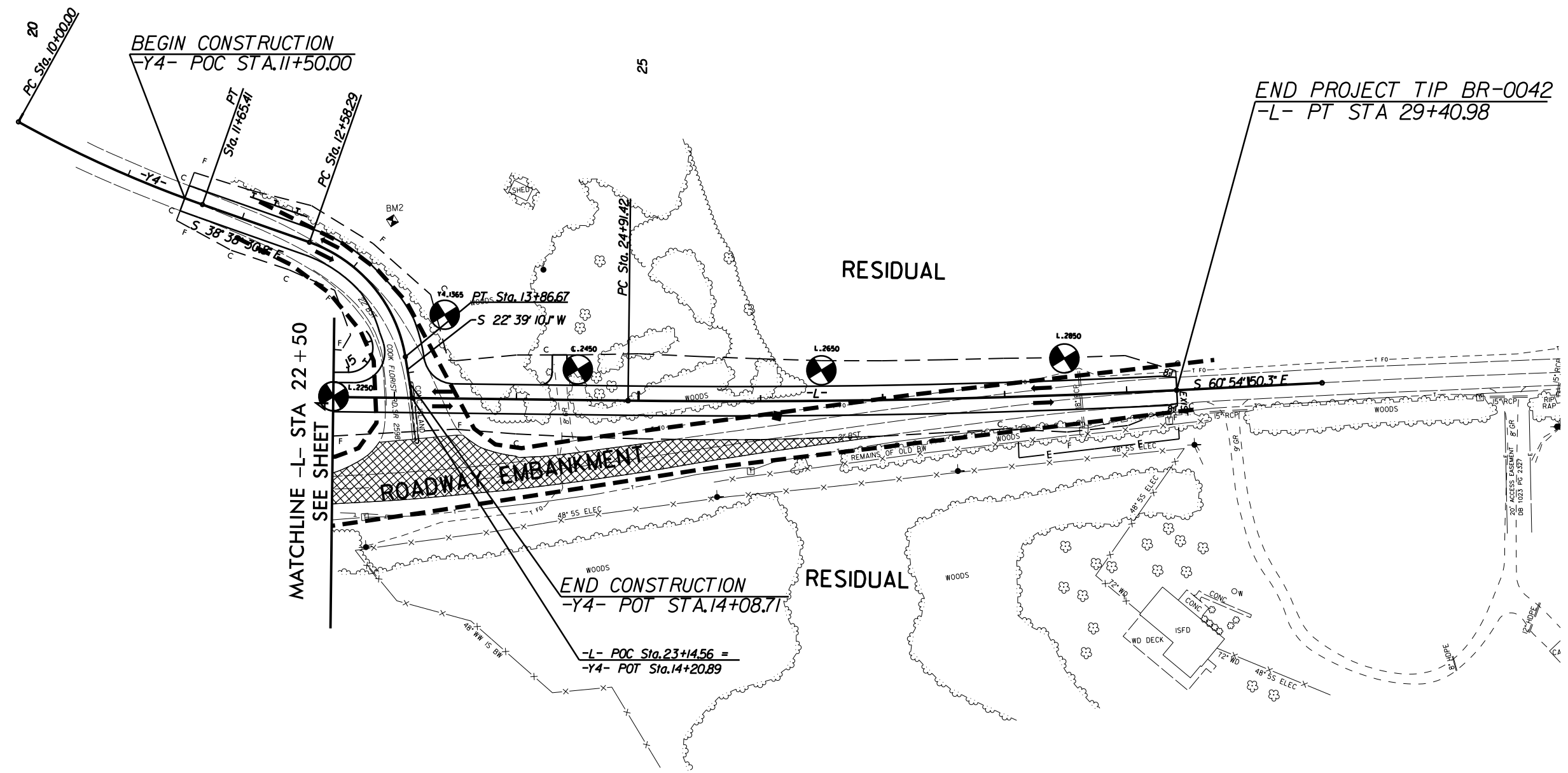
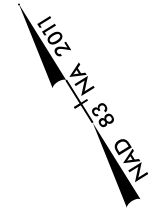
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-L- PC STA 11+54.68

END CONSTRUCTION
-Y3- POT STA. 12+55.00

END CONSTRUCTION
-Y- POT STA. 18+00.00

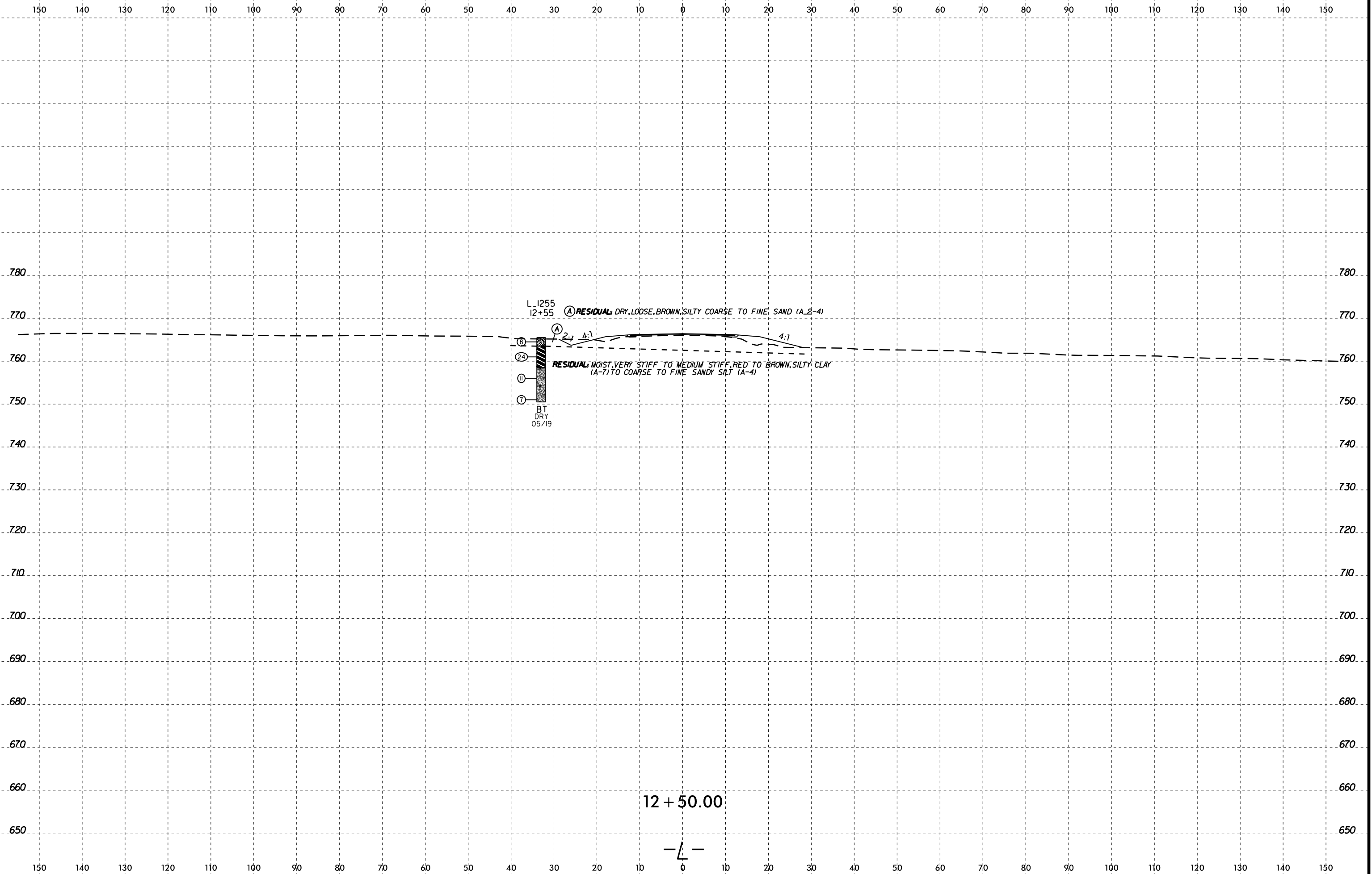
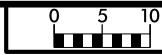
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REVISIONS

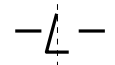
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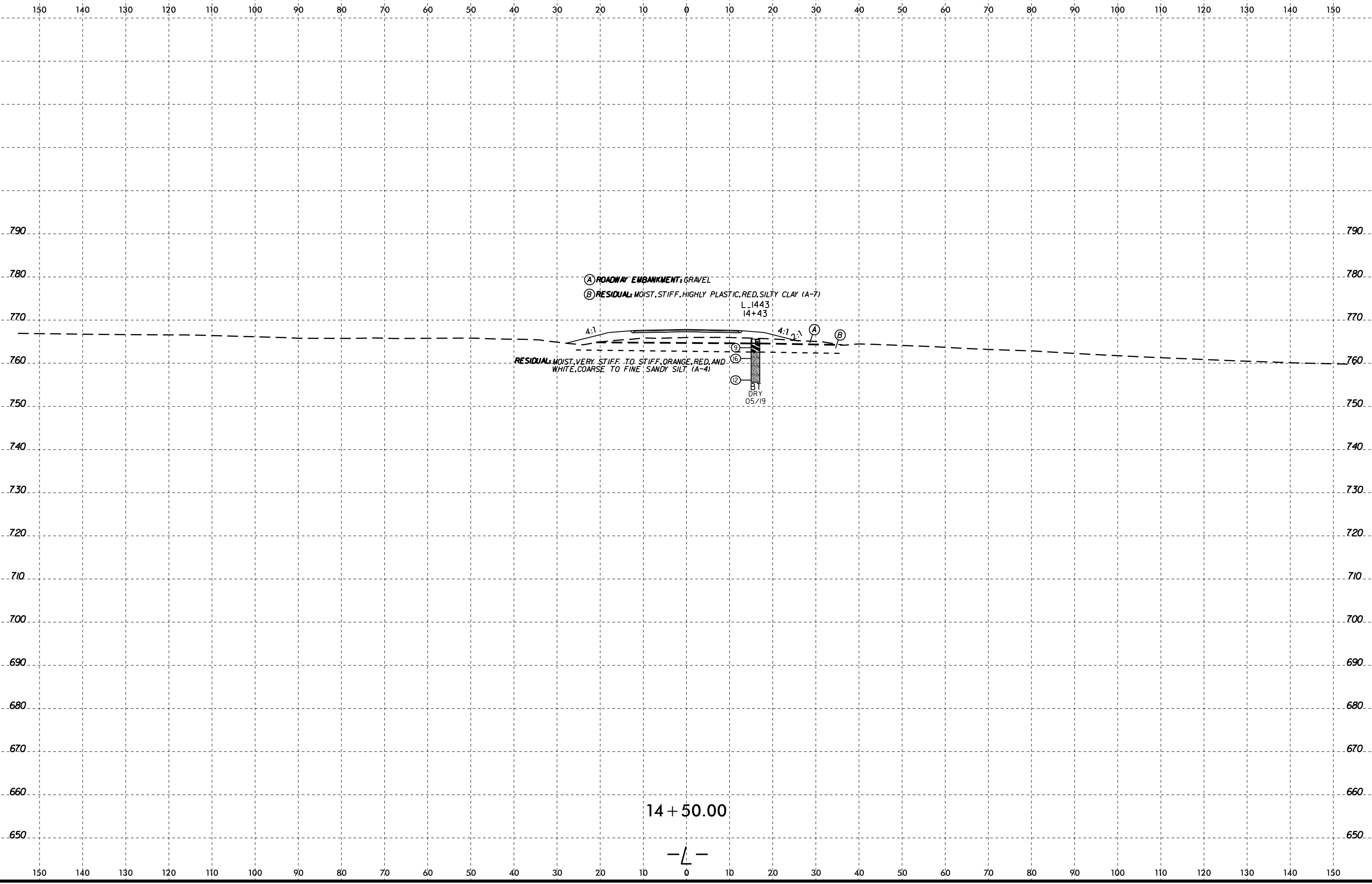


L 1255
12+55
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05/19

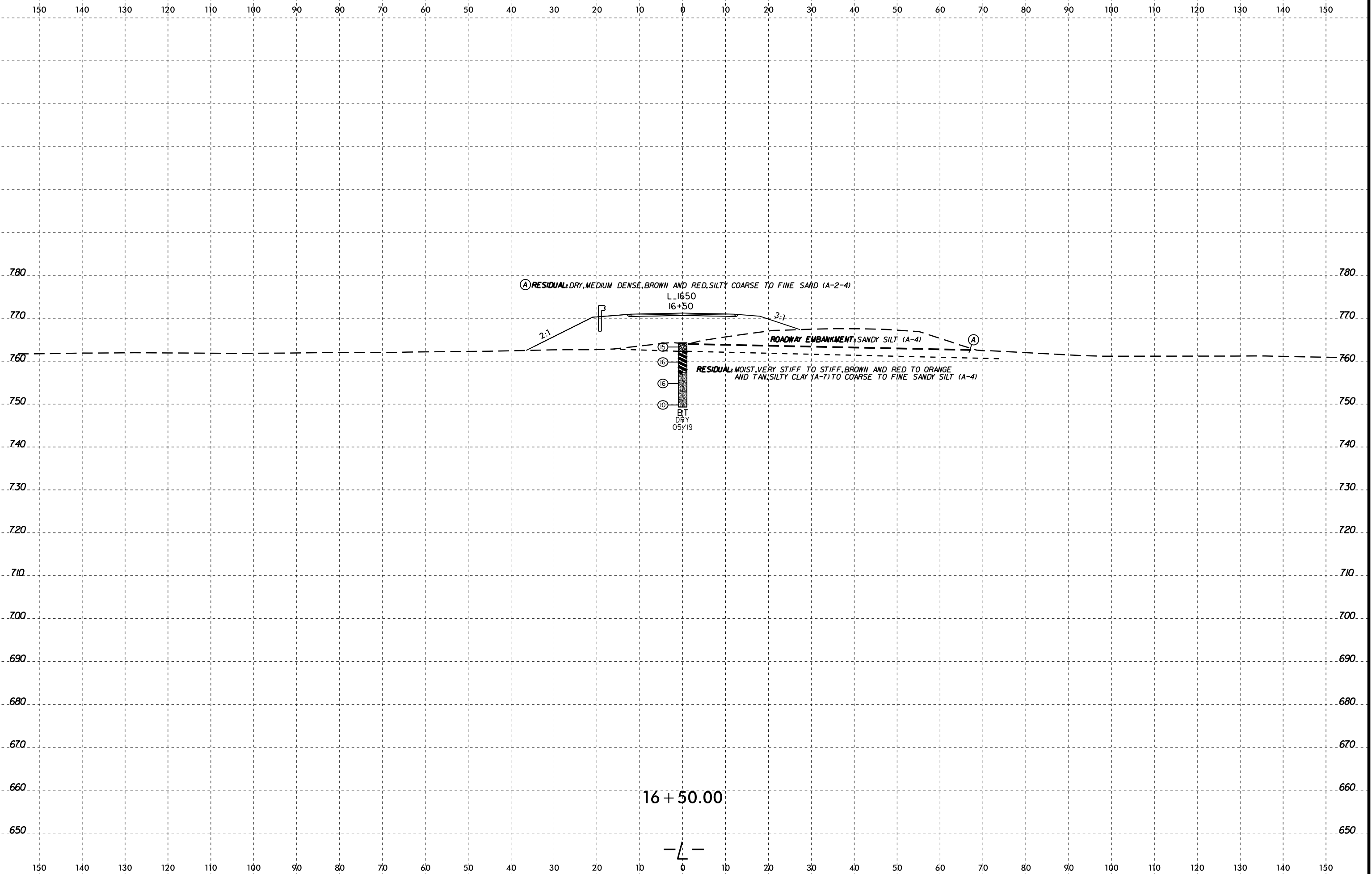
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 (A) RESIDUAL MOIST, VERY STIFF TO MEDIUM STIFF RED TO BROWN, SILTY CLAY (A-7) TO COARSE TO FINE SANDY SILT (A-4)

12 + 50.00

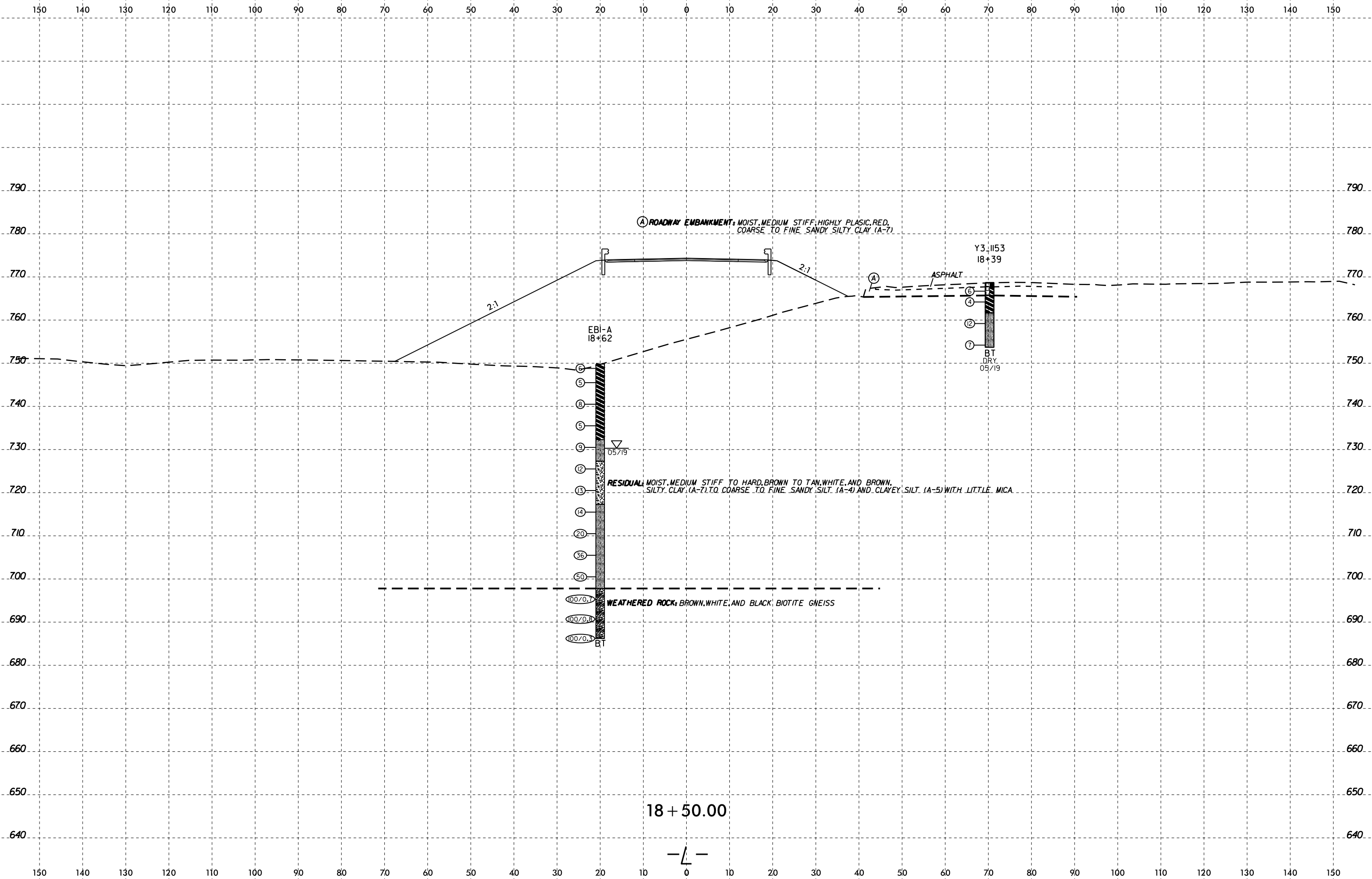




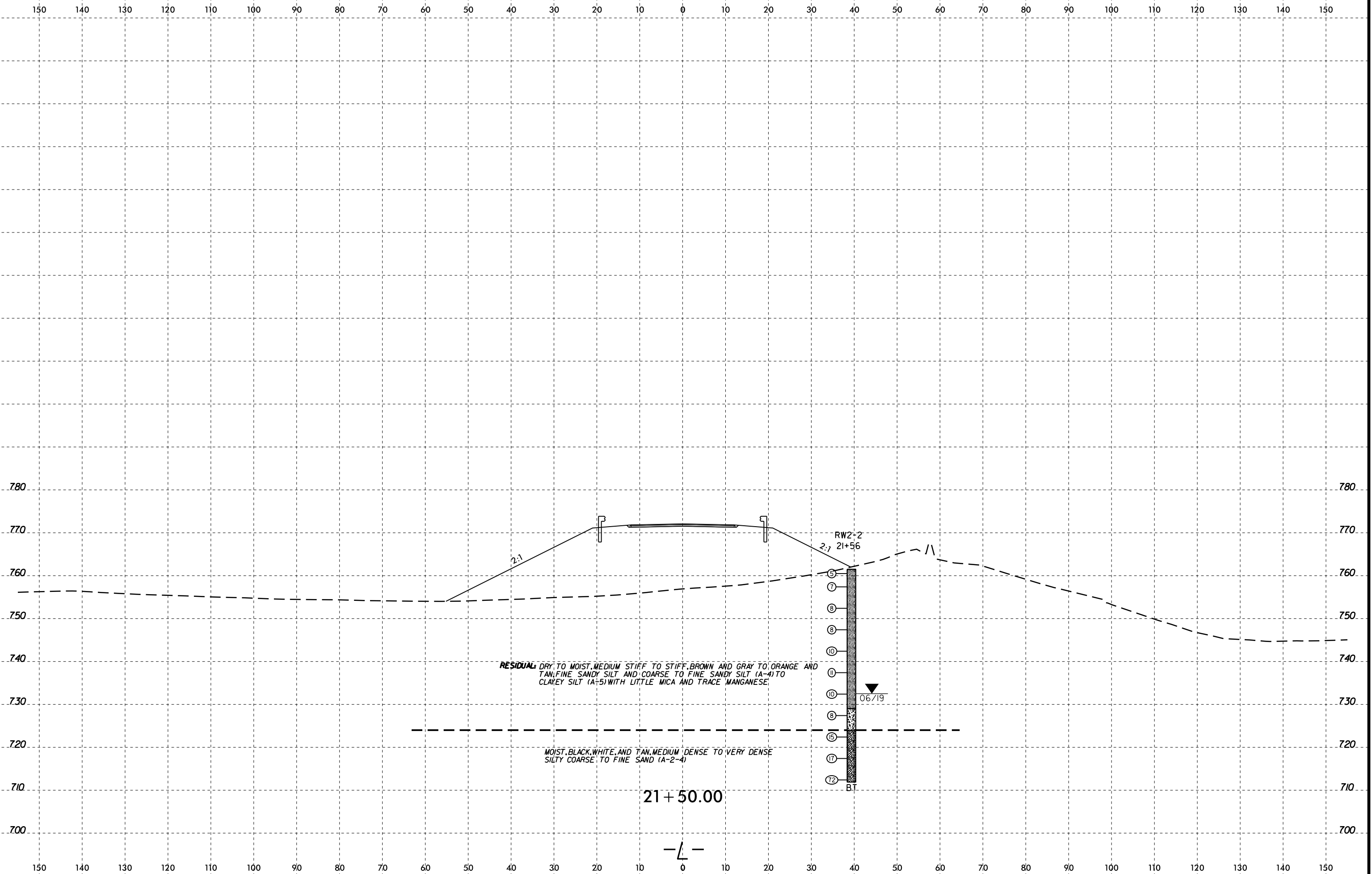
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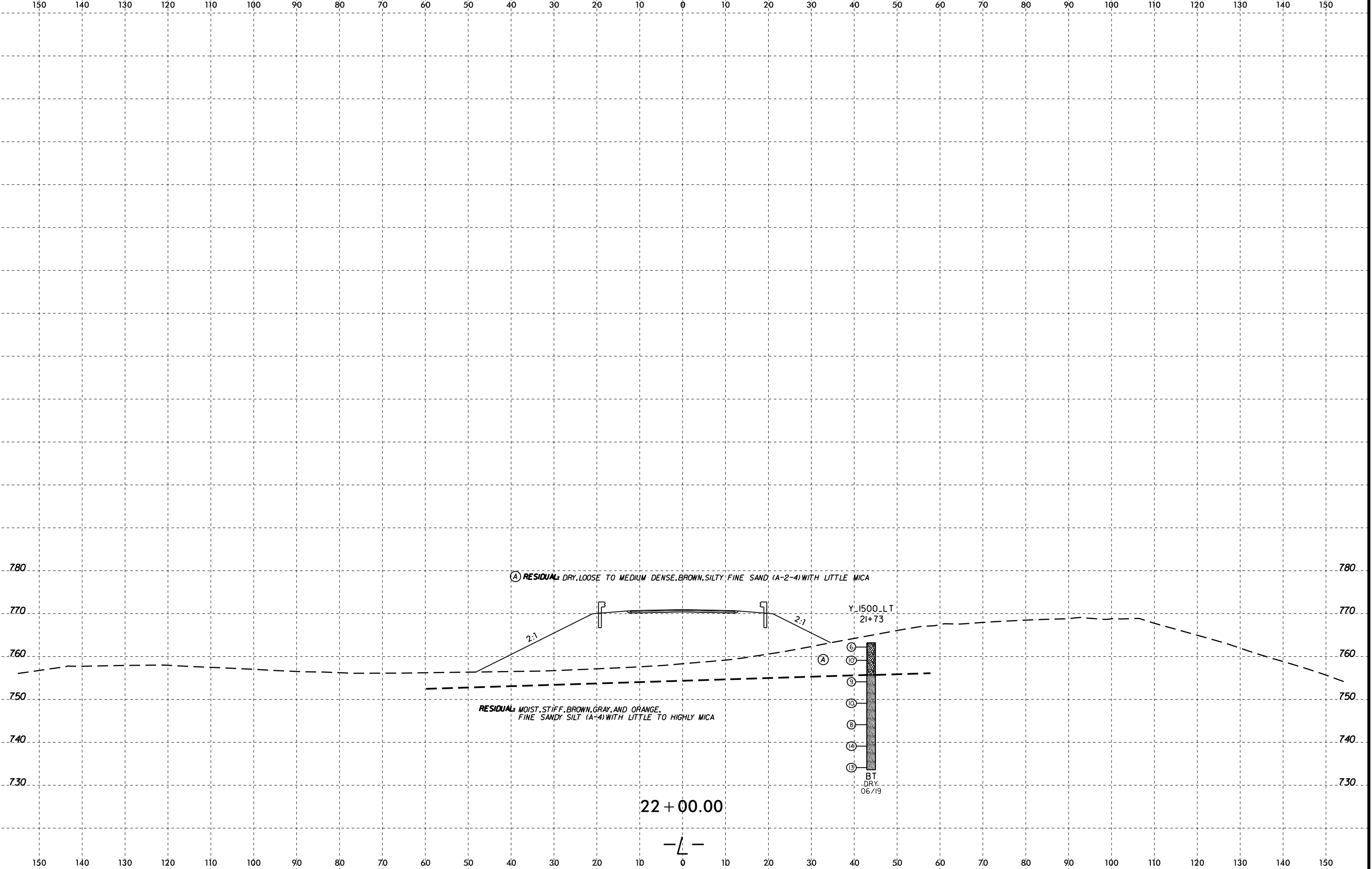


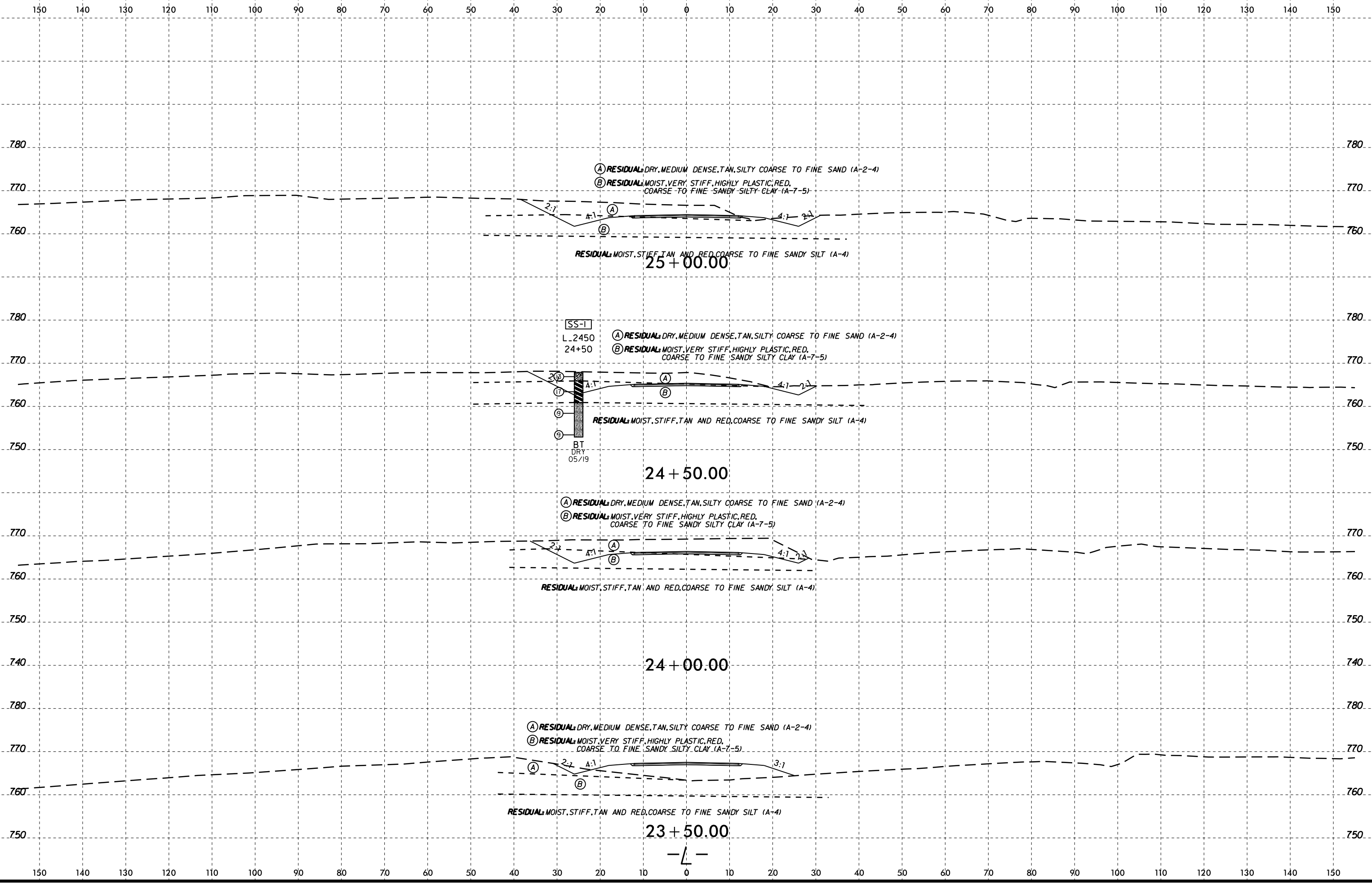
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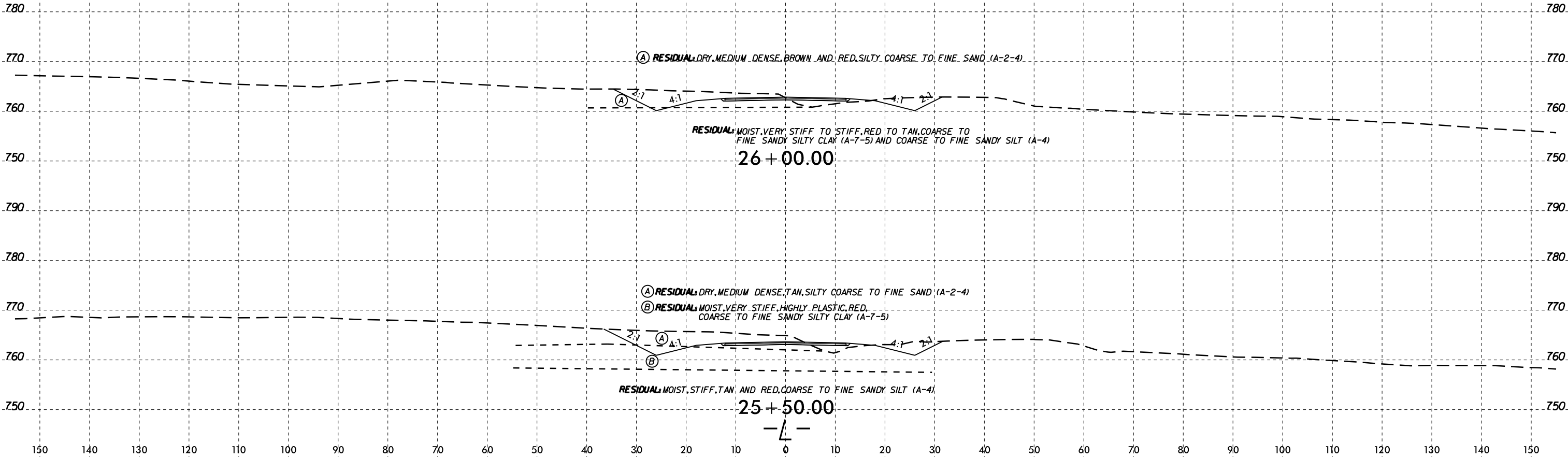


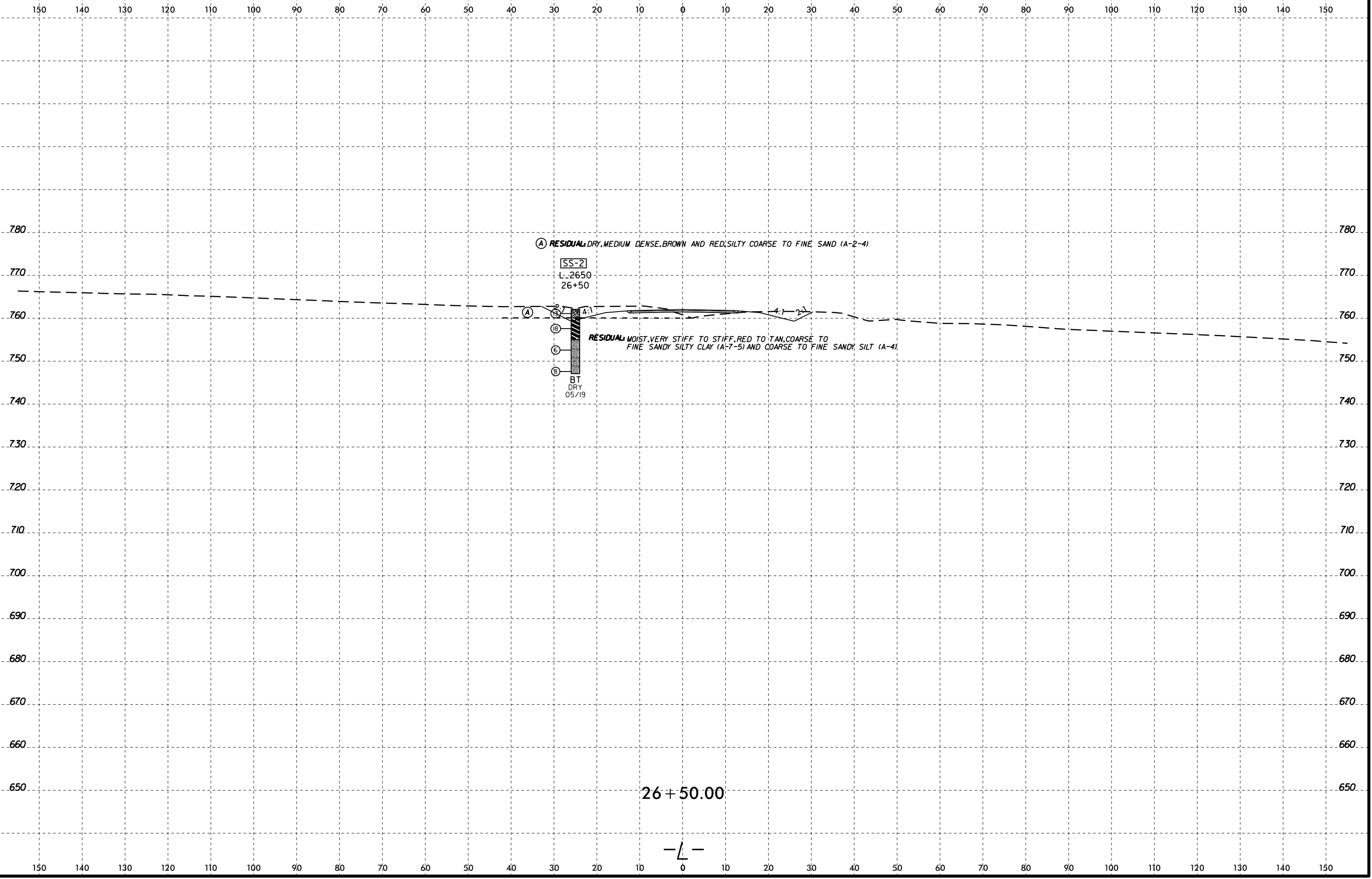


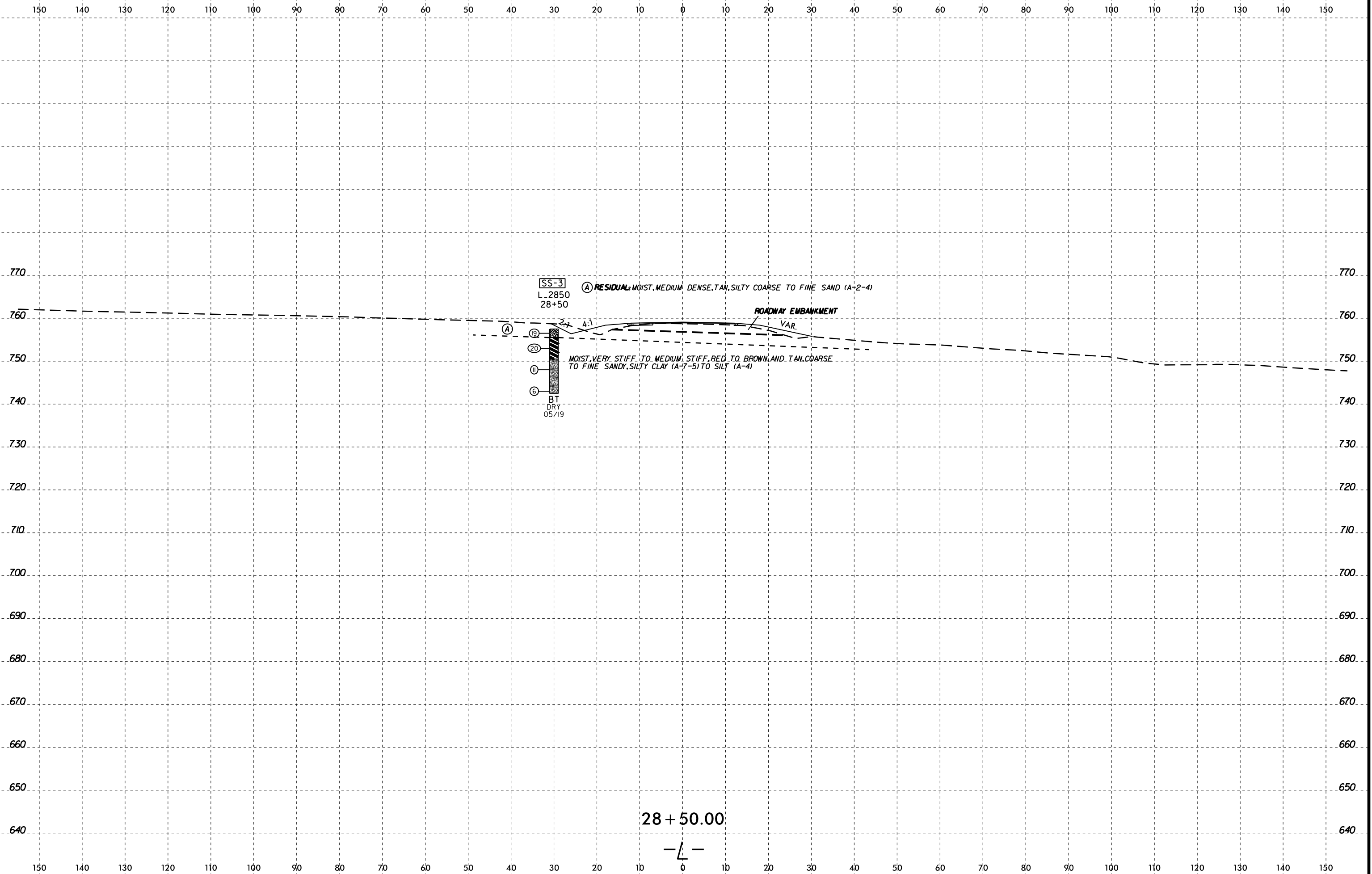
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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150







SS-3
L 2850
28+50

(A) RESIDUAL MOIST, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

ROADWAY EMBANKMENT

(A)

(19)

(20)

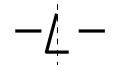
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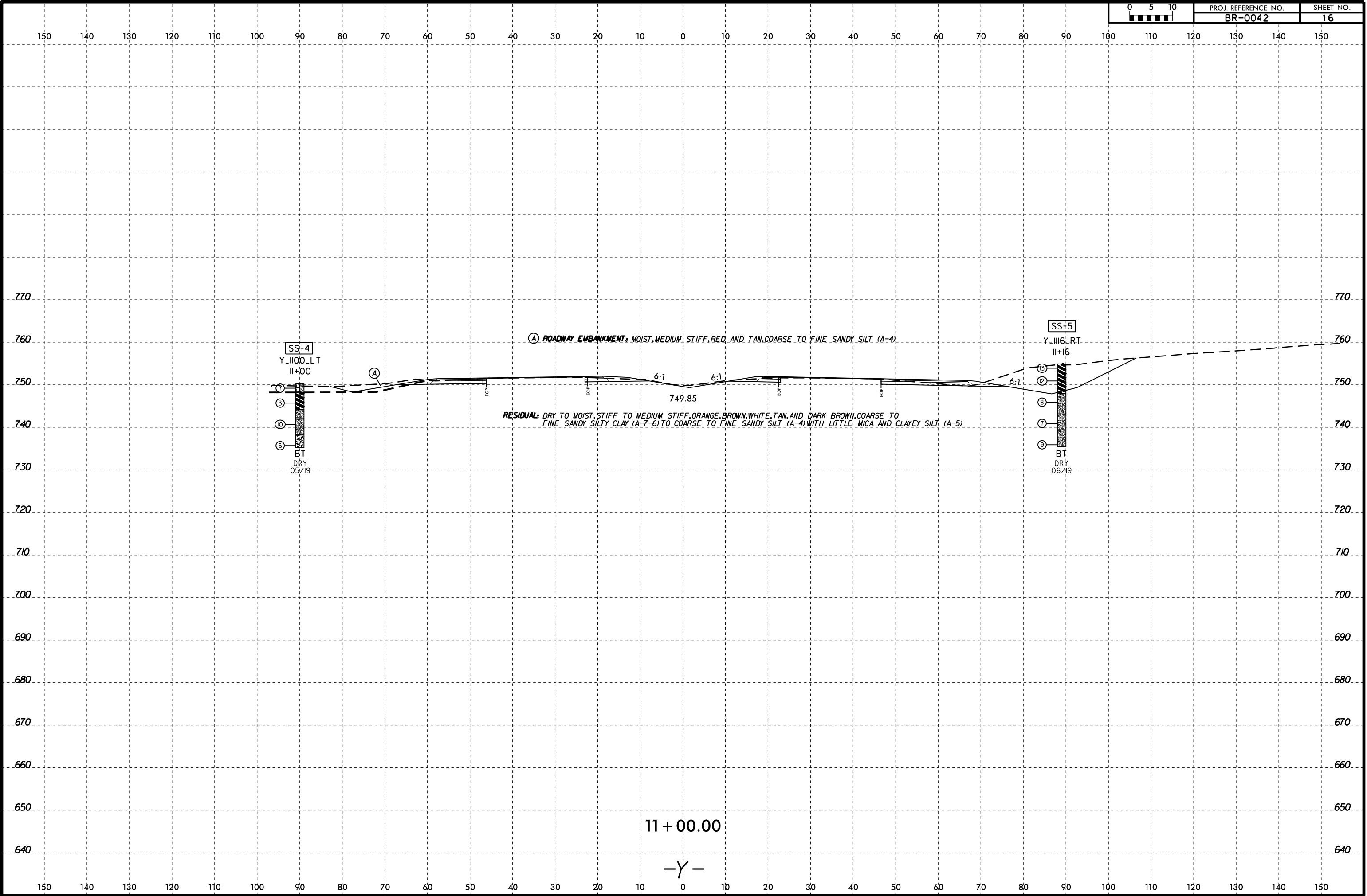
(6)

BT
DRY
05/19

MOIST, VERY STIFF TO MEDIUM STIFF, RED TO BROWN AND TAN, COARSE TO FINE SANDY, SILTY CLAY (A-7-5) TO SILT (A-4)

28 + 50.00





SS-4
 Y-1100.LT
 11+00
 7
 3
 10
 5
 BT
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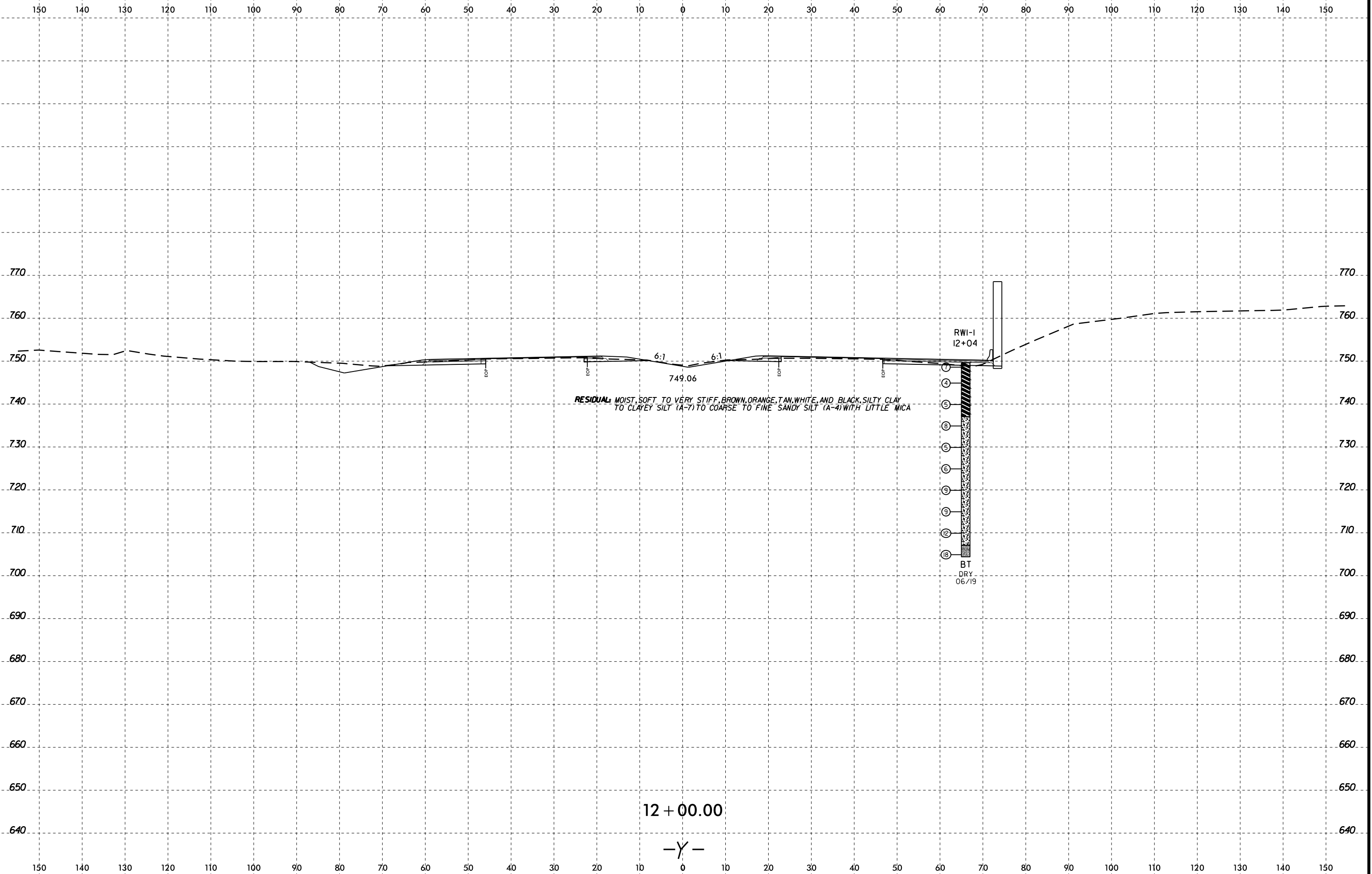
SS-5
 Y-1116.RT
 11+16
 15
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 7
 9
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 06/19

(A) ROADWAY EMBANKMENT: MOIST, MEDIUM STIFF, RED AND TAN, COARSE TO FINE SANDY SILT (A-4)

RESIDUAL: DRY TO MOIST, STIFF TO MEDIUM STIFF, ORANGE, BROWN, WHITE, TAN, AND DARK BROWN, COARSE TO FINE SANDY SILTY CLAY (A-7-6) TO COARSE TO FINE SANDY SILT (A-4) WITH LITTLE MICA AND CLAYEY SILT (A-5)

11 + 00.00

-Y-



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

770
760
750
740
730
720
710
700
690
680
670
660
650
640

12 + 00.00

-Y-

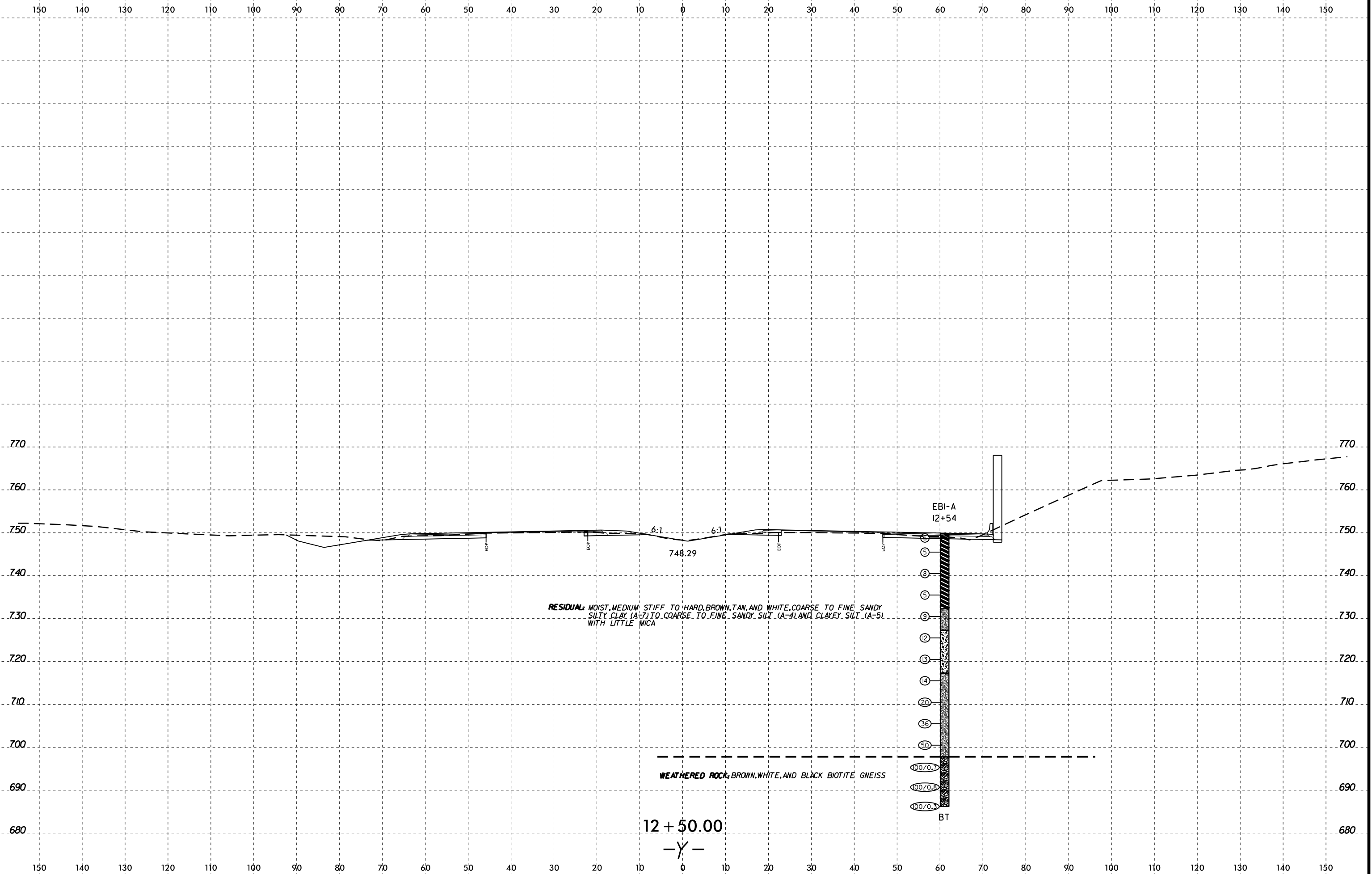
RESIDUAL: MOIST, SOFT TO VERY STIFF, BROWN, ORANGE, TAN, WHITE, AND BLACK, SILTY CLAY TO CLAYEY SILT (A-7) TO COARSE TO FINE SANDY SILT (A-4) WITH LITTLE MICA

RWI-1
I2+04

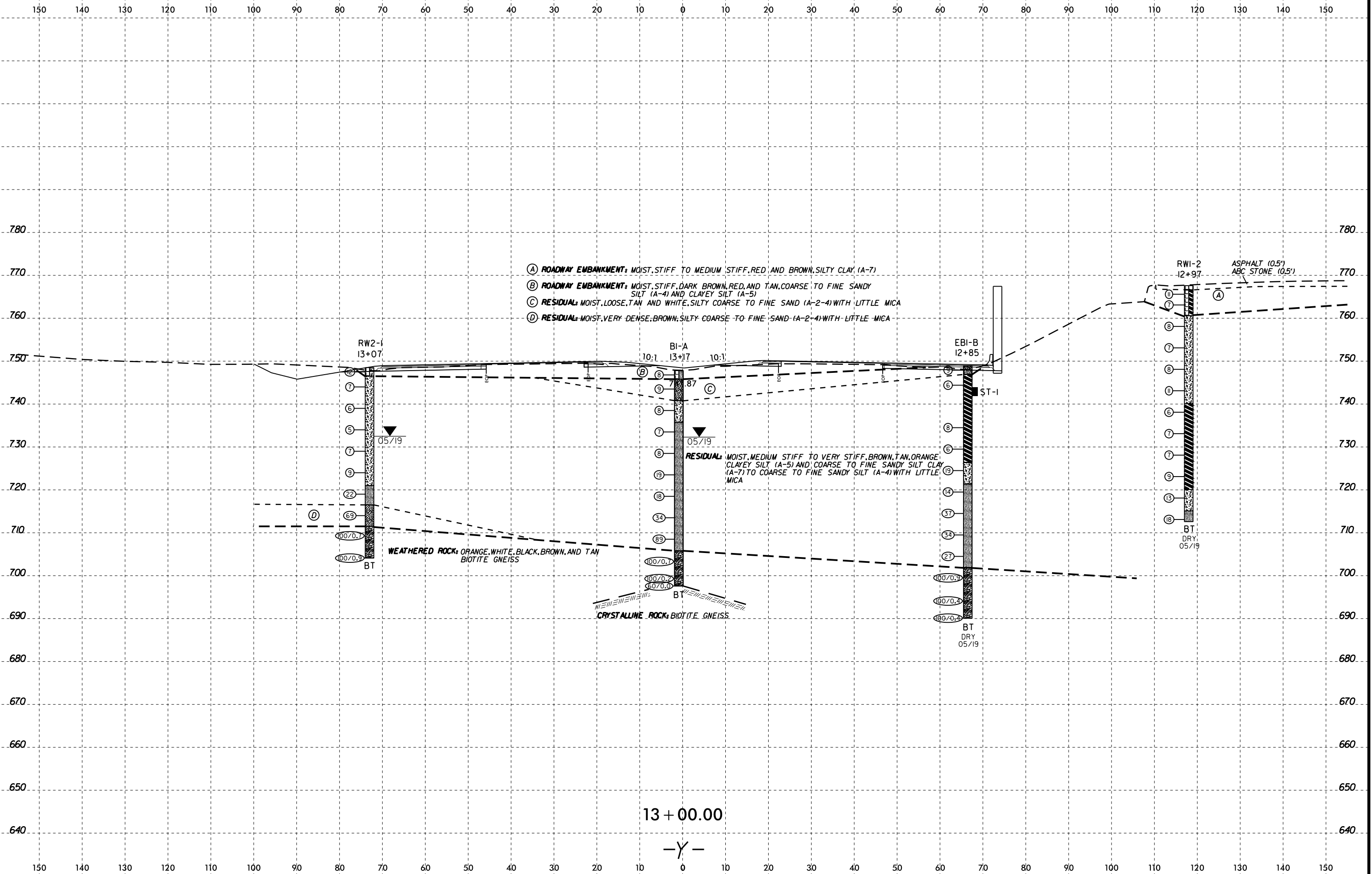
- ①
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- ⑨
- ⑫
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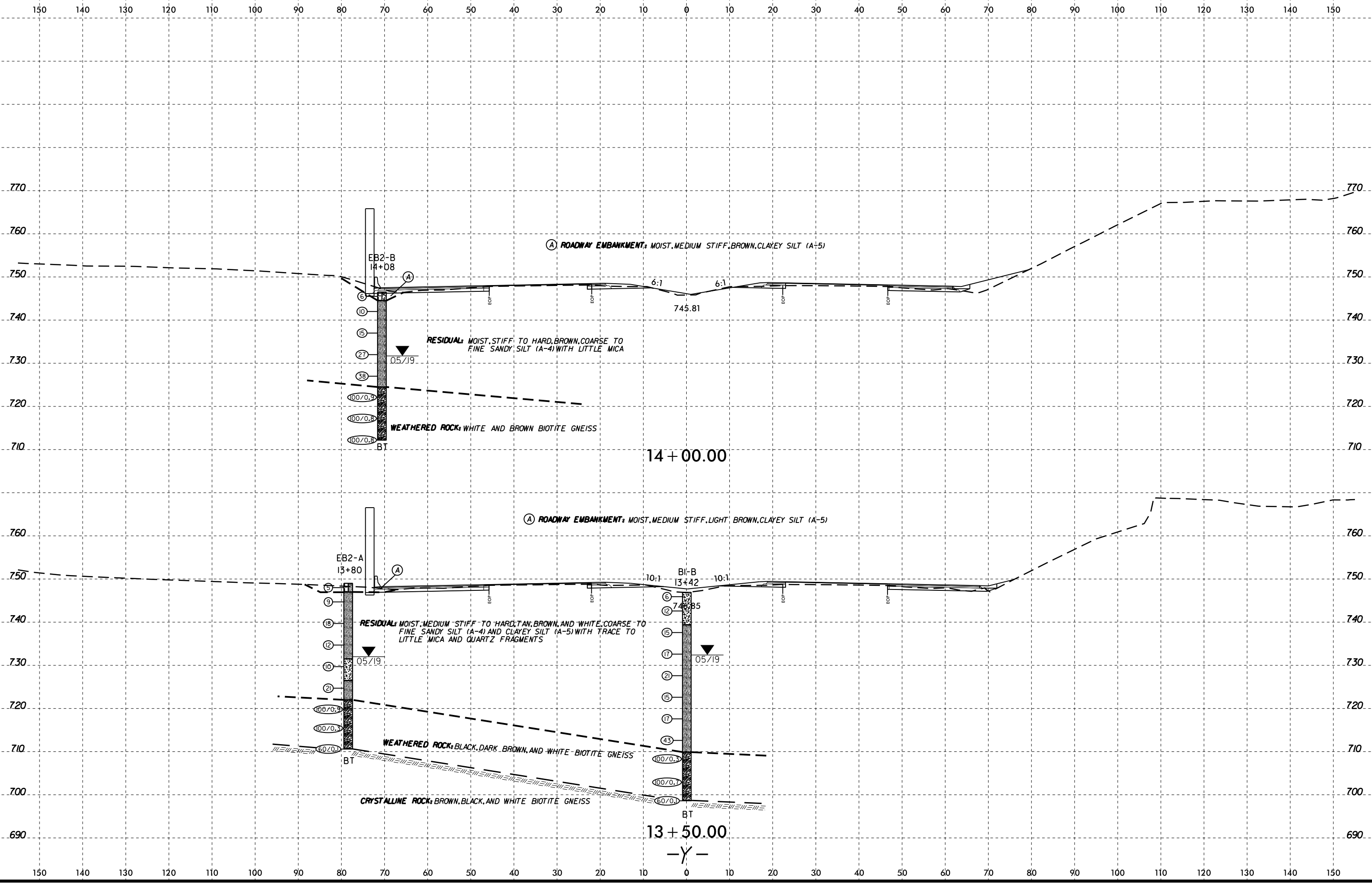
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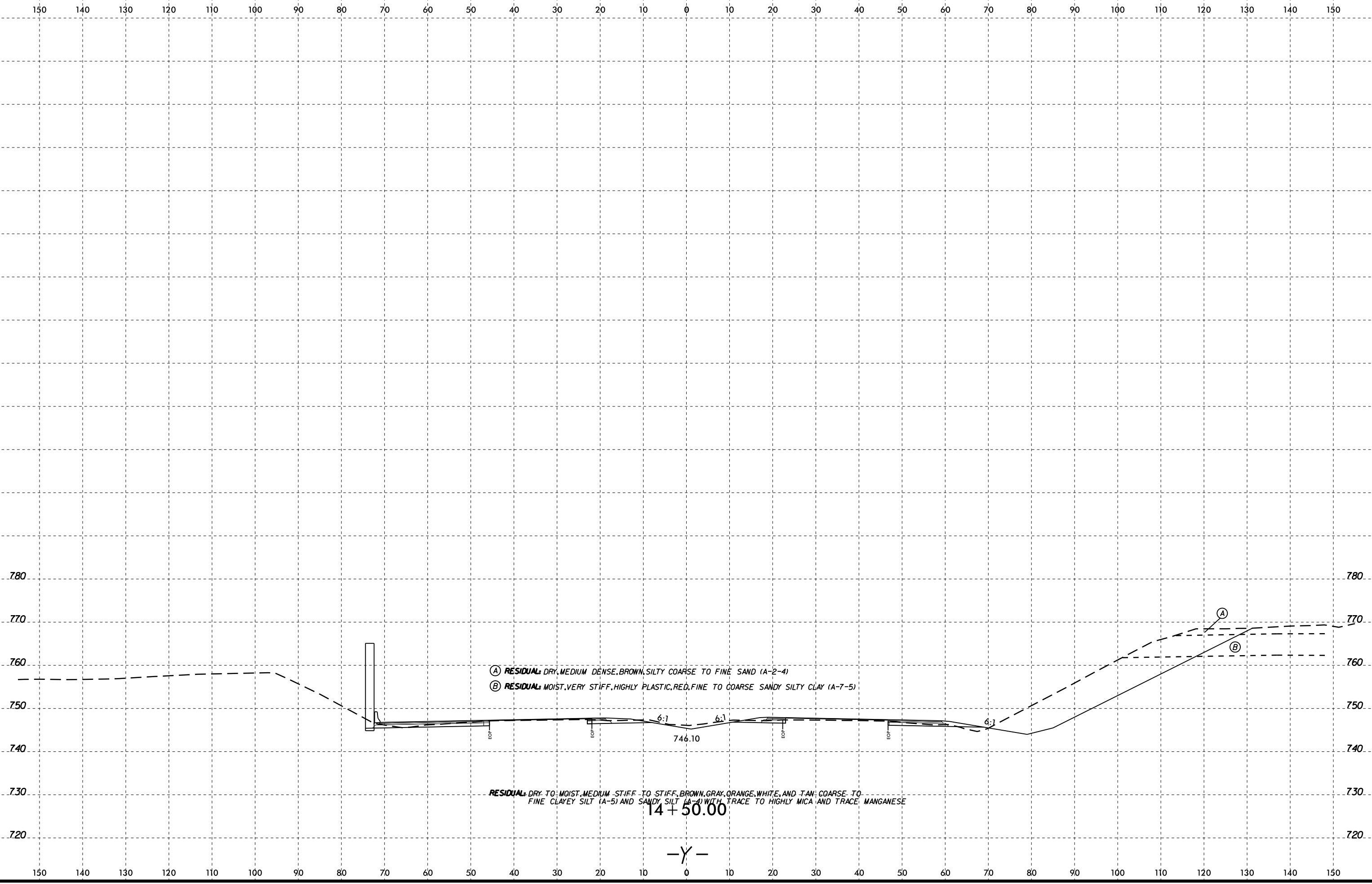


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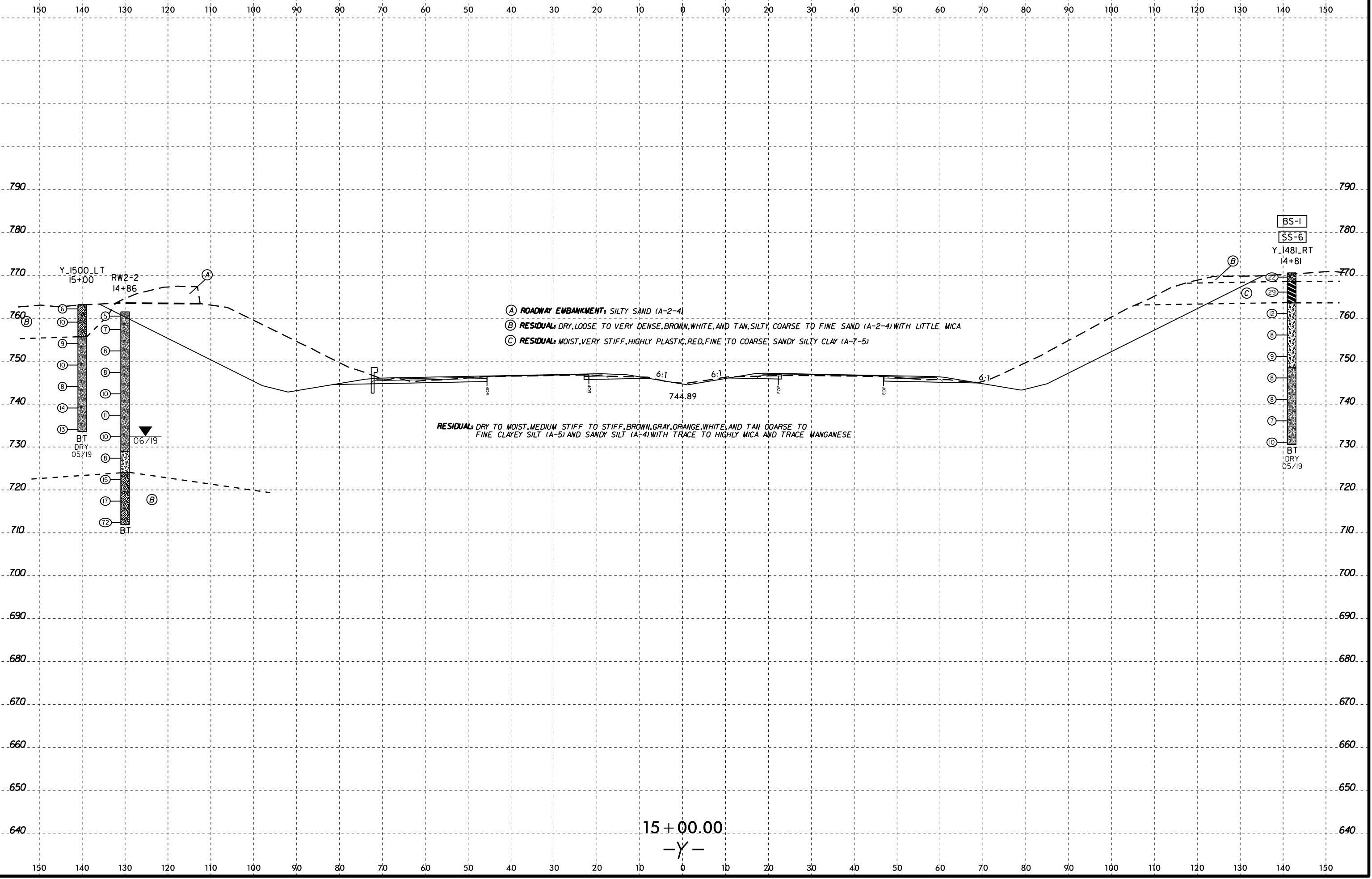


- (A) **RESIDUAL:** DRY, MEDIUM DENSE, BROWN, SILTY COARSE TO FINE SAND (A-2-4)
- (B) **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, FINE TO COARSE SANDY SILTY CLAY (A-7-5)

RESIDUAL: DRY TO MOIST, MEDIUM STIFF TO STIFF, BROWN, GRAY, ORANGE, WHITE, AND TAN, COARSE TO FINE CLAYEY SILT (A-5) AND SANDY SILT (A-4) WITH TRACE TO HIGHLY MICA AND TRACE MANGANESE

14+50.00

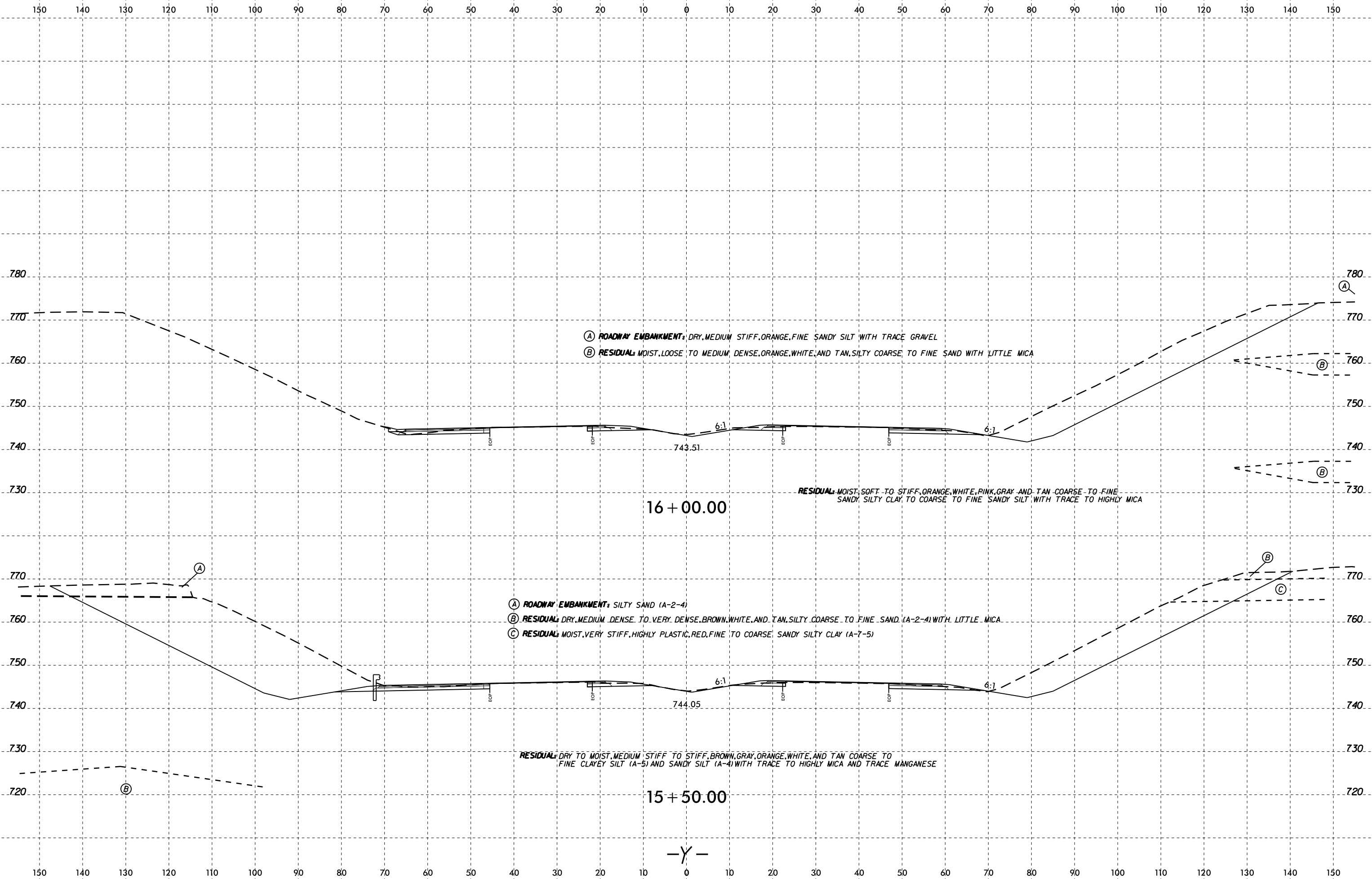
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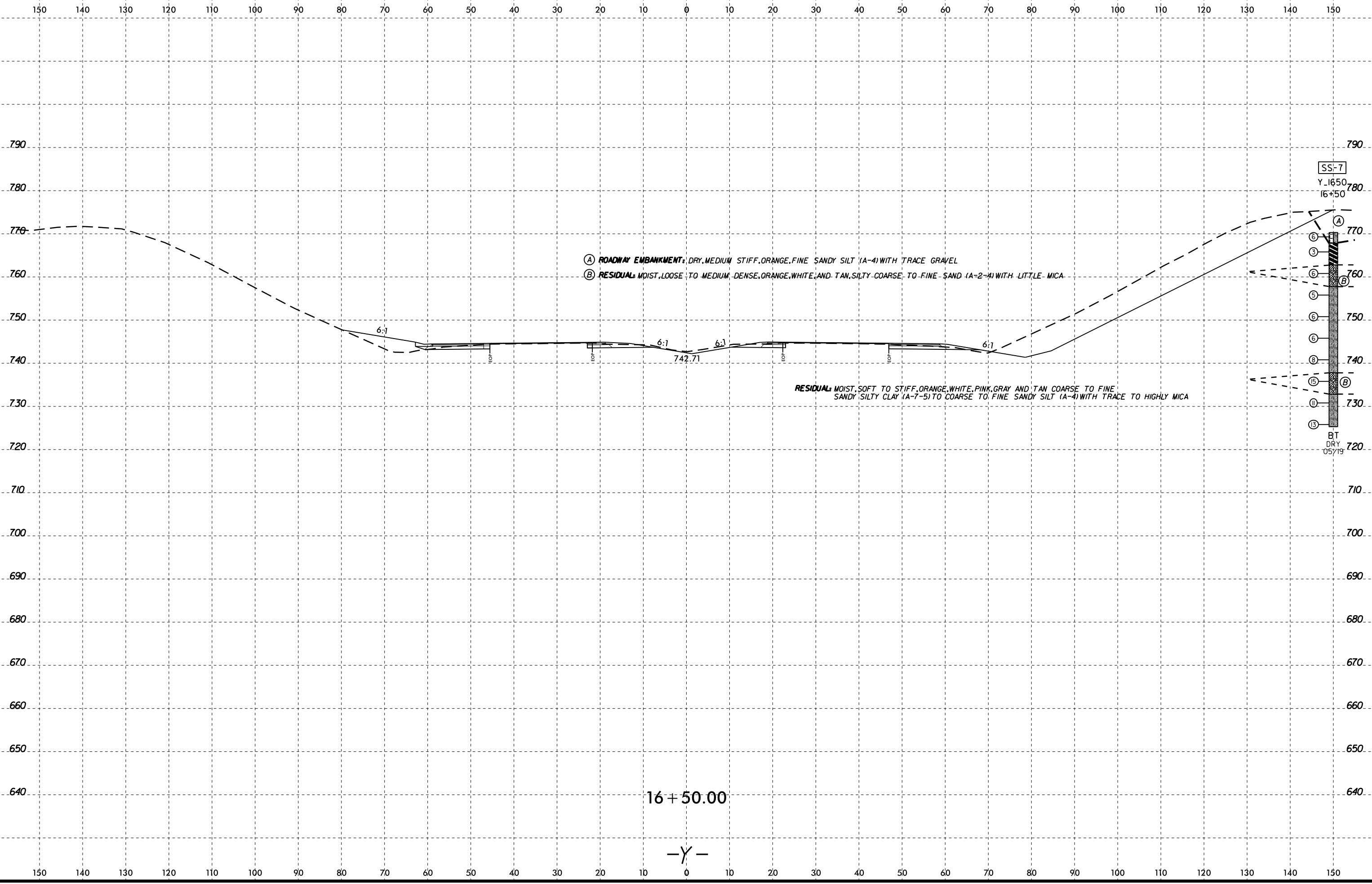
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-Y-

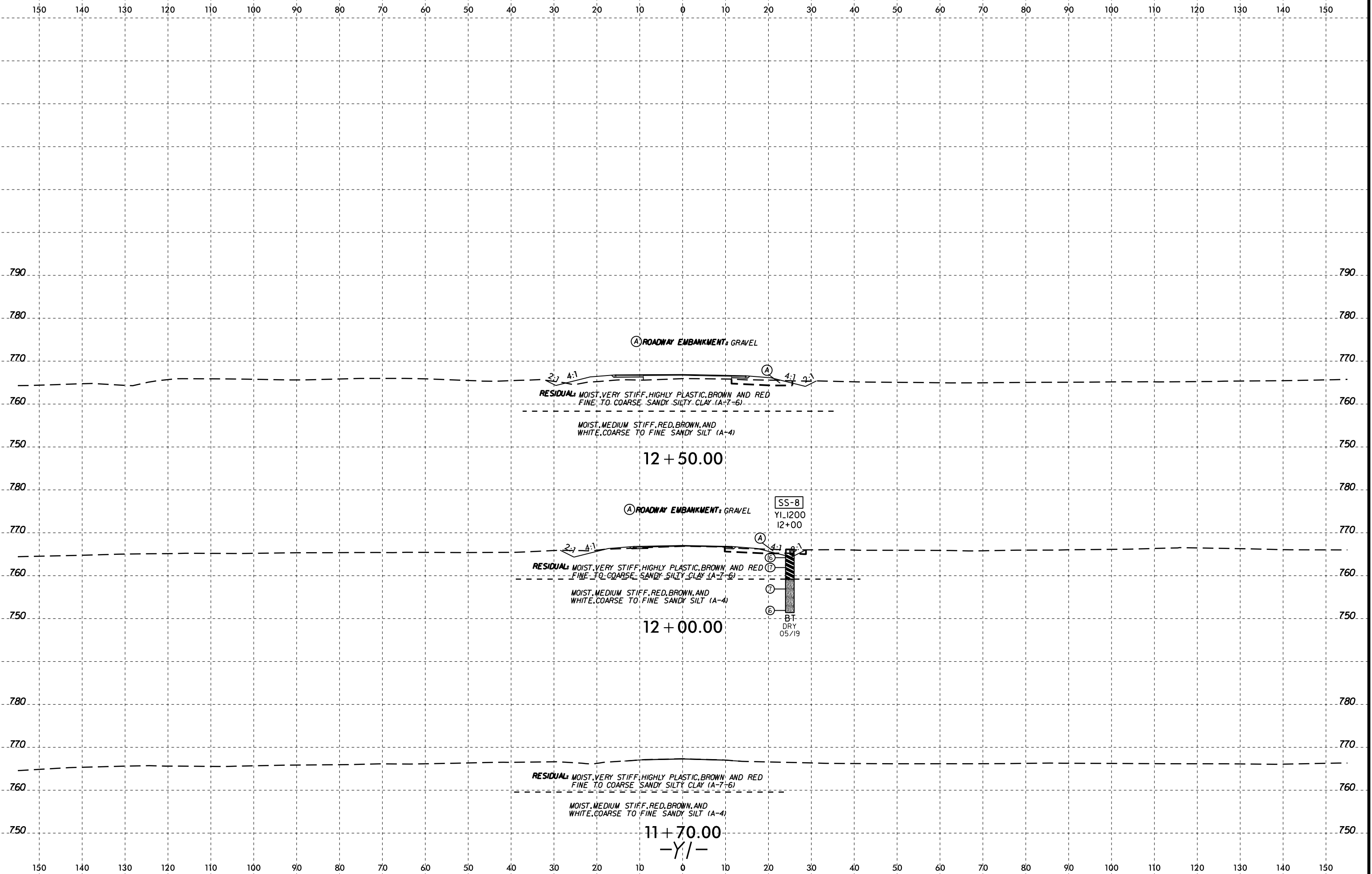
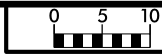
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16 + 50.00

-Y-



6/23/16



PROJ. REFERENCE NO.
BR-0042

SHEET NO.
26

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790

790

780

780

770

770

760

760

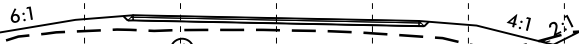
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740

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(A) RESIDUAL MOIST, STIFF, HIGHLY PLASTIC, RED
COARSE TO FINE SANDY SILTY CLAY (A-7-6)



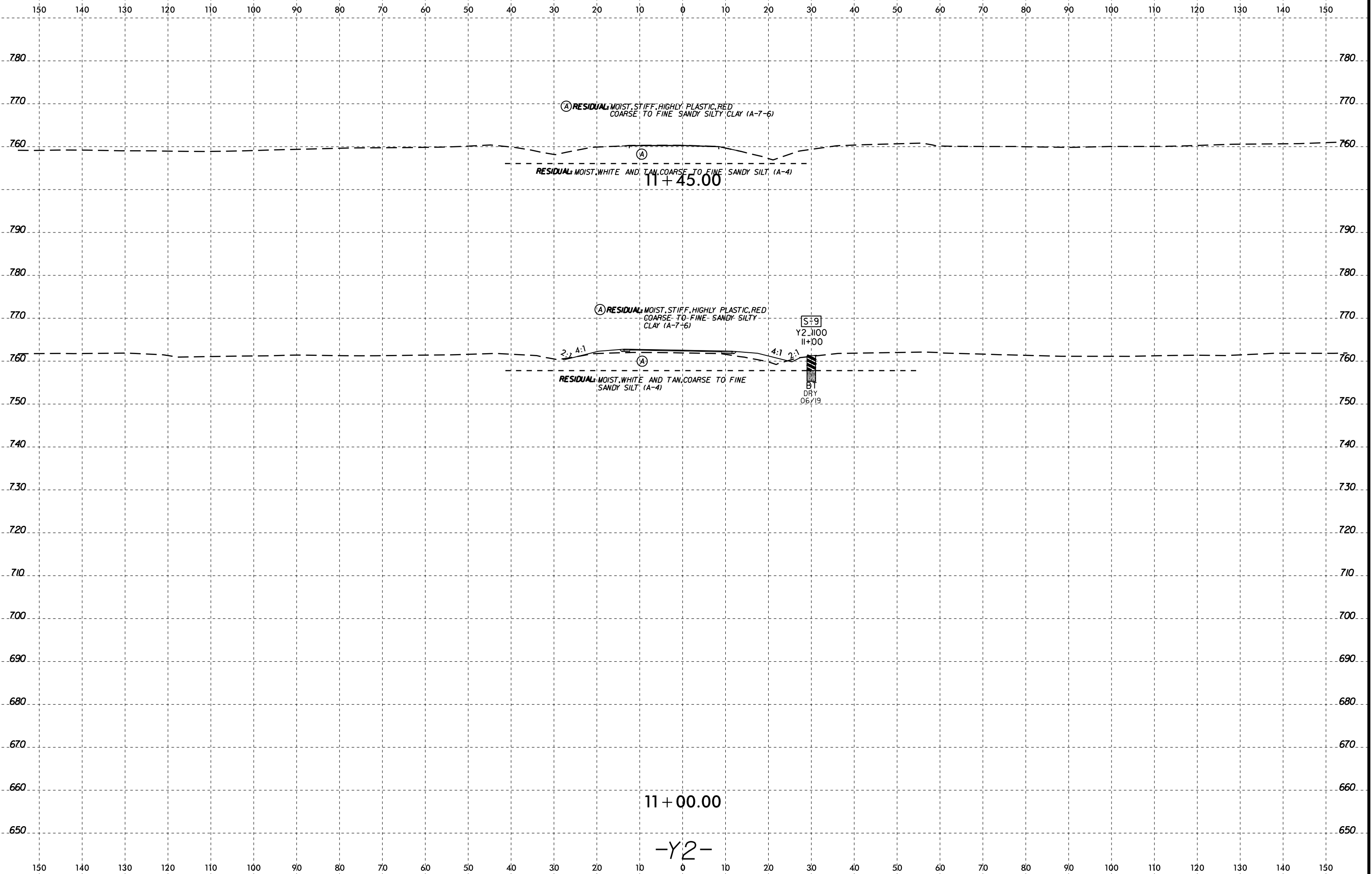
RESIDUAL MOIST, WHITE AND TAN, COARSE TO FINE SANDY SILT (A-4)

10+50.00

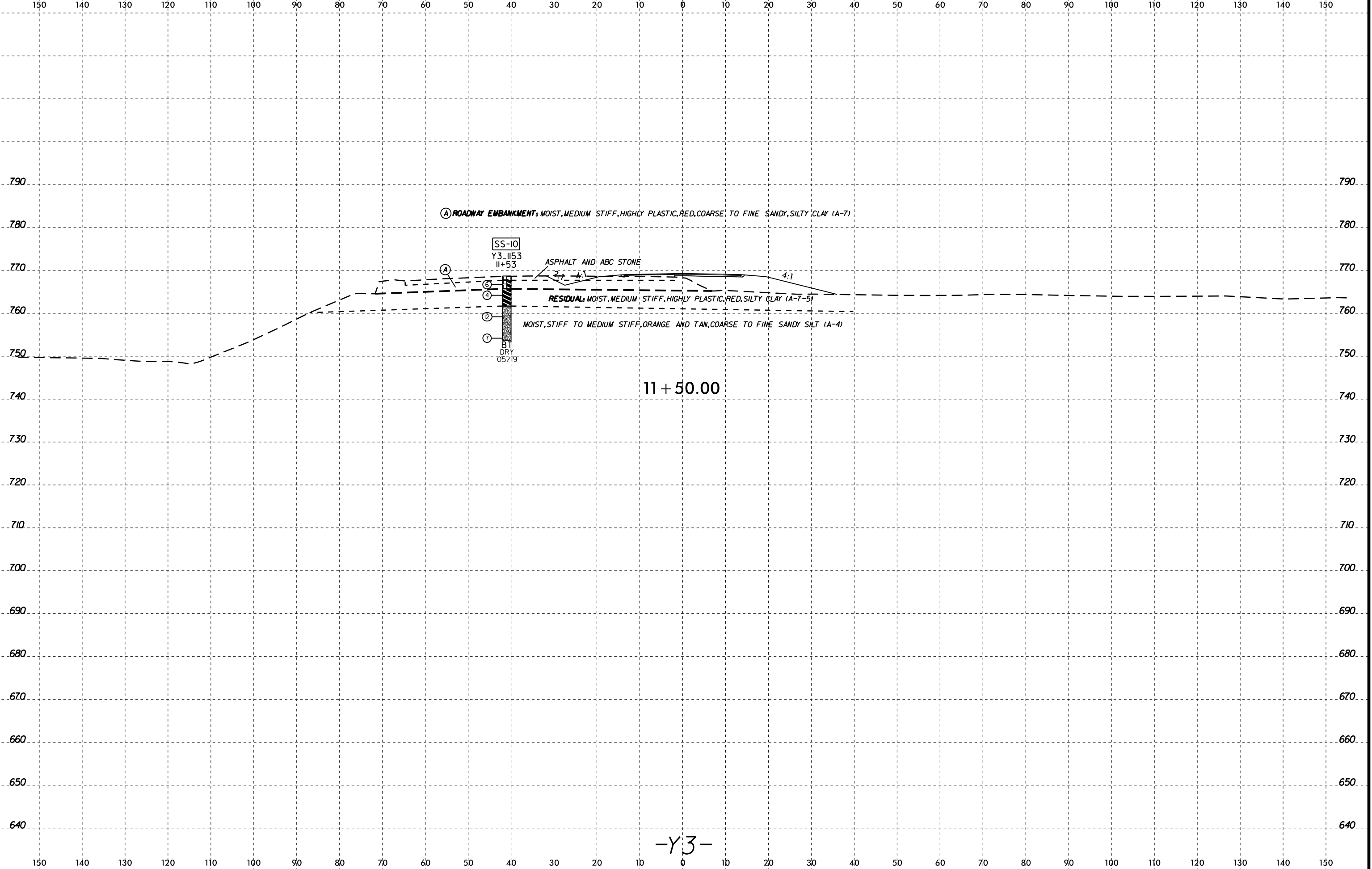
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Ⓐ ROADWAY EMBANKMENT: MOIST, MEDIUM STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY, SILTY CLAY (A-7)

SS-10

Y3-1153

11+53

ASPHALT AND ABC STONE

2" 4:1

4:1

RESIDUAL: MOIST, MEDIUM STIFF, HIGHLY PLASTIC, RED, SILTY CLAY (A-7-5)

MOIST, STIFF TO MEDIUM STIFF, ORANGE AND TAN, COARSE TO FINE SANDY SILT (A-4)

⑤

④

③

②

①

BT

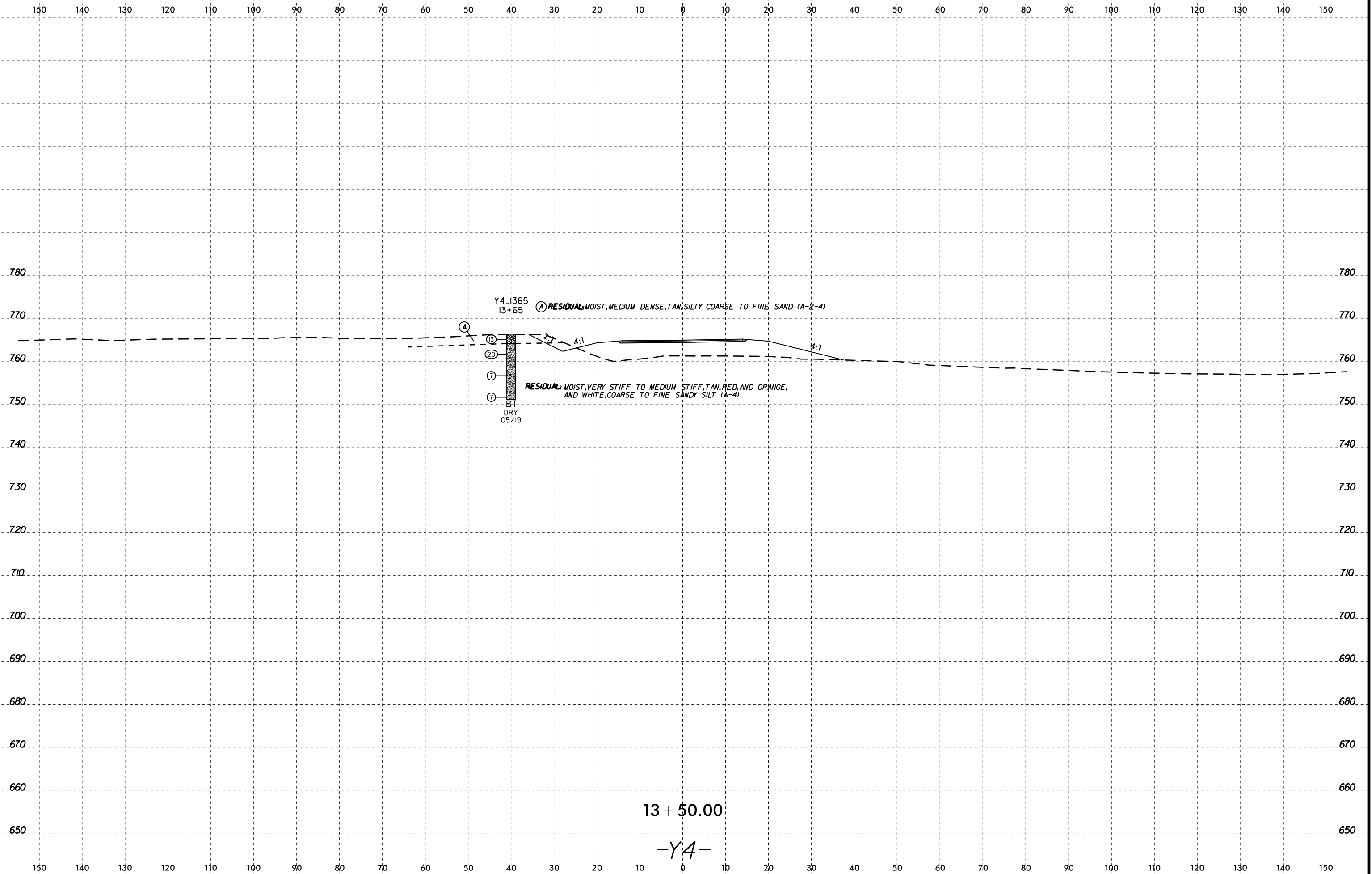
DRY

05/19

11 + 50.00

-Y3-

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Wells At KA211387



Y4.1365
13+65 (A) RESIDUAL MOIST, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

RESIDUAL MOIST, VERY STIFF TO MEDIUM STIFF, TAN, RED, AND ORANGE, AND WHITE, COARSE TO FINE SANDY SILT (A-4)

B1
DRY
05/19

13 + 50.00

-Y4-

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
 GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
 APPENDIX A
 LABORATORY RESULTS

REFERENCE: BR-0042

PROJECT: 67042

DS
JRW

Prepared in the Office of:



LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

PROJECT NO.: 67042.1.1 (BR-0042)
COUNTY: ROCKINGHAM
REPLACE BRIDGE NO. 116 ON SR 2600 over US 29

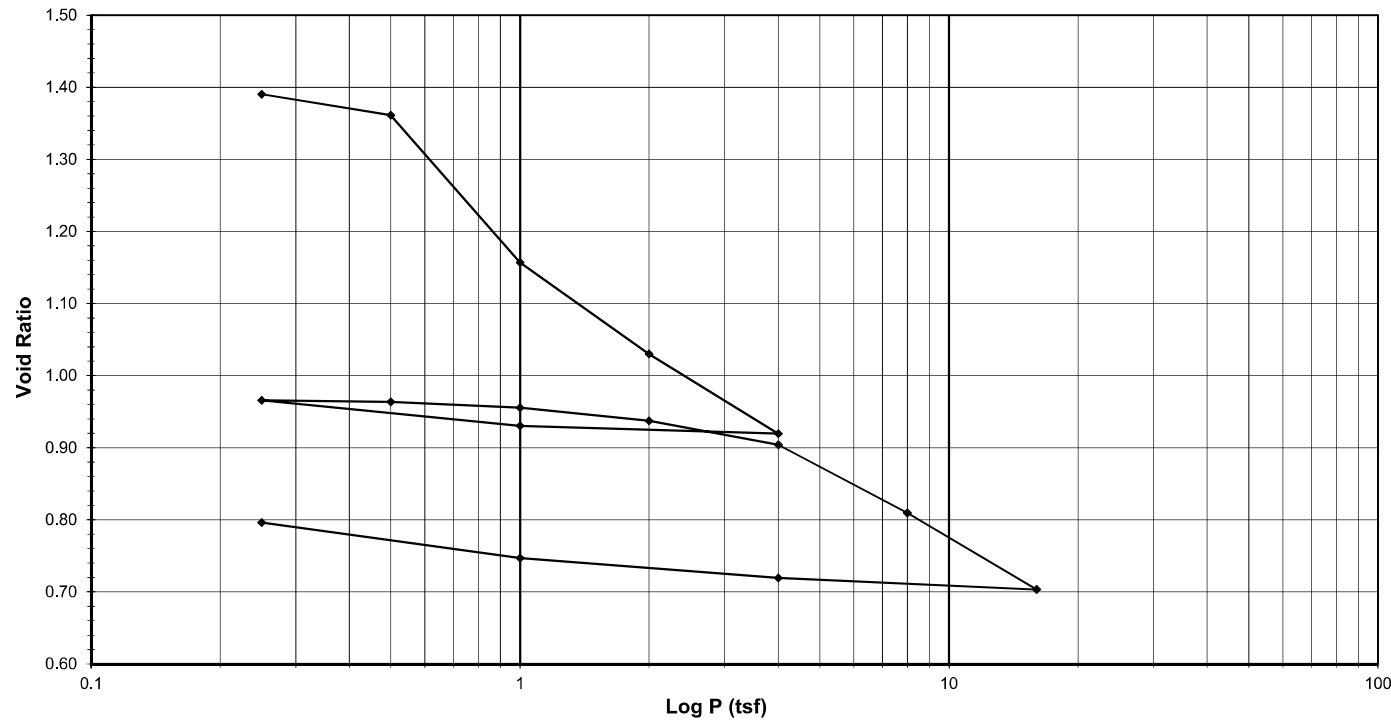
Sample No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class.	Atterberg Limits			Gradation Results							
								L.L.	P.L.	P.I.	Retained #4 Sieve	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
ST-1	EB1-B	-L-	18+77	7' RT	5.0 - 7.0	28.6	A-7-5	48	36	12	0.2	99.2	85.5	52.0	22.3	34.1	31.7	11.9
SS-1	L_2450	-L-	24+50	25' LT	3.5 - 5.0	24.0	A-7-5	58	31	27	0.0	99.9	90.1	68.7	17.3	18.7	29.2	34.9
SS-2	L_2650	-L-	26+50	25' LT	3.5 - 5.0	27.2	A-7-5	55	32	23	0.0	100.0	89.6	70.2	16.0	18.4	20.4	45.2
SS-3	L_2850	-L-	28+50	30' LT	3.5 - 5.0	31.9	A-7-5	71	46	25	0.0	100.0	97.1	87.8	5.2	9.6	26.6	58.7
SS-4	Y_1100_LT	-Y-	11+00	90' LT	3.5 - 5.0	28.6	A-7-6	45	24	21	0.0	99.6	91.6	59.7	16.0	27.6	15.8	40.7
SS-5	Y_1116_RT	-Y-	11+16	89' RT	3.0 - 4.5	34.6	A-7-5	67	49	18	0.0	99.7	93.0	70.2	15.0	15.9	18.2	50.9
SS-6	Y_1481_RT	-Y-	14+81	142' RT	3.5 - 5.0	25.4	A-7-5	83	35	48	0.9	98.5	90.7	76.9	12.3	11.7	16.5	59.4
BS-1	Y_1481_RT	-Y-	14+81	142' RT	8.5 - 18.5	19.0	A-5	45	36	9	0.0	99.6	95.9	87.3	6.3	8.1	53.3	32.4
SS-7	Y_1650	-Y-	16+50	150' RT	3.5 - 5.0	20.7	A-7-5	62	38	24	0.0	99.9	93.2	67.8	12.5	23.4	17.6	46.5
SS-8	Y1_1200	-Y1-	12+00	25' RT	1.0 - 2.5	27.5	A-7-6	59	28	31	0.0	99.7	89.1	71.7	16.5	13.9	15.7	53.9
S-9	Y2_1100	-Y2-	11+00	30' RT	0.0 - 3.5	27.2	A-7-6	54	25	29	0.0	99.7	95.0	79.3	9.2	13.5	14.2	63.1
SS-10	Y3_1153	-Y3-	11+53	41' LT	1.0 - 2.5	28.8	A-7-5	63	36	27	0.0	99.3	92.2	73.3	12.8	16.9	22.1	48.3



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Reference BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-0411 Date 6/18/2019 Approved By MPS Date 6/25/2019

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Reference BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R470
 1 Division = 0.0001 (in.)

Sample Properties

	Initial	Final
<i>Water Content</i>		
Tare Number	TB-10	TB-04
Wt. Tare & WS (g)	365.64	250.68
Wt. Tare & DS (g)	314.24	226.31
Wt. Water (g)	51.40	24.37
Wt. Tare (g)	134.65	135.15
Wt. DS (g)	179.59	91.16
Water Content (%)	28.62	26.73
<i>Sample Parameters</i>		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.7383
Sample Volume (cc)	80.44	59.39
Wt. Wet Sample + Ring (g)	332.88	331.15
Wt. of Ring (g)	214.66	214.66
Wt. of Wet Sample (g)	118.22	116.49
Wet Density (pcf)	91.71	122.39
Wet Density (g/cc)	1.47	1.96
Water Content (%)	28.62	26.73
Wt. of Dry Sample (g)	91.91	91.91
Dry Density (pcf)	71.30	96.57
Dry Density (g/cc)	1.14	1.55
Void Ratio	1.4330	0.7963
Saturation (%)	55.53	93.33
Specific Gravity	2.78	Measured

Test Data Summary

Applied Pressure (tsf)	Final Dial Reading (div)	Machine Deflection (div)	Corrected Reading (div)	Height of Sample (mm)	Volume (cc)	Dry Density (g/cc)	Void Ratio
Seating	0	0	0	25.400	80.440	1.14264	1.43297
0.25	197.9	22.8	175.1	24.955	79.031	1.16300	1.39037
0.5	338.7	44.2	294.5	24.652	78.071	1.17731	1.36131
1	1195.1	60.5	1134.6	22.518	71.313	1.28888	1.15692
2	1750.5	93.6	1656.9	21.192	67.112	1.36956	1.02985
4	2241.6	130.5	2111.2	20.038	63.458	1.44842	0.91933
1	2148.5	83.0	2065.5	20.154	63.825	1.44010	0.93043
0.25	1974.2	52.7	1921.5	20.519	64.984	1.41441	0.96548
0.5	1987.1	58.3	1928.8	20.501	64.924	1.41570	0.96369
1	2037.9	74.9	1963.0	20.414	64.649	1.42172	0.95537
2	2137.5	100.0	2037.5	20.225	64.050	1.43502	0.93726
4	2307.4	133.4	2174.0	19.878	62.952	1.46006	0.90404
8	2731.7	169.9	2561.8	18.893	59.832	1.53618	0.80968
16	3224.8	226.1	2998.7	17.783	56.318	1.63204	0.70339
4	3094.6	161.7	2933.0	17.950	56.847	1.61686	0.71938
1	2932.1	111.7	2820.3	18.236	57.753	1.59149	0.74679
0.25	2689.8	73.0	2616.8	18.753	59.390	1.54762	0.79631

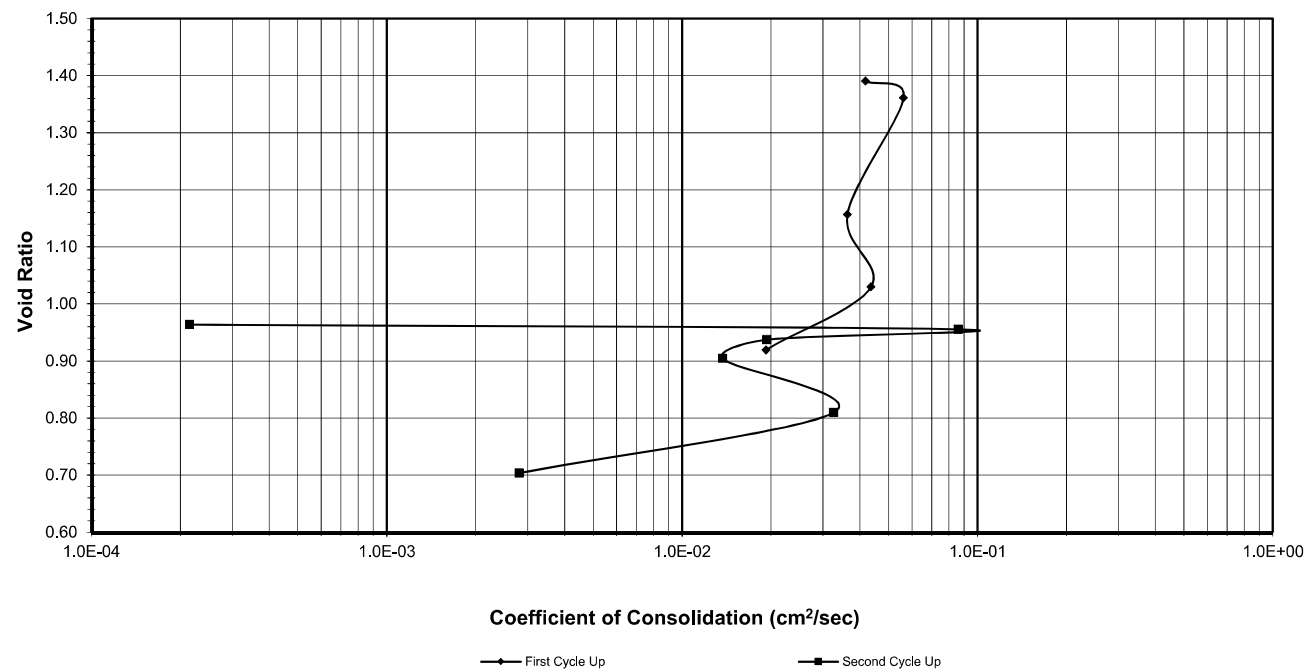
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ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Reference BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-0411 Date 6/18/2019 Input Checked By GEM Date 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6 Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT
 2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Reference BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED

Consolidometer No. R470
 1 Division = 0.0001 (in.)

Sample Properties	Initial	Final
Water Content		
Tare Number	TB-10	TB-04
Wt. Tare & WS (g)	365.64	250.68
Wt. Tare & DS (g)	314.24	226.31
Wt. Water (g)	51.40	24.37
Wt. Tare (g)	134.65	135.15
Wt. DS (g)	179.59	91.16
Water Content (%)	28.62	26.73
Sample Parameters		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.000	0.738
Sample Volume (cc)	80.44	59.39
Wt. Wet Sample + Ring (g)	332.88	331.15
Wt. of Ring (g)	214.66	214.66
Wt. of Wet Sample (g)	118.22	116.49
Wet Density (pcf)	91.71	122.39
Wet Density (g/cc)	1.47	1.96
Water Content (%)	28.62	26.73
Wt. of Dry Sample (g)	91.91	91.91
Dry Density (pcf)	71.30	96.57
Dry Density (g/cc)	1.14	1.55
Void Ratio	1.4330	0.7963
Saturation (%)	55.53	93.33
Specific Gravity	2.78	Measured

Load Increment (tsf)	Dial Reading @ t ₅₀ (div)	Machine Deflection (div)	C _v Test Data Summary		Time t ₅₀ (min.)	C _v (cm ² /sec)
			Corrected Dial Reading @ t ₅₀ (div)	Sample Height @ t ₅₀ (cm)		
0 - 0.25	100.0	22.8	77.2	2.520	0.13	0.04171
0.25 - 0.5	273.4	44.2	229.2	2.482	0.09	0.05617
0.5 - 1.0	806.5	60.5	746.0	2.351	0.13	0.03628
1.0 - 2.0	1488.8	93.6	1395.2	2.186	0.09	0.04357
2.0 - 4.0	2048.5	130.5	1918.0	2.053	0.18	0.01922
4.0 - 1.0	NA	83.0	NA	NA	NA	NA
1.0 - 0.25	NA	52.7	NA	NA	NA	NA
0.25 - 0.5	1986.8	58.3	1928.5	2.050	16.07	0.00021
0.5 - 1.0	2015.6	74.9	1940.7	2.047	0.04	0.08599
1.0 - 2.0	2109.1	100.0	2009.1	2.030	0.18	0.01932
2.0 - 4.0	2250.9	133.4	2117.5	2.002	0.24	0.01371
4.0 - 8.0	2523.3	169.9	2353.4	1.942	0.10	0.03259
8.0 - 16.0	2984.4	226.1	2758.3	1.839	0.99	0.00281
16.0 - 4.0	NA	161.7	NA	NA	NA	NA
4.0 - 1.0	NA	111.7	NA	NA	NA	NA
1.0 - 0.25	NA	73.0	NA	NA	NA	NA

Tested By 129-0411 Date 6/18/2019 Input Checked By GEM Date 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6 Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT

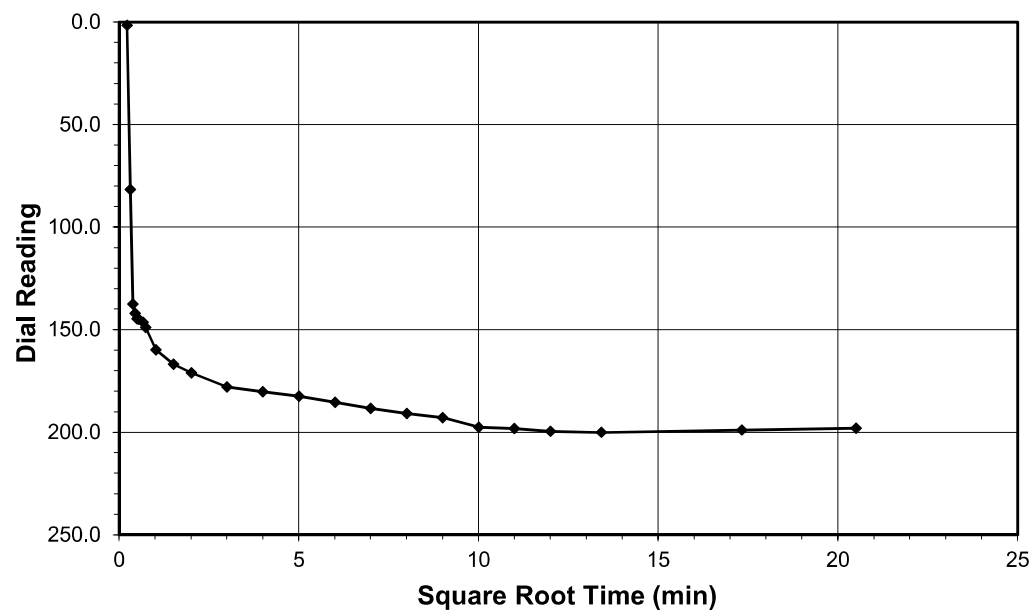


ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

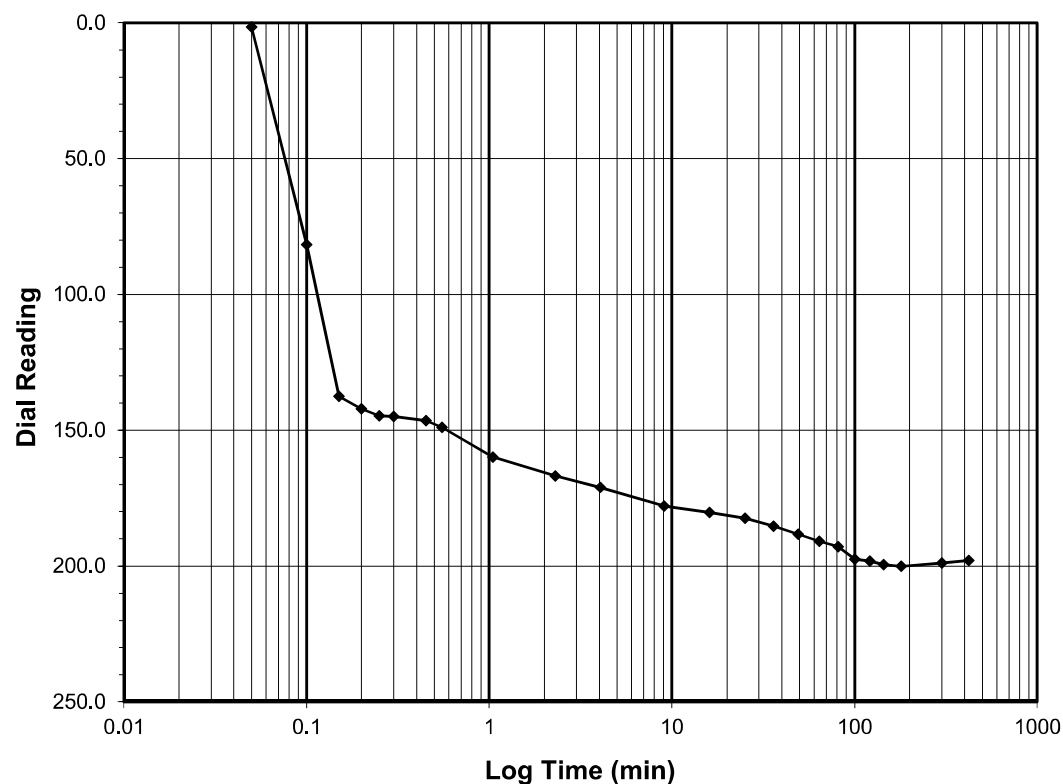
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.0-0.25
Final Reading (div) 197.9
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/18/2019
 Start Time 13:32:51

Elapsed Time (min)	Dial Reading (div)
Initial	0.0
0.05	1.5
0.10	81.7
0.15	137.6
0.20	142.1
0.25	144.7
0.30	145.0
0.45	146.5
0.55	148.9
1.05	159.9
2.30	166.8
4.05	171.1
9.05	178.0
16.05	180.3
25.07	182.4
36.07	185.4
49.07	188.3
64.07	190.9
81.07	192.9
100.07	197.5
121.07	198.1
144.07	199.5
180.07	200.1
300.07	198.9
420.45	197.9



Tested By 129-0411 Date 6/18/2019 Checked By GEM Date 6/25/2019

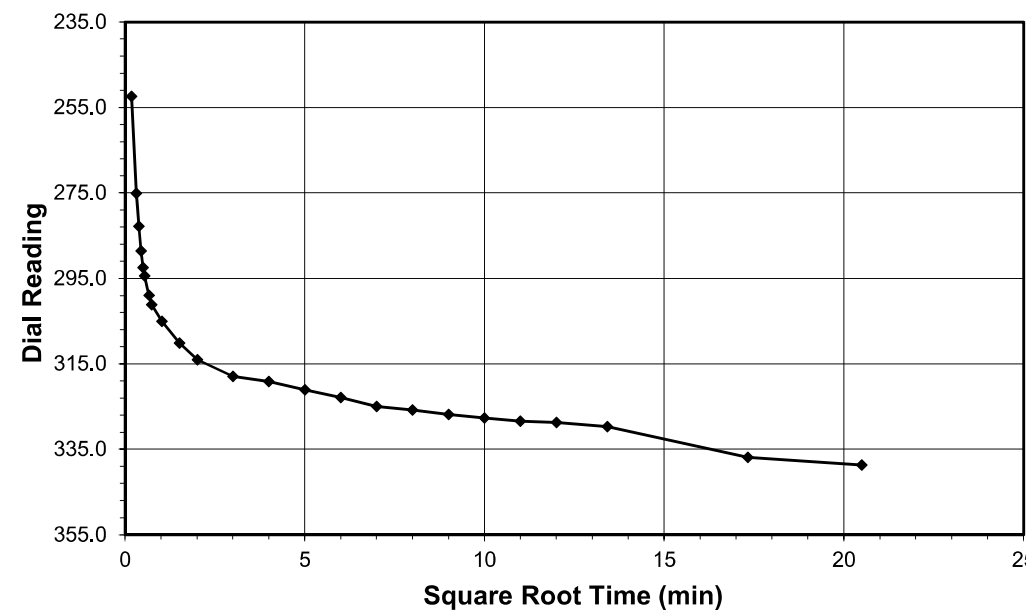


ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

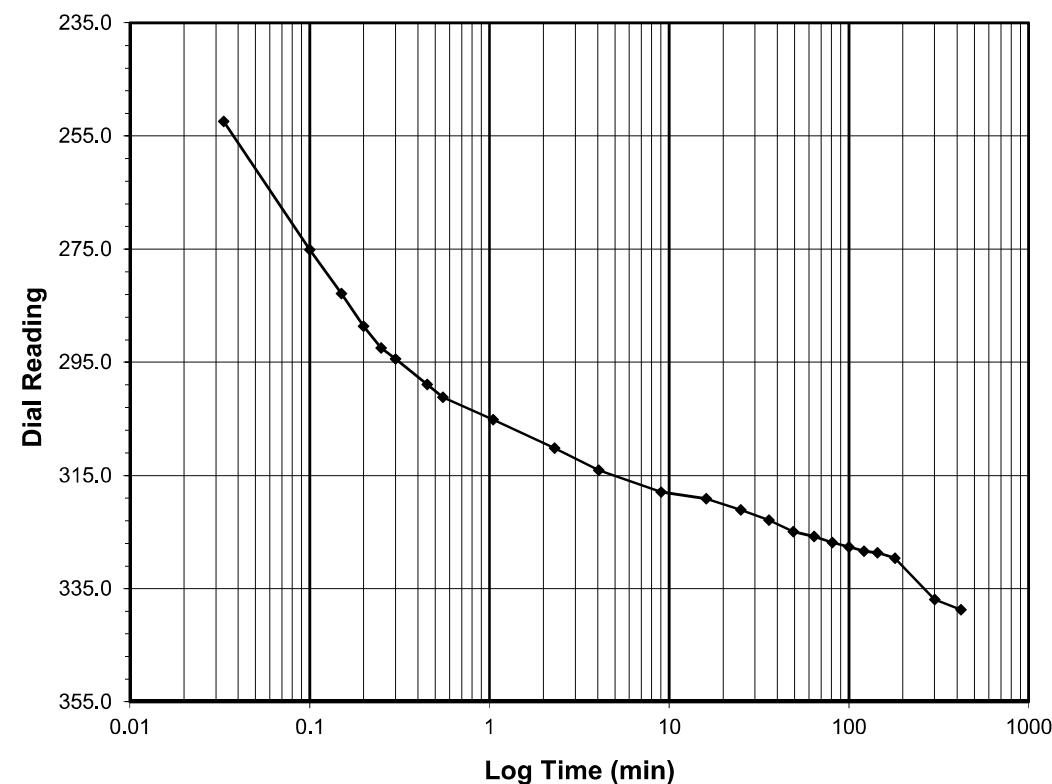
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5
Final Reading (div) 338.7
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/18/2019
 Start Time 20:33:18

Elapsed Time (min)	Dial Reading (div)
Initial	197.9
0.03	252.4
0.10	275.1
0.15	282.8
0.20	288.6
0.25	292.4
0.30	294.4
0.45	298.9
0.55	301.2
1.05	305.1
2.30	310.1
4.05	314.0
9.05	317.9
16.05	319.1
25.07	321.1
36.07	322.9
49.05	324.9
64.05	325.8
81.05	326.8
100.05	327.6
121.05	328.4
144.05	328.7
180.05	329.6
300.07	336.9
420.12	338.7



Tested By 129-0411 Date 6/18/2019 Checked By GEM Date 6/25/2019

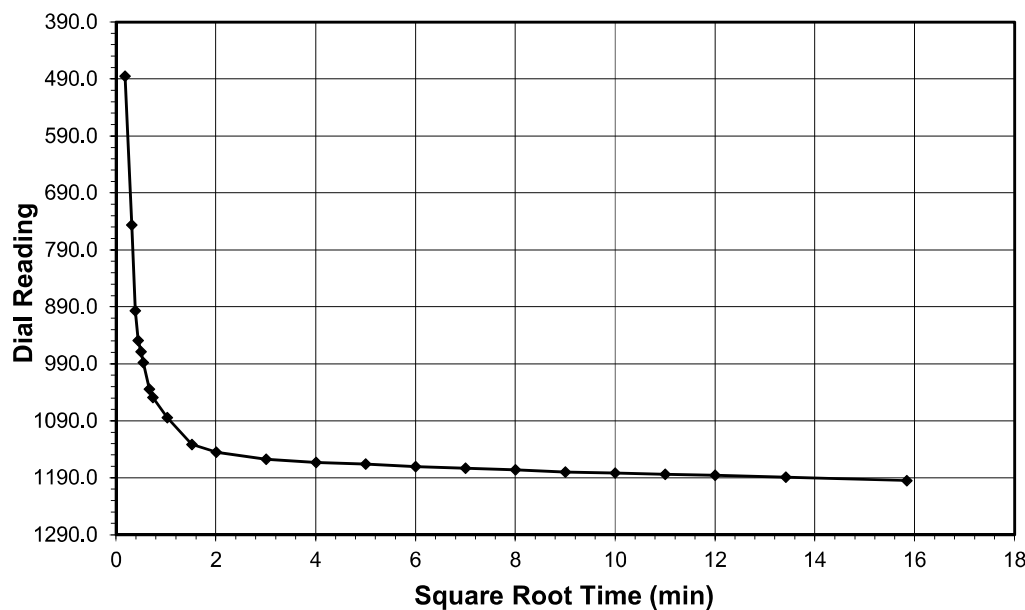


ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

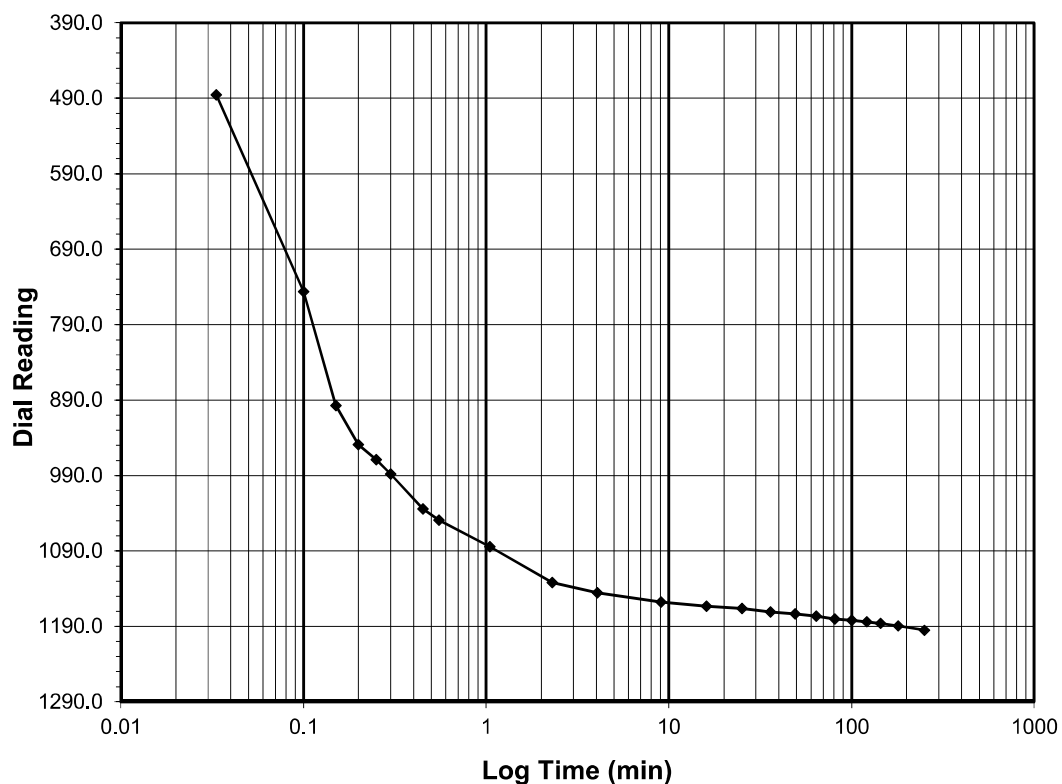
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0
Final Reading (div) 1195.1
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/19/2019
 Start Time 3:33:26

Elapsed Time (min)	Dial Reading (div)
Initial	338.7
0.03	485.5
0.10	746.5
0.15	897.3
0.20	949.0
0.25	968.9
0.30	987.9
0.45	1034.6
0.55	1049.2
1.05	1084.3
2.30	1131.7
4.05	1145.5
9.05	1157.6
16.05	1163.2
25.05	1166.2
36.05	1170.6
49.05	1173.3
64.05	1176.1
81.05	1180.2
100.05	1181.9
121.05	1183.8
144.05	1185.9
180.05	1189.3
251.08	1195.1



Tested By 129-0411 Date 6/19/2019 Checked By GEM Date 6/25/2019

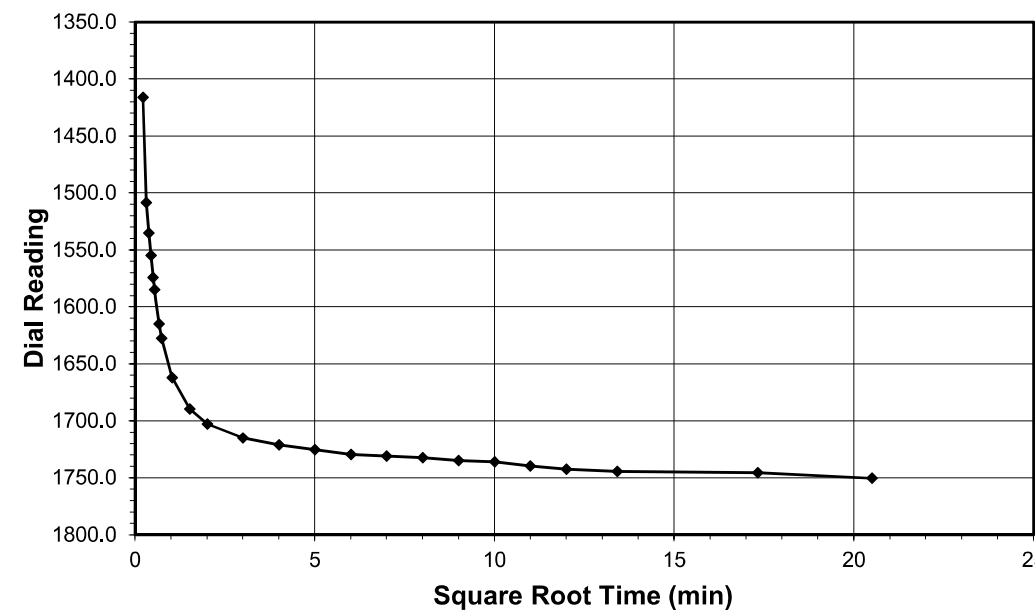


ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

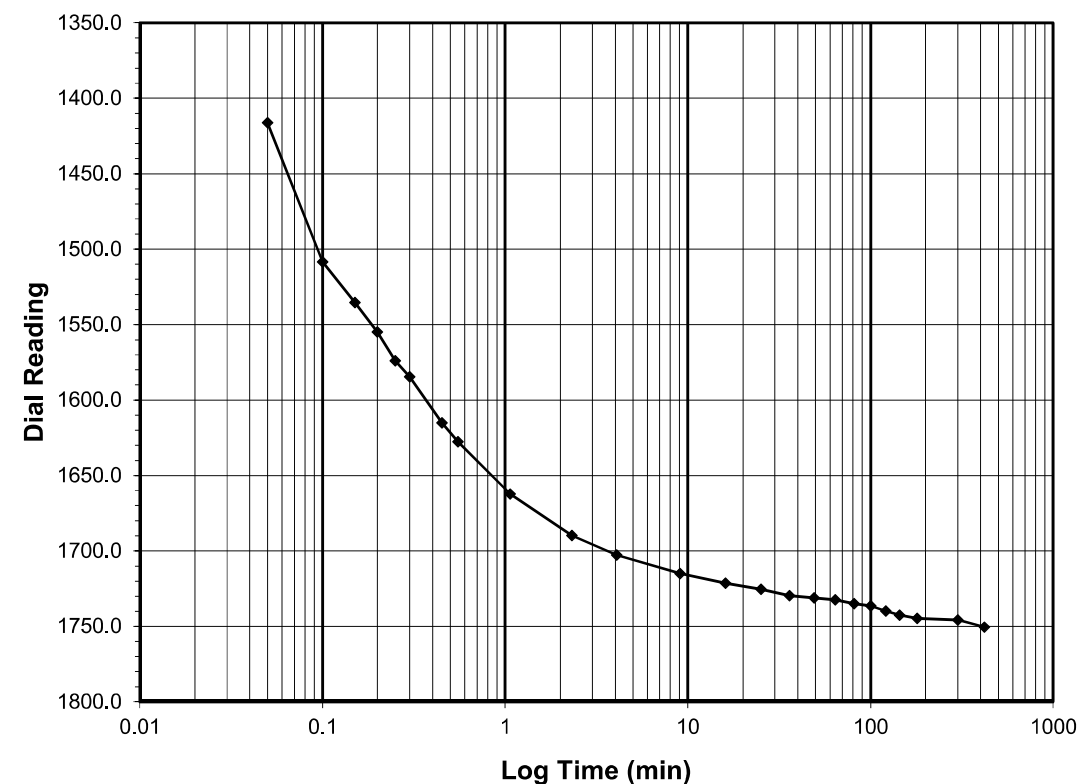
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0
Final Reading (div) 1750.5
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/19/2019
 Start Time 7:44:32

Elapsed Time (min)	Dial Reading (div)
Initial	1195.1
0.05	1416.2
0.10	1508.5
0.15	1535.2
0.20	1554.8
0.25	1574.1
0.30	1584.7
0.45	1615.1
0.55	1627.6
1.07	1662.3
2.32	1689.7
4.07	1702.8
9.07	1715.0
16.07	1721.3
25.07	1725.4
36.07	1729.6
49.07	1731.0
64.07	1732.4
81.07	1734.9
100.07	1736.2
121.07	1739.7
144.07	1742.5
180.07	1744.6
300.07	1745.6
420.37	1750.5



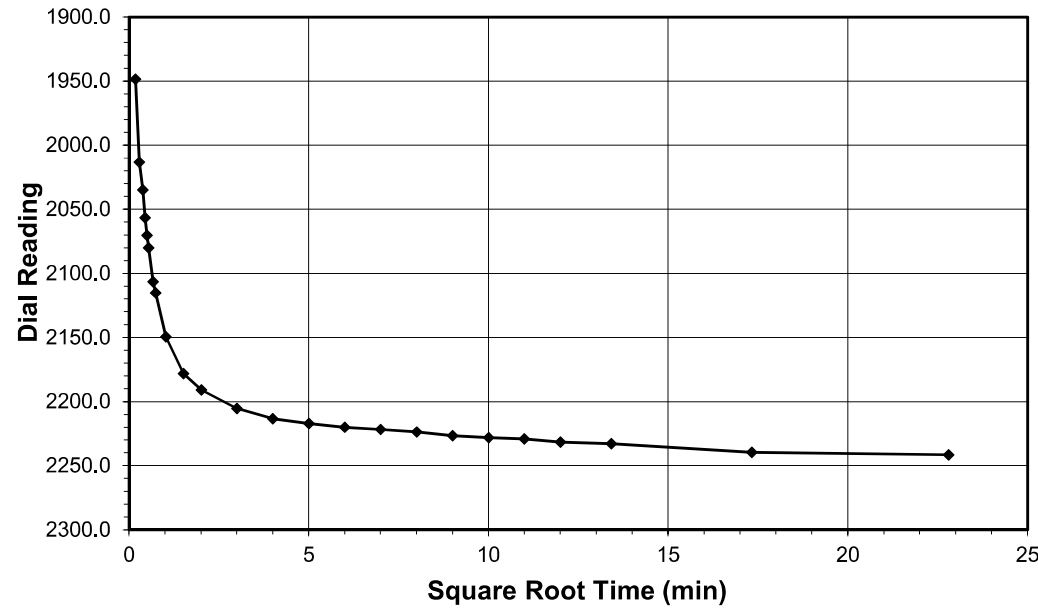
Tested By 129-0411 Date 6/19/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

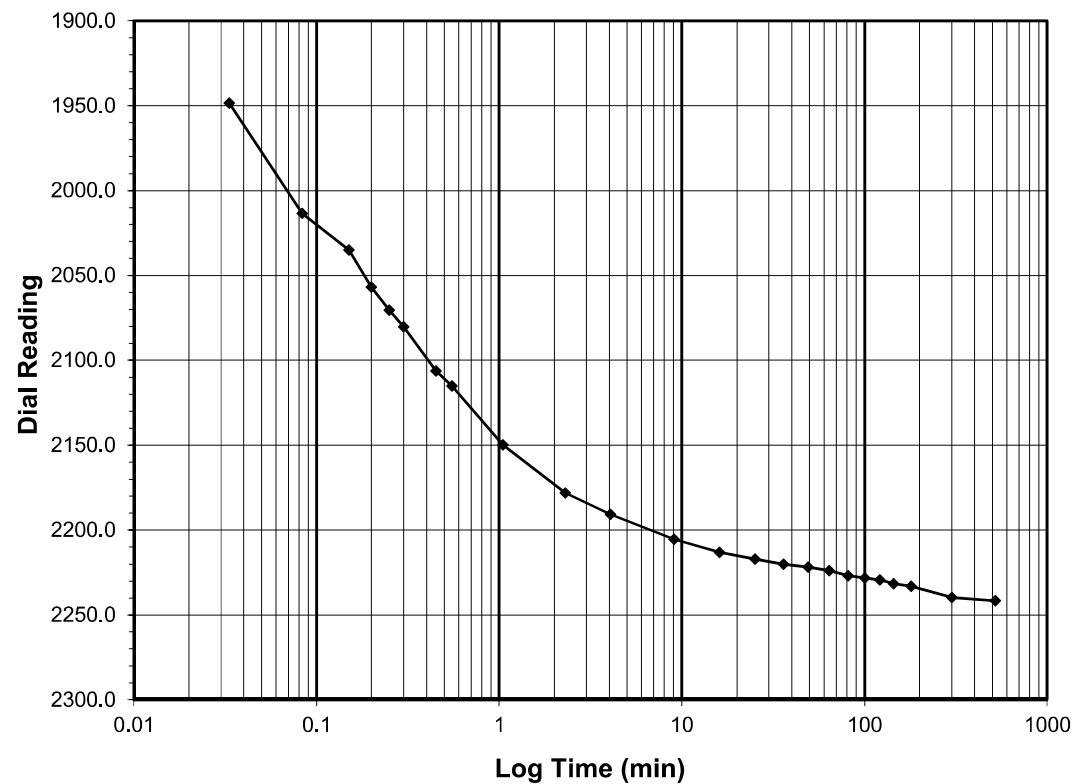
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0
Final Reading (div) 2241.6
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/19/2019
 Start Time 14:44:54

Elapsed Time (min)	Dial Reading (div)
Initial	1750.5
0.03	1948.5
0.08	2013.4
0.15	2035.0
0.20	2056.8
0.25	2070.4
0.30	2080.1
0.45	2106.4
0.55	2115.2
1.05	2149.7
2.30	2178.2
4.05	2190.8
9.05	2205.3
16.05	2213.2
25.05	2217.1
36.05	2220.1
49.07	2221.8
64.07	2223.8
81.07	2226.8
100.07	2228.2
121.07	2229.3
144.07	2231.6
180.07	2233.0
300.07	2239.7
520.07	2241.6



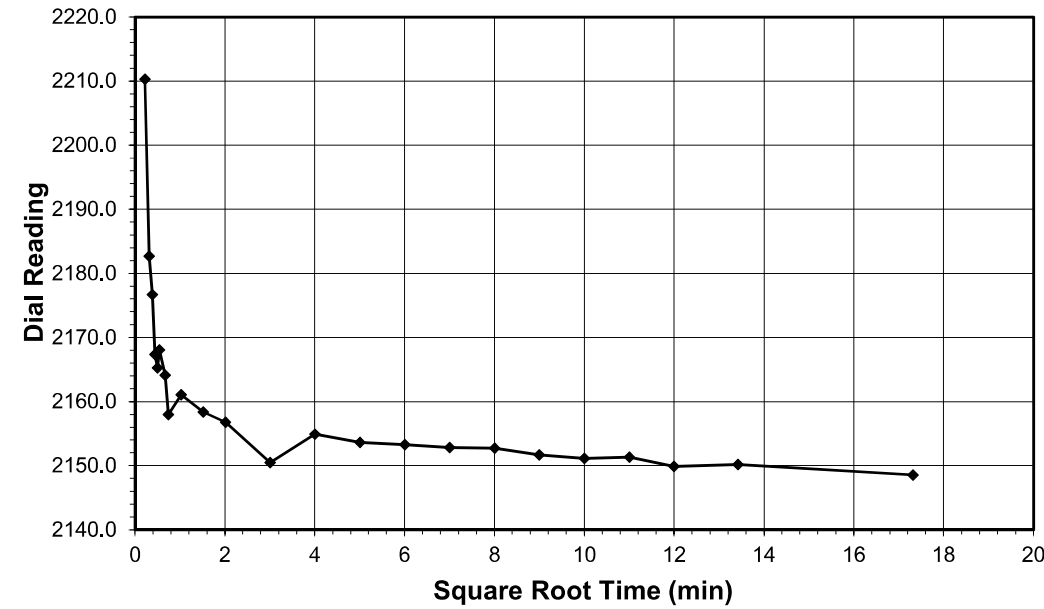
Tested By 129-0411 Date 6/19/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

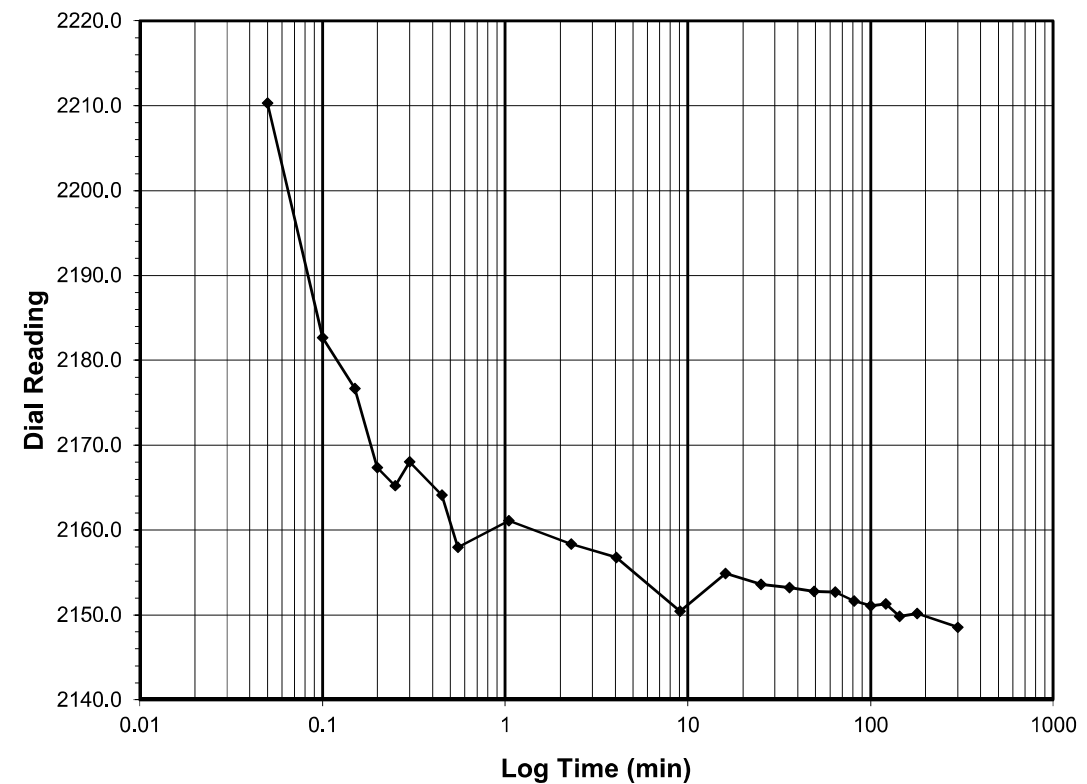
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-1.0
Final Reading (div) 2148.5
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/20/2019
 Start Time 2:45:06

Elapsed Time (min)	Dial Reading (div)
Initial	2241.6
0.05	2210.3
0.10	2182.7
0.15	2176.7
0.20	2167.4
0.25	2165.2
0.30	2168.0
0.45	2164.1
0.55	2158.0
1.05	2161.1
2.30	2158.4
4.05	2156.8
9.07	2150.4
16.07	2154.9
25.07	2153.6
36.07	2153.2
49.07	2152.8
64.07	2152.7
81.07	2151.7
100.07	2151.1
121.07	2151.3
144.07	2149.9
180.08	2150.2
300.08	2148.5



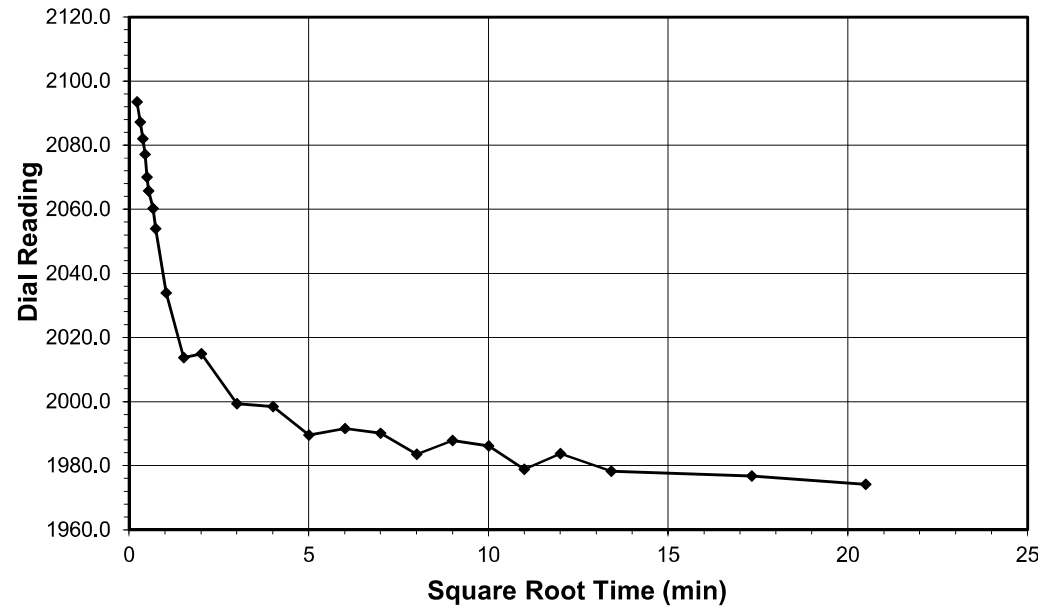
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ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

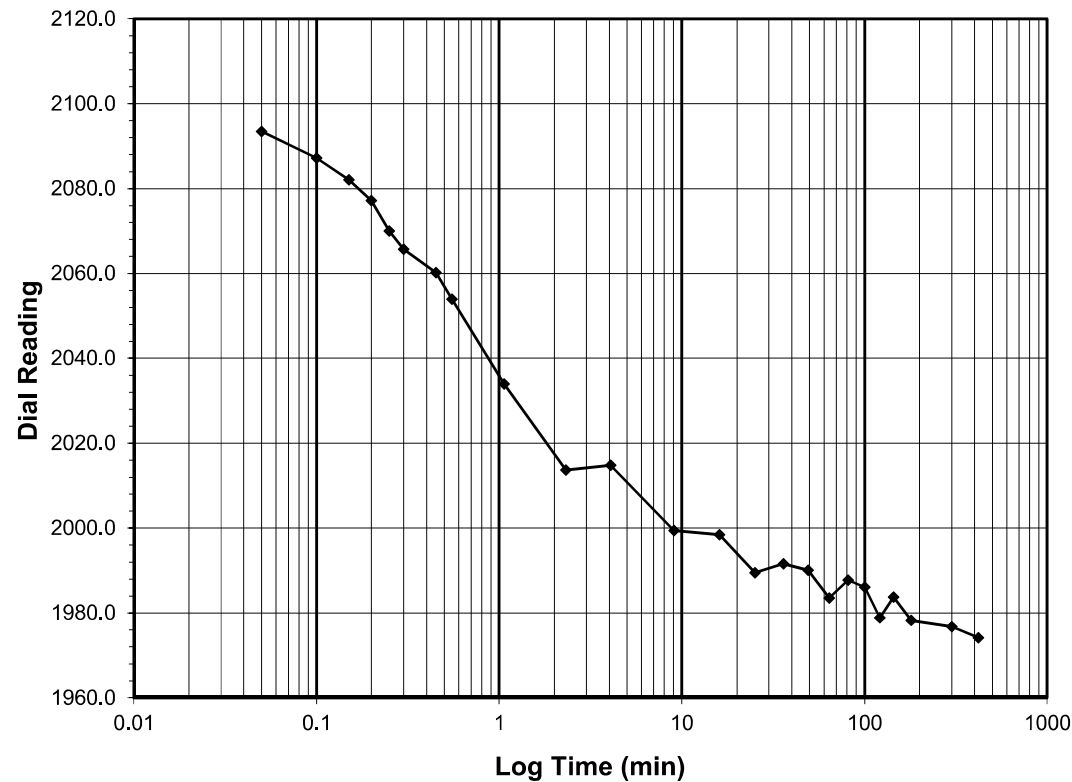
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25
Final Reading (div) 1974.2
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/20/2019
 Start Time 9:45:33

Elapsed Time (min)	Dial Reading (div)
Initial	2148.5
0.05	2093.5
0.10	2087.2
0.15	2082.1
0.20	2077.2
0.25	2070.0
0.30	2065.7
0.45	2060.2
0.55	2053.9
1.07	2033.9
2.32	2013.7
4.07	2014.9
9.07	1999.4
16.07	1998.5
25.07	1989.5
36.07	1991.6
49.07	1990.1
64.07	1983.5
81.07	1987.8
100.07	1986.1
121.07	1978.9
144.07	1983.7
180.07	1978.3
300.07	1976.8
420.00	1974.2



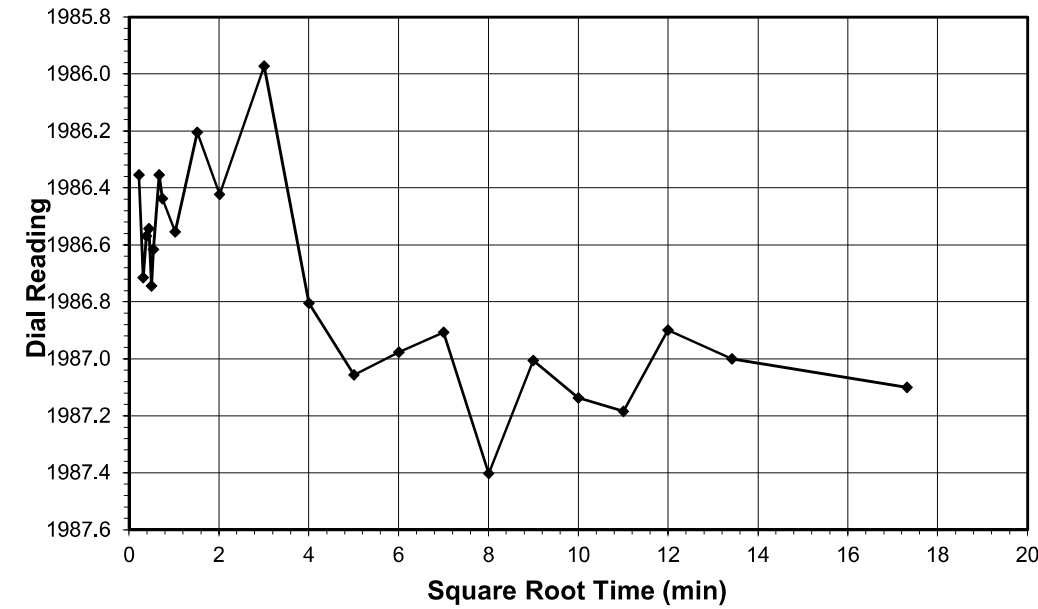
Tested By 129-0411 Date 6/20/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

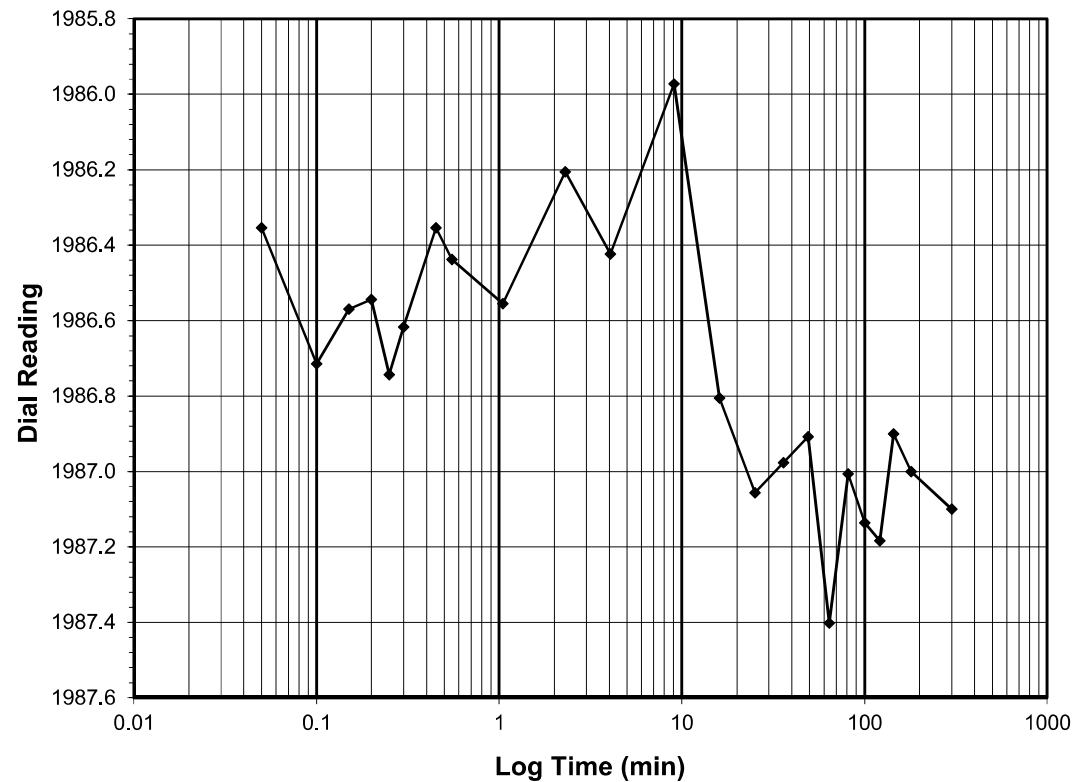
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5
Final Reading (div) 1987.1
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/20/2019
 Start Time 16:45:33

Elapsed Time (min)	Dial Reading (div)
Initial	1974.2
0.05	1986.4
0.10	1986.7
0.15	1986.6
0.20	1986.5
0.25	1986.7
0.30	1986.6
0.45	1986.4
0.55	1986.4
1.05	1986.6
2.30	1986.2
4.05	1986.4
9.05	1986.0
16.07	1986.8
25.07	1987.1
36.07	1987.0
49.07	1986.9
64.07	1987.4
81.07	1987.0
100.07	1987.1
121.07	1987.2
144.07	1986.9
180.07	1987.0
300.07	1987.1



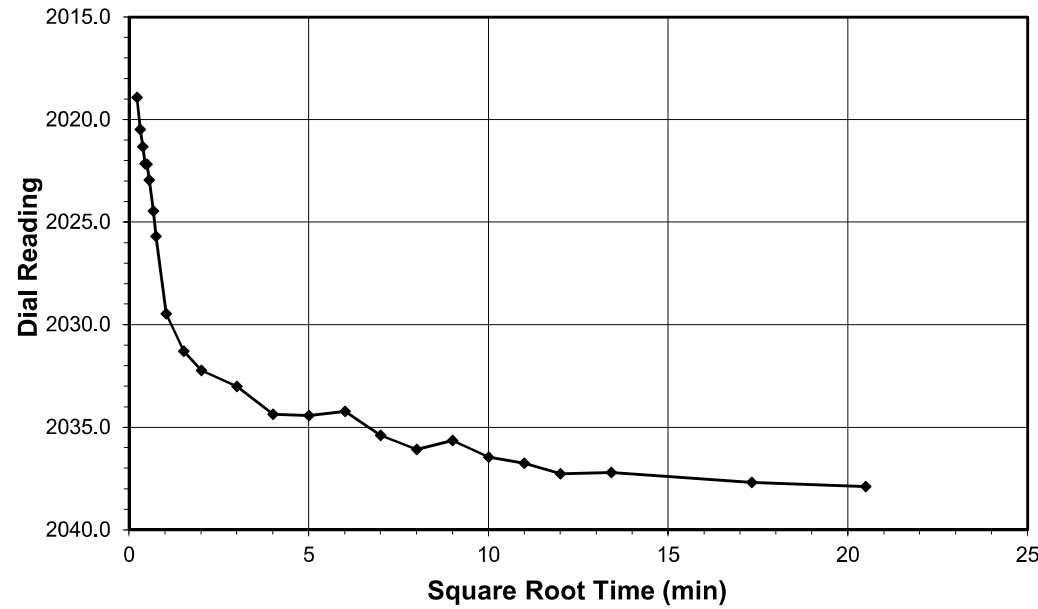
Tested By 129-0411 Date 6/20/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

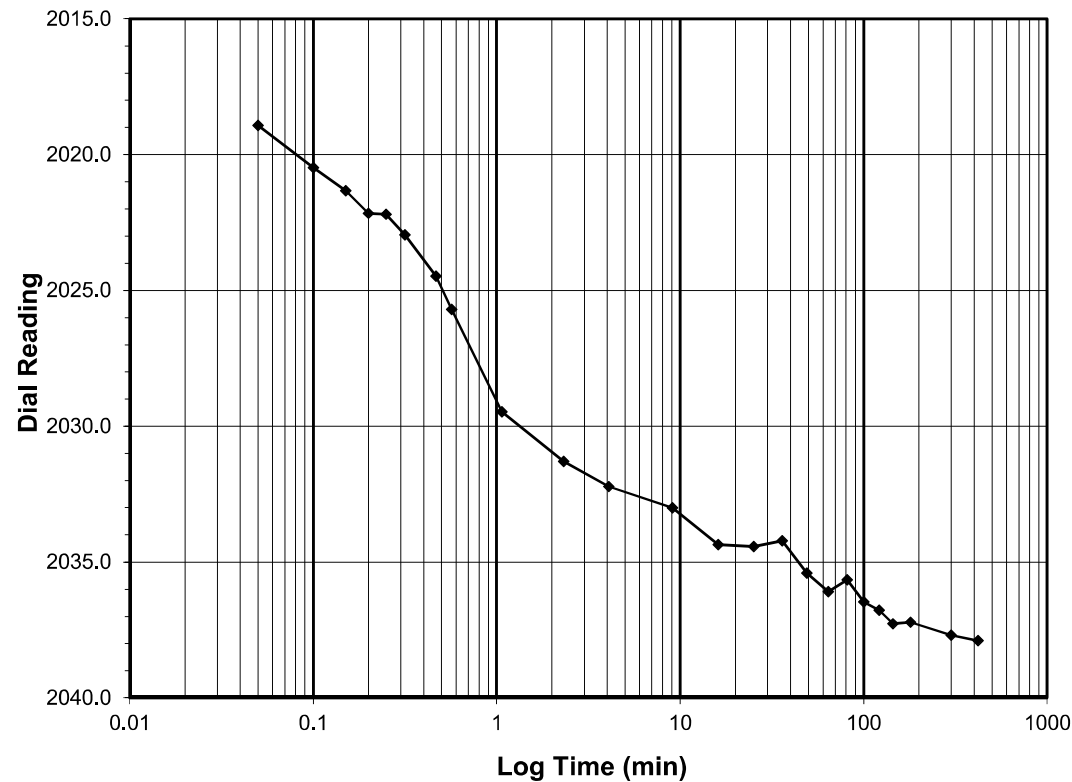
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0
 Final Reading (div) 2037.9
 Consolidometer No. R470
 1 Division (in) 0.0001

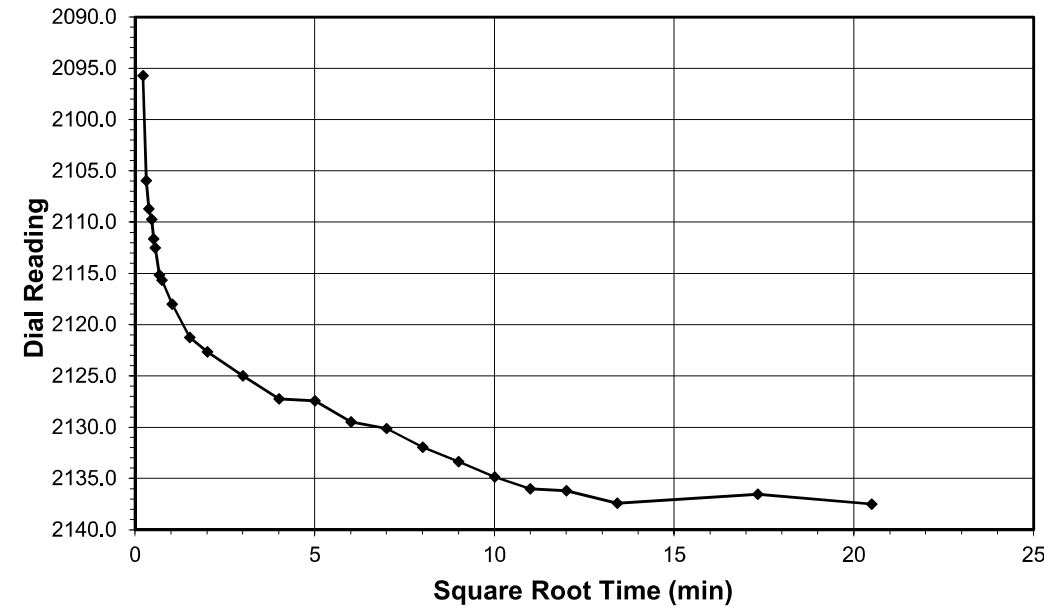
Start Date 6/20/2019
 Start Time 23:46:03

Elapsed Time (min)	Dial Reading (div)
Initial	1987.1
0.05	2018.9
0.10	2020.5
0.15	2021.3
0.20	2022.2
0.25	2022.2
0.32	2023.0
0.47	2024.5
0.57	2025.7
1.07	2029.5
2.32	2031.3
4.07	2032.2
9.07	2033.0
16.07	2034.4
25.07	2034.4
36.07	2034.2
49.07	2035.4
64.07	2036.1
81.07	2035.6
100.07	2036.5
121.07	2036.8
144.07	2037.3
180.07	2037.2
300.07	2037.7
420.07	2037.9



Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

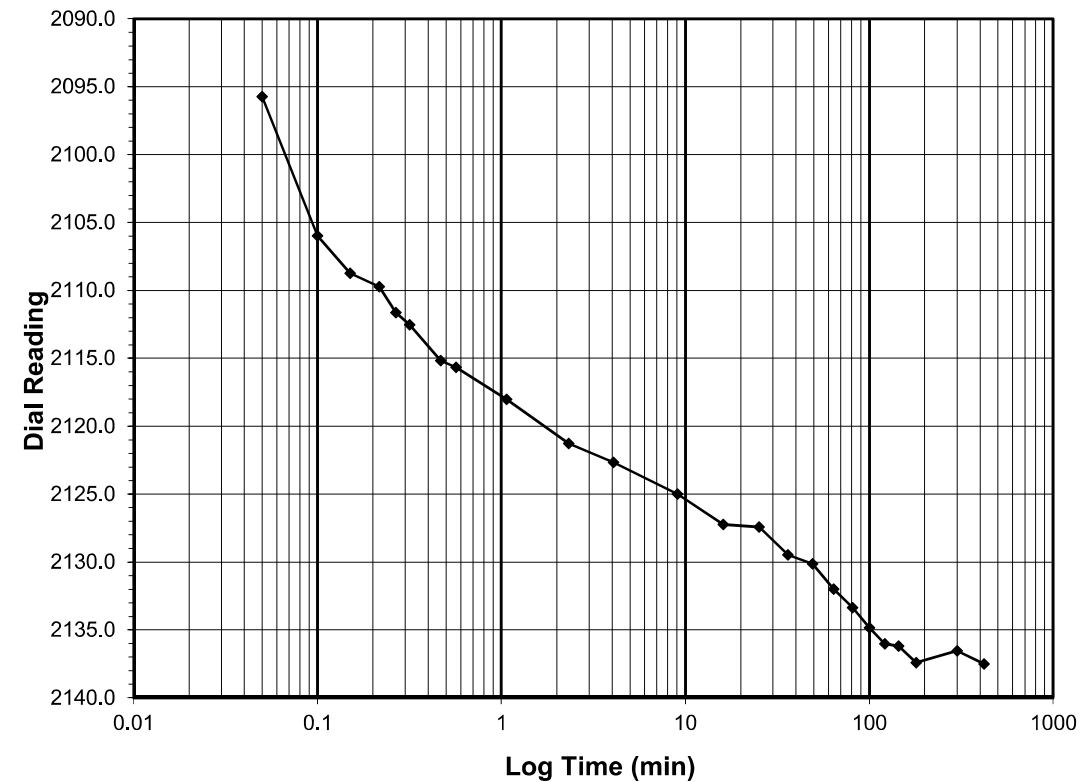
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0
 Final Reading (div) 2137.5
 Consolidometer No. R470
 1 Division (in) 0.0001

Start Date 6/21/2019
 Start Time 6:46:07

Elapsed Time (min)	Dial Reading (div)
Initial	2037.9
0.05	2095.7
0.10	2106.0
0.15	2108.7
0.22	2109.7
0.27	2111.6
0.32	2112.5
0.47	2115.2
0.57	2115.7
1.07	2118.0
2.32	2121.3
4.07	2122.7
9.07	2125.0
16.07	2127.2
25.07	2127.4
36.07	2129.5
49.07	2130.1
64.07	2132.0
81.07	2133.4
100.07	2134.9
121.08	2136.0
144.08	2136.2
180.08	2137.4
300.08	2136.5
420.08	2137.5



Tested By 129-0411 Date 6/20/2019 Checked By GEM Date 6/25/2019

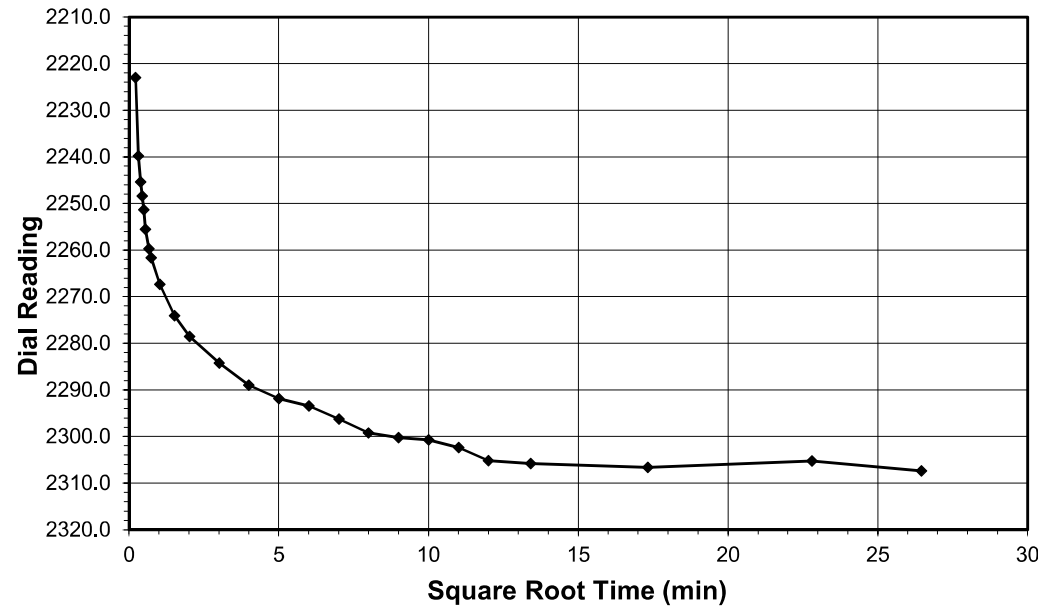
Tested By 129-0411 Date 6/21/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

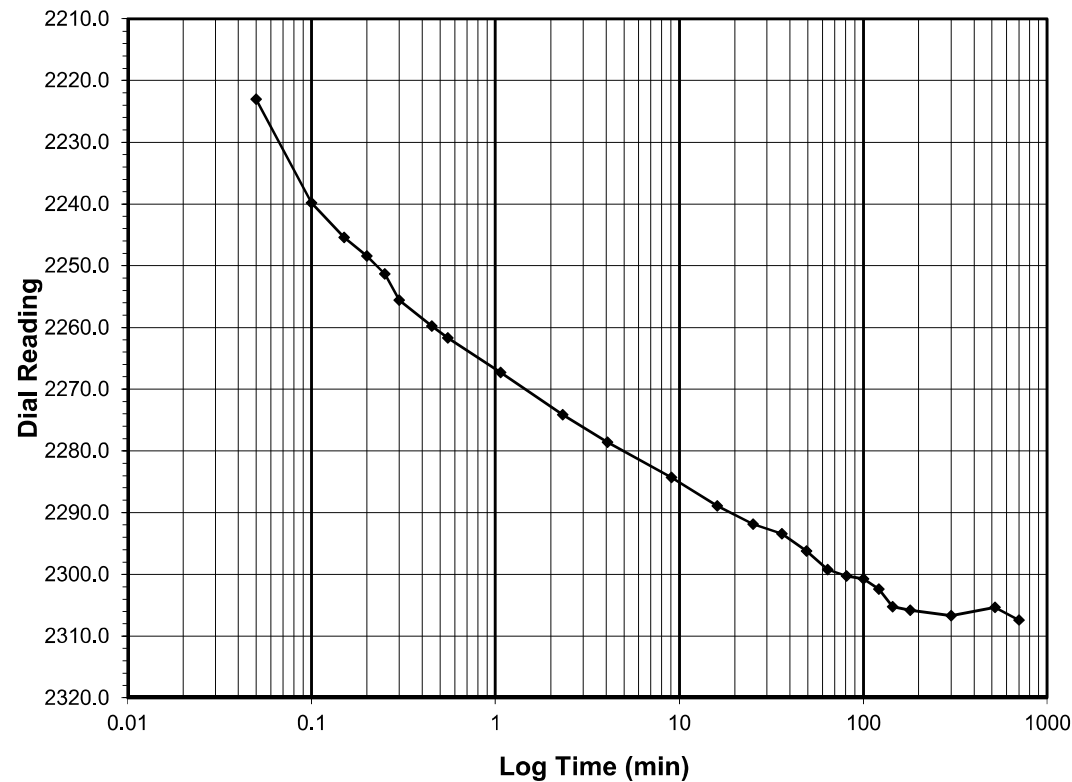
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0
Final Reading (div) 2307.4
 Consolidometer No. **R470**
 1 Division (in) 0.0001

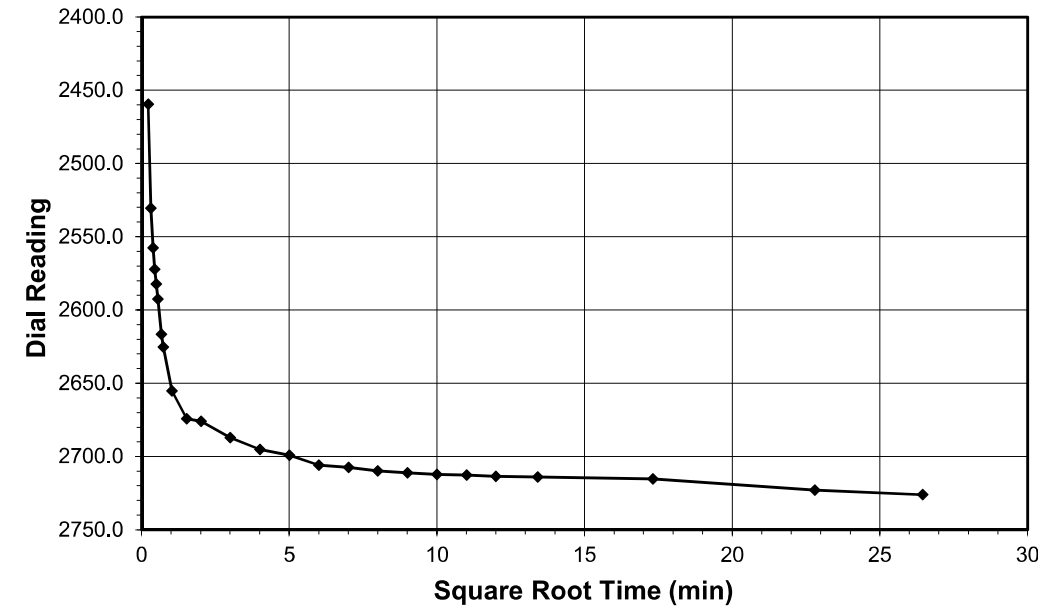
Start Date 6/21/2019
 Start Time 13:46:12

Elapsed Time (min)	Dial Reading (div)
Initial	2137.5
0.05	2223.1
0.10	2239.8
0.15	2245.4
0.20	2248.4
0.25	2251.3
0.30	2255.6
0.45	2259.7
0.55	2261.6
1.07	2267.3
2.32	2274.1
4.07	2278.6
9.07	2284.3
16.07	2288.9
25.07	2291.9
36.07	2293.4
49.07	2296.2
64.07	2299.2
81.07	2300.3
100.07	2300.7
121.07	2302.4
144.07	2305.2
180.07	2305.8
300.07	2306.7
520.07	2305.3
700.07	2307.4



Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

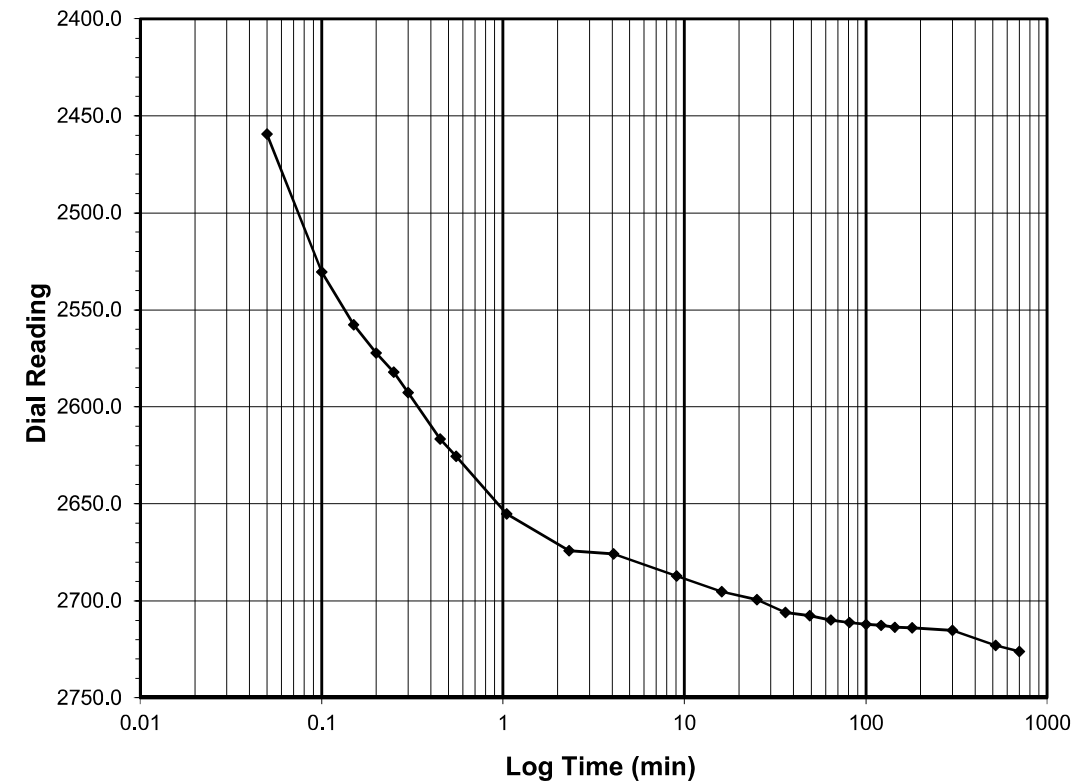
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-8.0
Final Reading (div) 2731.7
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/22/2019
 Start Time 1:46:23

Elapsed Time (min)	Dial Reading (div)
Initial	2307.4
0.05	2459.4
0.10	2530.4
0.15	2557.6
0.20	2572.2
0.25	2582.1
0.30	2592.7
0.45	2616.6
0.55	2625.4
1.05	2655.2
2.32	2674.2
4.07	2675.8
9.07	2687.2
16.07	2695.2
25.07	2699.3
36.07	2705.9
49.07	2707.5
64.07	2709.9
81.07	2711.1
100.07	2712.2
121.07	2712.7
144.07	2713.7
180.07	2714.0
300.07	2715.3
520.07	2723.0
700.08	2731.7



Tested By 129-0411 Date 6/21/2019 Checked By GEM Date 6/25/2019

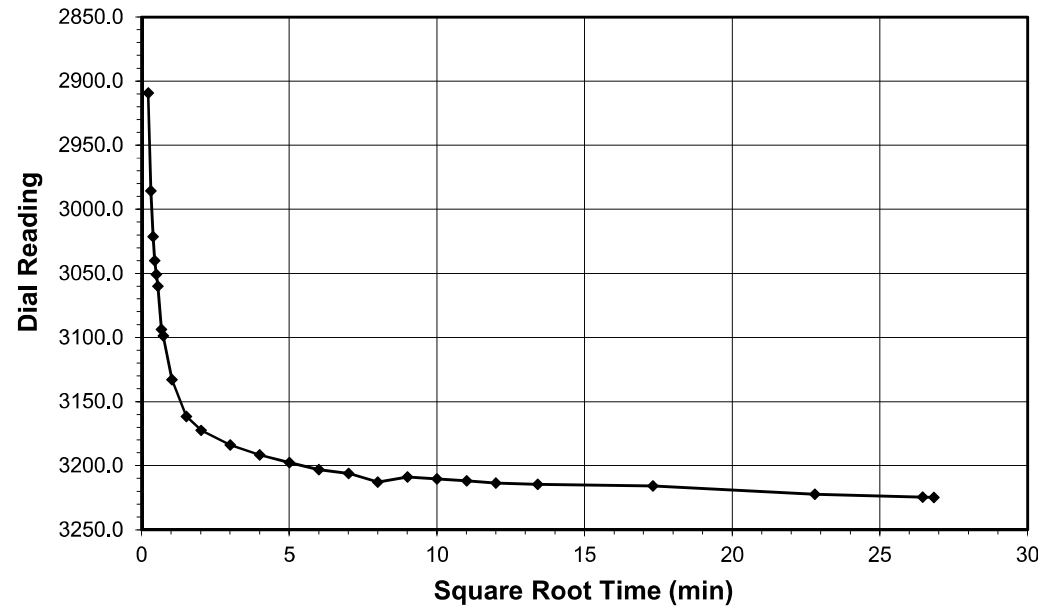
Tested By 129-0411 Date 6/22/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

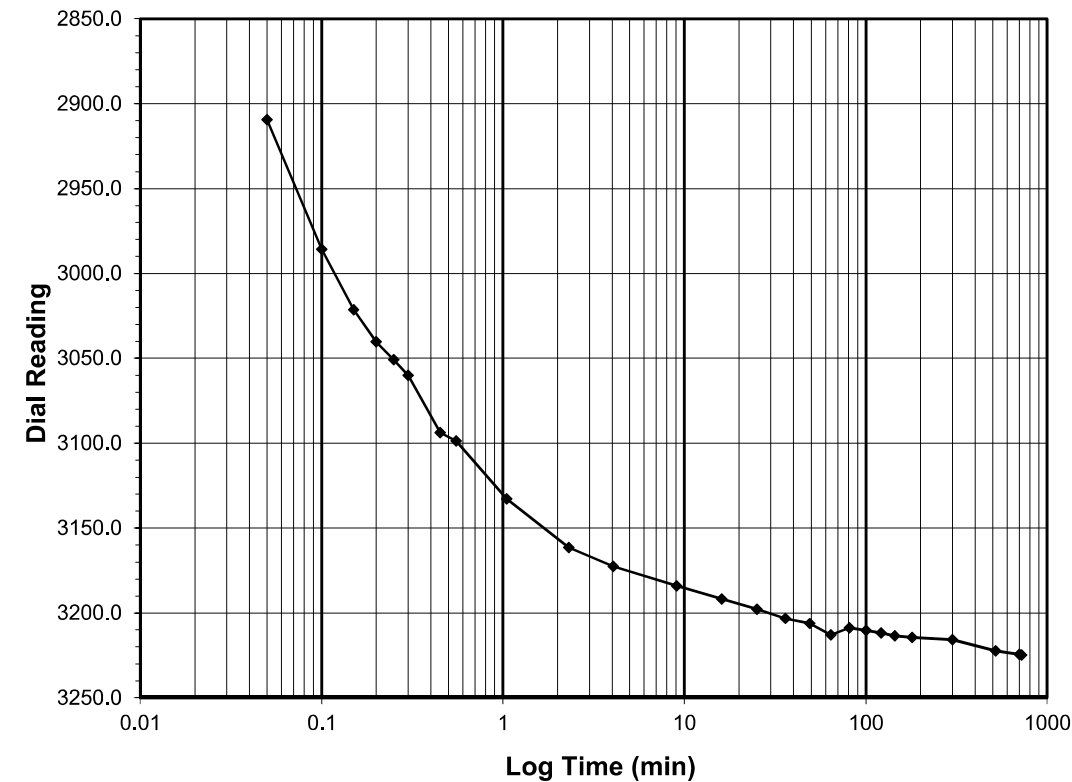
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 8.0-16.0
Final Reading (div) 3224.8
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/22/2019
 Start Time 13:46:32

Elapsed Time (min)	Dial Reading (div)
Initial	2731.7
0.05	2909.4
0.10	2985.9
0.15	3021.3
0.20	3040.1
0.25	3050.8
0.30	3060.0
0.45	3093.7
0.55	3098.7
1.05	3132.9
2.30	3161.5
4.05	3172.5
9.05	3184.1
16.05	3191.7
25.05	3197.6
36.07	3203.2
49.07	3206.3
64.07	3212.9
81.07	3208.8
100.07	3210.3
121.07	3211.9
144.07	3213.6
180.07	3214.5
300.07	3215.8
520.07	3222.3
700.07	3224.5
720.20	3224.8



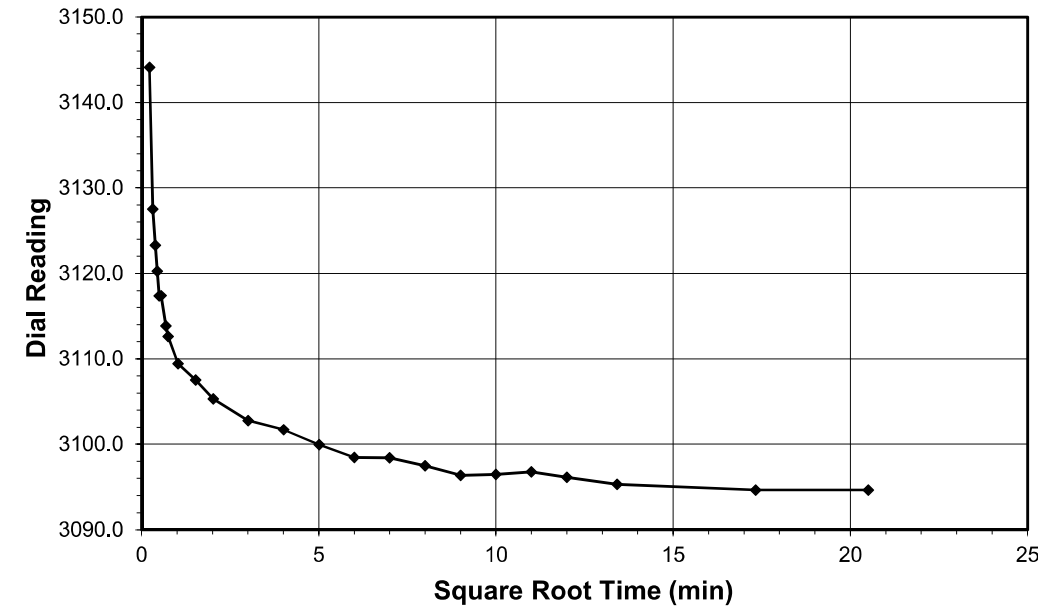
Tested By 129-0411 Date 6/22/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client Kleinfelder Boring No. EB1-B
 Client Project BR-0042 Roadway Depth (ft) 5.0-7.0
 Project No. R-2019-178-001 Sample No. ST-1
 Lab ID R-2019-178-001-001 Visual Description TAN SILT

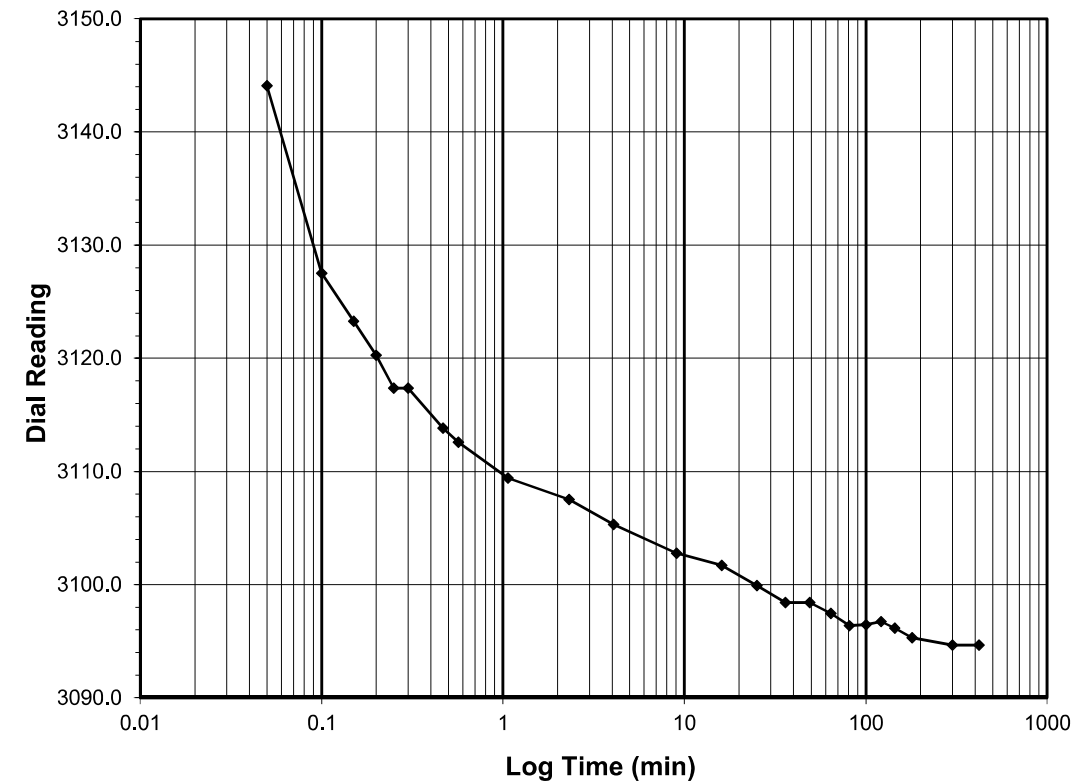
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 16.0-4.0
Final Reading (div) 3094.6
 Consolidometer No. **R470**
 1 Division (in) 0.0001

Start Date 6/23/2019
 Start Time 1:46:44

Elapsed Time (min)	Dial Reading (div)
Initial	3224.8
0.05	3144.1
0.10	3127.5
0.15	3123.3
0.20	3120.3
0.25	3117.4
0.30	3117.4
0.47	3113.8
0.57	3112.6
1.07	3109.4
2.32	3107.5
4.07	3105.3
9.07	3102.8
16.07	3101.7
25.07	3099.9
36.07	3098.4
49.07	3098.4
64.08	3097.5
81.08	3096.4
100.08	3096.5
121.08	3096.7
144.08	3096.1
180.08	3095.3
300.08	3094.6
420.50	3094.6



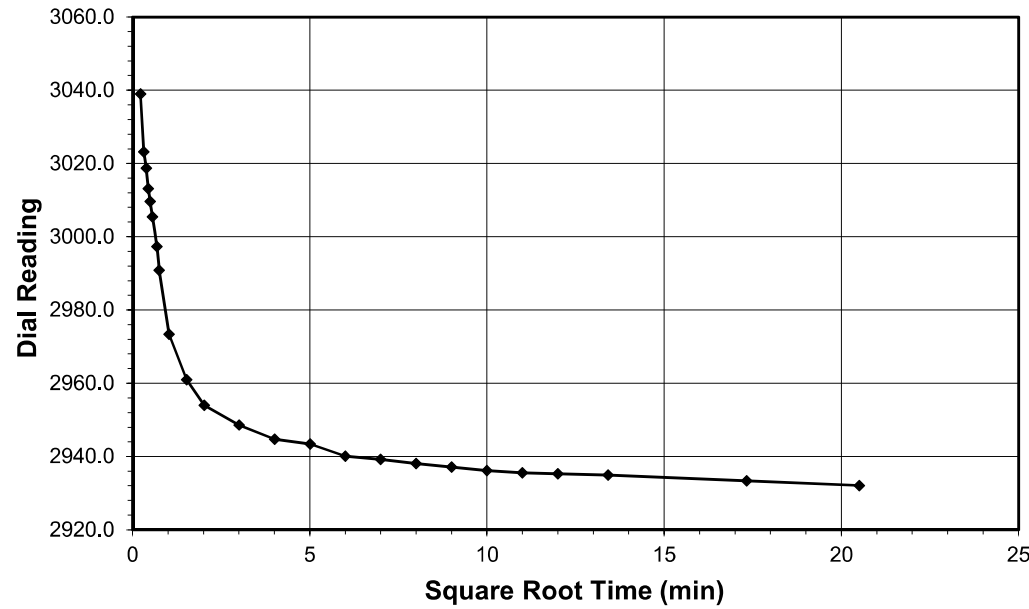
Tested By 129-0411 Date 6/23/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client: Kleinfelder Boring No.: EB1-B
 Client Project: BR-0042 Roadway Depth (ft): 5.0-7.0
 Project No.: R-2019-178-001 Sample No.: ST-1
 Lab ID: R-2019-178-001-001 Visual Description: TAN SILT

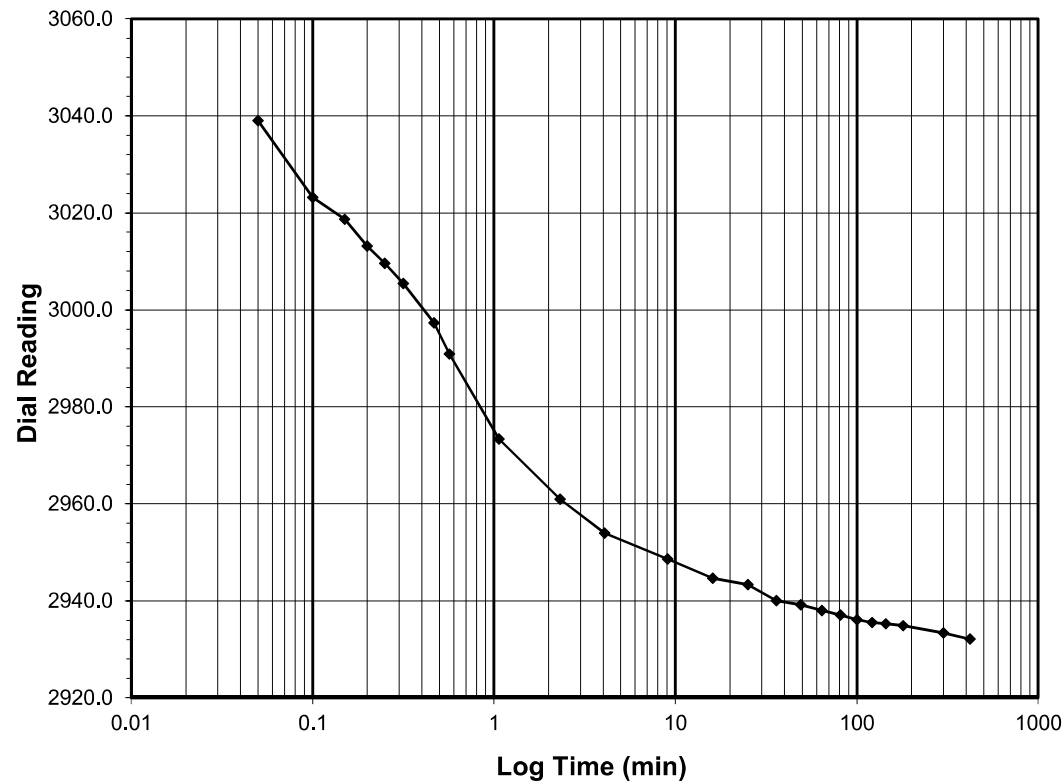
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 4.0-1.0
Final Reading (div): 2932.1
 Consolidometer No.: **R470**
 1 Division (in): 0.0001

Start Date: 6/23/2019
 Start Time: 8:47:14

Elapsed Time (min)	Dial Reading (div)
Initial	3094.6
0.05	3039.0
0.10	3023.2
0.15	3018.6
0.20	3013.1
0.25	3009.6
0.32	3005.4
0.47	2997.3
0.57	2990.9
1.07	2973.4
2.32	2960.9
4.07	2954.0
9.07	2948.6
16.07	2944.7
25.07	2943.3
36.07	2940.1
49.07	2939.2
64.07	2938.0
81.07	2937.1
100.07	2936.1
121.07	2935.5
144.07	2935.3
180.07	2934.9
300.07	2933.3
420.48	2932.1



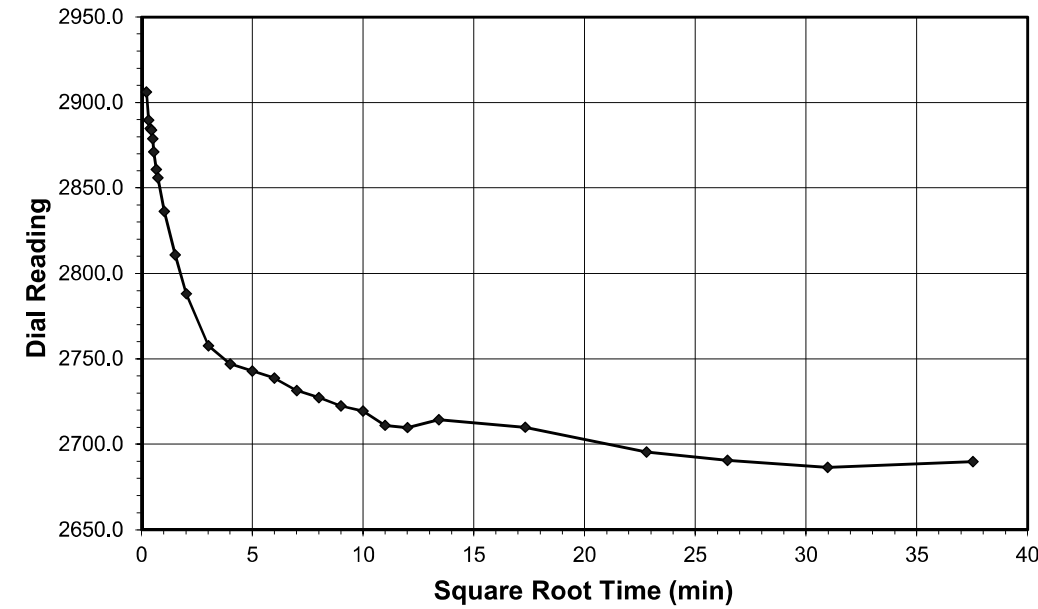
Tested By 129-0411 Date 6/23/2019 Checked By GEM Date 6/25/2019



ONE DIMENSIONAL CONSOLIDATION
AASHTO T-216

Client: Kleinfelder Boring No.: EB1-B
 Client Project: BR-0042 Roadway Depth (ft): 5.0-7.0
 Project No.: R-2019-178-001 Sample No.: ST-1
 Lab ID: R-2019-178-001-001 Visual Description: TAN SILT

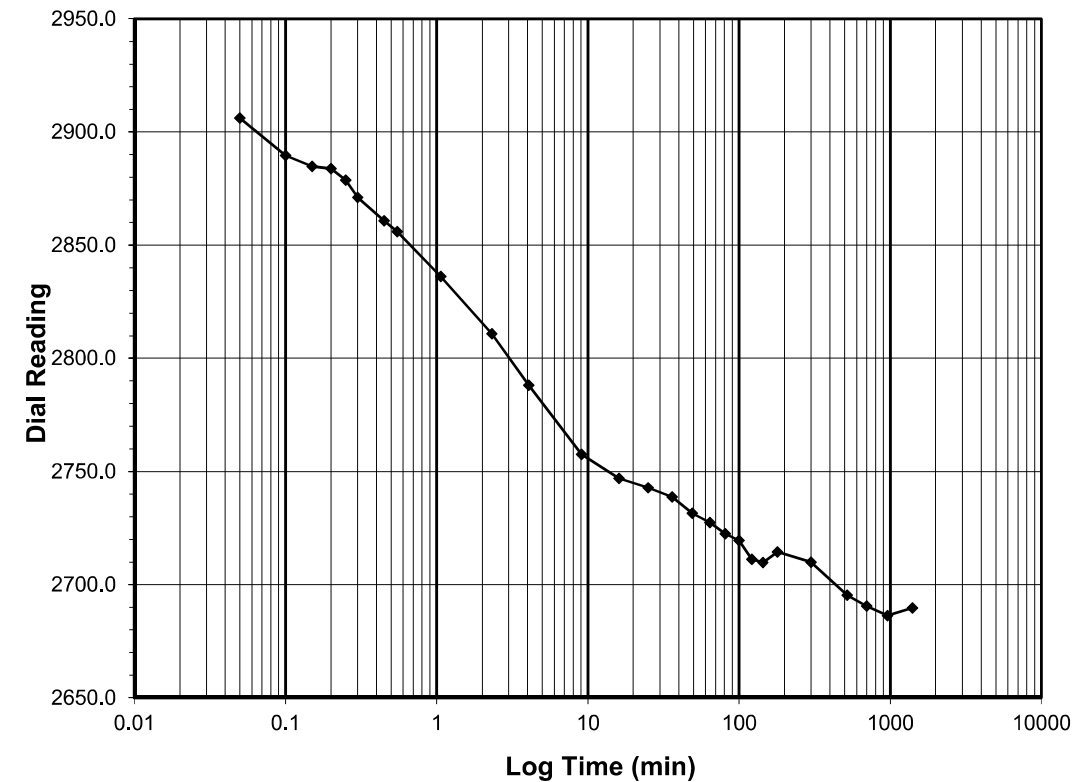
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf): 1.0-0.25
Final Reading (div): 2689.8
 Consolidometer No.: **R470**
 1 Division (in): 0.0001

Start Date: 6/23/2019
 Start Time: 15:47:43

Elapsed Time (min)	Dial Reading (div)
Initial	2932.1
0.05	2906.1
0.10	2889.7
0.15	2884.8
0.20	2883.8
0.25	2878.8
0.30	2871.1
0.45	2860.7
0.55	2855.9
1.07	2836.1
2.32	2810.9
4.07	2788.1
9.07	2757.6
16.07	2747.0
25.07	2742.9
36.07	2738.7
49.07	2731.5
64.07	2727.4
81.07	2722.5
100.07	2719.6
121.07	2711.2
144.07	2709.9
180.07	2714.5
300.07	2710.0
520.07	2695.5
700.07	2690.6
960.07	2686.4
1409.47	2689.8



Tested By 129-0411 Date 6/23/2019 Checked By GEM Date 6/25/2019



MOISTURE DENSITY RELATIONSHIP
AASHTO T99-18

Client: Kleinfelder
 Client Reference: BR-0042 Roadway
 Project No.: R-2019-178-001
 Lab ID: R-2019-178-001-003

Boring No.: Y_1500_RT
 Depth (ft): 8.5-18.5
 Sample No.: BS-1
 Test Method: **STANDARD**

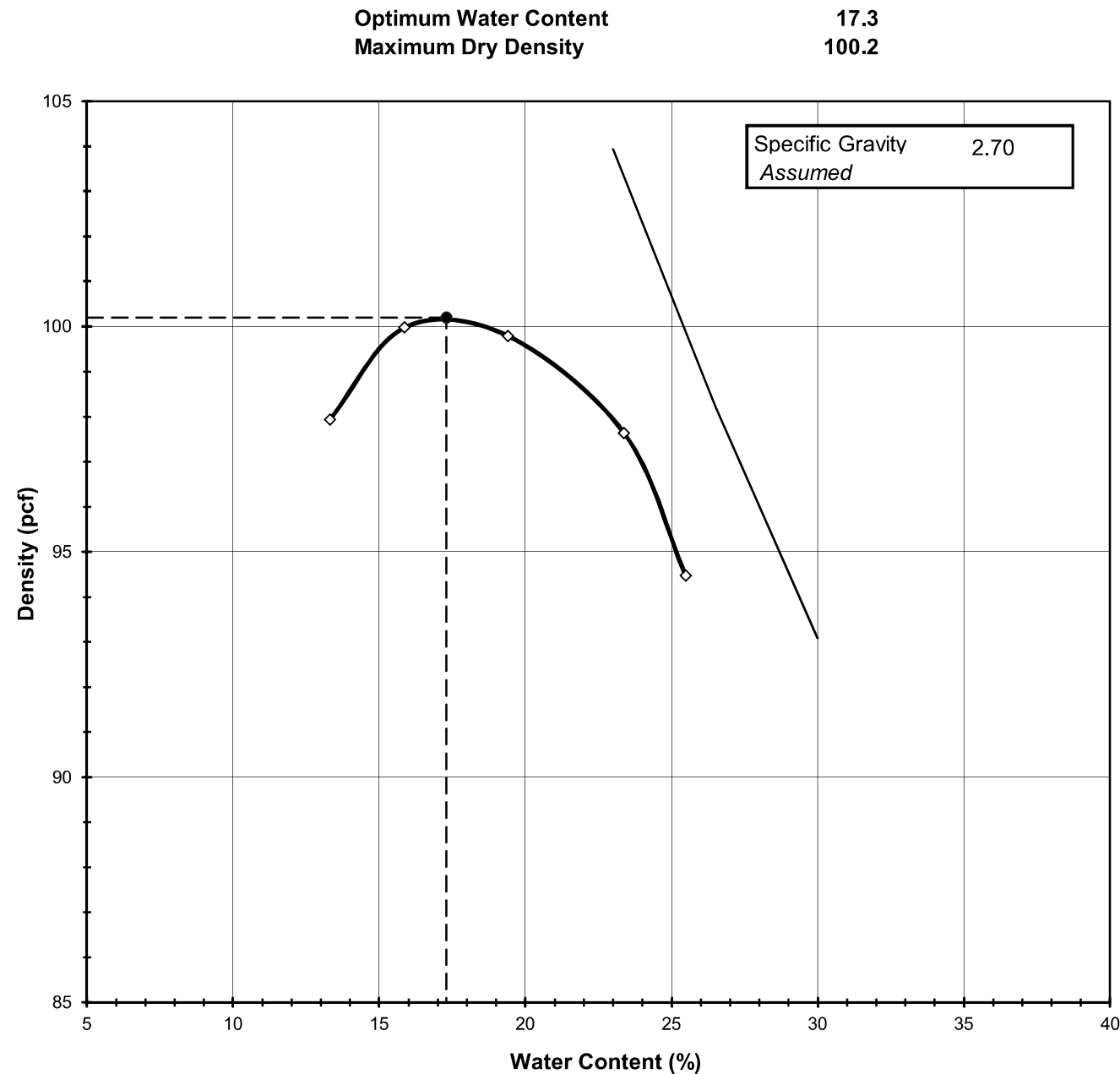
Visual Description: Tan Silt

MOISTURE - DENSITY RELATIONSHIP
AASHTO T99-18

Client: Kleinfelder
 Client Reference: BR-0042 Roadway
 Project No.: R-2019-178-001
 Lab ID: R-2019-178-001-003

Boring No.: Y_1500_RT
 Depth (ft): 8.5-18.5
 Sample No.: BS-1

Visual Description: Tan Silt



Total Weight of the Sample (g)	16950
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	0
Percent Retained on 3/8"	0
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type	STANDARD
Rammer Weight (lb)	5.5
Rammer Drop (in)	12
Rammer Type	MECHANICAL
Machine ID	R 174
Mold ID	R 607
Mold diameter	4"
Weight of the Mold (g)	4291
Volume of the Mold (cm ³)	940

Mold / Specimen

Point No.	1	2	3	4	5
Wt. of Mold & Wet Sample (g)	5962	6035	6085	6105	6076
Wt. of Mold (g)	4291	4291	4291	4291	4291
Wt. of Wet Sample (g)	1671	1744	1794	1814	1785
Mold Volume (cm ³)	940	940	940	940	940

Moisture Content / Density

Tare Number	SS-4	SS-0	SS-5	902	911
Wt. of Tare & Wet Sample (g)	397.20	346.50	320.70	337.60	373.70
Wt. of Tare & Dry Sample (g)	362.20	312.85	284.80	292.30	318.55
Wt. of Tare (g)	99.50	100.80	99.80	98.50	102.20
Wt. of Water (g)	35.00	33.65	35.90	45.30	55.15
Wt. of Dry Sample (g)	262.70	212.05	185.00	193.80	216.35

Wet Density (g/cm ³)	1.78	1.86	1.91	1.93	1.90
Wet Density (pcf)	111.0	115.8	119.2	120.5	118.6
Moisture Content (%)	13.3	15.9	19.4	23.4	25.5
Dry Density (pcf)	97.9	100.0	99.8	97.6	94.5

Zero Air Voids

Moisture Content (%)	23.0	26.5	30.0
Dry Unit Weight (pcf)	103.9	98.2	93.1

Tested By 129-05-0411 Date 6/19/19 Checked By GEM Date 6/20/19
 page 1 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14 PROCTOR.xls

Tested By 129-05-0411 Date 6/19/19 Checked By GEM Date 6/20/19
 page 2 of 2 DCN:CT-S12 DATE:5/1/13 REVISION: 14 PROCTOR.xls



SINGLE POINT CBR TEST
ASTM D 1883-16

Client Kleinfelder Boring No. Y_1500_RT
 Client Reference BR-0042 Roadway Depth(ft.) 8.5-18.5
 Project No. 2019-178-001 Sample No. BS-1
 Lab ID 2019-178-001-003 Visual Description Tan Silt

Test Type	STANDARD	Density Measurement		Before Soaking	After Soaking
		Molding Method	C	Wt. Mold & WS (gm.)	8140
Mold ID	R-356	Wt. WS (gm.)	3992	4311	
Wt. of Mold (gm.)	4148	Sample Volume (cc)	2114	2238	
Mold Volume (cc)	2114	Wet Density (gm./cc)	1.89	1.93	
Surcharge (lbs.)	10	Wet Density (pcf)	117.8	120.2	
Piston Area (in ²)	3	Dry Density (pcf)	100.2	95.4	
Sample Height	4.58	Dry Density (gm./cc)	1.61	1.53	
Sample Conditions	Soaked				
Blows per Layer	60				

Water Contents	As Rec'd	Begining Compaction	After Compaction	Before Soaking	After Soaking	Top 1" After Soak
	Tare No.	855	841	842		ADF03
Wt. of T+WS (gm.)	392.28	993.4	1049.2		1182.2	571.4
Wt. of T+DS (gm.)	351.29	883.56	930.13		985.74	444.7
Wt of Tare (gm.)	135.82	260.2	256.6		229.4	100.4
Moisture Content(%)	19.0	17.6	17.7	17.6	26.0	36.8

Piston Displacement (in.)	Load (lbs.)	Penetration Stress (psi.)	Swell Measurement		
			Elapsed Time (hrs)	Dial Gauge (Div)	Percent Swell
0	3.93	1.3			
0.025	37.79	12.6			
0.050	56.36	18.8			
0.075	70.54	23.5			
0.100	84.60	28.2	0.00	300	0.00%
0.125	99.14	33.0	70.42	582	6.16%
0.150	113.39	37.8	94.83	580	6.11%
0.175	127.23	42.4			
0.200	141.02	47.0			
0.250	167.85	56.0			
0.300	192.52	64.2			
0.350	216.03	72.0			
0.400	238.62	79.5			
0.450	262.21	87.4			
0.500	285.67	95.2			
0.550	309.54	103.2			
0.600	332.61	110.9			

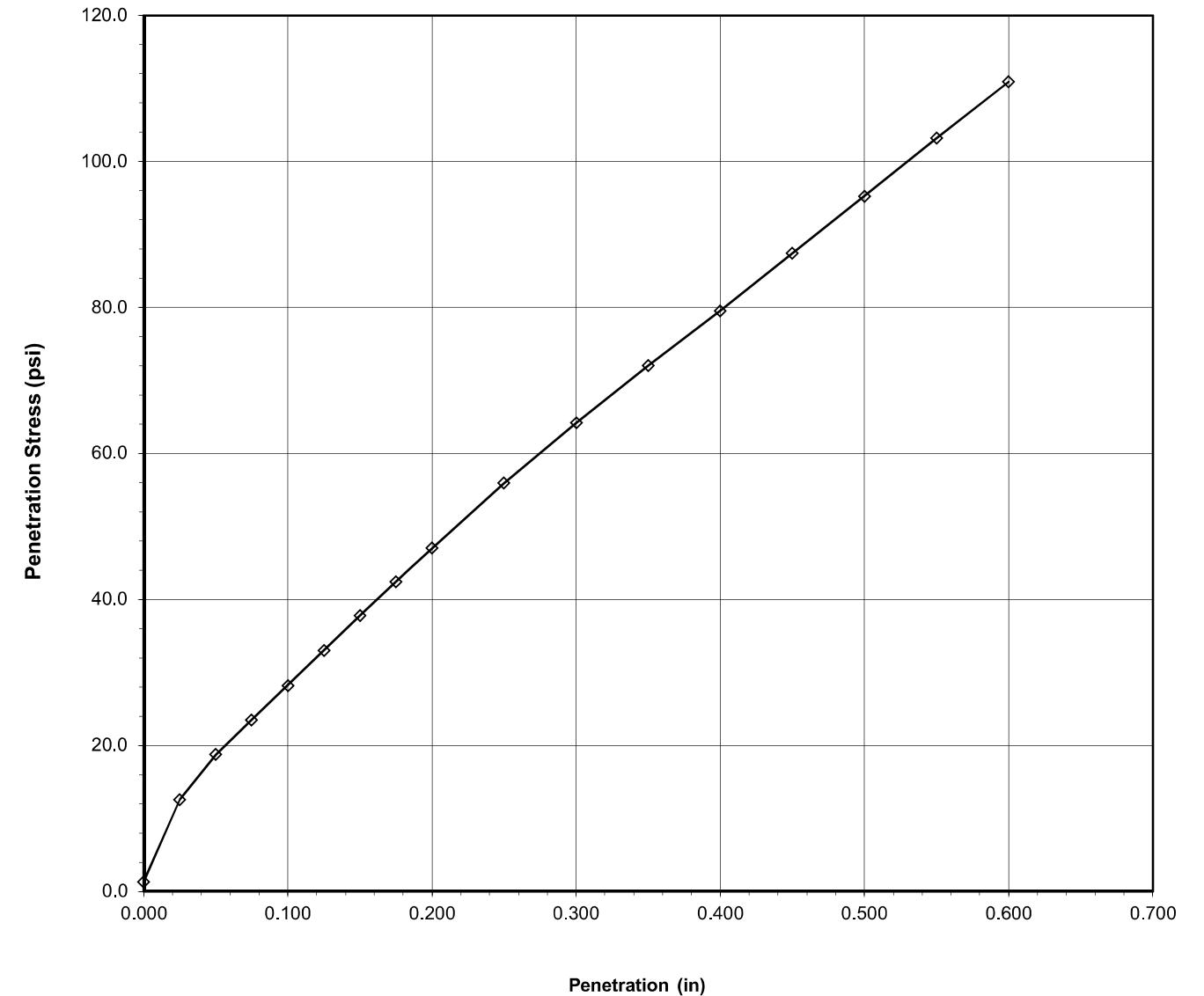
1Division = 0.001 in.

SINGLE POINT CBR TEST
ASTM D 1883-16

Client Kleinfelder Boring No. Y_1500_RT
 Client Reference BR-0042 Roadway Depth(ft.) 8.5-18.5
 Project No. 2019-178-001 Sample No. BS-1
 Lab ID 2019-178-001-003 Visual Description Tan Silt

CBR VALUE (0.1") 2.8 %
CBR VALUE (0.2") 3.1 %

Penetration Stress vs. Penetration



Tested By 129-05-0411 Date 6/25/2019 Approved By MPS Date 7/3/2019