

REFERENCE: B-5981

PROJECT: 47747

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 Duplin  
PROJECT DESCRIPTION Replace Bridge 16 over CSX  
Railroad on US 117 Northbound Lane and Bridge  
Preservation of Bridge 17 over CSX Railroad

**INVENTORY – REVISED**

**CONTENTS**

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>
-L-	13+20 to 33+55	4-5
-YI-	10+00 to 14+25	5
-SRI-	10+75 to 24+60	4-5

**CROSS SECTIONS**

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>
-L-	11+00 to 33+50	6-24
-YI-	10+00 to 14+00	25-27
-SRI-	10+91.83 to 20+66.54	6-16
-SRI-	21+00 to 24+50	28-30

**APPENDICES**

<u>APPENDIX</u>	<u>TITLE</u>	<u>SHEETS</u>
A	LABORATORY TEST RESULTS	31-42

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5981	1	

**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

P.M. WEAVER

C.R. PASTRANA

C.P. TURNER

F&R

INVESTIGATED BY ESP Associates, INC.

DRAWN BY C.R. PASTRANA

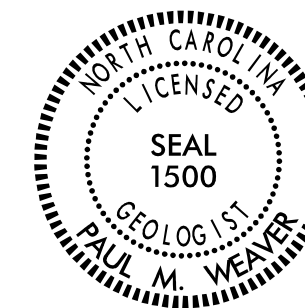
CHECKED BY P.M. WEAVER

SUBMITTED BY ESP Associates, INC.

DATE January 2023



ESP ASSOCIATES, INC.  
7011 ALBERT PICK RD  
SUITE E  
GREENSBORO, NC 27409  
FIRM # C-0587  
WWW.ESPASSOCIATES.COM



DocuSigned by:

*Paul M. Weaver*

02/28/2023

01847D3738AD49C  
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

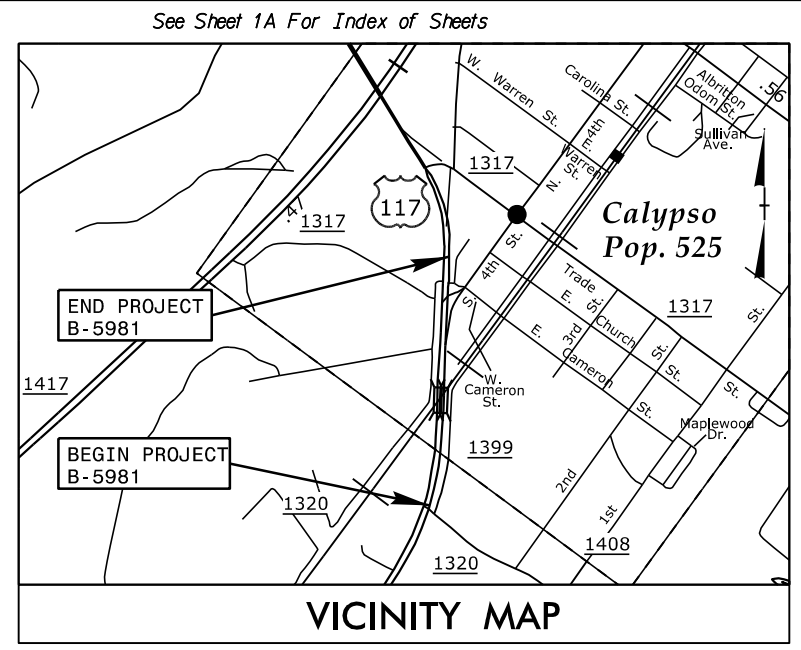
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE 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>										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.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED, AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										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 DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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 (IN OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.									
MINERALOGICAL COMPOSITION										COMPRESSION										CRYSTALLINE ROCK (CR)										NON-CRYSTALLINE ROCK (NCR)									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										COASTAL PLAIN SEDIMENTARY ROCK (CP)										COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.									
COMPRESSIBILITY										PERCENTAGE OF MATERIAL										WEATHERING										COASTAL PLAIN SEDIMENTARY ROCK (CP)									
ORGANIC MATERIAL TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10%										GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.										VERY SLIGHT (IV SLI.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.									
GROUND WATER										MISCELLANEOUS SYMBOLS										MODERATE (MOD.)										SEVERE (SEV.)									
WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION										SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL									
STATIC WATER LEVEL AFTER 24 HOURS										SOIL SYMBOL										VERY SEVERE (IV SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF										SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF									
PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA										ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT										MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF										COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.									
SPRING OR SEEP										INFERRED SOIL BOUNDARY										ROCK HARDNESS										VERY HARD									
FAIR TO POOR										INFERRED ROCK LINE										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.									
POOR										ALLUVIAL SOIL BOUNDARY										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.									
UNSATURABLE										RECOMMENDATION SYMBOLS										SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.										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.									
TEXTURE OR GRAIN SIZE										ABBREVIATIONS										FRACTURE SPACING										BEDDING									
U.S. STD. SIEVE SIZE OPENING (MM) 4, 10, 40, 60, 200, 270										AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, F - FINE, FOSS. - FOSSILIFEROUS, FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS, HI. - HIGHLY, MED. - MEDIUM, MICA. - MICACEOUS, MOD. - MODERATELY, NP - NON PLASTIC, ORG. - ORGANIC, PMT - PRESSUREMETER TEST, SAP. - SAPROLITIC, SD. - SAND, SANDY, SL. - SILT, SILTY, SLI. - SLIGHTLY, TCR - TRICONE REFUSAL, w - MOISTURE CONTENT, V - VERY										TERM SPACING MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FOOT, LESS THAN 0.16 FEET										TERM THICKNESS 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, VERY THINLY BEDDED 0.03 - 0.16 FEET, THICKLY LAMINATED 0.008 - 0.03 FEET, < 0.008 FEET									
BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F SD.), SILT (SL.), CLAY (CL.)										VST - VANE SHEAR TEST, WEA. - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT										FRAGILE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED										FRAGILE, MODERATELY INDURATED, INDURATED, EXTREMELY INDURATED									
GRAIN SIZE MM 305, 75, 2.0, 0.25, 0.05, 0.005										UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE, UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.									
SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION										BENCH MARK: FILE 'b5981.is_tin_190827.tin' WAS USED TO DETERMINE GROUND ELEVATION AT BORINGS									
SOIL MOISTURE SCALE (ATTERBERG LIMITS), FIELD MOISTURE DESCRIPTION, GUIDE FOR FIELD MOISTURE DESCRIPTION										DRILL UNITS: CME-45C, CME-55, CME-550, VANE SHEAR TEST, PORTABLE HOIST										FRAGMENTATION: RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.										GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.									
LL - LIQUID LIMIT, PL - PLASTIC LIMIT, OM - OPTIMUM MOISTURE SHRINKAGE LIMIT										ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 8" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING w/ ADVANCER, TRICONE *STEEL TEETH, TRICONE *TUNG-CARB., CORE BIT										MODERATELY INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.										INDURATED: GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.									
PLASTICITY										HAMMER TYPE										EXTREMELY INDURATED										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.									
PLASTICITY INDEX (PI), DRY STRENGTH										AUTOMATIC, MANUAL, CORE SIZE: -B, -H, -N, HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.									
NON PLASTIC, SLIGHTLY PLASTIC, MODERATELY PLASTIC, HIGHLY PLASTIC										ELEVATION: FEET										INDURATION										BENCH MARK: FILE 'b5981.is_tin_190827.tin' WAS USED TO DETERMINE GROUND ELEVATION AT BORINGS									
COLOR										NOTES:										INDURATION										BENCH MARK: FILE 'b5981.is_tin_190827.tin' WAS USED TO DETERMINE GROUND ELEVATION AT BORINGS									
DESCRIPTORS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										F.I.A.D. = FILLED IMMEDIATELY AFTER DRILLING										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.									

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5981	3	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
47747.1.1	BRZ-0117 (048)	PE	

STATE OF NORTH CAROLINA  
DIVISION OF HIGHWAYS  
**DUPLIN COUNTY**

**LOCATION: BRIDGE NO.16 OVER CSX RAILROAD ON  
US-117 NORTH BOUND LANES AND  
PRESERVATION OF BRIDGE NO.17 OVER CSX RAILROAD**

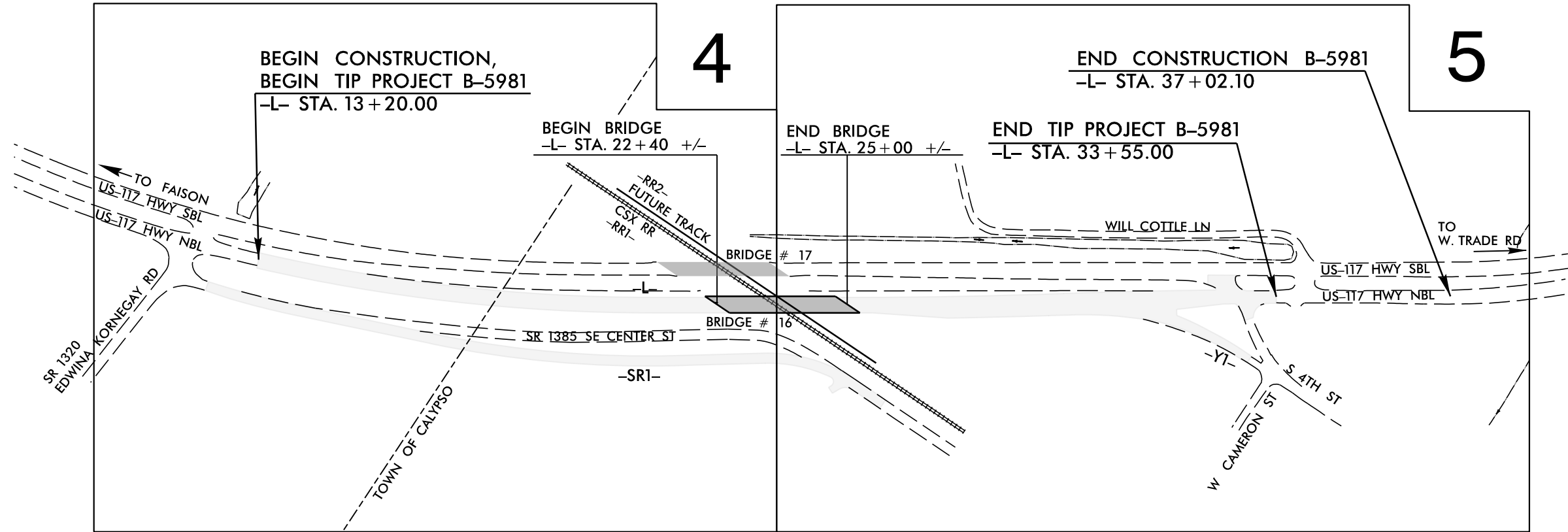
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURE,  
AND STRUCTURE PRESERVATION**



25% PLANS

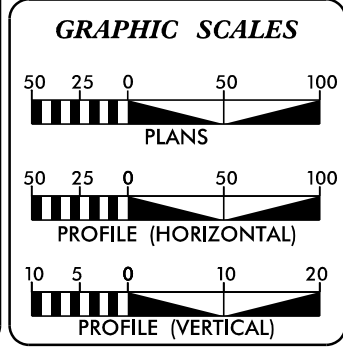


**CONTRACT: 47747**      **TIP PROJECT: B-5981**



THE PROJECT IS WITHIN MUNICIPAL BOUNDARIES OF CALYPSO.  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD \_\_\_\_.

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



**DESIGN DATA**

ADT 2020 =	2,027
ADT 2040 =	2,300
K =	9% %
D =	100 %
T =	6 % *
V =	60 MPH
* (TTST = 3% + DUAL = 3%)	
FUNC. CLASS =	MAJOR COLLECTOR
REGIONAL TIER	

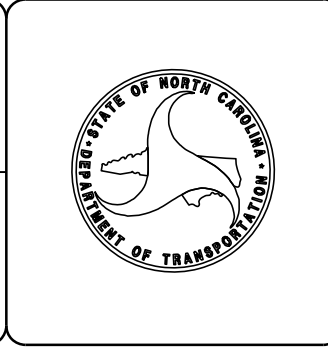
**PROJECT LENGTH**

LENGTH OF ROADWAY TIP PROJECT B-5981 =	0.406 MI
LENGTH OF STRUCTURE TIP PROJECT B-5981 =	0.049 MI
TOTAL LENGTH OF TIP PROJECT B-5981 =	0.357 MI

Prepared in the Office of:  
**DIVISION OF HIGHWAYS**  
1000 Birch Ridge Dr., Raleigh, NC 27610

2018 STANDARD SPECIFICATIONS	
RIGHT OF WAY DATE: DECEMBER 2, 2019	TATIA L. WHITE, PE, PLS PROJECT ENGINEER
LETTING DATE: OCTOBER 20, 2020	SHERRI E. CALHOUN, PE PROJECT TEAM LEAD

HYDRAULICS ENGINEER	_____ P.E.
ROADWAY DESIGN ENGINEER	_____ P.E.



I:\19\2023\2-5\05 PM W:\Projects\2020\01\15\4.300 (NCDOT 2020-2022 On-Call Contract)\15\4.334 (B-5981Revisions)\B5981.GEO\_RDWY\_REV\CADD\_GEO\TECH\Plan\Prof\B5981.rdy.tsh\_la\_lb.dgn 09/08/19

January 30, 2023

STATE PROJECT: 47747.1.1  
 TIP: B-5981  
 COUNTY: Duplin  
 DESCRIPTION: Replace Bridge 16 over CSX Railroad on US 117 Northbound Lane and Bridge Preservation of Bridge 17 over CSX Railroad  
 SUBJECT: Revised Geotechnical Report-Roadway Inventory

**Project Description**

This proposed project is located in Calypso, North Carolina. It begins at -L- Station 13+20, which is approximately 920 feet south of the beginning of Bridge 16, and continues to -L- Station 33+55, which is approximately 855 feet north of the end of Bridge 16. The total project length of TIP Project B-5981 is approximately 0.4 miles. The project area is primarily woodlands and farmland with isolated single-family homes and a business.

Proposed is the widening of US 117 (-L-) on the east side of the northbound lane, the realignment of SR 1385-SE Center Street (-SR1-) and the widening of the south side of the ramp from northbound US 117 to South 4<sup>th</sup> Street/ALT US 117 (-Y1). The proposed maximum embankment heights are approximately 20 feet, while the proposed maximum cut depths are approximately 2 feet. Intersections along the project include the CSX Railroad (-RR1- and -RR2-) and the ramp from northbound US 117 to South 4<sup>th</sup> Street/ALT US 117 (-Y1-).

This geotechnical investigation was confined to the areas of proposed construction.

Initial site scoping was performed on October 31, 2019. The field roadway investigation was performed from November 13 to November 15, 2019. Standard Penetration Test borings were advanced with a CME 55 drill machine equipped with an automatic hammer. A hand auger was utilized to evaluate subsurface conditions in areas inaccessible to the drilling rig. Representative soil samples were collected for visual classification in the field and for laboratory analyses.

The following alignments were investigated. Subsurface cross sections of these alignments are included in this report.

Alignment	Station (±)
-L-	13+20 to 33+55
-Y1-	10+00 to 14+25
-SR1-	10+75 to 24+60

**Physiography and Geography**

The project corridor is located in the Coastal Plain Physiographic Province. It is composed of sediments deposited during transgressive-regressive cycles caused by eustatic sea level fluctuations. Progressively younger sequences lie nearer the modern coast. The Geologic Map of North Carolina (1985) shows the subsurface materials within the project corridor area to consist of the Black Creek Formation which is Cretaceous in age. The Black Creek Formation is described as “clay, gray to black, lignitic; contains thin beds and laminae of fine-

grained micaceous sand and thick lenses of cross-bedded sand; glauconitic, fossiliferous clayey sand lenses in upper part.”

The roadway along US 117 (-L-) generally slopes up from the south end of the project to Bridge 16, then down from Bridge 16 to the north end of the project with elevations ranging from approximately 191 feet to approximately 162 feet. The roadway along SE Center Street (-SR1-) generally slopes down from the south end of the project to the north end of the project with elevations ranging from approximately 166 feet to approximately 158 feet. The roadway along the ramp to South 4<sup>th</sup> Street (-Y1-) slopes down from US 117 (-L-) with elevations ranging from approximately 172 feet to approximately 161 feet.

**Soil Properties**

Soils encountered within this project area have been divided into three categories: artificial fill, roadway embankment, and coastal plain deposits.

The artificial fill was only encountered in one boring (L\_2000). It extended to a depth of approximately 1 foot below the existing ground surface and sampled as loose, silty sand (A-2-4). This artificial fill was placed over an old road consisting of asphalt over concrete totaling 1.6 feet in thickness.

The roadway embankment ranged in thickness from approximately 1 foot to approximately 26 feet, and was composed of loose, silty sand (A-2-4) and clayey sand (A-2-6), and of soft to stiff, sandy silt (A-4), sandy clay (A-6), and silty clay (A-7). Plasticities within the roadway embankment range from non-plastic to highly plastic with laboratory plasticity index tests results ranging from non-plastic to 49.

Soils identified as coastal plain deposits were encountered either beginning at the existing ground surface or underlying the embankment fill material. The coastal plain materials consisted of very loose to medium dense, silty sand (A-2-4) and clayey sand (A-2-6), and of very soft to stiff, sandy silt (A-4), sandy clay (A-6), and silty clay (A-7). Plasticities within the coastal plain materials ranged from non-plastic to highly plastic with laboratory plasticity index results ranging from non-plastic to 27.

**Groundwater Properties**

Ground water data was collected in November, 2019. Ground water depths ranged from 5.3 to 8.7 feet below the existing ground surface, and groundwater elevations ranged from 153.6 to 149.6 feet above sea level.

**Areas of Special Geotechnical Interest**

- 1) The following sections contain cohesive soils which have the potential to cause embankment/subgrade and/or slope stability problems during construction:

Alignment	Station (±)	Offset
-L-	28+75 to 33+75	Within existing embankment
-Y1-	10+00 to 14+25	Within existing embankment
-SR1-	12+25 to 19+91	Across extent of construction

2) The following area contains artificial fill material.

Alignment	Station to Station (±)	Offset (±)	Notes
-L-	19+85 to 20+15	50' RT to 60' RT	Fill over old roadway

**Ponds**

There are no ponds are located within the project corridor:

**Water Wells**

No water wells are identified on the project plans within the project corridor.

**APPENDIX A – UNDISTURBED AND BULK SAMPLES**

<b>SAMPLE NO.</b>	<b>ALIGNMENT</b>	<b>STATION</b>	<b>OFFSET</b>	<b>SAMPLE DEPTH (FT)</b>	<b>TESTS PERFORMED</b>
<b>ST-1</b>	<b>-L-</b>	<b>19+95</b>	<b>53' RT</b>	<b>6.0-8.0</b>	<b>Consolidation, Atterberg, grain-size with hydrometer, moisture content</b>

PROJECT REFERENCE NO. B-5981	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	

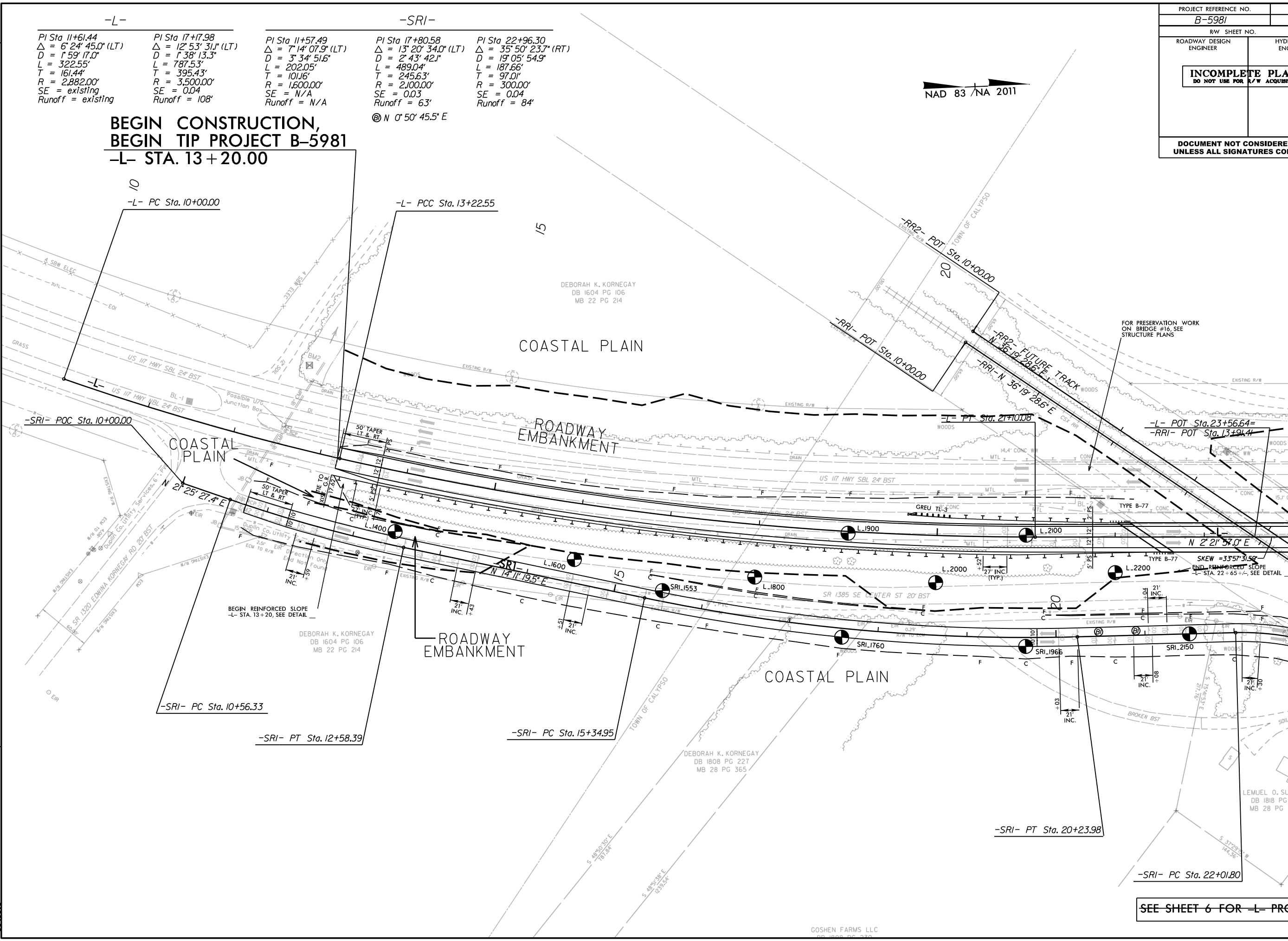
-L-	-SRI-	-SRI-	-SRI-	-SRI-
PI Sta 11+61.44 Δ = 6° 24' 45.0" (LT) D = 1' 59' 17.0" L = 322.55' T = 161.44' R = 2,882.00' SE = existing Runoff = existing	PI Sta 17+17.98 Δ = 12° 53' 31.1" (LT) D = 1' 38' 13.3" L = 787.53' T = 395.43' R = 3,500.00' SE = 0.04 Runoff = 108'	PI Sta 11+57.49 Δ = 7° 14' 07.9" (LT) D = 3' 34' 51.6" L = 202.05' T = 101.16' R = 1,600.00' SE = N/A Runoff = N/A	PI Sta 17+80.58 Δ = 13° 20' 34.0" (LT) D = 2' 43' 42.1" L = 489.04' T = 245.63' R = 2,100.00' SE = 0.03 Runoff = 63'	PI Sta 22+96.30 Δ = 35° 50' 23.7" (RT) D = 19' 05' 54.9" L = 187.66' T = 97.01' R = 300.00' SE = 0.04 Runoff = 84'

NAD 83 / NA 2011

**BEGIN CONSTRUCTION,  
BEGIN TIP PROJECT B-5981**  
-L- STA. 13+20.00

Ⓢ N 0° 50' 45.5" E

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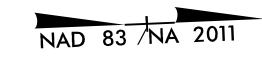


MATCHLINE -L- STA. 24+00 SEE SHEET 5

SEE SHEET 6 FOR -L- PROFILE

GOSHEN FARMS LLC  
DB 1808 PG 227  
MB 28 PG 365

PROJECT REFERENCE NO. <b>B-5981</b>	SHEET NO. <b>5</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>INCOMPLETE PLANS</b> DO NOT USE FOR R/W ACQUISITION	
<b>DOCUMENT NOT CONSIDERED FINAL</b> UNLESS ALL SIGNATURES COMPLETED	



**-L-**

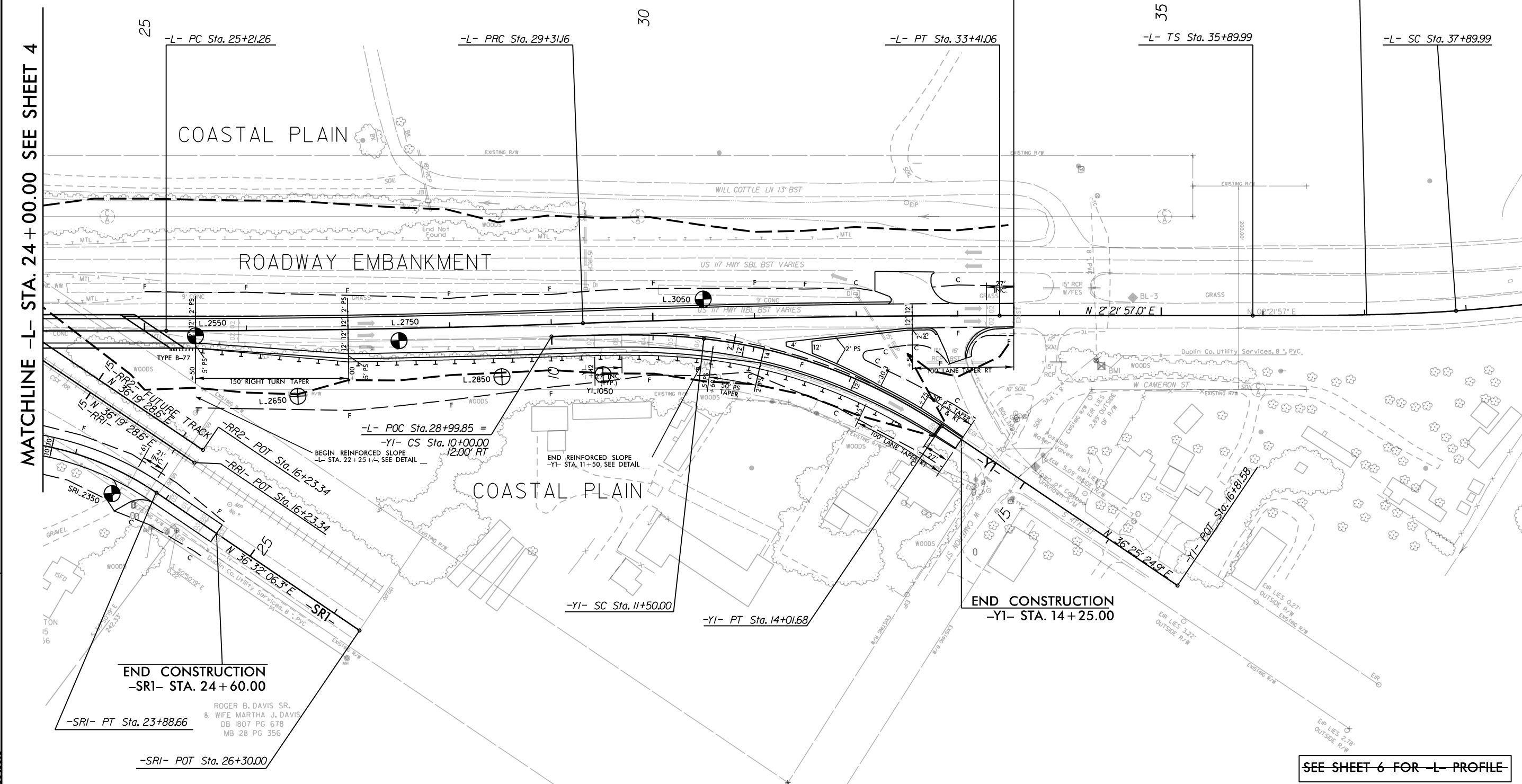
PI Sta 27+26.23 Δ = 2°05'48.9" (LT) D = 0°30'41.7" L = 409.90' T = 204.97' R = 11,200.00' SE = NC Runoff = N/A	PI Sta 31+36.13 Δ = 2°05'48.9" (RT) D = 0°30'41.7" L = 409.90' T = 204.97' R = 11,200.00' SE = NC Runoff = N/A	PIs Sta 37+23.35 θs = 4°00'24.1" Ls = 200.00' LT = 133.37' ST = 66.70'	PI Sta 41+18.94 Δ = 25°54'34.6" (LT) D = 4°00'24.1" L = 646.66' T = 328.95' R = 1,430.00' SE = EXIST.
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**-YI-**

PIs Sta 11+00.11 θs = 8°15'49.7" Ls = 150.00' LT = 100.11' ST = 50.10'	PI Sta 12+78.35 Δ = 27°43'50.5" (RT) D = 1°01'06.3" L = 251.68' T = 128.35' R = 520.00' SE = 0.06	PI Sta 22+96.30 Δ = 35°50'23.7" (RT) D = 19°05'54.9" L = 187.66' T = 97.01' R = 300.00' SE = 0.04 Runoff = 84'	⊙ N 0°50'45.5" E
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**END TIP PROJECT B-5981**  
**-L- STA. 33+55.00**

**END CONSTRUCTION B-5981**  
**-L- STA. 37+02.10**



**MATCHLINE -L- STA. 24+00.00 SEE SHEET 4**

**SEE SHEET 6 FOR -L- PROFILE**

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**END CONSTRUCTION**  
**-SRI- STA. 24+60.00**

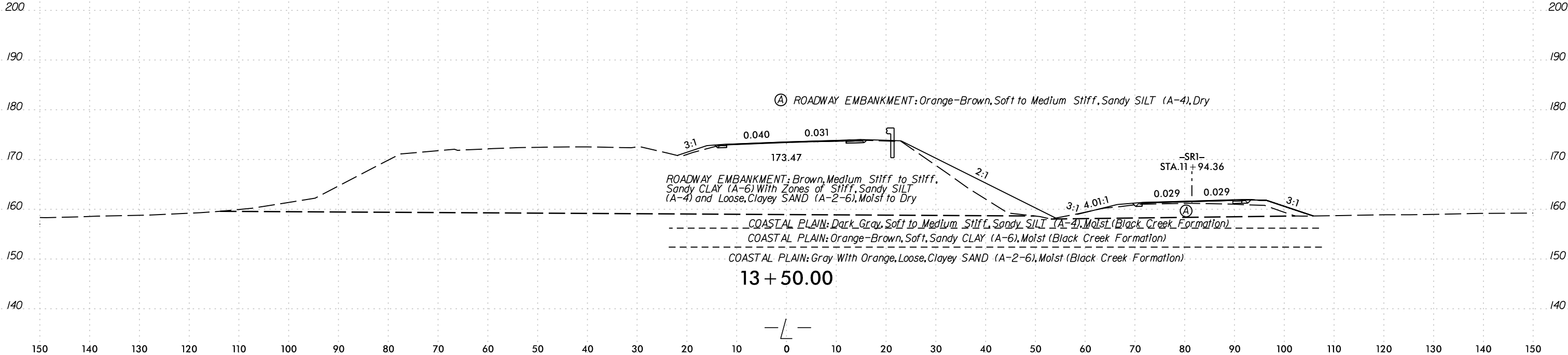
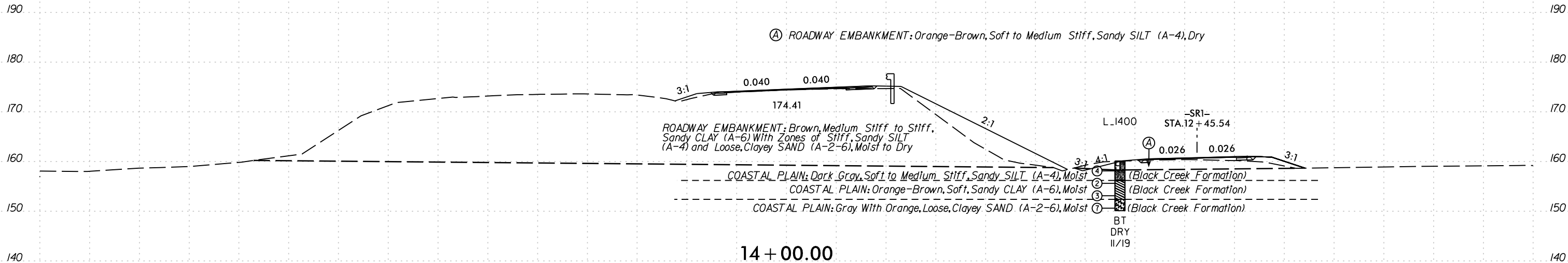
ROGER B. DAVIS SR.  
& WIFE MARTHA J. DAVIS  
DB 1807 PG 678  
MB 28 PG 356

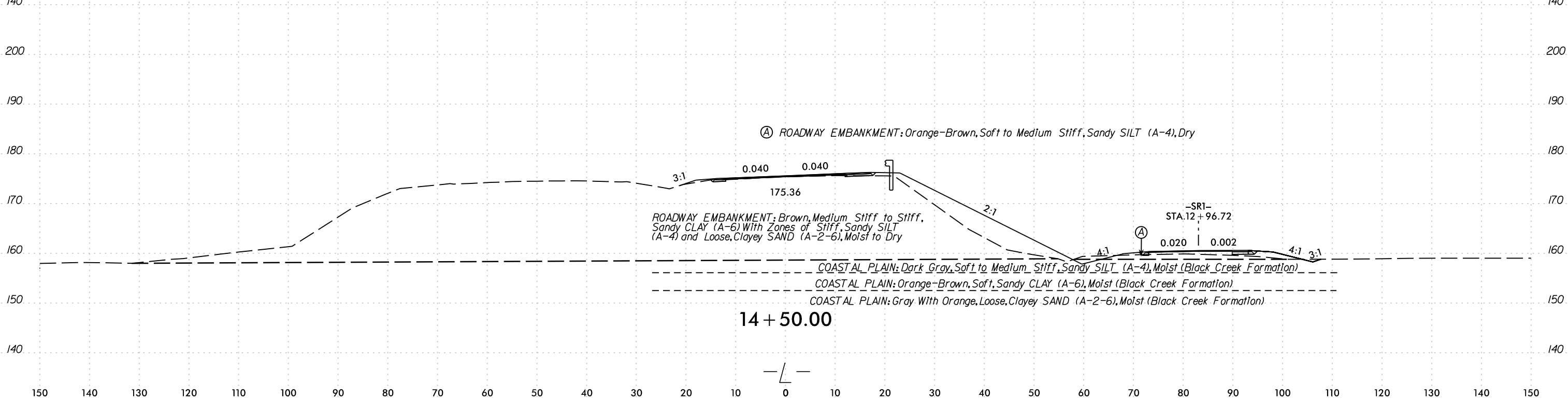
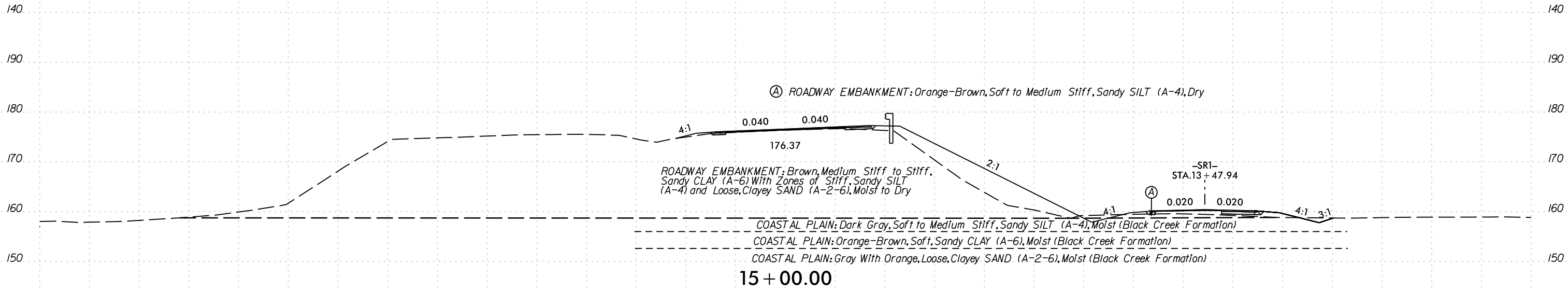
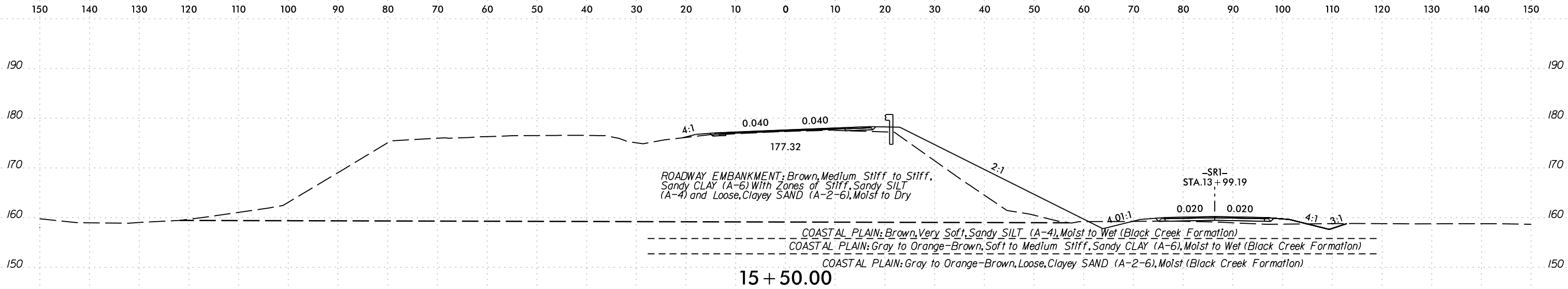






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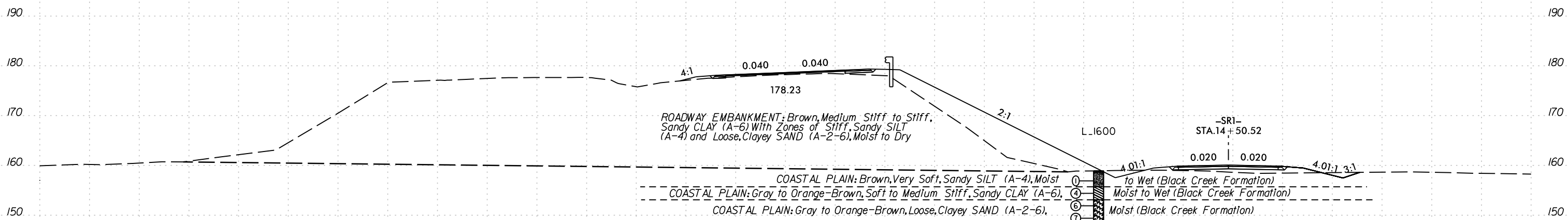
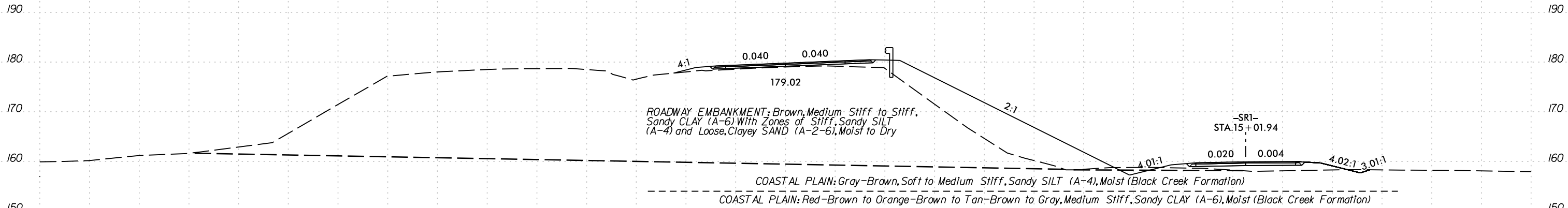


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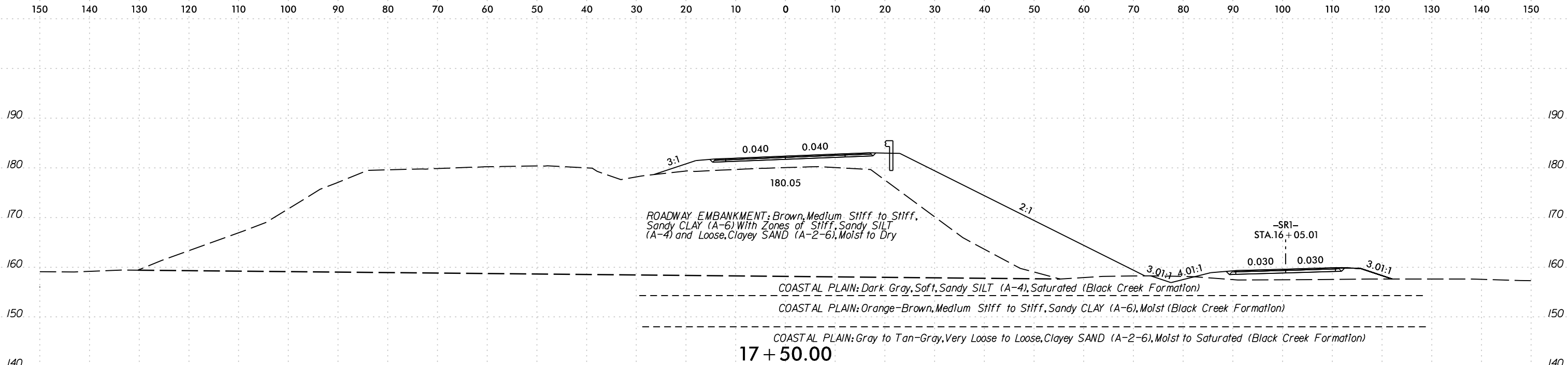
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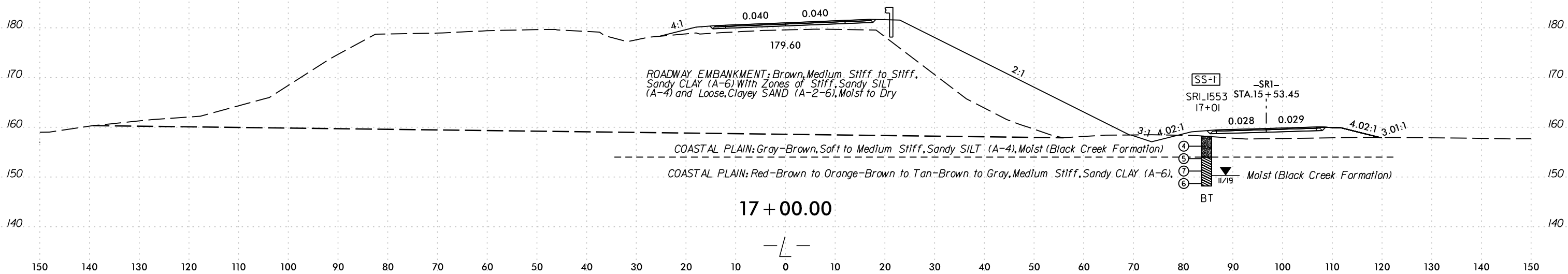


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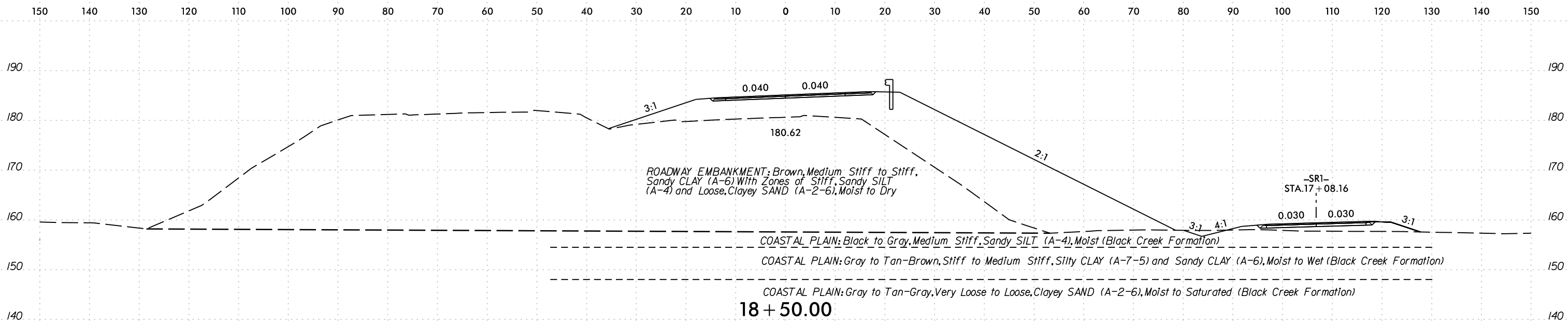
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	12' LT	15+53	1.0-2.5	A-4(0)	20.5		22	40	21	17	99	87	54	14.0	-

\* NOTE: STATION AND OFFSET REFERS TO -SR1- ALIGNMENT

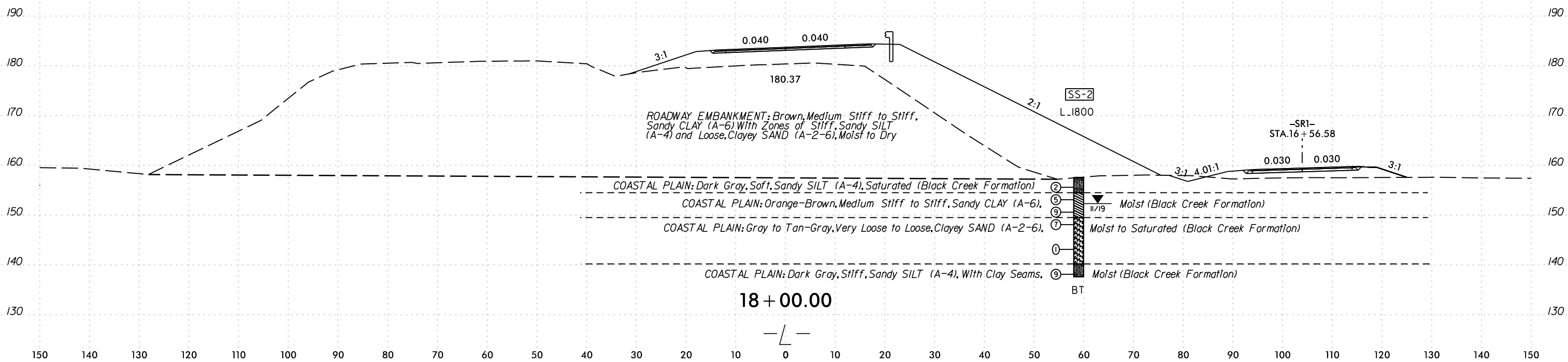


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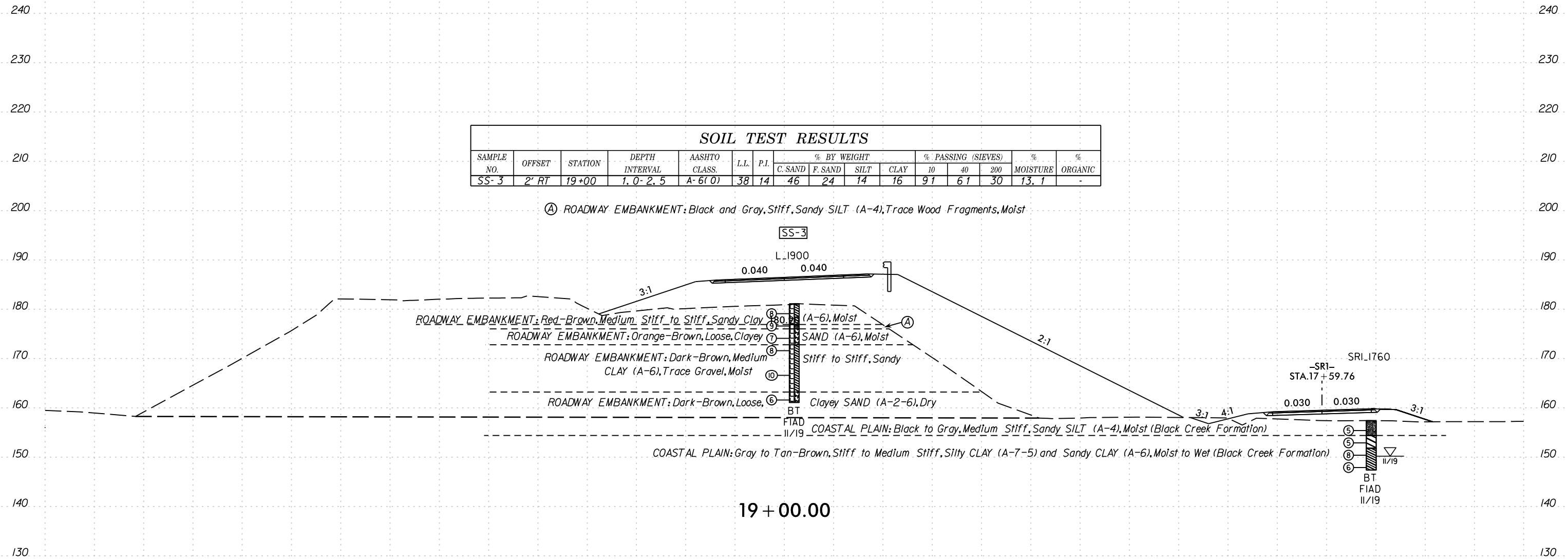
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-2	59' RT	18+00	8.5- 10.0	A-2-6(O)	31	12	45	29	3	23	94	69	27	15.2	-



18 + 00.00

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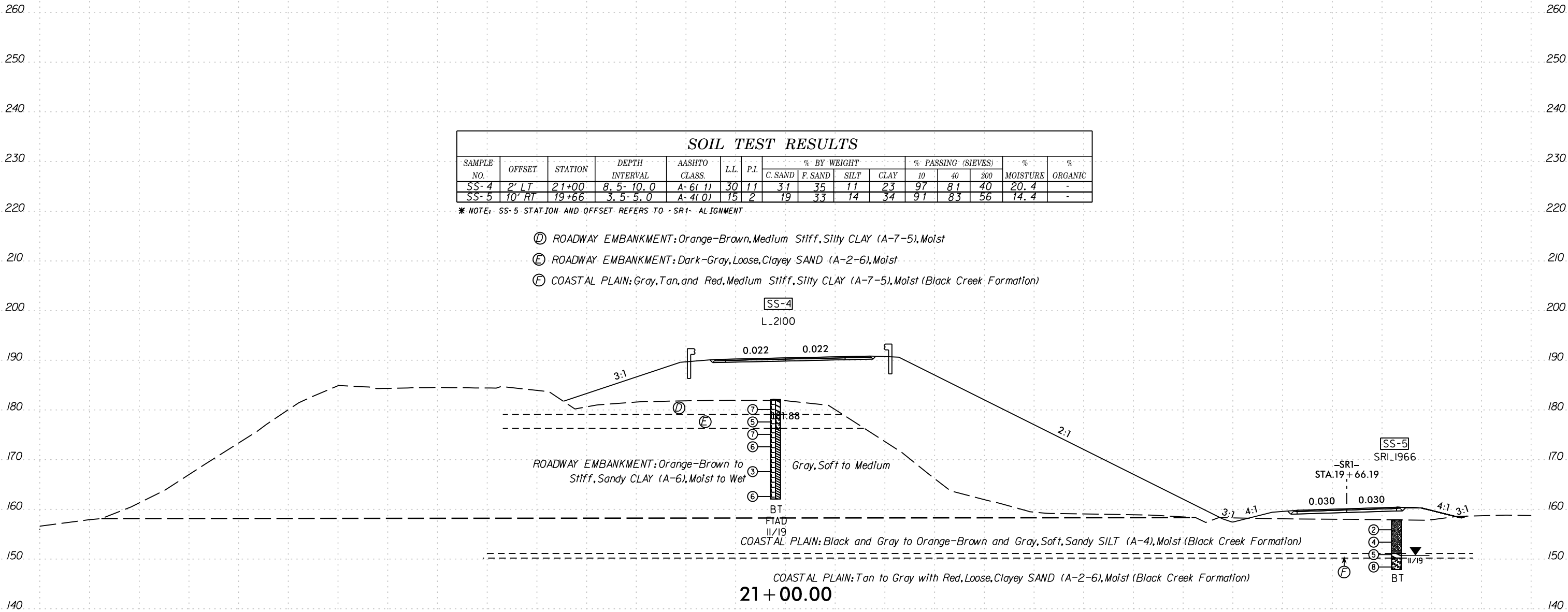








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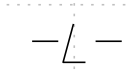
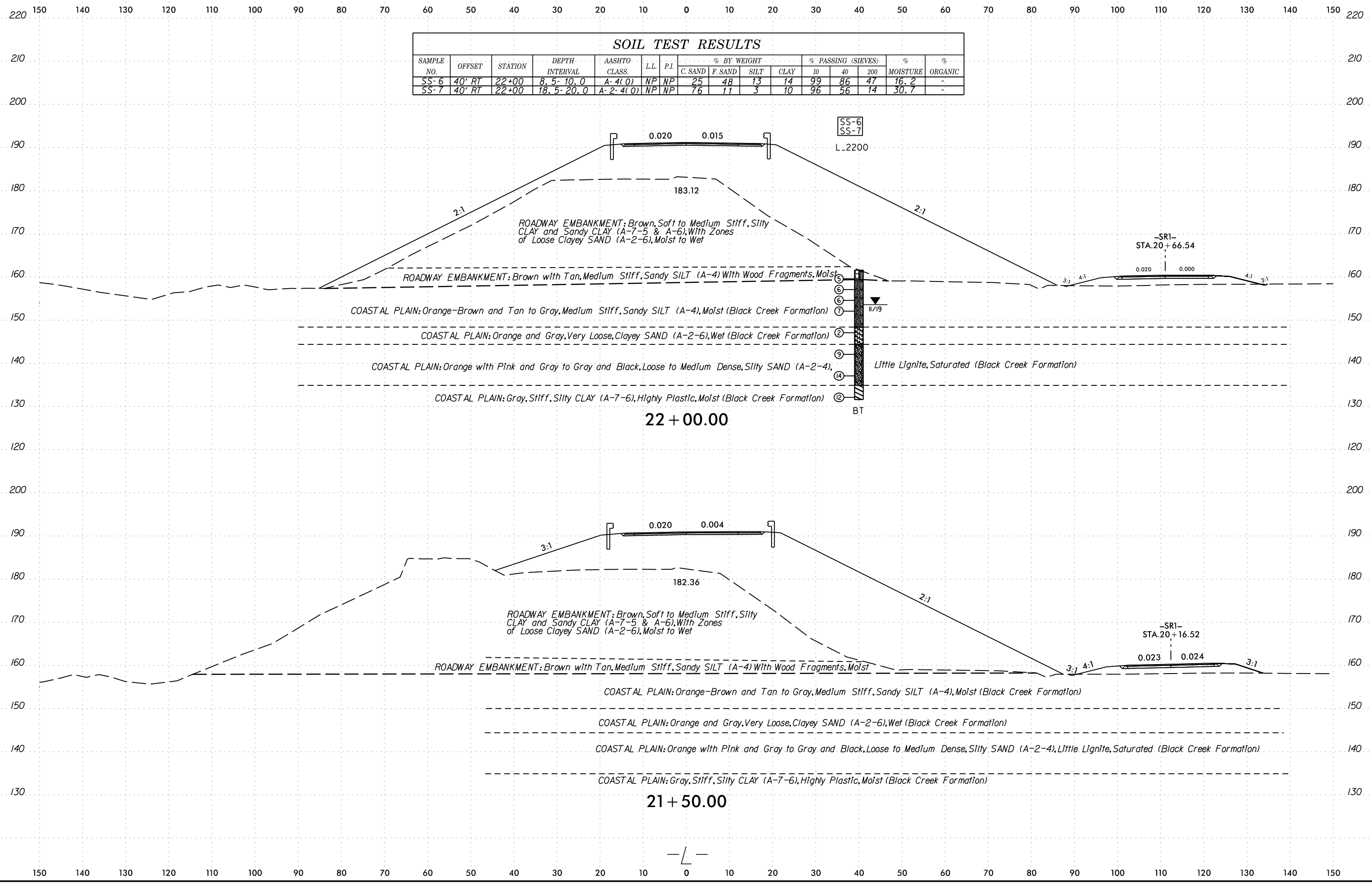
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
							SS-4	2' LT	21+00	8.5-10.0	A-6(1)	30	11		
SS-5	10' RT	19+66	3.5-5.0	A-4(0)	15	2	19	33	14	34	91	83	56	14.4	-

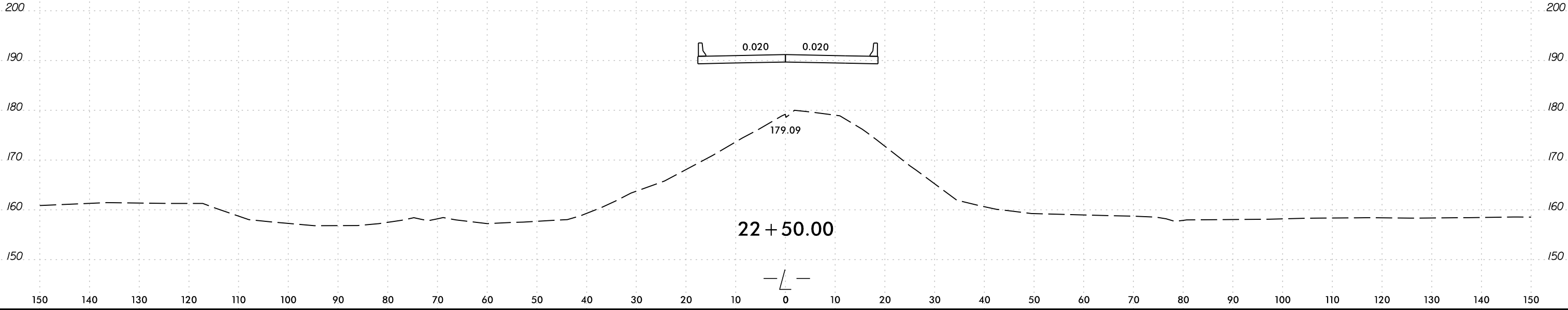
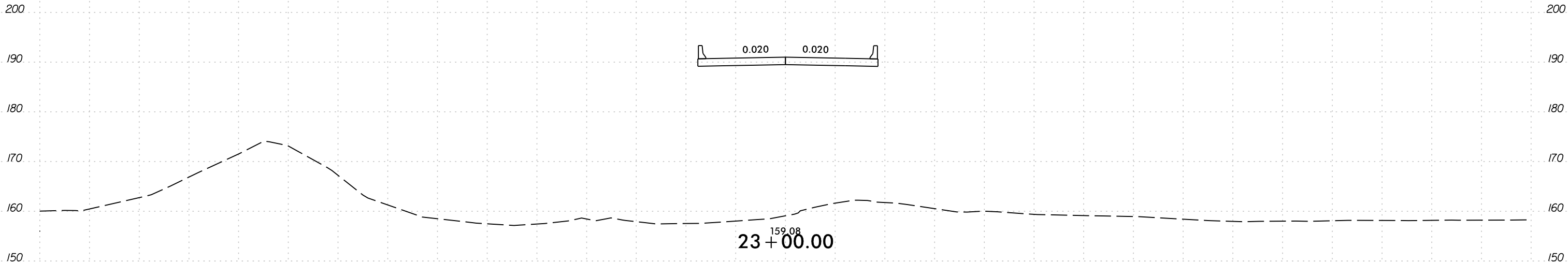
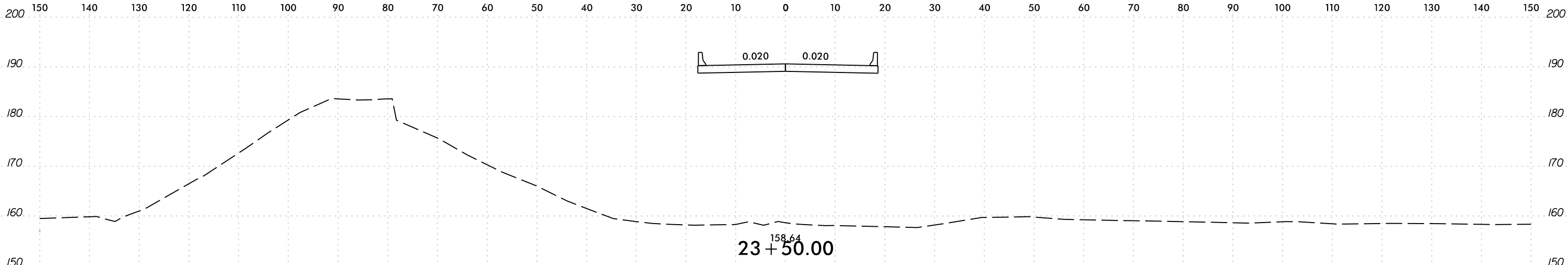
- \* NOTE: SS-5 STATION AND OFFSET REFERS TO SRI ALIGNMENT
- Ⓓ ROADWAY EMBANKMENT: Orange-Brown, Medium Stiff, Silty CLAY (A-7-5), Moist
  - Ⓔ ROADWAY EMBANKMENT: Dark-Gray, Loose, Clayey SAND (A-2-6), Moist
  - Ⓕ COASTAL PLAIN: Gray, Tan, and Red, Medium Stiff, Silty CLAY (A-7-5), Moist (Black Creek Formation)

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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-6	40' RT	22+00	8.5-10.0	A-4(0)	NP	NP	25	48	13	14	99	86	47	16.2	-
SS-7	40' RT	22+00	18.5-20.0	A-2-4(0)	NP	NP	76	11	3	10	96	56	14	30.7	-







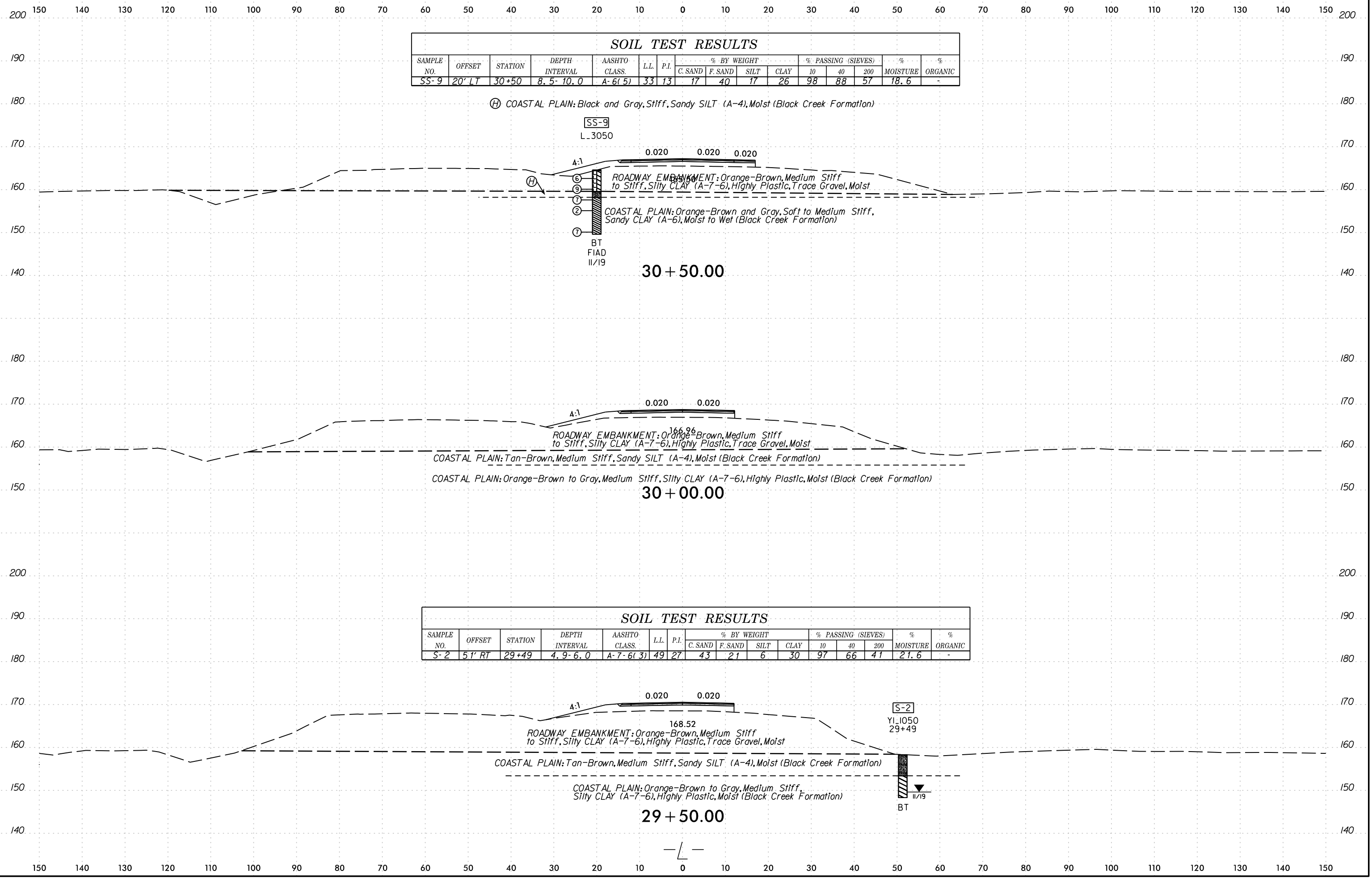








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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-9	20' LT	30+50	8.5-10.0	A-6(5)	33	13	17	40	17	26	98	88	57	18.6	-

Ⓜ COASTAL PLAIN: Black and Gray, Stiff, Sandy SILT (A-4), Moist (Black Creek Formation)

SS-9  
L\_3050

ROADWAY EMBANKMENT: Orange-Brown, Medium Stiff to Stiff, Silty CLAY (A-7-6), Highly Plastic, Trace Gravel, Moist

COASTAL PLAIN: Orange-Brown and Gray, Soft to Medium Stiff, Sandy CLAY (A-6), Moist to Wet (Black Creek Formation)

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FIAD  
11/19

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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-2	51' RT	29+49	4.9-6.0	A-7-6(3)	49	27	43	21	6	30	97	66	41	21.6	-

ROADWAY EMBANKMENT: Orange-Brown, Medium Stiff to Stiff, Silty CLAY (A-7-6), Highly Plastic, Trace Gravel, Moist

COASTAL PLAIN: Tan-Brown, Medium Stiff, Sandy SILT (A-4), Moist (Black Creek Formation)

COASTAL PLAIN: Orange-Brown to Gray, Medium Stiff, Silty CLAY (A-7-6), Highly Plastic, Moist (Black Creek Formation)

30 + 00.00

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-2	51' RT	29+49	4.9-6.0	A-7-6(3)	49	27	43	21	6	30	97	66	41	21.6	-

ROADWAY EMBANKMENT: Orange-Brown, Medium Stiff to Stiff, Silty CLAY (A-7-6), Highly Plastic, Trace Gravel, Moist

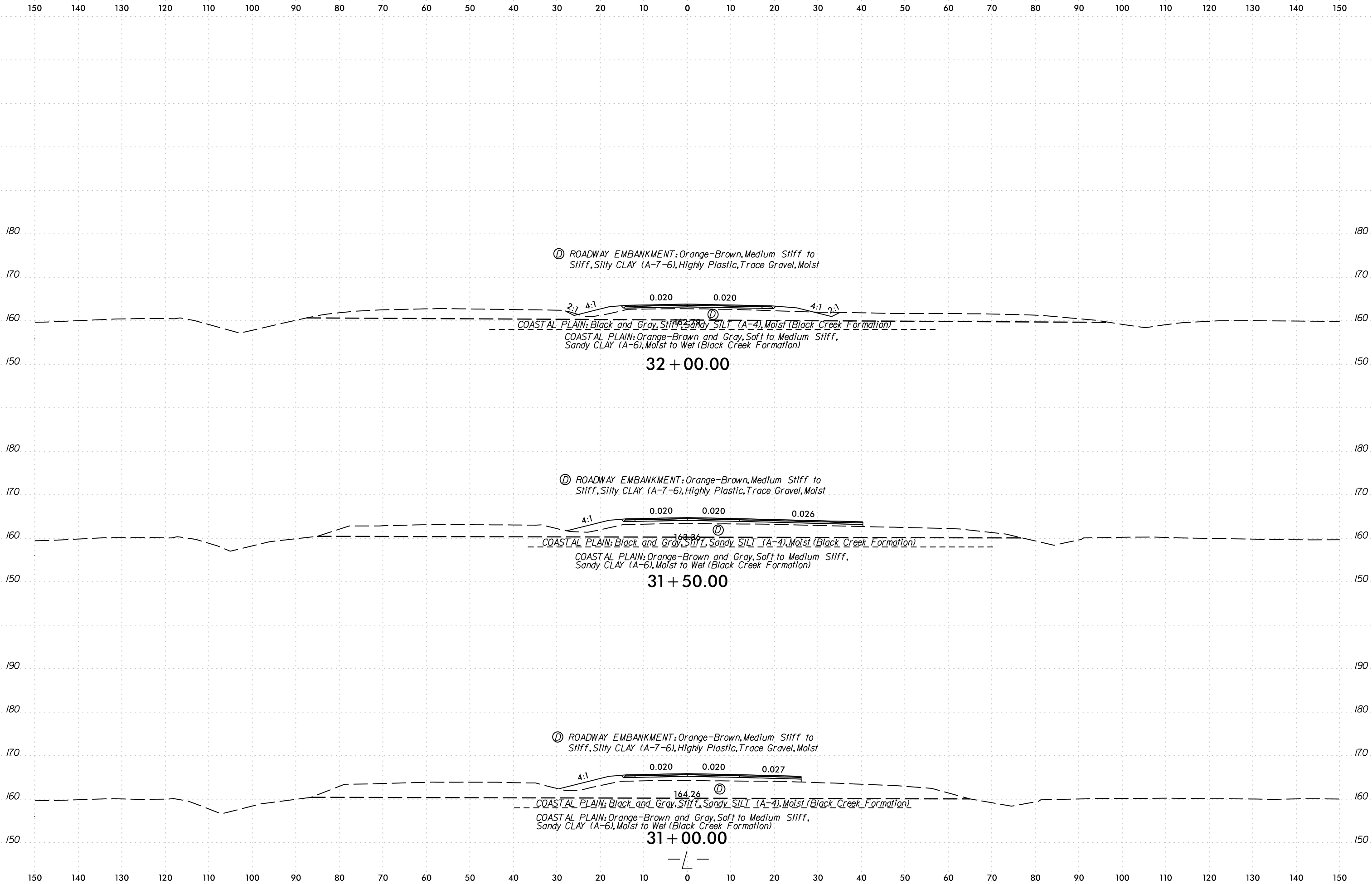
COASTAL PLAIN: Tan-Brown, Medium Stiff, Sandy SILT (A-4), Moist (Black Creek Formation)

COASTAL PLAIN: Orange-Brown to Gray, Medium Stiff, Silty CLAY (A-7-6), Highly Plastic, Moist (Black Creek Formation)

S-2  
Y1\_1050  
29+49

BT  
11/19

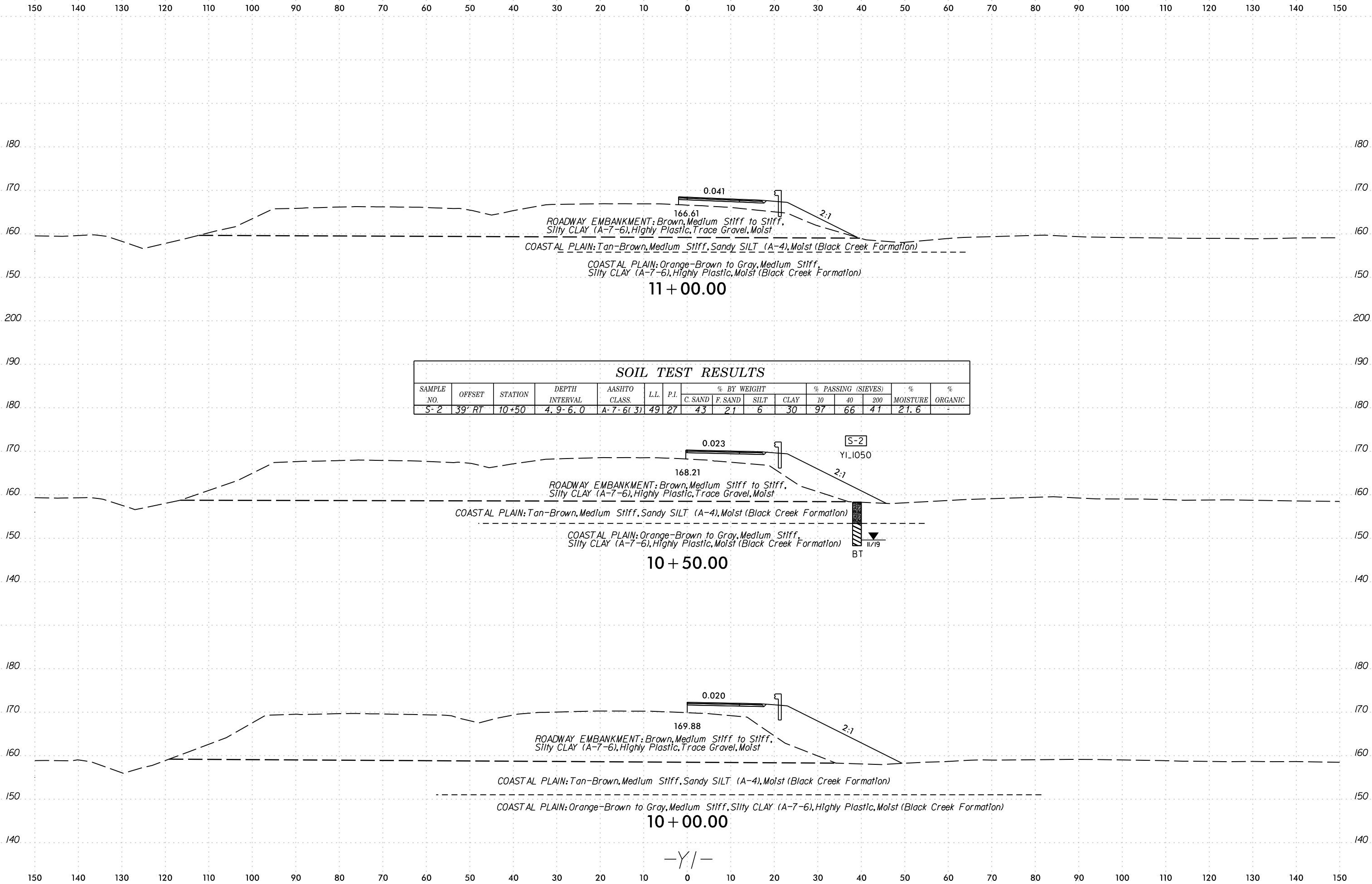
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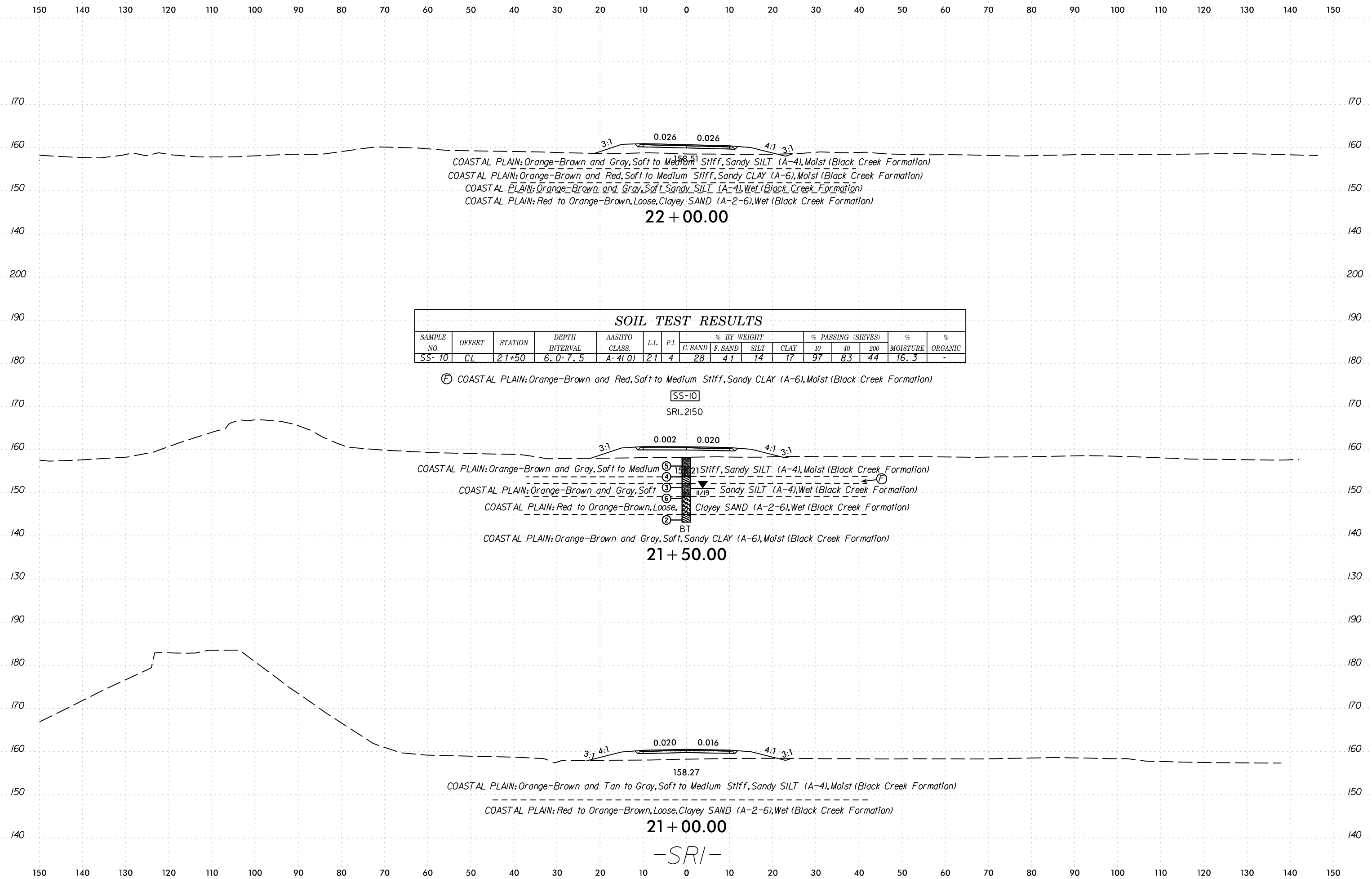


SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
S-2	39' RT	10+50	4.9'-6.0'	A-7-6(3)	49	27	43	21	6	30	97	66	41	21.6	-

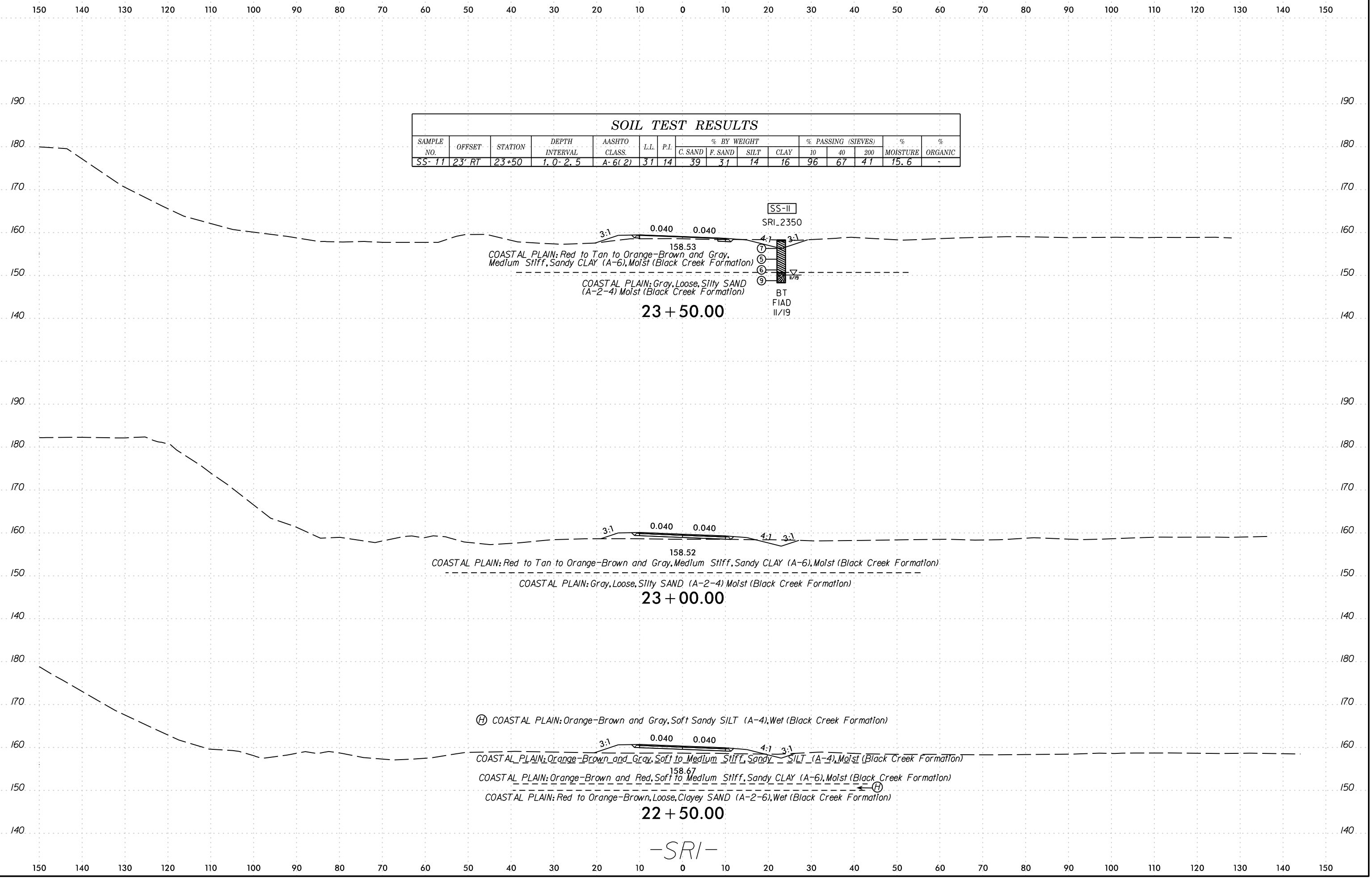
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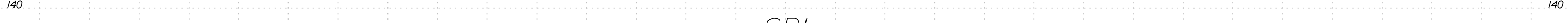
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 cotocole







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



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

157.30  
**25 + 00.00**

3:1 0.003 0.031 4:1 3:1  
157.59  
COASTAL PLAIN: Red to Tan to Orange-Brown and Gray,  
Medium Stiff, Sandy CLAY (A-6), Moist (Black Creek Formation)  
**24 + 50.00**

3:1 0.021 0.030 4:1 3:1  
158.16  
COASTAL PLAIN: Red to Tan to Orange-Brown and Gray,  
Medium Stiff, Sandy CLAY (A-6), Moist (Black Creek Formation)  
**24 + 00.00**

-SRI-

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

REFERENCE: B-5981

PROJECT: 47747

SOILS LABORATORY TESTS RESULTS

WBS NO.: 47747.1.1

TIP NO.: B-5981

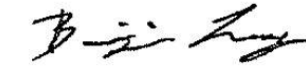
COUNTY: Duplin

SITE DESCRIPTION: Replace Bridge 16 over CSX Railroad on US 117 Northbound Lane and Bridge Preservation of Bridge 17 over CSX Railroad

BORING NO.	SAMPLE NO.	BORING LOCATION	DEPTH INTERVAL (FT)	AASHTO CLASS	N	L.L	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
								CSE. SAND	F. SAND	SILT	CLAY	10	40	200		
L_1800	SS-2	-L- STA. 18+00, 59' RT	8.5-10.0	A-2-6 (0)	7	31	12	45	29	3	23	94	69	27	15.2	-
L_1900	SS-3	-L- STA. 19+00, 2' RT	1.0-2.5	A-6 (0)	8	38	14	46	24	14	16	91	61	30	13.1	-
L_1995	ST-1	-L- STA. 19+95, 53' RT	6.0-8.0	A-6 (3)	N/A	29	15	24	39	12	25	99	88	47	18.6	-
L_2100	SS-4	-L- STA. 21+00, 2' LT	8.5-10.0	A-6 (1)	6	30	11	31	35	11	23	97	81	40	20.4	-
L_2200	SS-6	-L- STA. 22+00, 40' RT	8.5-10.0	A-4 (0)	7	NP	NP	25	48	13	14	99	86	47	16.2	-
L_2200	SS-7	-L- STA. 22+00, 40' RT	18.5-20.0	A-2 4 (0)	9	NP	NP	76	11	3	10	96	56	14	30.7	-
L_2750	SS-8	-L- STA. 27+50, 12' RT	1.0-2.5	A-7-6 (14)	5	76	49	28	32	2	38	94	78	43	42.2	-
L_2850	S-1	-L- STA. 28+50, 50' RT	3.5-5.0	A-4 (3)	N/A	26	10	23	34	17	26	99	85	56	19.0	-
L_3050	SS-9	-L- STA. 30+50, 20' LT	8.5-10.0	A-6 (5)	2	33	13	17	40	17	26	98	88	57	18.6	-
SR1_1553	SS-1	-SR1- STA. 15+53, 12' LT	1.0-2.5	A-4 (0)	4	20	5	22	40	21	17	99	87	54	14.0	-
SR1_1966	SS-5	-SR1- STA. 19+66, 10' RT	3.5-5.0	A-4 (0)	4	15	2	19	33	14	34	91	83	56	14.4	-
SR1_2150	SS-10	-SR1- STA. 21+50, CL	6.0-7.5	A-4 (0)	3	21	4	28	41	14	17	97	83	44	16.3	-
SR1_2350	SS-11	-SR1- STA. 23+50, 23' RT	1.0-2.5	A-6 (2)	7	31	14	39	31	14	16	96	67	41	15.6	-
Y1_1050	S-2	-Y1- STA. 10+50, 39' RT	4.9-6.0	A-7-6 (6)	N/A	49	27	43	21	6	30	97	66	41	21.6	-

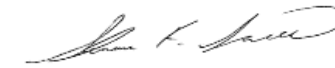
For All Samples But Sample ST-1: Signed

NCDOT Certification No. 144-02-0718



For Sample ST-1: Signed

NCDOT Certification No. 129-04-0411

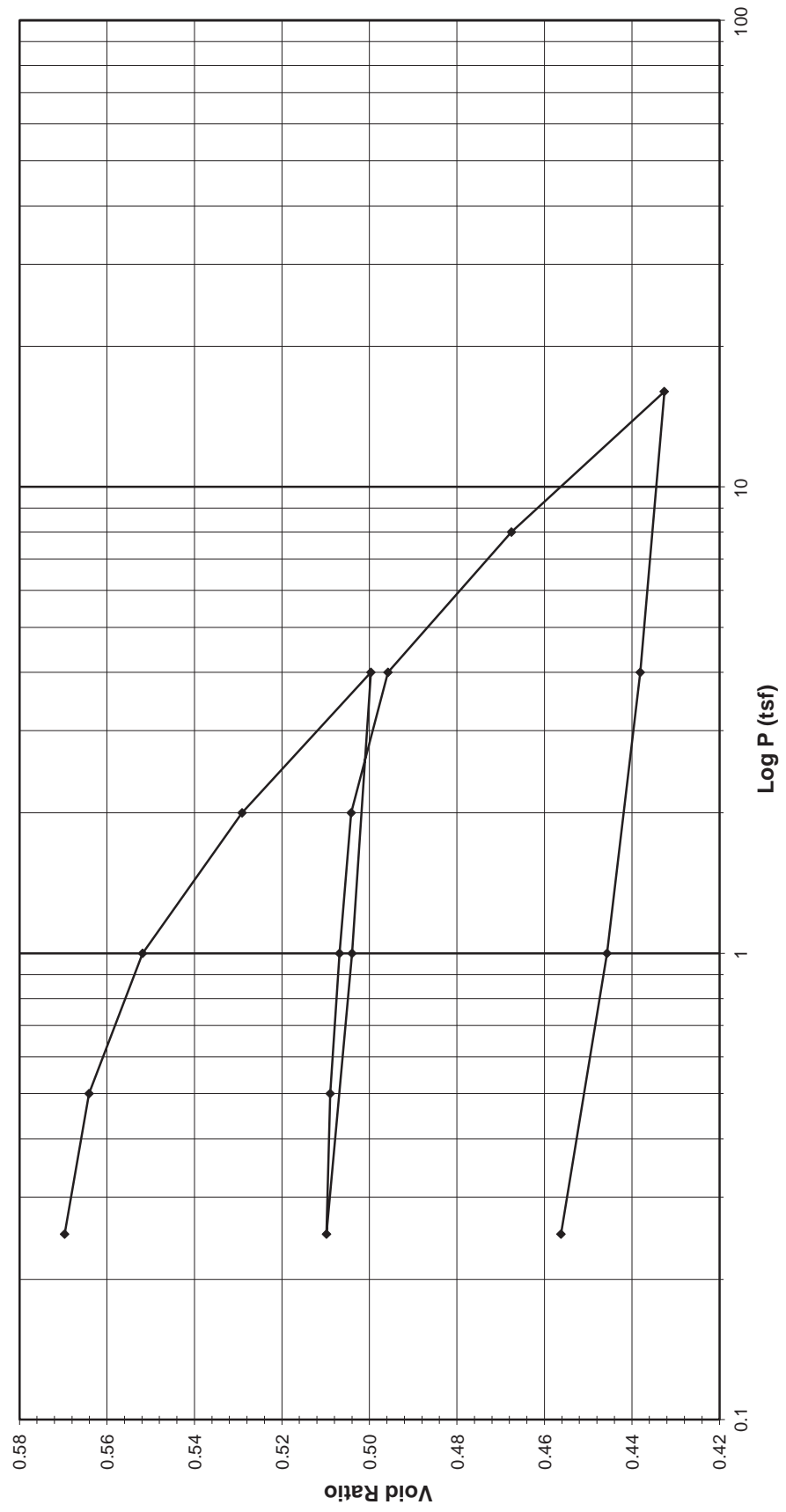


**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc.  
 Client Reference B-5981  
 Project No. R-2019-327-001  
 Lab ID R-2019-327-001-001

Boring No. L\_1995  
 Depth (ft) 6.0-8.0  
 Sample No. ST-1  
 Visual Description Gray Sandy Clay

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



page 1 of 4  
 DCN: CT-24E Date: 5/3/12 Revision: 6  
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 Tested By 129-08-0411 Date 11/20/2019 Approved By MPS Date 12/2/2019

**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc.  
 Client Reference B-5981  
 Project No. R-2019-327-001  
 Lab ID R-2019-327-001-001

Boring No. L\_1995  
 Depth (ft) 6.0-8.0  
 Sample No. ST-1  
 Visual Description Gray Sandy Clay

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED

**Consolidometer No.** R409  
**1 Division** = 0.0001 (in.)

**Sample Properties**

	Initial	Final
<i>Water Content</i>		
Tare Number	SS-3	SS-6
Wt. Tare & WS (g)	471.93	258.40
Wt. Tare & DS (g)	413.79	236.08
Wt. Water (g)	58.14	22.32
Wt. Tare (g)	100.72	100.96
Wt. DS (g)	313.07	135.12
Water Content (%)	18.57	16.52
<i>Sample Parameters</i>		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.9183
Sample Volume (cc)	80.44	73.87
Wt. Wet Sample + Ring (g)	375.40	372.61
Wt. of Ring (g)	214.20	214.20
Wt. of Wet Sample (g)	161.20	158.41
Wet Density (pcf)	125.05	133.81
Wet Density (g/cc)	2.00	2.14
Water Content (%)	18.57	16.52
Wt. of Dry Sample (g)	135.95	135.95
Dry Density (pcf)	105.46	114.84
Dry Density (g/cc)	1.69	1.84
Void Ratio	0.5857	0.4562
Saturation (%)	84.98	97.04
Specific Gravity	2.68	Assumed

**Test Data Summary**

Applied Pressure (tsf)	Final Reading (div)	Dial Deflection (div)	Machine Deflection (div)	Corrected Reading (div)	Height of Sample (mm)	Volume (cc)	Dry Density (g/cc)	Void Ratio
Seating	0	0	0	0	25.400	80.440	1.69011	0.58569
0.25	111.5	10.7	10.7	100.8	25.144	79.629	1.70733	0.56970
0.5	166.2	30.0	30.0	136.2	25.054	79.344	1.71345	0.56410
1	260.7	47.1	47.1	213.6	24.857	78.722	1.72700	0.55182
2	431.4	74.4	74.4	357.0	24.493	77.568	1.75268	0.52909
4	643.8	101.3	101.3	542.5	24.022	76.076	1.78706	0.49967
1	585.2	69.8	69.8	515.4	24.091	76.294	1.78196	0.50396
0.25	513.1	34.5	34.5	478.5	24.185	76.590	1.77506	0.50981
0.5	524.7	40.8	40.8	483.9	24.171	76.547	1.77606	0.50896
1	552.7	55.4	55.4	497.3	24.137	76.440	1.77856	0.50684
2	591.6	77.3	77.3	514.3	24.094	76.303	1.78175	0.50414
4	669.4	102.2	102.2	567.2	23.959	75.877	1.79174	0.49575
8	891.5	146.5	146.5	745.0	23.508	74.447	1.82616	0.46756
16	1165.3	199.9	199.9	965.4	22.948	72.674	1.87072	0.43261
4	1069.1	138.4	138.4	930.6	23.036	72.954	1.86354	0.43812
1	969.5	86.8	86.8	882.7	23.158	73.340	1.85374	0.44573
0.25	862.3	45.6	45.6	816.7	23.326	73.870	1.84042	0.45619

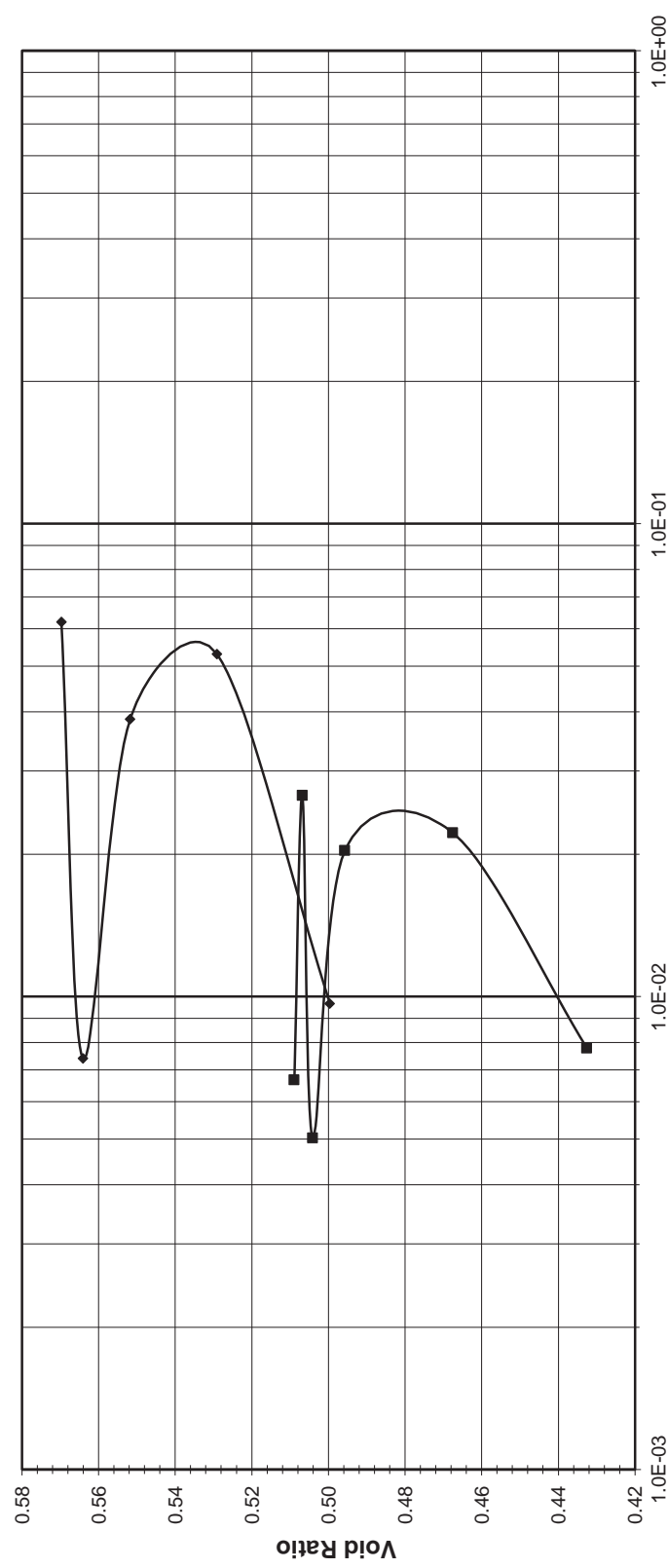
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 page 2 of 4  
 DCN: CT-24E Date: 5/3/12 Revision: 6  
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 Z:\2019 PROJECTS\ESP ASSOCIATES\2019-327 ESP - B-5981\2019-327-001-001 DOT GEOJAC-16TSF1 Cv.xls\m\FINAL PLOT

### ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	ESP Associates, Inc.	Boring No.	L_1995
Client Reference	B-5981	Depth (ft)	6.0-8.0
Project No.	R-2019-327-001	Sample No.	ST-1
Lab ID	R-2019-327-001-001	Visual Description	Gray Sandy Clay

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED



**Coefficient of Consolidation (cm²/sec)**

◆ First Cycle Up      ■ Second Cycle Up

Tested By 129-08-0411 Date 11/20/2019 Input Checked By GEM Date 12/2/2019

DCN: CT-24E Date: 5/3/12 Revision: 6 Z:\2019 PROJECTS\ESP ASSOCIATES\2019-327 ESP - B-5981\2019-327-001-001 DOT GEOJAC-16TSF1 Cv.xlsm\FINAL PLOT  
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### ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	ESP Associates, Inc.	Boring No.	L_1995
Client Reference	B-5981	Depth (ft)	6.0-8.0
Project No.	R-2019-327-001	Sample No.	ST-1
Lab ID	R-2019-327-001-001	Visual Description	Gray Sandy Clay

**Sample Conditions:** UNDISTURBED, INUNDATED AND DOUBLE DRAINED

**Consolidometer No.** R409

**1 Division** = 0.0001 (in.)

Sample Properties	Initial		Final		C <sub>v</sub> Test Data Summary						
	SS-3	SS-6	SS-3	SS-6	Load Increment (tsf)	Dial Reading @ t <sub>50</sub> (div)	Machine Deflection (div)	Corrected Dial Reading @ t <sub>50</sub> (div)	Sample Height @ t <sub>50</sub> (cm)	Time t <sub>50</sub> (min.)	C <sub>v</sub> (cm²/sec)
Water Content											
Tare Number											
Wt. Tare & WS (g)	471.93	258.40			0 - 0.25	42.0	10.7	31.3	2.532	0.09	0.06191
Wt. Tare & DS (g)	413.79	236.08			0.25 - 0.5	141.3	30.0	111.2	2.512	0.70	0.00740
Wt. Water (g)	58.14	22.32			0.5 - 1.0	206.5	47.1	159.4	2.500	0.13	0.03856
Wt. Tare (g)	100.72	100.96			1.0 - 2.0	330.4	74.4	255.9	2.475	0.10	0.05293
Wt. DS (g)	313.07	135.12			2.0 - 4.0	553.6	101.3	452.3	2.425	0.50	0.00965
Water Content (%)	18.57	16.52			4.0 - 1.0	NA	69.8	NA	NA	NA	NA
Sample Parameters					1.0 - 0.25	NA	34.5	NA	NA	NA	NA
Sample Diameter (in)	2.5	2.5			0.25 - 0.5	520.7	40.8	479.9	2.418	0.72	0.00667
Sample Height (in)	1.000	0.918			0.5 - 1.0	540.0	55.4	484.6	2.417	0.18	0.02664
Sample Volume (cc)	80.44	73.87			1.0 - 2.0	578.7	77.3	501.4	2.413	0.95	0.00503
Wt. Wet Sample + Ring (g)	375.40	372.61			2.0 - 4.0	634.7	102.2	532.4	2.405	0.23	0.02037
Wt. of Ring (g)	214.20	214.20			4.0 - 8.0	765.7	146.5	619.2	2.383	0.21	0.02219
Wt. of Wet Sample (g)	161.20	158.41			8.0 - 16.0	1044.3	199.9	844.4	2.326	0.57	0.00779
Wet Density (pcf)	125.05	133.81			16.0 - 4.0	NA	138.4	NA	NA	NA	NA
Wet Density (g/cc)	2.00	2.14			4.0 - 1.0	NA	86.8	NA	NA	NA	NA
Water Content (%)	18.57	16.52			1.0 - 0.25	NA	45.6	NA	NA	NA	NA
Wt. of Dry Sample (g)	135.95	135.95									
Dry Density (pcf)	105.46	114.84									
Dry Density (g/cc)	1.69	1.84									
Void Ratio	0.5857	0.4562									
Saturation (%)	84.98	97.04									
Specific Gravity	2.68	Assumed									

Tested By 129-08-0411 Date 11/20/2019 Input Checked By GEM Date 12/2/2019

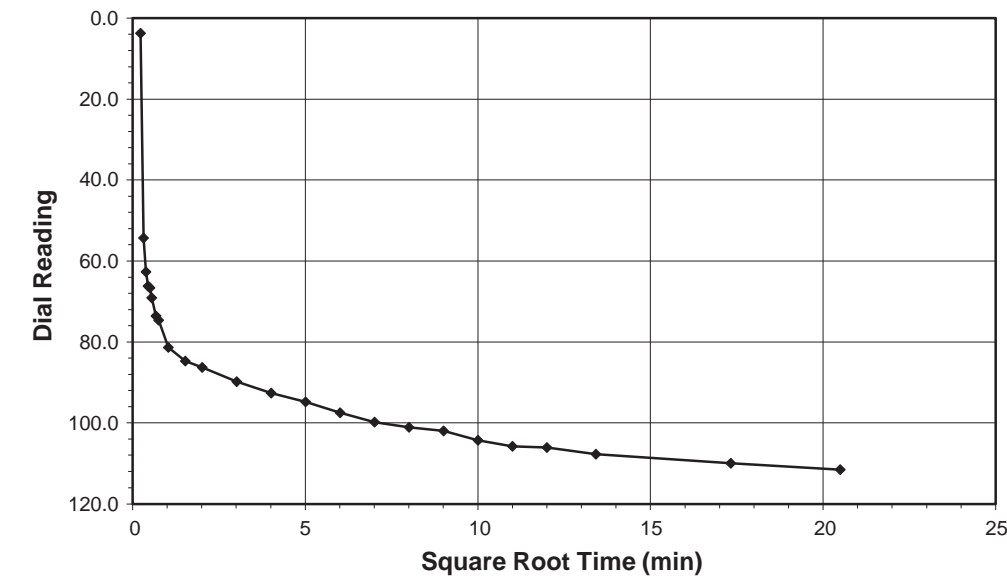
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**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

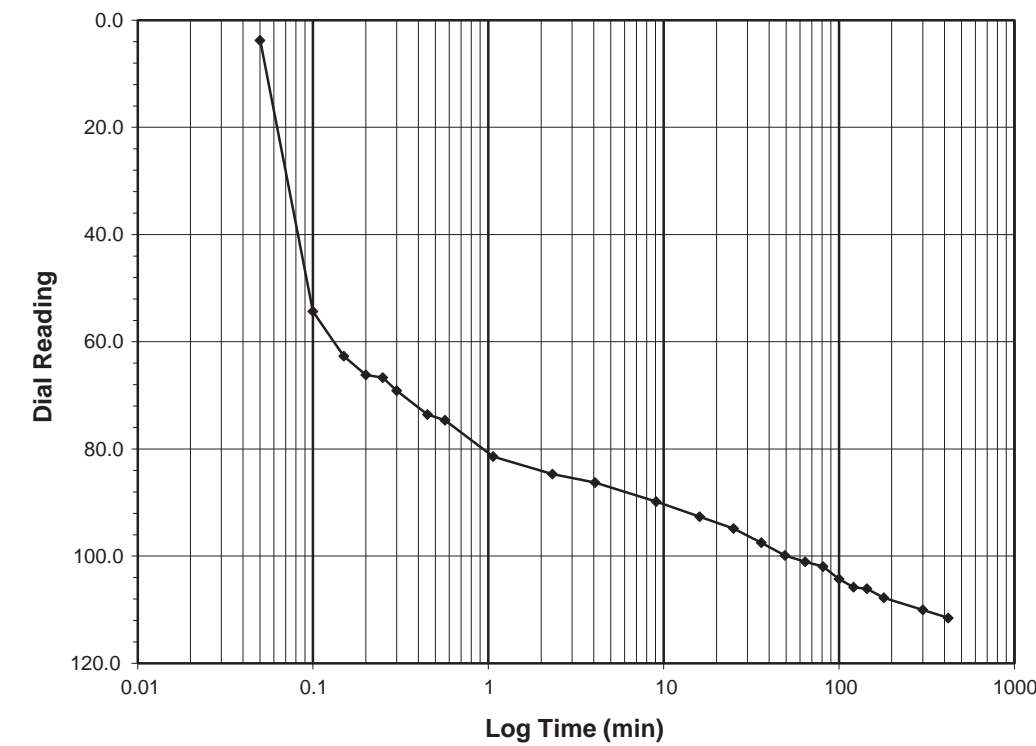
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.0-0.25  
 Final Reading (div) 111.5  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/20/2019  
 Start Time 9:15:40

Elapsed Time (min)	Dial Reading (div)
Initial	0.0
0.05	3.8
0.10	54.3
0.15	62.7
0.20	66.2
0.25	66.7
0.30	69.1
0.45	73.6
0.57	74.7
1.07	81.4
2.32	84.7
4.07	86.3
9.07	89.8
16.07	92.6
25.07	94.8
36.07	97.5
49.07	99.8
64.07	101.1
81.07	102.0
100.07	104.3
121.08	105.8
144.08	106.1
180.08	107.8
300.08	110.0
420.08	111.5



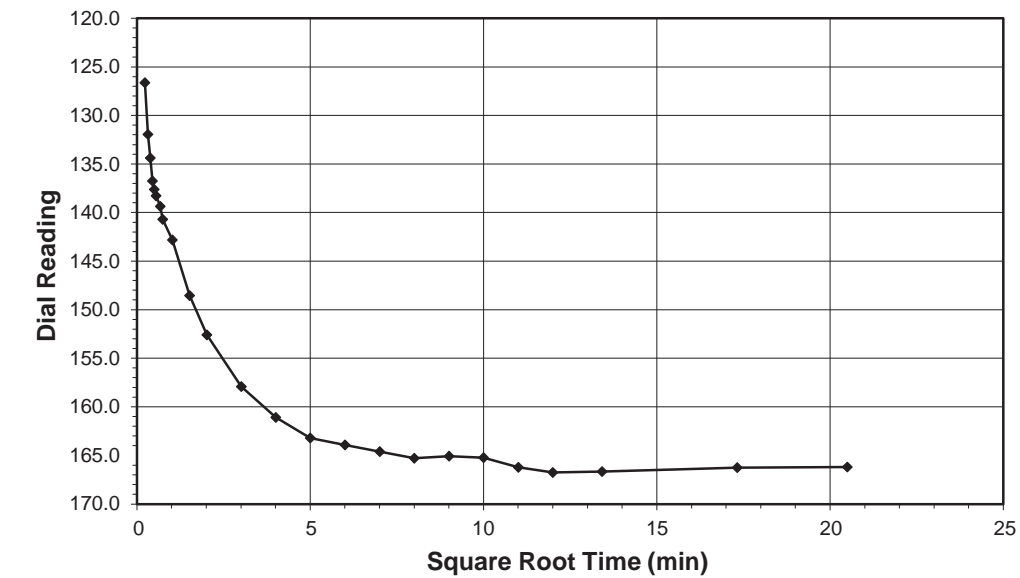
Tested By 129-08-0411 Date 11/20/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

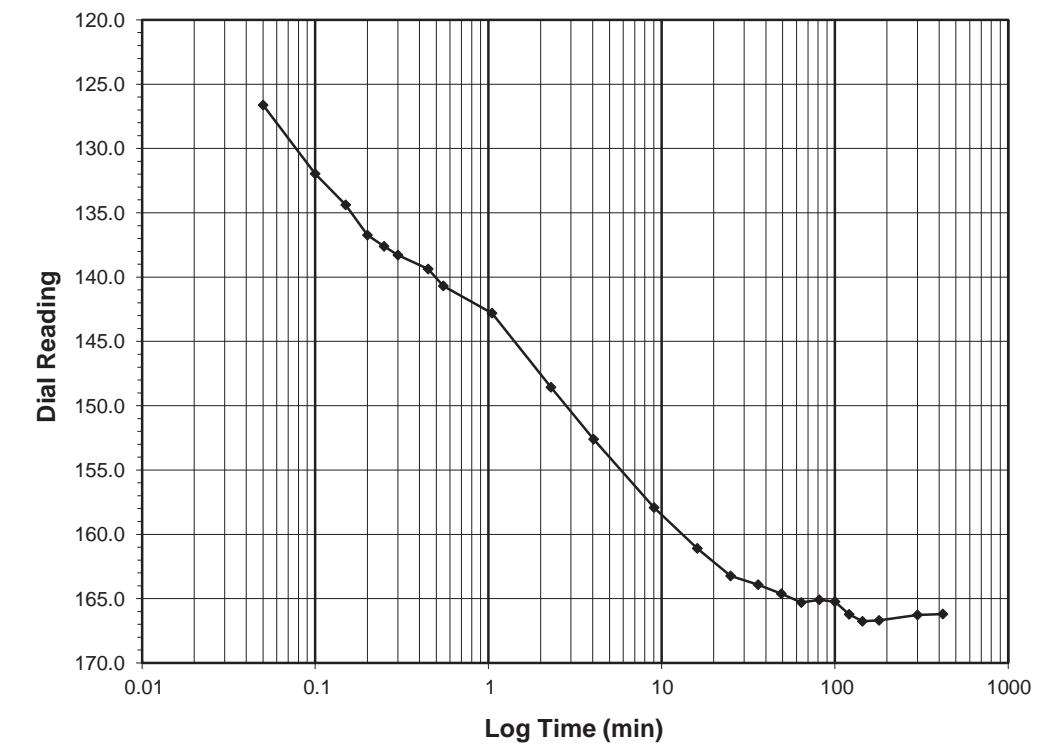
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5  
 Final Reading (div) 166.2  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/20/2019  
 Start Time 16:15:45

Elapsed Time (min)	Dial Reading (div)
Initial	111.5
0.05	126.6
0.10	132.0
0.15	134.4
0.20	136.7
0.25	137.6
0.30	138.3
0.45	139.4
0.55	140.7
1.05	142.8
2.30	148.6
4.05	152.6
9.05	157.9
16.05	161.1
25.05	163.2
36.05	163.9
49.07	164.6
64.07	165.3
81.07	165.1
100.07	165.2
121.07	166.2
144.07	166.8
180.07	166.7
300.07	166.3
420.12	166.2



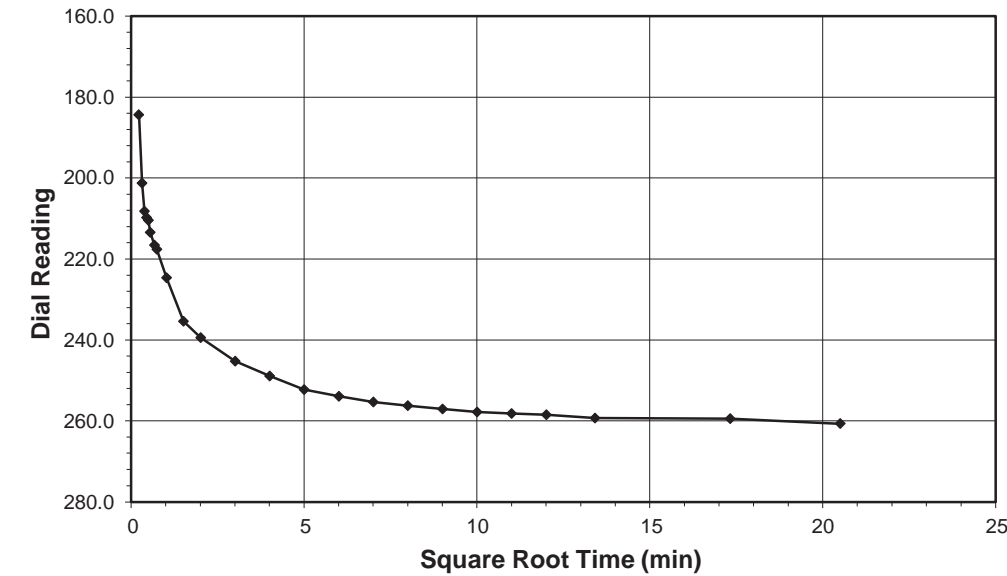
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**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

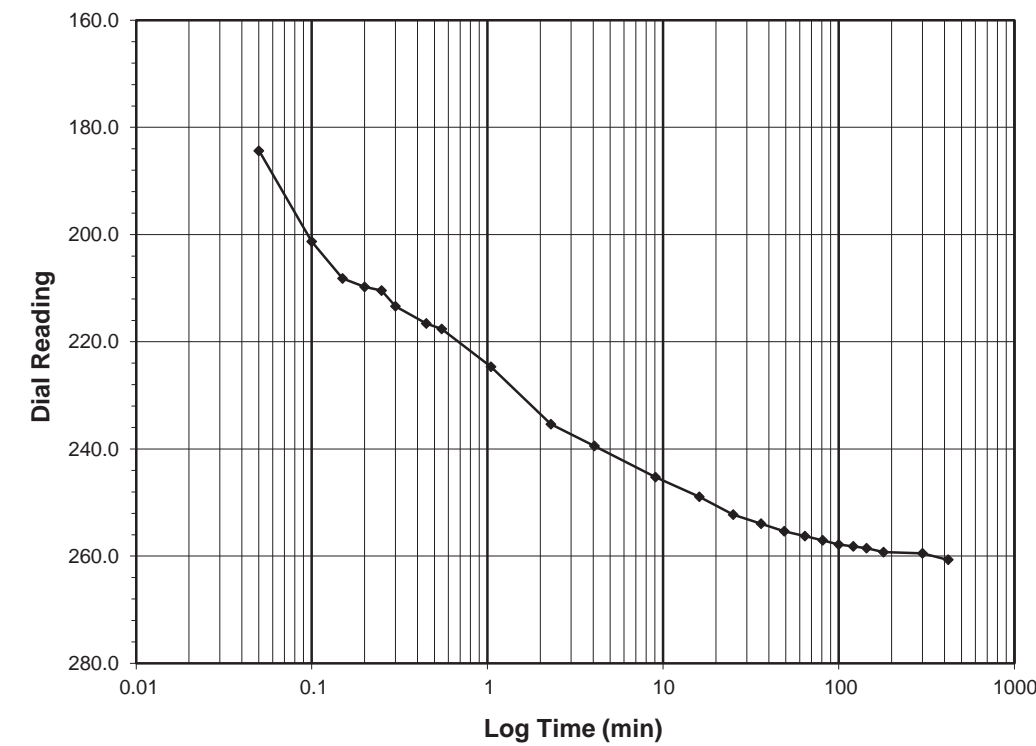
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0  
 Final Reading (div) 260.7  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/20/2019  
 Start Time 23:15:52

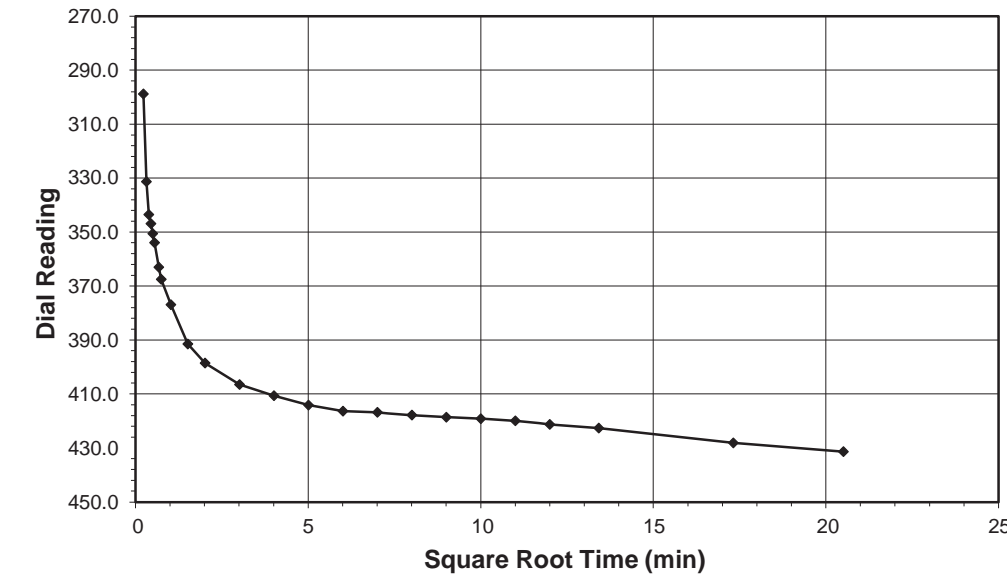
Elapsed Time (min)	Dial Reading (div)
Initial	166.2
0.05	184.4
0.10	201.3
0.15	208.2
0.20	209.8
0.25	210.5
0.30	213.4
0.45	216.6
0.55	217.6
1.05	224.7
2.30	235.4
4.07	239.4
9.07	245.2
16.07	248.9
25.07	252.3
36.07	253.9
49.07	255.4
64.07	256.2
81.07	257.1
100.07	257.8
121.07	258.1
144.07	258.5
180.07	259.3
300.07	259.5
420.50	260.7



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

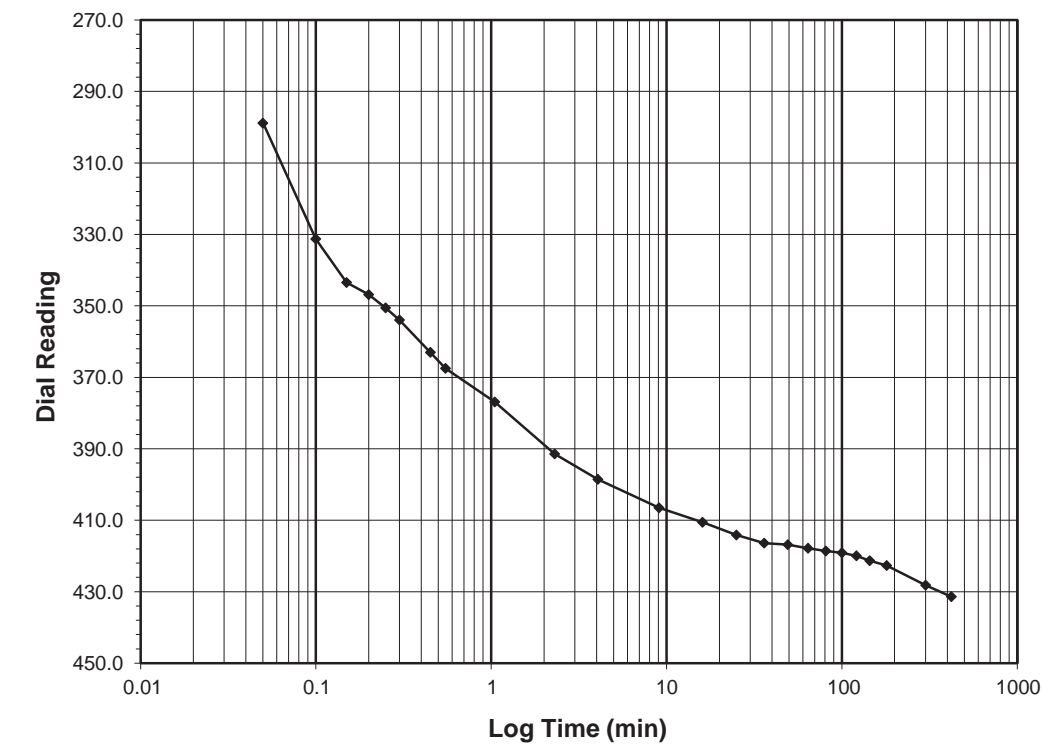
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0  
 Final Reading (div) 431.4  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/21/2019  
 Start Time 6:16:23

Elapsed Time (min)	Dial Reading (div)
Initial	260.7
0.05	298.8
0.10	331.3
0.15	343.5
0.20	346.9
0.25	350.6
0.30	353.9
0.45	363.0
0.55	367.5
1.05	376.9
2.30	391.5
4.07	398.5
9.07	406.5
16.07	410.6
25.07	414.1
36.07	416.4
49.07	416.8
64.07	417.8
81.07	418.6
100.07	419.1
121.07	420.0
144.07	421.4
180.07	422.7
300.07	428.2
420.43	431.4



Tested By 129-08-0411 Date 11/20/2019 Checked By GEM Date 12/2/2019

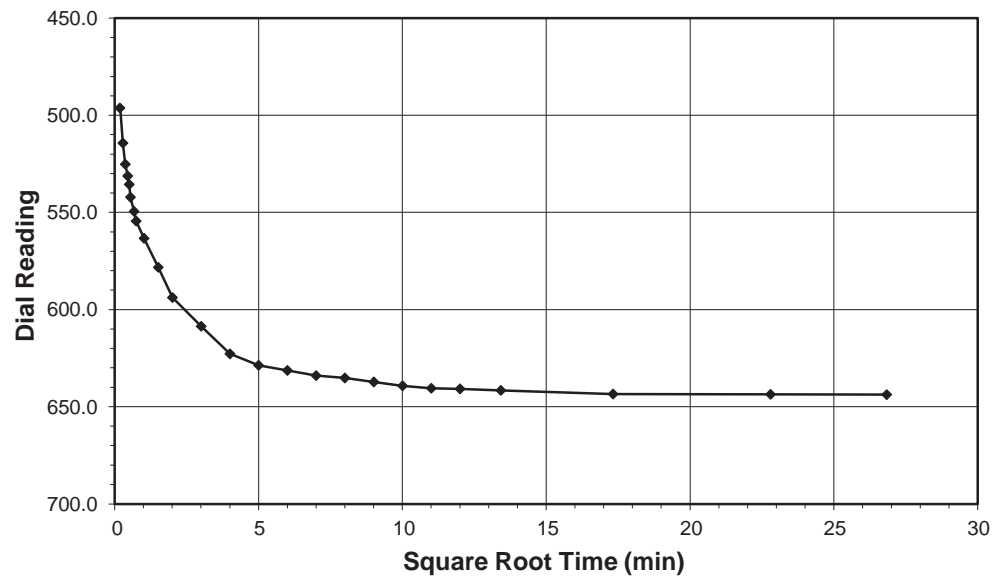
Tested By 129-08-0411 Date 11/21/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

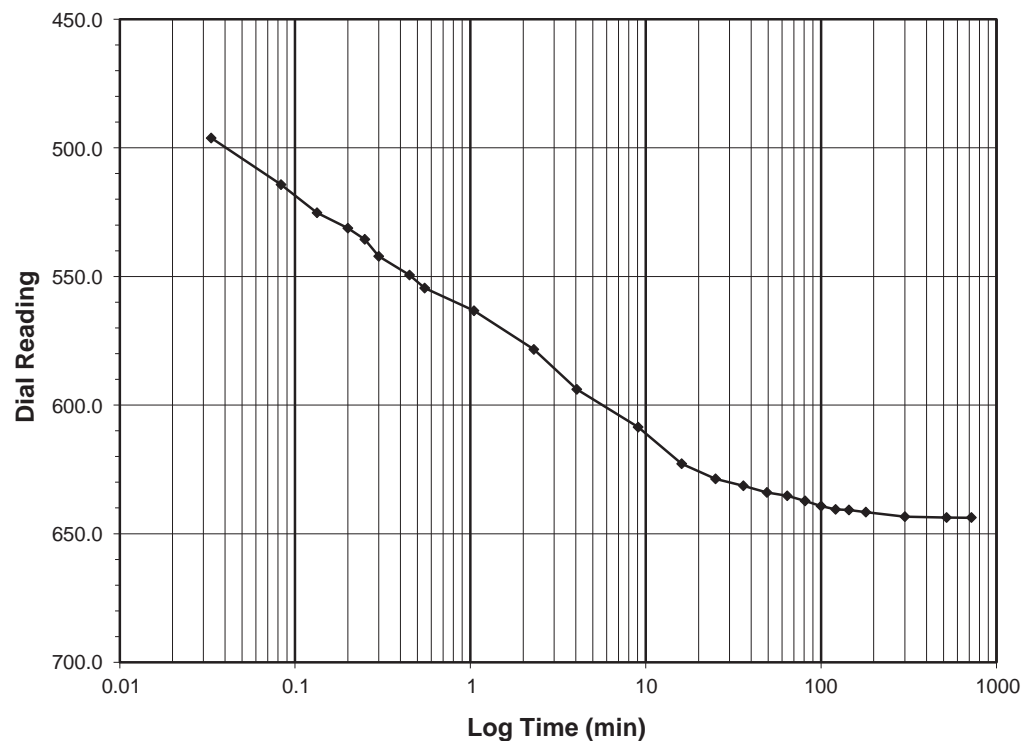
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0  
 Final Reading (div) 643.8  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/21/2019  
 Start Time 13:16:49

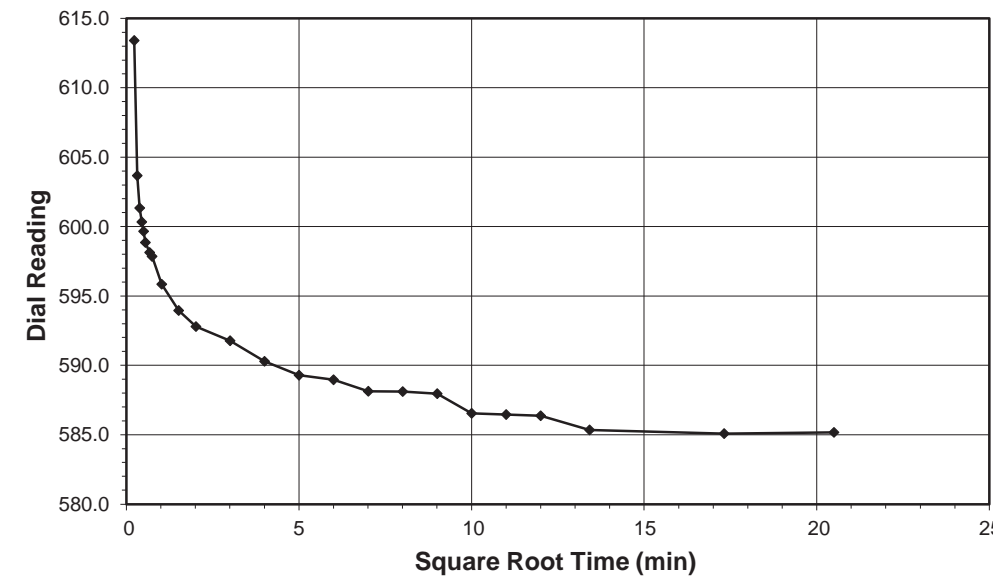
Elapsed Time (min)	Dial Reading (div)
Initial	431.4
0.03	496.2
0.08	514.3
0.13	525.2
0.20	531.2
0.25	535.6
0.30	542.2
0.45	549.5
0.55	554.5
1.05	563.3
2.30	578.3
4.05	593.9
9.05	608.6
16.05	622.8
25.07	628.7
36.07	631.3
49.07	633.9
64.07	635.2
81.07	637.2
100.07	639.3
121.07	640.5
144.07	640.8
180.07	641.6
300.07	643.4
520.07	643.7
720.32	643.8



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

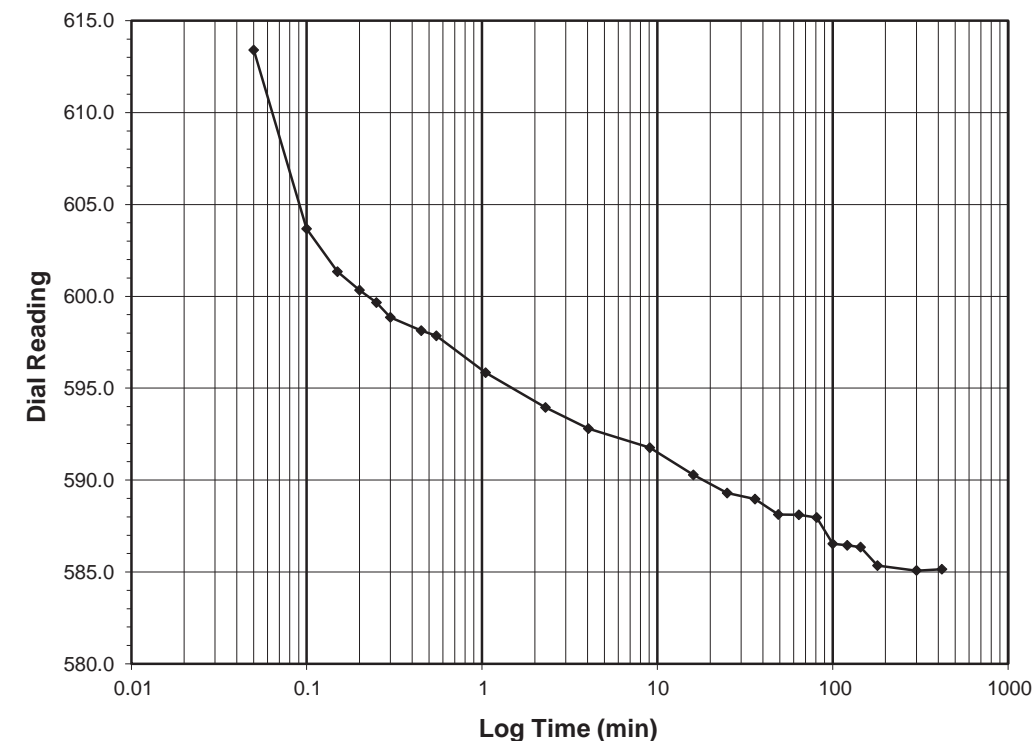
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-1.0  
 Final Reading (div) 585.2  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/22/2019  
 Start Time 1:17:09

Elapsed Time (min)	Dial Reading (div)
Initial	643.8
0.05	613.4
0.10	603.7
0.15	601.3
0.20	600.3
0.25	599.7
0.30	598.8
0.45	598.1
0.55	597.8
1.05	595.8
2.30	594.0
4.05	592.8
9.05	591.8
16.05	590.3
25.05	589.3
36.05	589.0
49.05	588.1
64.05	588.1
81.07	588.0
100.07	586.5
121.07	586.5
144.07	586.4
180.07	585.3
300.07	585.1
420.07	585.2



Tested By 129-08-0411 Date 11/21/2019 Checked By GEM Date 12/2/2019

Tested By 129-08-0411 Date 11/22/2019 Checked By GEM Date 12/2/2019

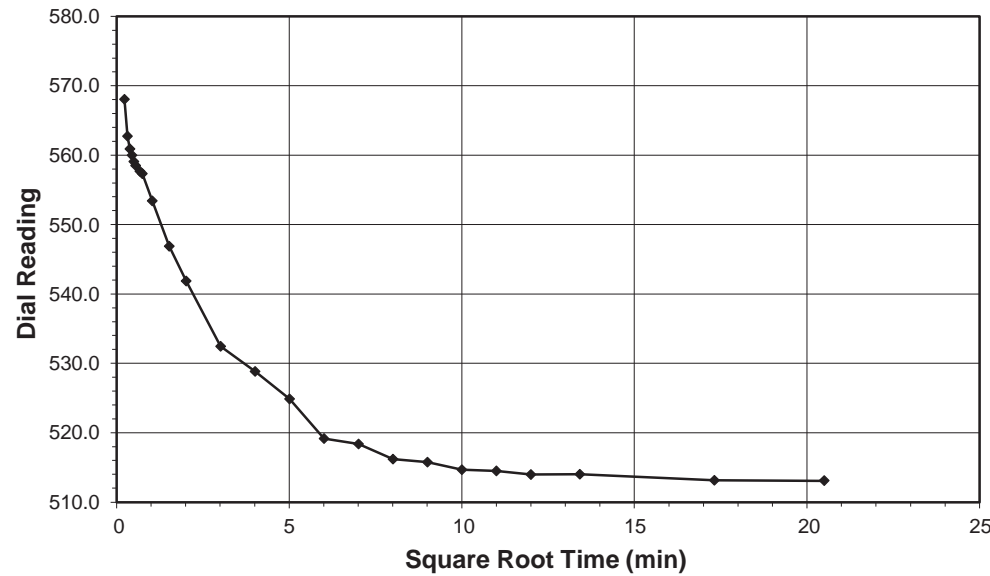




**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

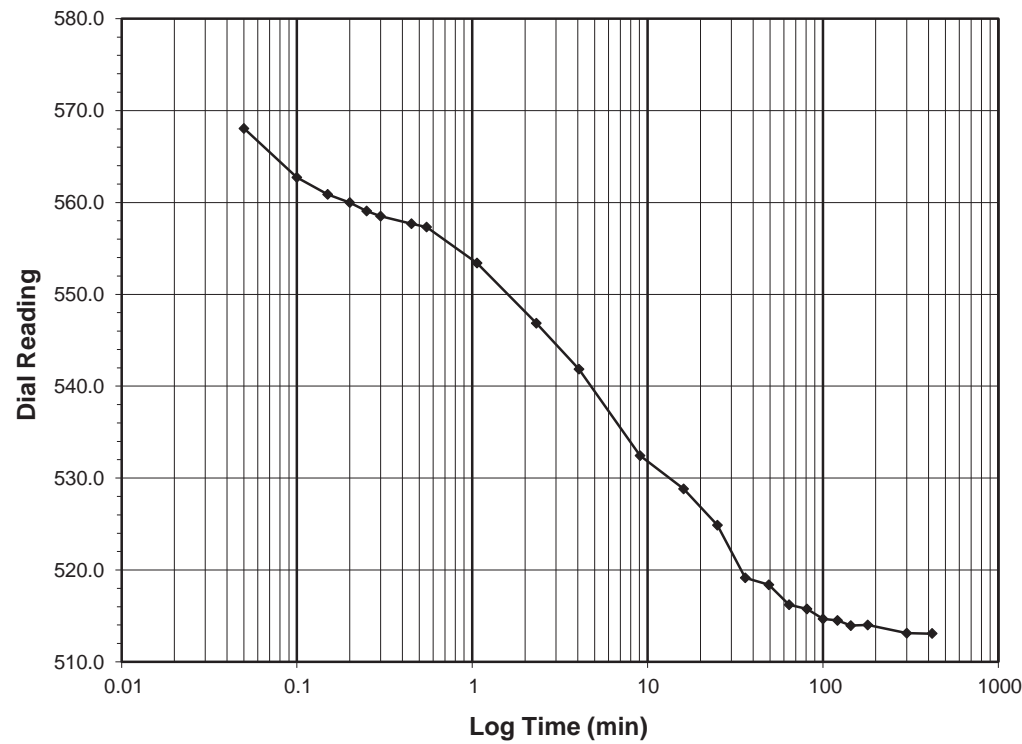
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25  
 Final Reading (div) 513.1  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/22/2019  
 Start Time 8:17:13

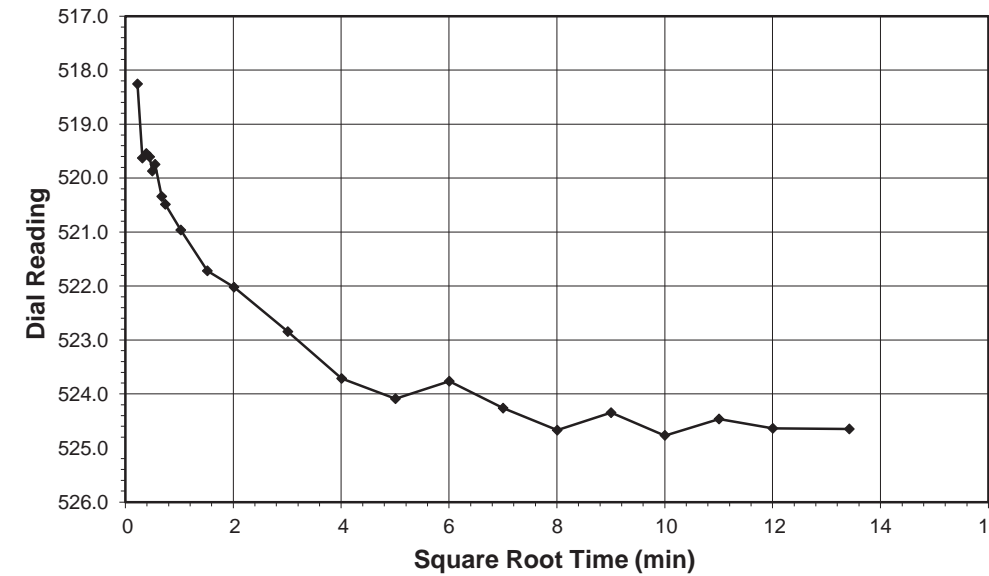
Elapsed Time (min)	Dial Reading (div)
Initial	585.2
0.05	568.1
0.10	562.7
0.15	560.9
0.20	560.0
0.25	559.1
0.30	558.5
0.45	557.7
0.55	557.3
1.07	553.4
2.32	546.9
4.07	541.8
9.07	532.4
16.07	528.8
25.07	524.9
36.07	519.2
49.07	518.4
64.07	516.2
81.07	515.8
100.07	514.7
121.07	514.5
144.07	514.0
180.07	514.0
300.07	513.1
420.00	513.1



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

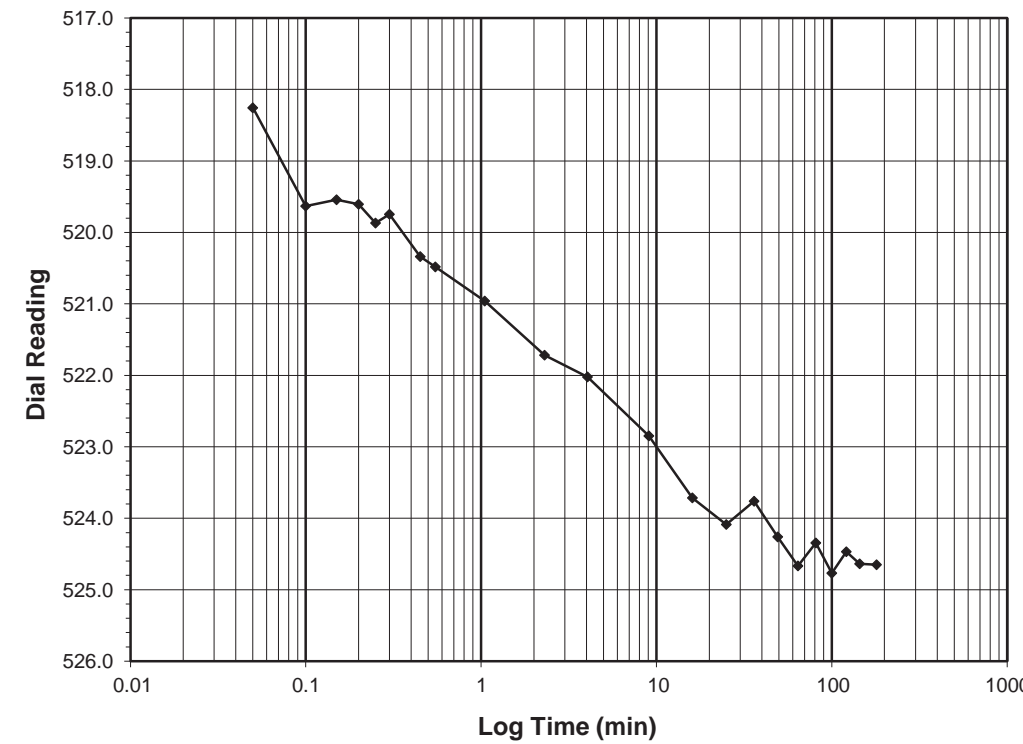
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.25-0.5  
 Final Reading (div) 524.7  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/22/2019  
 Start Time 15:17:13

Elapsed Time (min)	Dial Reading (div)
Initial	513.1
0.05	518.3
0.10	519.6
0.15	519.5
0.20	519.6
0.25	519.9
0.30	519.7
0.45	520.3
0.55	520.5
1.05	521.0
2.30	521.7
4.05	522.0
9.05	522.8
16.05	523.7
25.05	524.1
36.07	523.8
49.07	524.3
64.07	524.7
81.07	524.3
100.07	524.8
121.07	524.5
144.07	524.6
180.07	524.7



Tested By 129-08-0411 Date 11/22/2019 Checked By GEM Date 12/2/2019

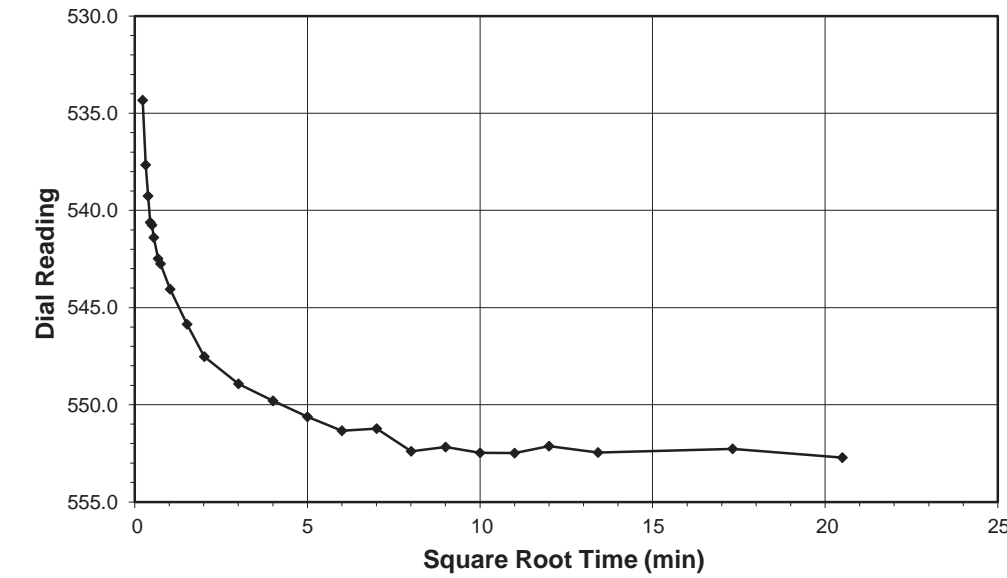
Tested By 129-08-0411 Date 11/22/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

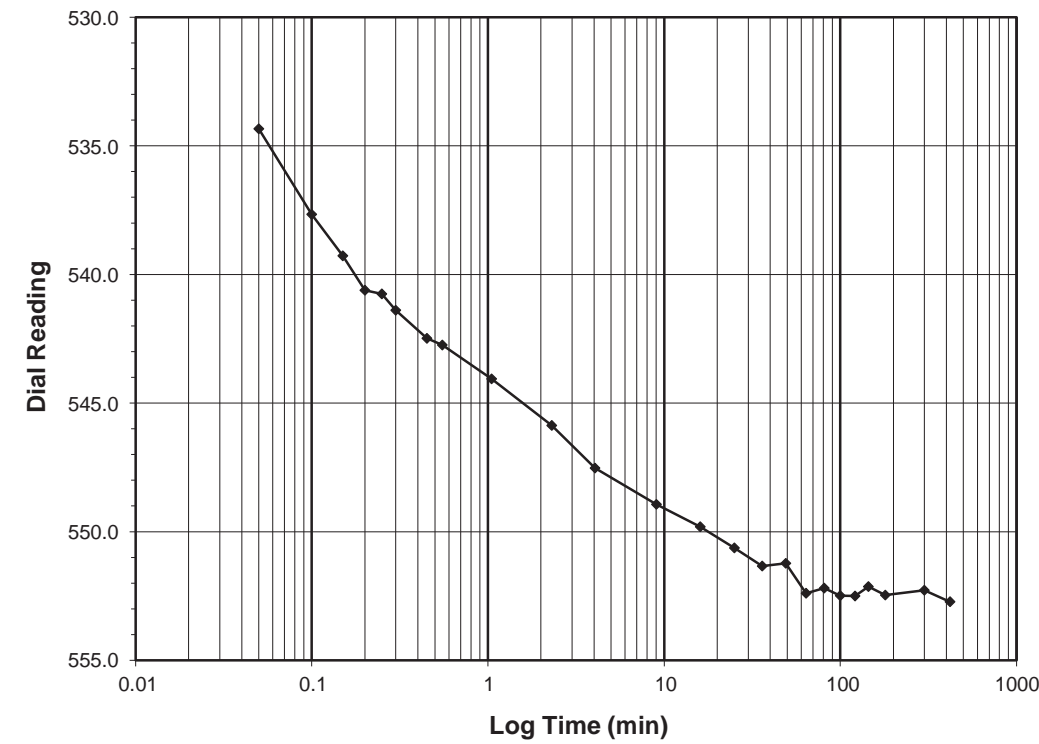
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 0.5-1.0  
 Final Reading (div) 552.7  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/22/2019  
 Start Time 22:17:43

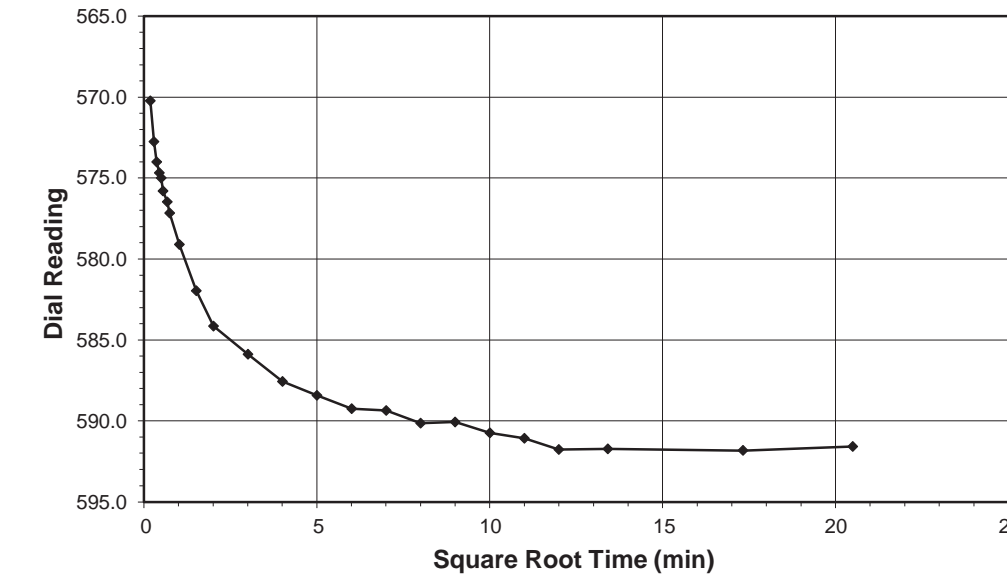
Elapsed Time (min)	Dial Reading (div)
Initial	524.7
0.05	534.3
0.10	537.7
0.15	539.3
0.20	540.6
0.25	540.8
0.30	541.4
0.45	542.5
0.55	542.7
1.05	544.1
2.30	545.9
4.05	547.5
9.05	548.9
16.05	549.8
25.05	550.6
36.05	551.3
49.05	551.2
64.05	552.4
81.07	552.2
100.07	552.5
121.07	552.5
144.07	552.1
180.07	552.5
300.07	552.3
420.03	552.7



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

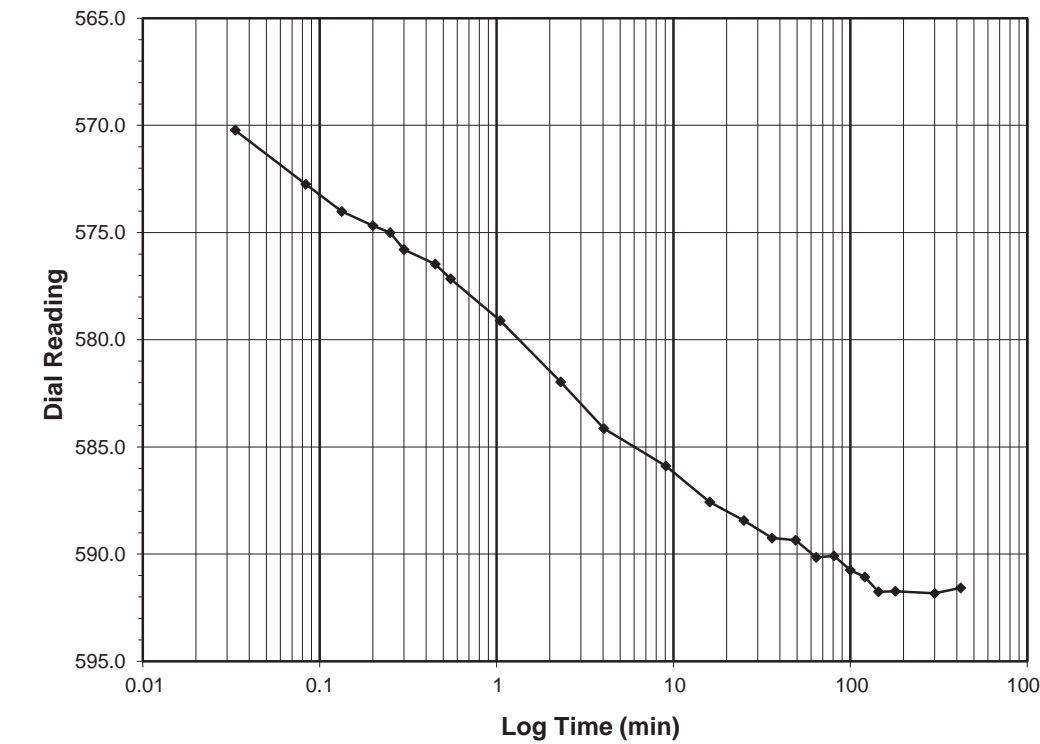
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-2.0  
 Final Reading (div) 591.6  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/23/2019  
 Start Time 5:17:45

Elapsed Time (min)	Dial Reading (div)
Initial	552.7
0.03	570.2
0.08	572.8
0.13	574.0
0.20	574.7
0.25	575.0
0.30	575.8
0.45	576.5
0.55	577.2
1.05	579.1
2.30	582.0
4.05	584.1
9.05	585.9
16.05	587.6
25.05	588.4
36.05	589.2
49.05	589.4
64.05	590.1
81.05	590.1
100.05	590.7
121.05	591.1
144.05	591.8
180.05	591.7
300.05	591.8
420.10	591.6



Tested By 129-08-0411 Date 11/22/2019 Checked By GEM Date 12/2/2019

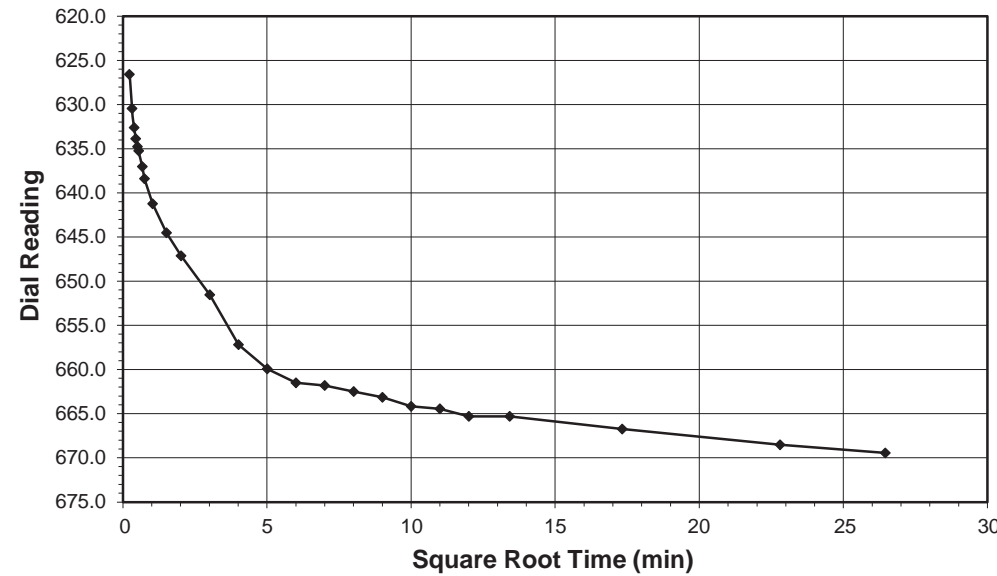
Tested By 129-08-0411 Date 11/23/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

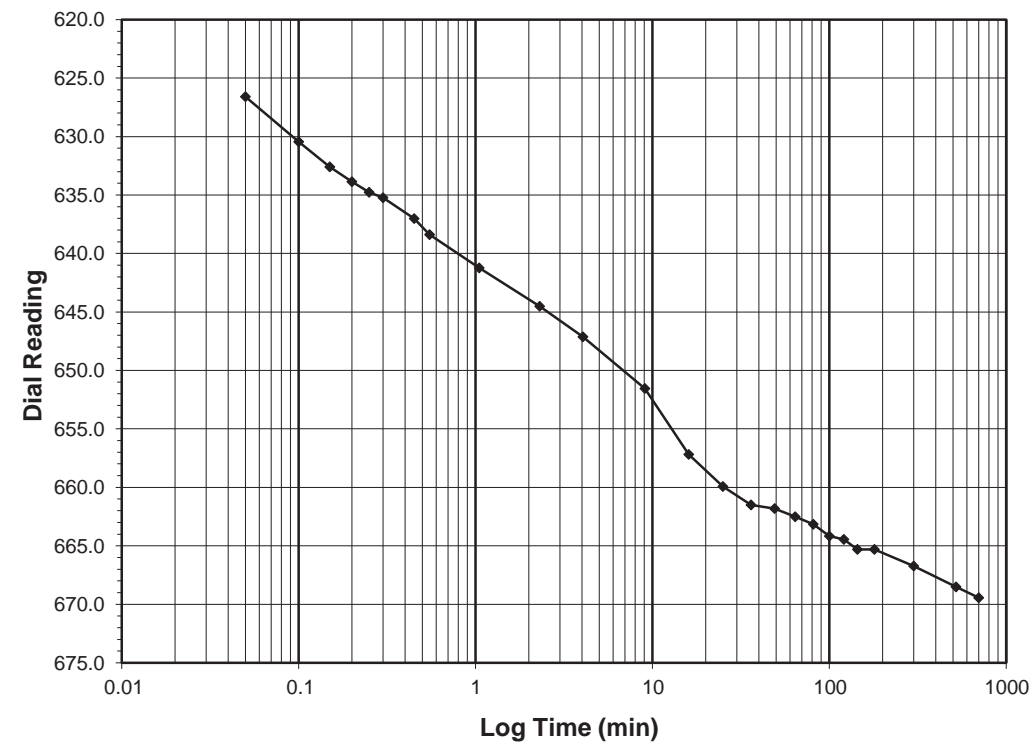
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 2.0-4.0  
 Final Reading (div) 669.4  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/23/2019  
 Start Time 12:17:52

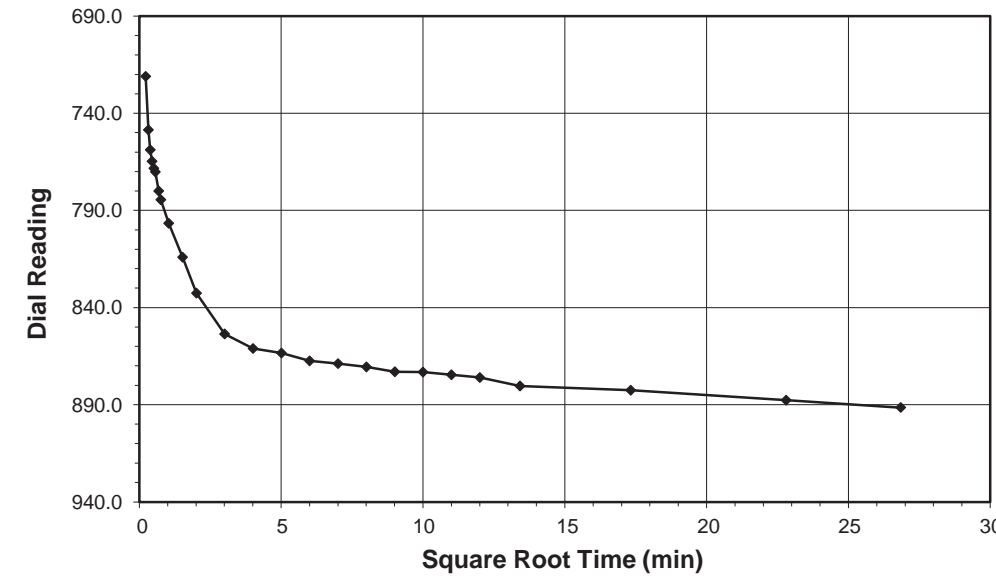
Elapsed Time (min)	Dial Reading (div)
Initial	591.6
0.05	626.6
0.10	630.4
0.15	632.6
0.20	633.9
0.25	634.8
0.30	635.2
0.45	637.0
0.55	638.4
1.05	641.2
2.30	644.5
4.05	647.1
9.05	651.6
16.07	657.2
25.07	659.9
36.07	661.5
49.07	661.8
64.07	662.5
81.07	663.1
100.07	664.2
121.07	664.5
144.07	665.3
180.07	665.3
300.07	666.7
520.07	668.5
700.07	669.4



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

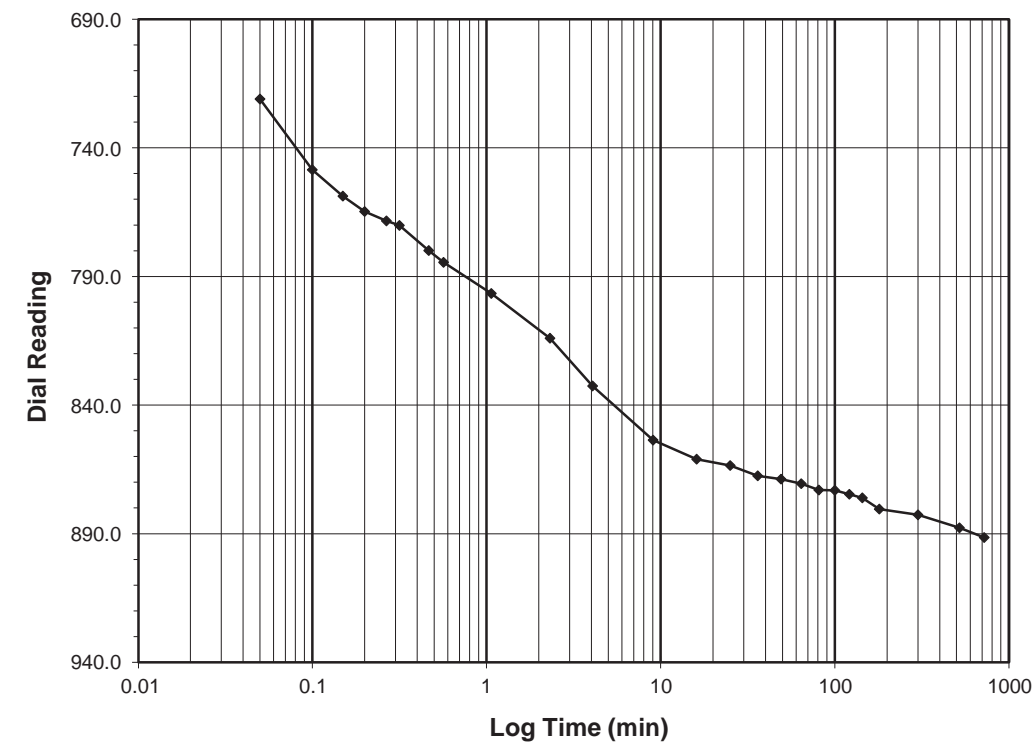
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-8.0  
 Final Reading (div) 891.5  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/24/2019  
 Start Time 0:18:14

Elapsed Time (min)	Dial Reading (div)
Initial	669.4
0.05	721.0
0.10	748.6
0.15	758.8
0.20	764.7
0.27	768.4
0.32	770.1
0.47	779.9
0.57	784.5
1.07	796.6
2.32	814.1
4.07	832.6
9.07	853.6
16.07	861.0
25.07	863.5
36.07	867.5
49.07	868.8
64.07	870.5
81.07	873.0
100.07	873.2
121.07	874.6
144.07	876.1
180.07	880.4
300.07	882.6
520.08	887.7
720.40	891.5



Tested By 129-08-0411 Date 11/23/2019 Checked By GEM Date 12/2/2019

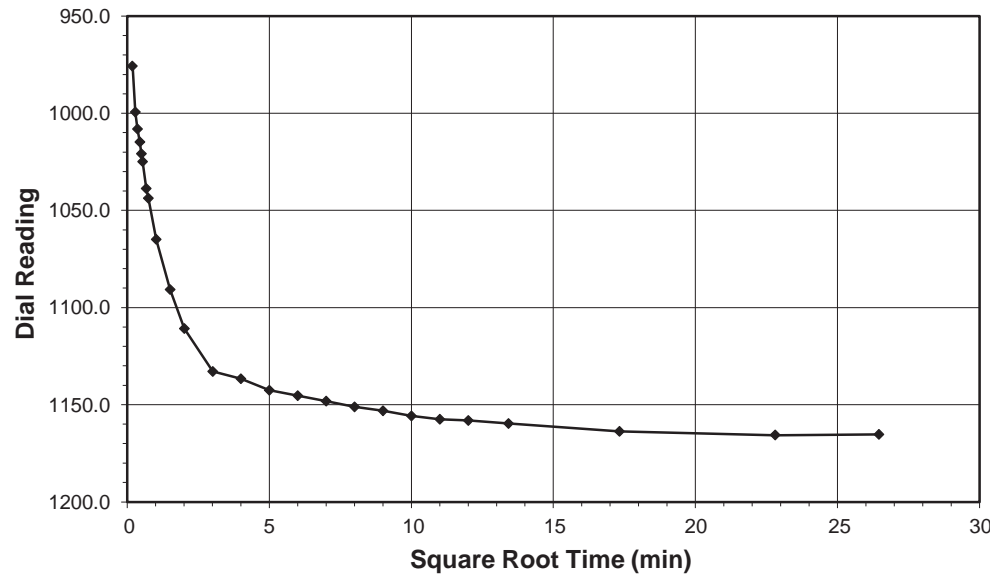
Tested By 129-08-0411 Date 11/24/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

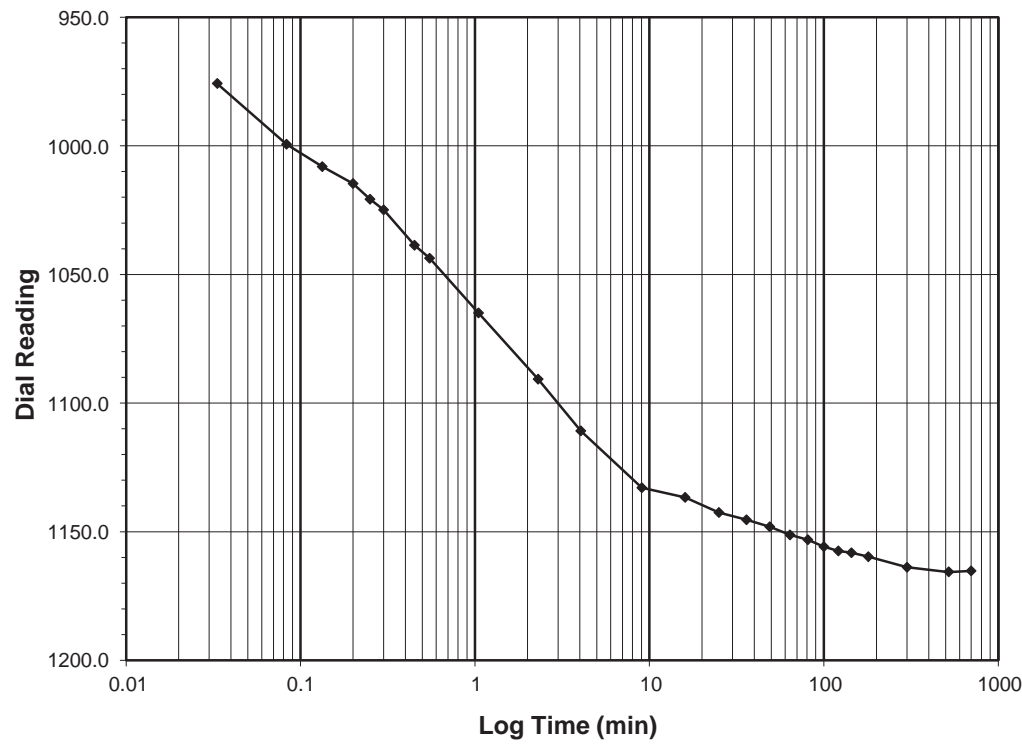
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 8.0-16.0  
 Final Reading (div) 1165.3  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/24/2019  
 Start Time 12:18:38

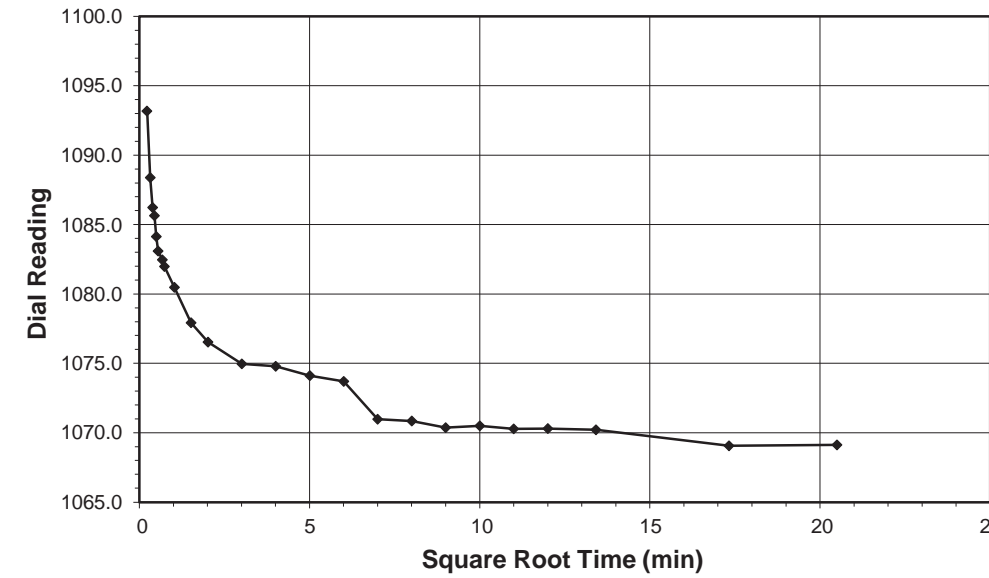
Elapsed Time (min)	Dial Reading (div)
Initial	891.5
0.03	975.8
0.08	999.4
0.13	1008.1
0.20	1014.7
0.25	1020.8
0.30	1024.9
0.45	1038.7
0.55	1043.7
1.05	1064.9
2.30	1090.7
4.05	1110.8
9.05	1132.9
16.05	1136.6
25.05	1142.6
36.05	1145.3
49.05	1148.1
64.05	1151.2
81.05	1153.1
100.05	1155.8
121.05	1157.5
144.05	1158.2
180.05	1159.8
300.05	1163.8
520.05	1165.6
700.05	1165.3



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

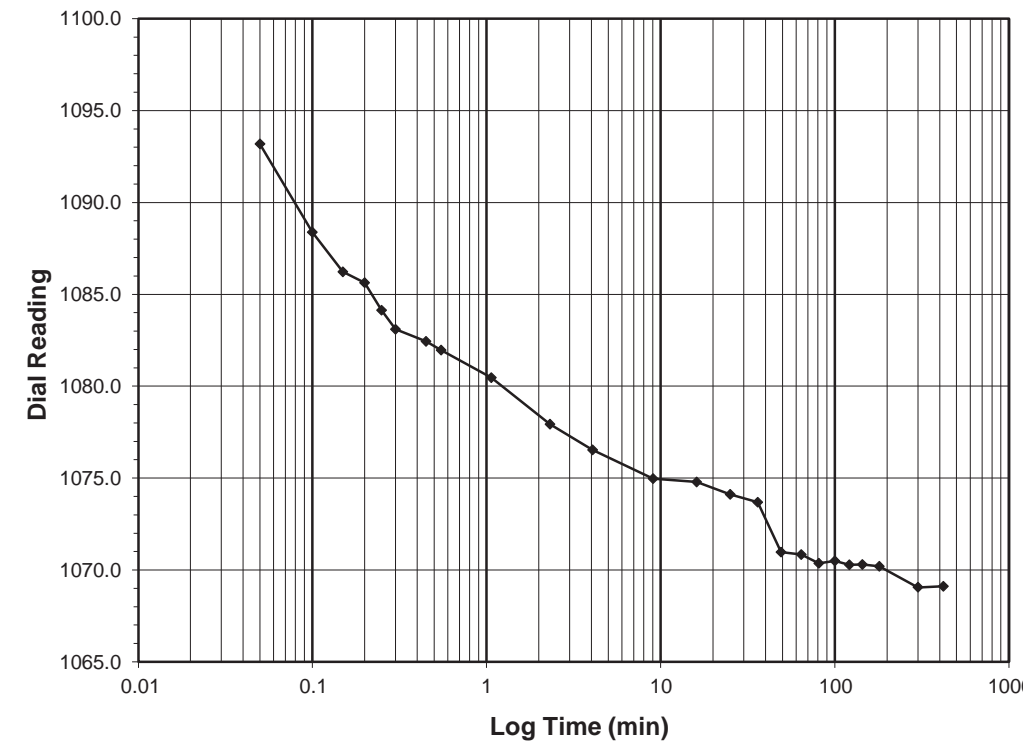
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 16.0-4.0  
 Final Reading (div) 1069.1  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/25/2019  
 Start Time 0:19:03

Elapsed Time (min)	Dial Reading (div)
Initial	1165.3
0.05	1093.2
0.10	1088.4
0.15	1086.2
0.20	1085.6
0.25	1084.1
0.30	1083.1
0.45	1082.4
0.55	1082.0
1.07	1080.5
2.32	1077.9
4.07	1076.5
9.07	1075.0
16.07	1074.8
25.07	1074.1
36.07	1073.7
49.07	1071.0
64.07	1070.8
81.07	1070.4
100.07	1070.5
121.07	1070.3
144.07	1070.3
180.07	1070.2
300.07	1069.1
420.15	1069.1



Tested By 129-08-0411 Date 11/24/2019 Checked By GEM Date 12/2/2019

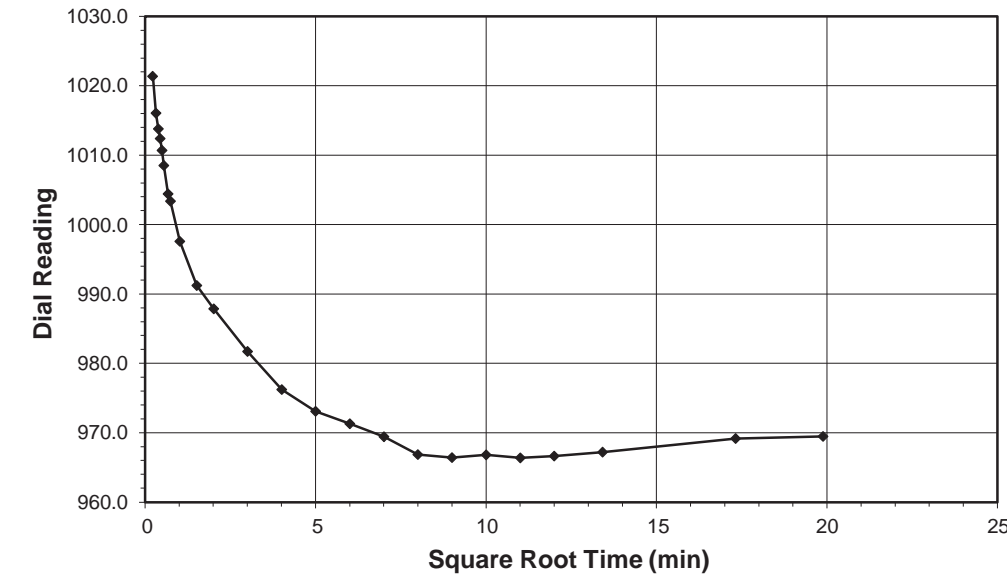
Tested By 129-08-0411 Date 11/25/2019 Checked By GEM Date 12/2/2019



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

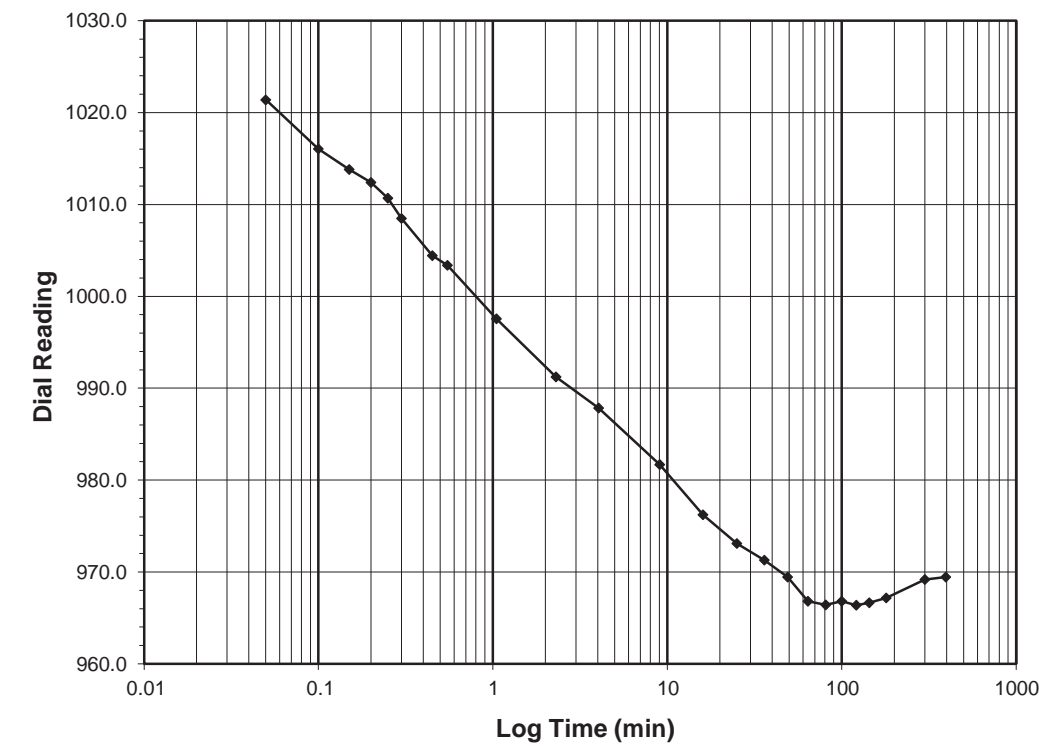
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 4.0-1.0  
 Final Reading (div) 969.5  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/25/2019  
 Start Time 7:19:12

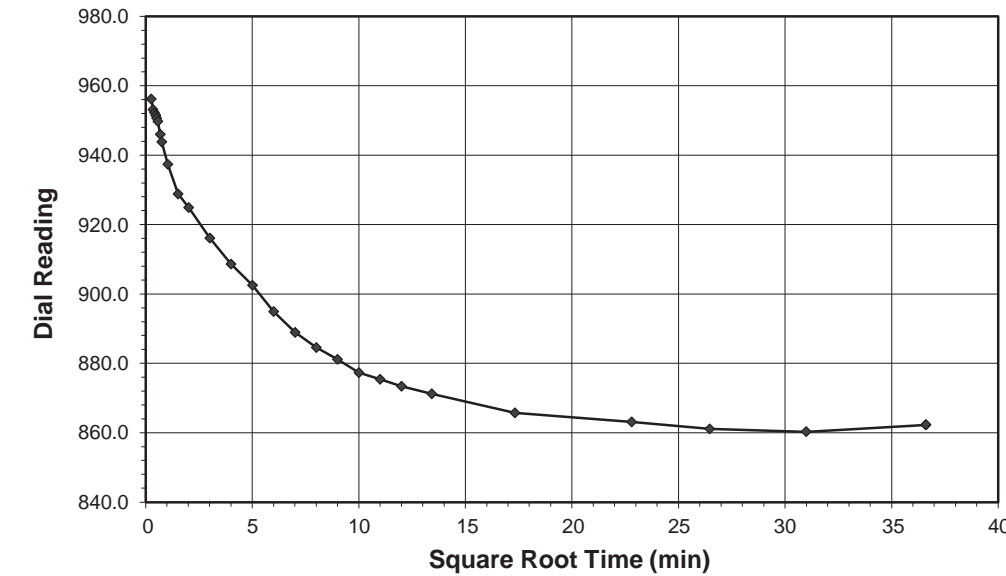
Elapsed Time (min)	Dial Reading (div)
Initial	1069.1
0.05	1021.4
0.10	1016.0
0.15	1013.8
0.20	1012.4
0.25	1010.7
0.30	1008.5
0.45	1004.4
0.55	1003.4
1.05	997.6
2.30	991.2
4.05	987.9
9.05	981.7
16.05	976.2
25.05	973.1
36.05	971.3
49.05	969.4
64.07	966.8
81.07	966.4
100.07	966.8
121.07	966.4
144.07	966.6
180.07	967.2
300.07	969.2
395.33	969.5



**ONE DIMENSIONAL CONSOLIDATION**  
AASHTO T-216

Client ESP Associates, Inc. Boring No. L\_1995  
 Client Project B-5981 Depth (ft) 6.0-8.0  
 Project No. R-2019-327-001 Sample No. ST-1  
 Lab ID R-2019-327-001-001 Visual Description Gray Sandy Clay

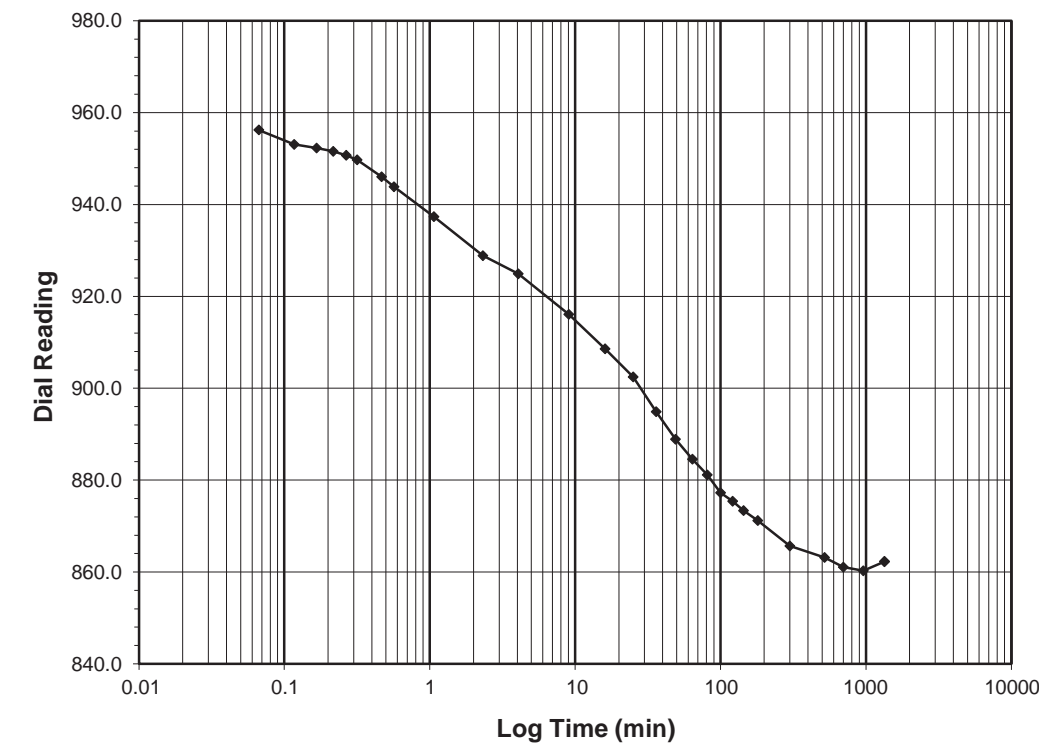
Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load (tsf) 1.0-0.25  
 Final Reading (div) 862.3  
 Consolidometer No. R409  
 1 Division (in) 0.0001

Start Date 11/25/2019  
 Start Time 13:54:33

Elapsed Time (min)	Dial Reading (div)
Initial	969.5
0.07	956.2
0.12	953.1
0.17	952.3
0.22	951.5
0.27	950.7
0.32	949.7
0.47	946.0
0.57	943.8
1.07	937.3
2.32	928.8
4.07	924.9
9.07	916.1
16.07	908.6
25.07	902.5
36.07	894.9
49.07	888.9
64.07	884.6
81.07	881.2
100.07	877.3
121.07	875.4
144.07	873.4
180.08	871.2
300.08	865.7
520.08	863.1
700.08	861.1
960.08	860.3
1340.50	862.2
1340.63	862.3



Tested By 129-08-0411 Date 11/25/2019 Checked By GEM Date 12/2/2019

Tested By 129-08-0411 Date 11/25/2019 Checked By GEM Date 12/2/2019