

REFERENCE: U-5738

PROJECT: 50163

SEE SHEET 3 FOR PLAN SHEET LAYOUT  
AT TIME OF INVESTIGATION

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5738	1	27

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**CROSS SECTIONS**

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# ROADWAY SUBSURFACE INVESTIGATION

COUNTY ROWAN  
PROJECT DESCRIPTION SR 2528 (JULIAN ROAD) FROM  
SR 2667 (SUMMIT PARK DRIVE) TO US 601 (JAKE  
ALEXANDER BLVD.) IN SALISBURY  
**INVENTORY**

**CAUTION NOTICE**

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

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

PERSONNEL

J.K. CRENSHAW

C. TAYLOR

O.F. WOODARD

INVESTIGATED BY J.K. CRENSHAW

DRAWN BY C. JONES

CHECKED BY M.G. BATTEN

SUBMITTED BY M.G. BATTEN

DATE AUGUST 2019



8/20/2019

SIGNATURE DATE

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

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

# SUBSURFACE INVESTIGATION

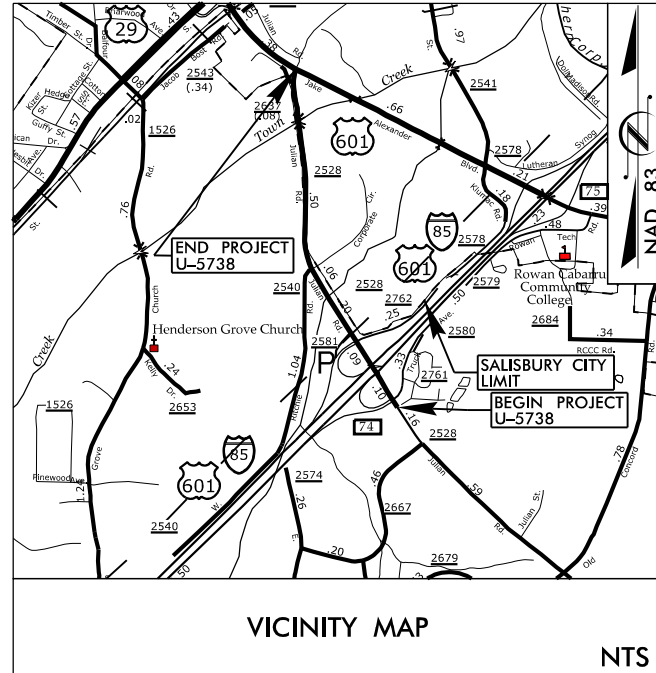
## SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										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 REPLACED 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 (SCRC) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
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.										CRYSTALLINE ROCK (CR)										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.									
MINERALOGICAL COMPOSITION										MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										NON-CRYSTALLINE ROCK (NCR)										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.									
COMPRESSIONIBILITY										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.									
PERCENTAGE OF MATERIAL										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										WEATHERING										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.									
GROUND WATER										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										VERY SLIGHT (V SL.)										ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN. CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.									
MISCELLANEOUS SYMBOLS										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										SLIGHT (SLI.)										ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.									
CONSISTENCY OR DENSENESS										PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT <sup>2</sup> )										MODERATE (MOD.)										SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.									
TEXTURE OR GRAIN SIZE										U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										SEVERE (SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL									
SOIL MOISTURE - CORRELATION OF TERMS										SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										VERY SEVERE (V 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									
PLASTICITY										PLASTICITY INDEX (PI) DRY STRENGTH										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.									
COLOR										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.										ROCK HARDNESS										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.									
EQUIPMENT USED ON SUBJECT PROJECT										DRILL UNITS: CME-45C, CME-55, CME-550, VANE SHEAR TEST, PORTABLE HOIST										HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.																			
RECOMMENDATION SYMBOLS										UNDERCUT, UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE, UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										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.																			
ABBREVIATIONS										AR - AUGER REFUSAL, BT - BORING TERMINATED, CL - CLAY, CPT - CONE PENETRATION TEST, CSE - COARSE, DMT - DILATOMETER TEST, DPT - DYNAMIC PENETRATION TEST, e - VOID RATIO, 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, VST - VANE SHEAR TEST, WEAL - WEATHERED, UNIT WEIGHT, DRY UNIT WEIGHT, SAMPLE ABBREVIATIONS: S - BULK, SS - SPLIT SPOON, ST - SHELBY TUBE, RS - ROCK, RT - RECOMPACTED TRIAXIAL, CBR - CALIFORNIA BEARING RATIO										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 PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.																			
FRACTURE SPACING										TERM SPACING: VERY WIDE MORE THAN 10 FEET, WIDE 3 TO 10 FEET, MODERATELY CLOSE 1 TO 3 FEET, CLOSE 0.16 TO 1 FOOT, VERY CLOSE LESS THAN 0.16 FEET										BEDDING THICKNESS: VERY THICKLY BEDDED 4 FEET, THICKLY BEDDED 1.5 - 4 FEET, THINLY BEDDED 0.16 - 1.5 FEET, VERY THINLY BEDDED 0.03 - 0.16 FEET, THINLY LAMINATED 0.008 - 0.03 FEET, THINLY LAMINATED < 0.008 FEET																			
INDURATION										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.																			
BENCH MARK: SEE NOTE BELOW										ELEVATION: N/A FEET										INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																			
NOTES:										FIAD - FILLED IMMEDIATELY AFTER DRILLING										EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																			
BORING AND GROUND SURFACE ELEVATIONS ACQUIRED FROM 'U5738.DDC.tin' RECEIVED ON 1/20/2018																																							

09/08/19

TIP PROJECT: U-5738

See Sheet 1A for Index of Sheets  
See Sheet 1B For Conventional Symbols  
See Sheet 1C-1 for Survey Control Sheet



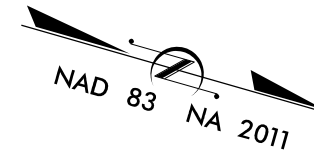
VICINITY MAP

NTS

# STATE OF NORTH CAROLINA DIVISION OF HIGHWAYS ROWAN COUNTY

**LOCATION: SR 2528 (JULIAN ROAD) FROM  
SR 2667 (SUMMIT PARK DRIVE) TO  
US 601 (JAKE ALEXANDER BOULEVARD)  
IN SALISBURY**

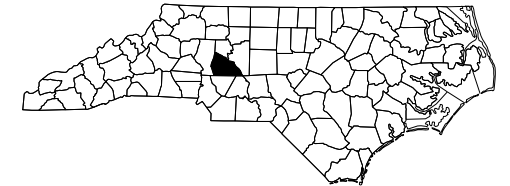
**TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND  
STRUCTURES**



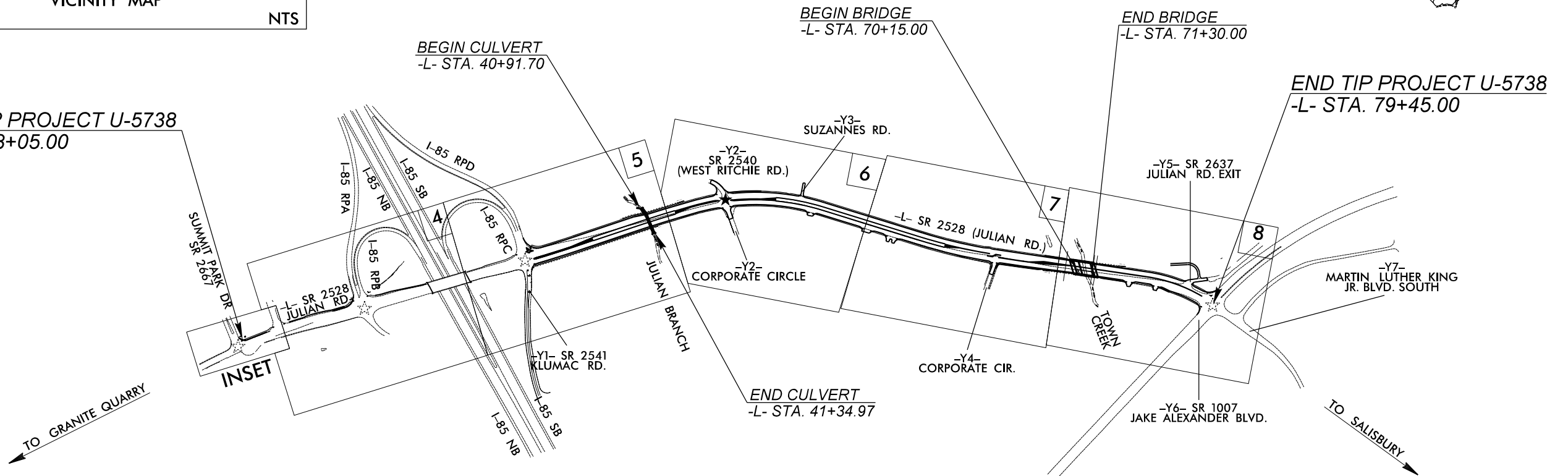
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5738	3	27
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50163.1.1		P.E.	
50163.2.1		RW/UTILS	
50163.3.1		CONST	

65% Roadway Plans  
Submitted: December 6, 2017

- ☆ EXISTING TRAFFIC SIGNAL
- ★ PROPOSED TRAFFIC SIGNAL



**BEGIN TIP PROJECT U-5738**  
-L- STA. 13+05.00



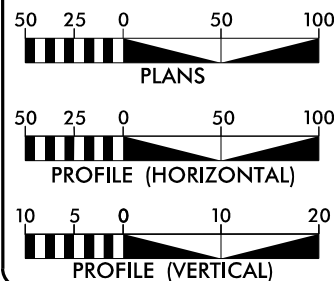
THIS PROJECT IS PARTIALLY WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF SALISBURY, NC  
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

PREPARED FOR  
DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
DIVISION NINE  
PLANS COORDINATED BY:  
Brett Abernathy, PE, PLS - Division Project Development Engineer

DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:

### GRAPHIC SCALES



### DESIGN DATA

ADT 2020 = 24,000  
ADT 2040 = 26,800  
K = 9 %  
D = 60 %  
T = 8 % \*  
V = 50 MPH  
\*(TTST=2% DUAL=6%)  
FUNC CLASS = LOCAL  
STATEWIDE TIER

### PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT U-5738 = 1.236 Miles  
LENGTH OF STRUCTURES TIP PROJECT U-5738 = 0.022 Miles  
TOTAL LENGTH TIP PROJECT U-5738 = 1.258 Miles

Prepared in the Office of:

**SEPI**  
ENGINEERING & CONSTRUCTION  
1025 Wade Avenue  
Raleigh, NC 27605  
Tel: 919-785-9977  
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License: C-2197

2018 STANDARD SPECIFICATIONS

**RIGHT OF WAY DATE:**  
FEBRUARY 16, 2018

**LETTING DATE:**  
FEBRUARY 18, 2020

**BEN CRAWFORD, PE**  
PROJECT ENGINEER

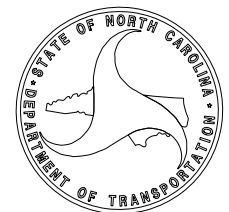
**ROBBIE KIRK, PE**  
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

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

**ROADWAY DESIGN  
ENGINEER**

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



\$\$\$\$\$SYTIME\$\$\$\$\$  
\$\$\$\$\$DON\$\$\$\$\$  
\$\$\$\$\$USERNAME\$\$\$\$\$

August 30, 2019

**STATE PROJECT: 50163.1.1**

**TIP NUMBER: U-5738**

**COUNTY: Rowan**

**DESCRIPTION: SR 2528 (Julian Road) from SR 2667 (Summit Park Drive) to US 601 (Jake Alexander Boulevard) in Salisbury**

**SUBJECT: Geotechnical Roadway Inventory report**

**PROJECT DESCRIPTION**

The U-5738 project is designed to improve traffic flow and ease congestion in the City of Salisbury, NC. The project consists of widening and realigning a portion of SR 2528, from south of SR 2667 to US 601. Part of this project includes the replacement of Bridge No. 201 over Town Creek. A structure subsurface inventory and recommendations report was provided addressing the bridge specifically.

The field investigation was conducted in March of 2018 using a track mounted CME 55 with an automatic hammer. Standard Penetration Tests (SPT) were performed at selected locations. Borings were advanced with hollow stem augers, selected bridge borings were cored. Representative soil and rock samples were collected and forwarded to an approved NCDOT M&T testing facility for soil quality analysis, moisture content, and AASHTO classification.

**The following alignments were investigated**

Line	Station			Length (ft)
-L-	13+09	to	79+19	6,604
-Y2-	10+80	to	13+70	370
-Y3-	10+50	to	11+84	184
-Y4-	10+00	to	11+25	125
-Y5-	10+65	To	12+38	238
			Total =	7,521 (~1.42 miles)

**PHYSIOGRAPHY AND GEOLOGY**

**Physiography and Geology**

The project is located in the Piedmont Physiographic Province. Geologically, it is located in the Carolina Slate Belt. Soils in this area generally consist of residual sands, silts, and clays which can be saprolitic. Intermittently outcropping, but typically underlying the residual soils are metamorphosed felsic and mafic tuffs and flowrock. Topography along the project corridor is gently rolling, existing suburban development covers the majority of the project area with the exception of the lowland areas in the vicinity of Town Creek. Natural ground elevations range from 787± feet above sea level near the beginning of the project to 720± feet above sea level at the bottom of Town Creek.

**Soil Properties**

Soil and rock encountered along the project corridor are divided into five categories based on origin and the severity of weathering: roadway embankment soils, alluvial soils, residual soils, weathered rock, and crystalline rock.

Residual soils consisting of medium dense to dense, coarse to fine sand and clayey to silty sand (A-1-b, A-2-4, A-2-6), soft to hard silt (A-4, A-5), and soft to hard, sandy and silty clay (A-6, A-7-5, A-7-6) were encountered throughout the area. These soils range in moisture from dry to moist, and vary in thickness from less than one foot to at least 42 feet. Within the cohesive residual soils, moisture contents ranged from 11.0% to 42.7%.

Weathered rock consisting of gray metavolcanic tuffs and flows was encountered at several locations along the corridor. Weathered rock layers vary in thickness from less than one foot to at least 13 feet.

Crystalline rock was identified at some points along the corridor by split spoon and auger refusal, however no coring has been done at the time this report was written. The fragments that were recovered in the split-spoon were of gray metavolcanic rocks.

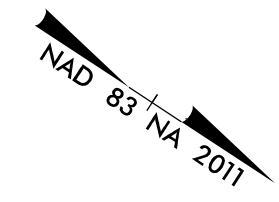
**Ground Water**

All SPT borings were left open for at least 24 hours to allow ground water levels within the borehole to equilibrate with the surrounding hydrologic conditions. Ground water data were collected in March of 2018, during a time of normal precipitation. Ground water elevations generally varied with topography, and ranged in elevation from 726± feet to 710± feet above sea level.

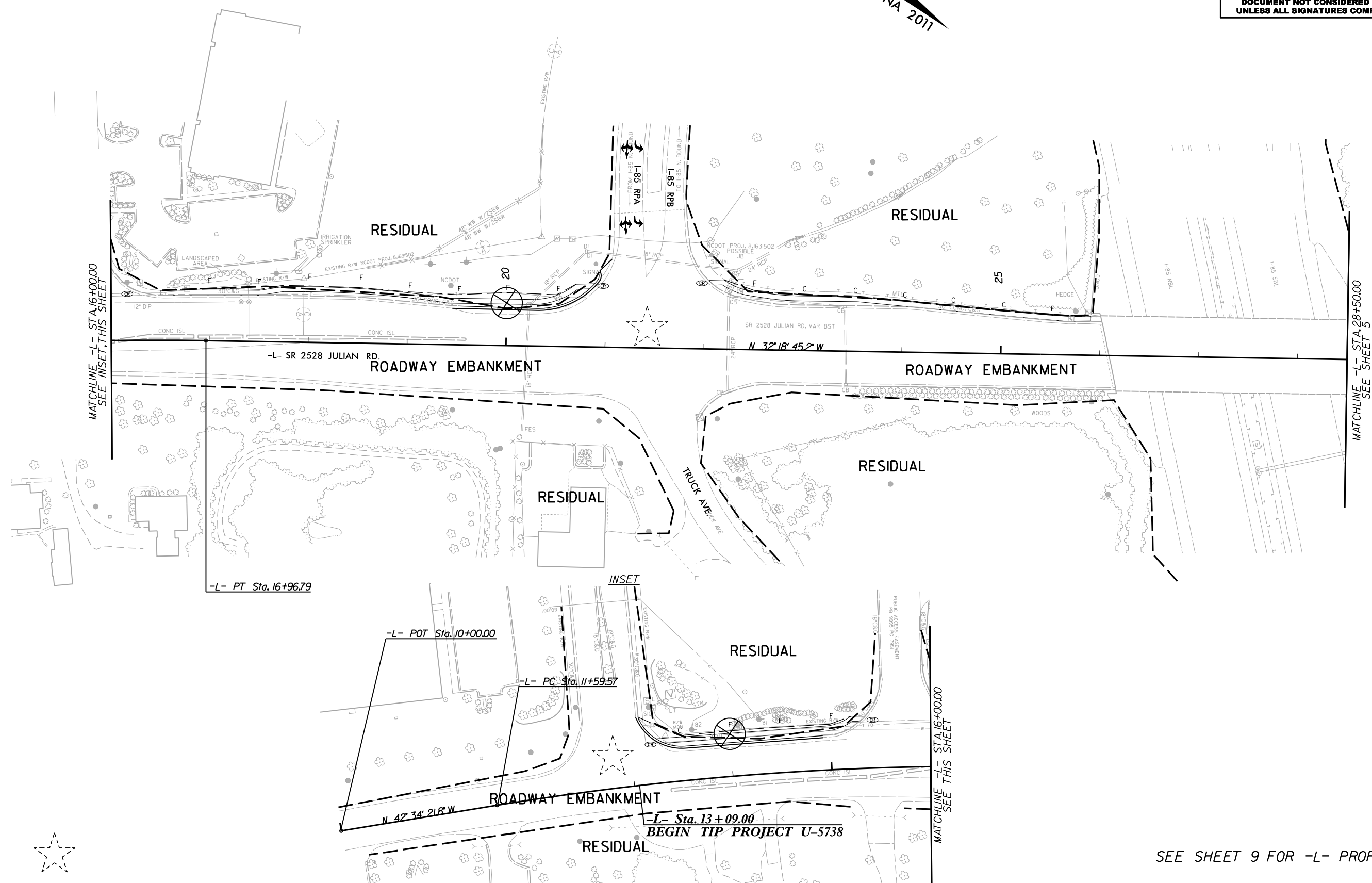
Prepared by,

**HDR**

PROJECT REFERENCE NO. <i>U-5738</i>	SHEET NO. <b>4</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



REVISIONS



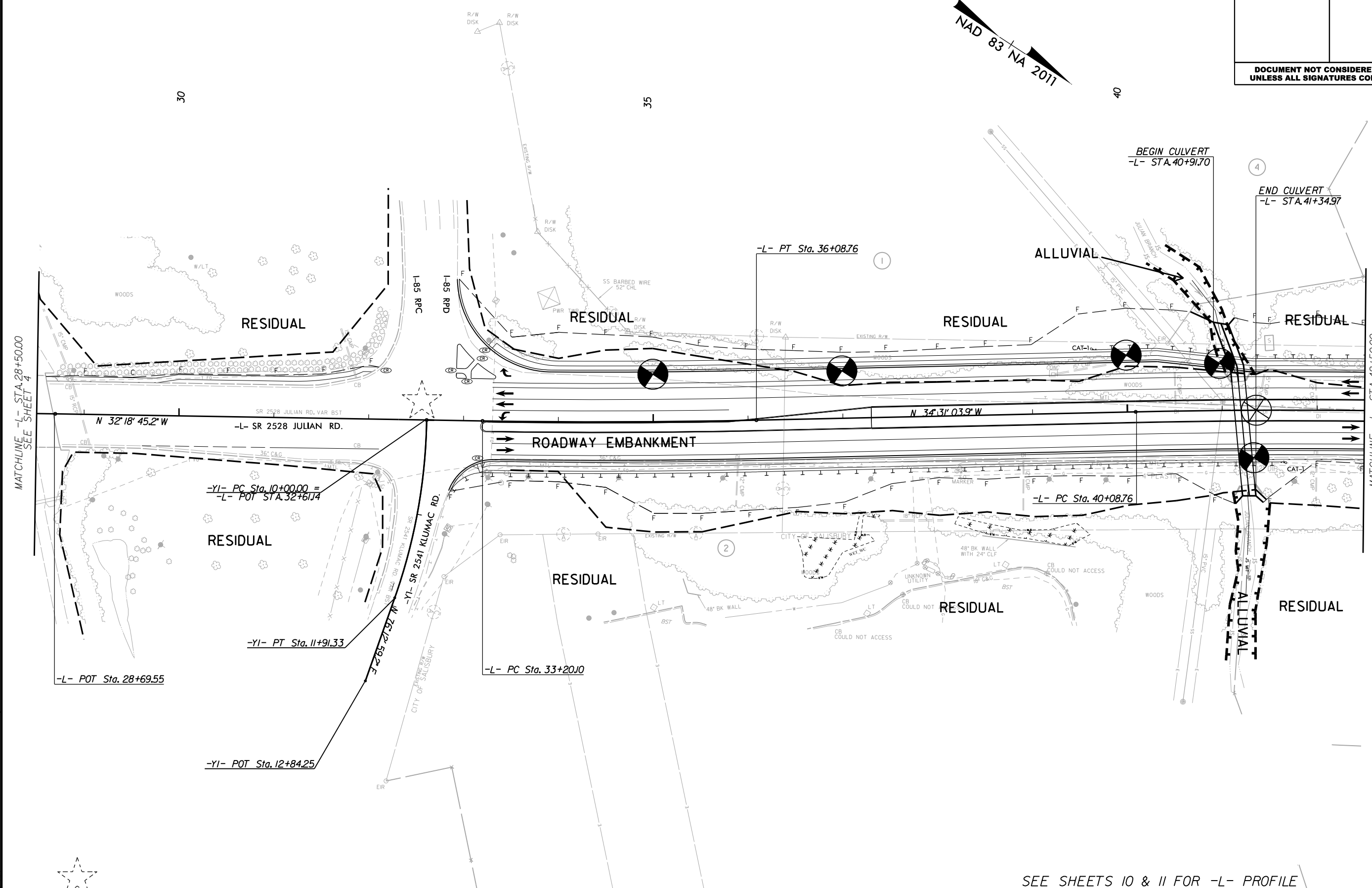
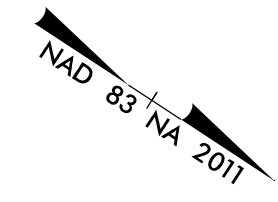
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SEE SHEET 9 FOR -L- PROFILE

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RW SHEET NO.	
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REVISIONS

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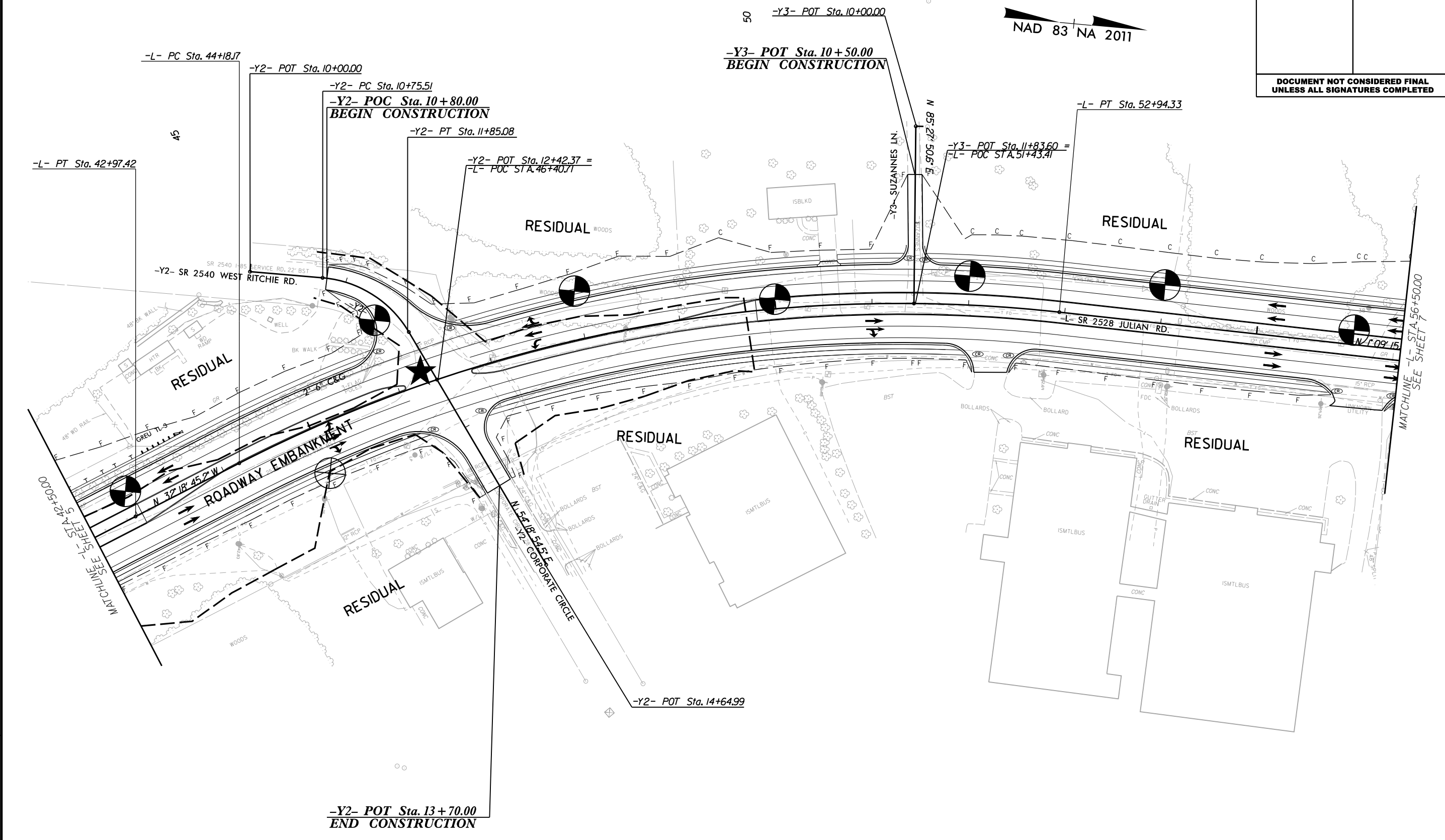
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SEE SHEET 6

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SEE SHEETS 10 & 11 FOR -L- PROFILE

PROJECT REFERENCE NO. <i>U-5738</i>	SHEET NO. <b>6</b>
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



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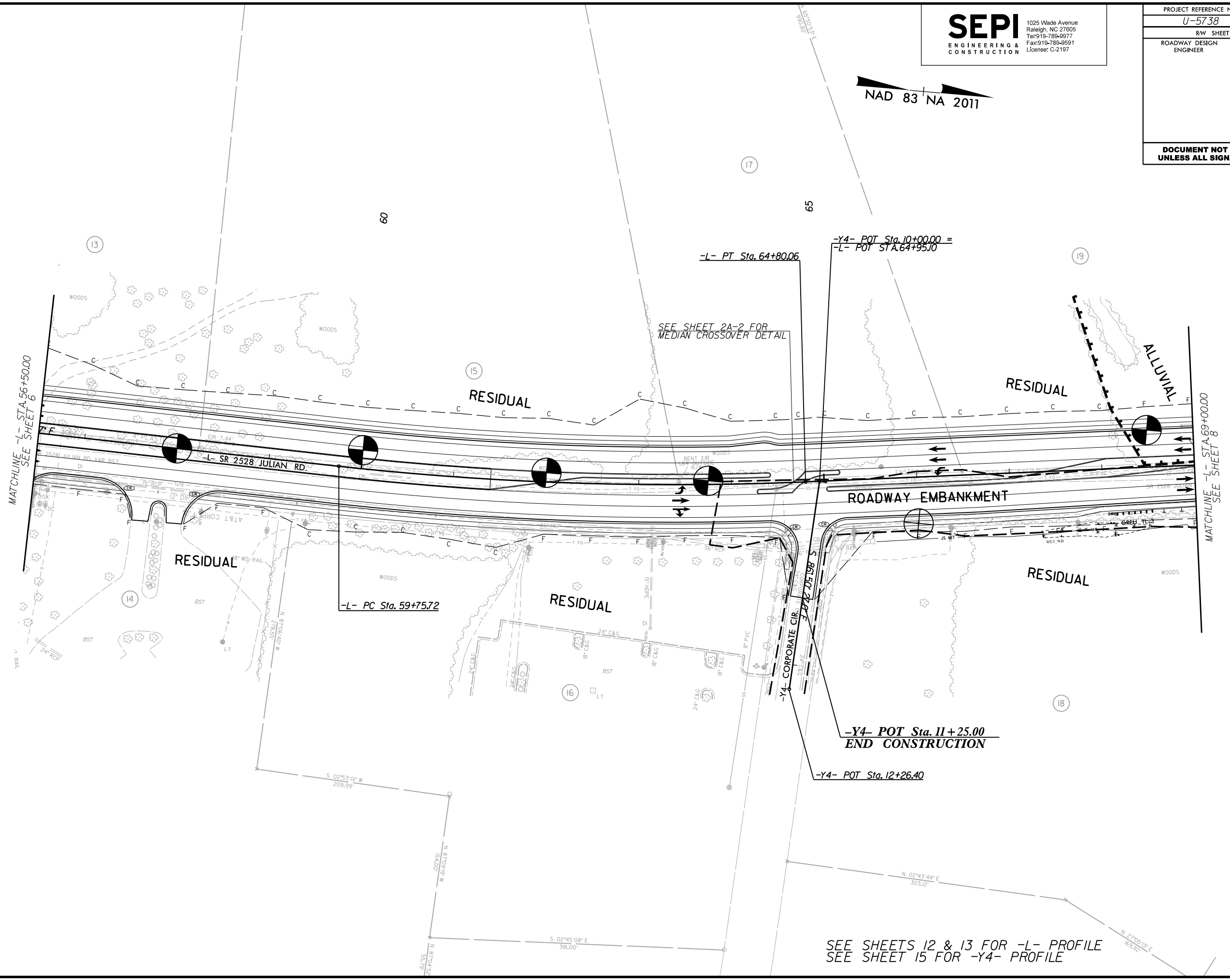


SEE SHEETS 11 & 12 FOR -L- PROFILE  
 SEE SHEET 14 FOR -Y2- PROFILE  
 SEE SHEET 14 FOR -Y3- PROFILE

**SEPI**  
 ENGINEERING &  
 CONSTRUCTION

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PROJECT REFERENCE NO.	SHEET NO.
U-5738	7
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



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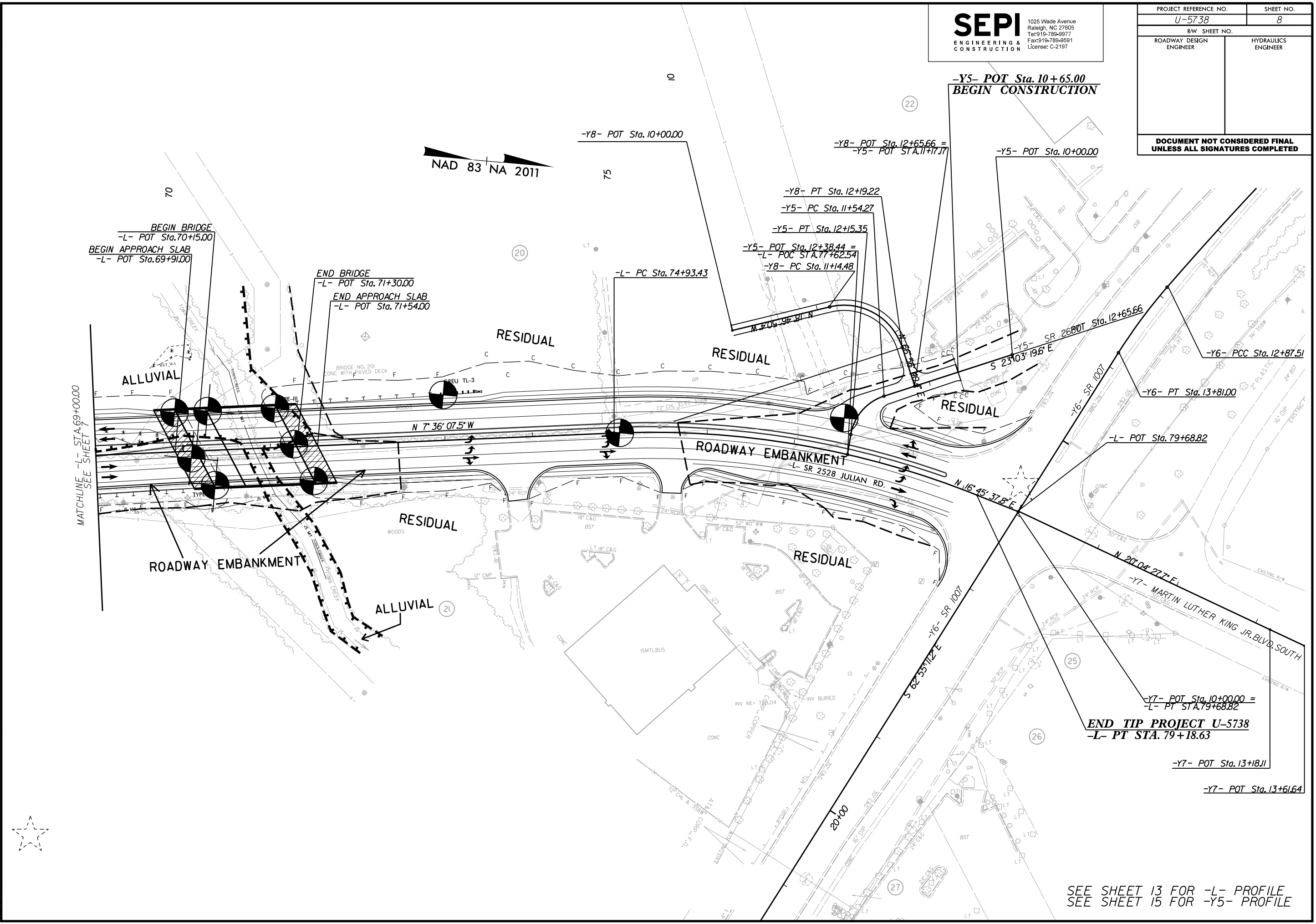
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SEE SHEETS 12 & 13 FOR -L- PROFILE  
 SEE SHEET 15 FOR -Y4- PROFILE



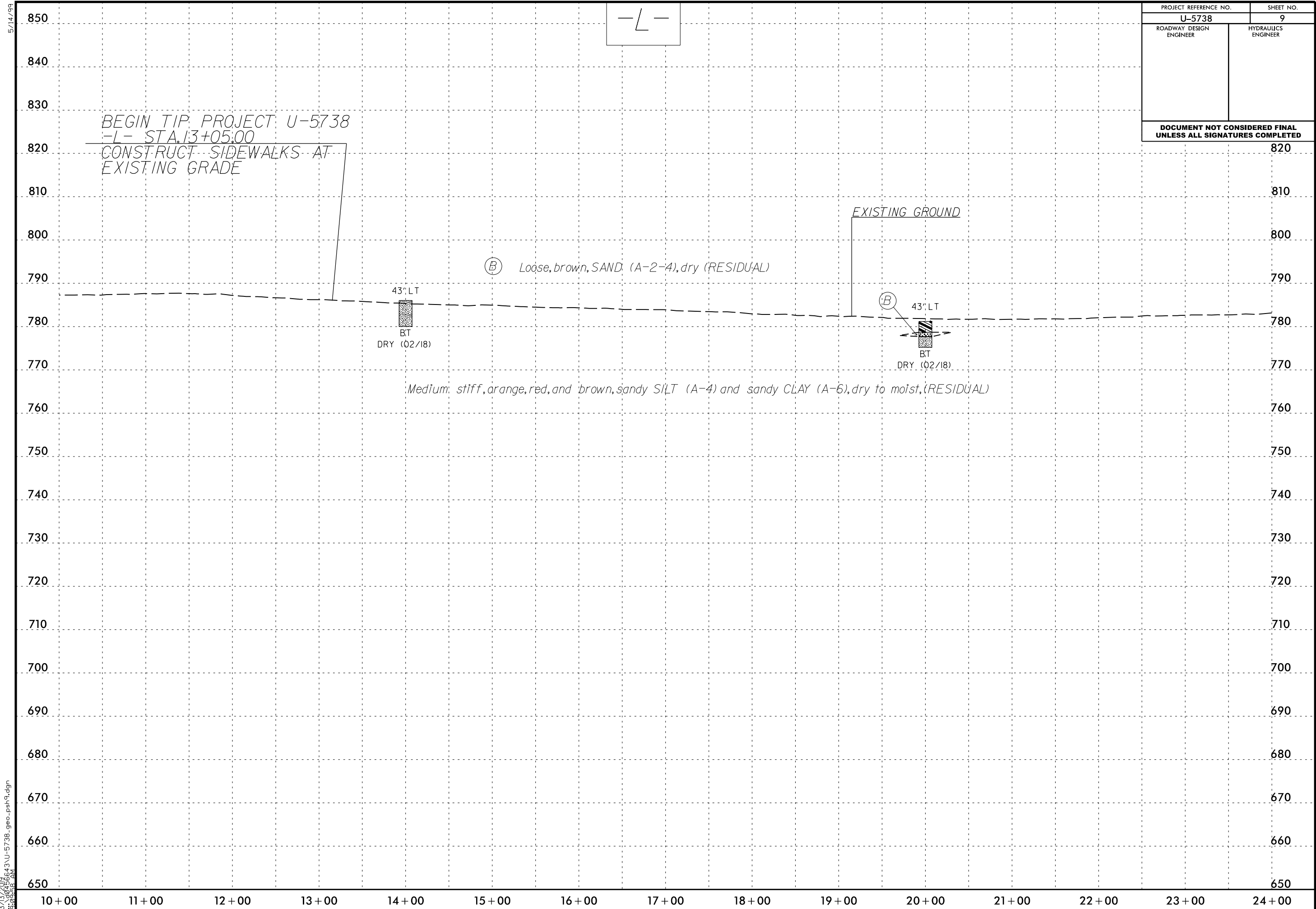
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U-5738	8
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SEE SHEET 13 FOR -L- PROFILE  
 SEE SHEET 15 FOR -Y5- PROFILE

PROJECT REFERENCE NO.	SHEET NO.
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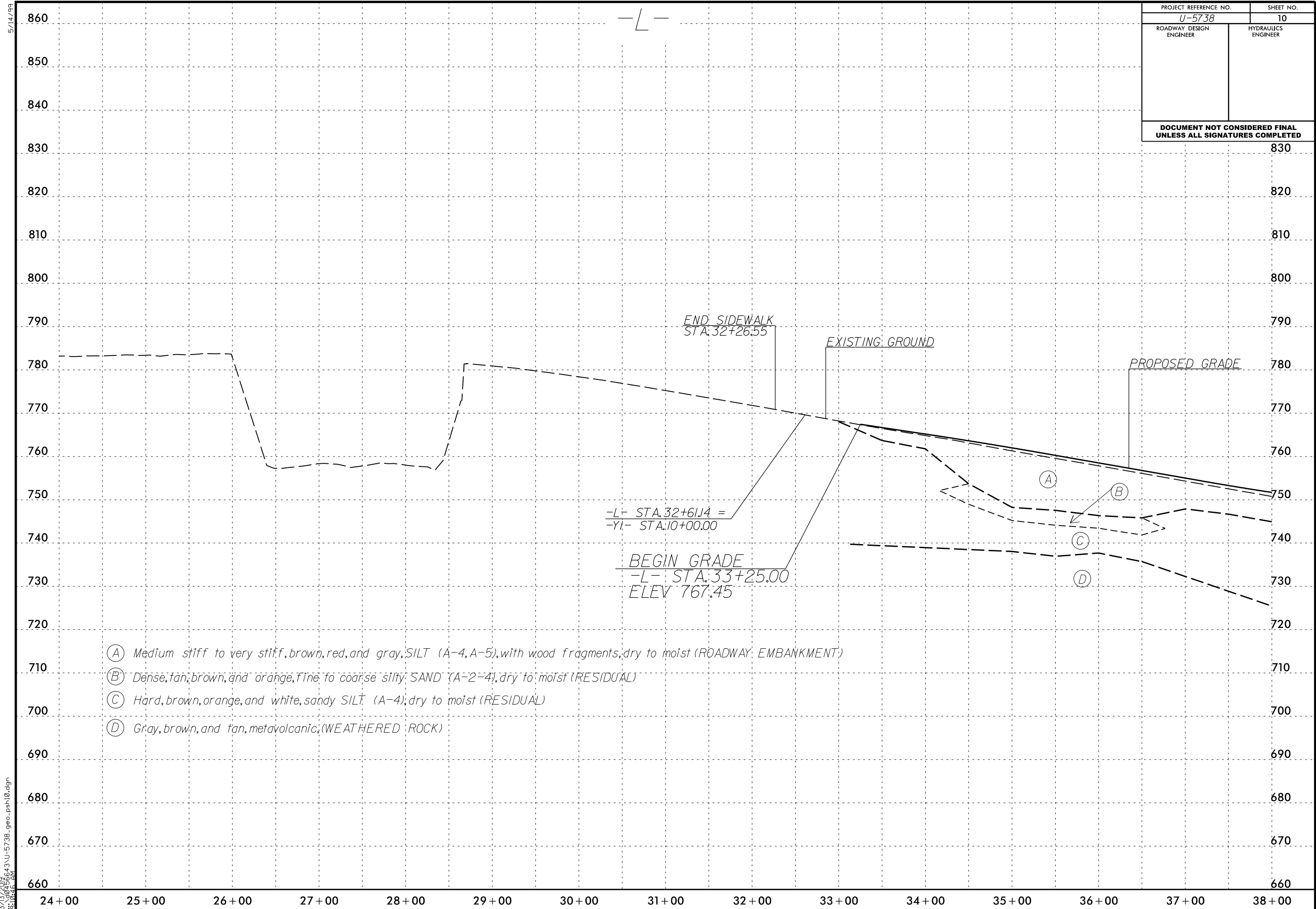


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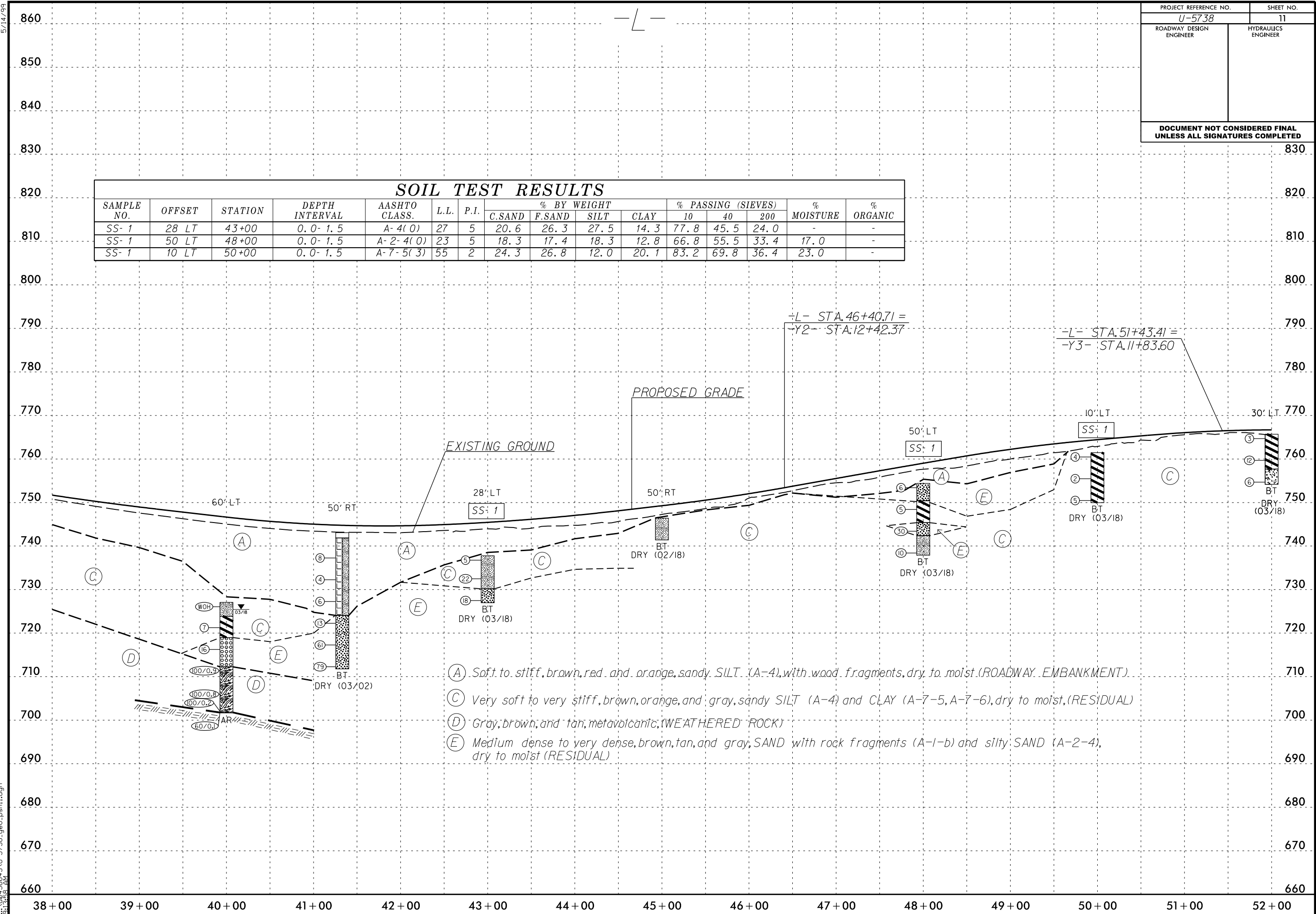
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SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
							SS- 1	28 LT	43+00	0.0- 1.5	A- 4(0)	27	5		
SS- 1	50 LT	48+00	0.0- 1.5	A- 2- 4(0)	23	5	18.3	17.4	18.3	12.8	66.8	55.5	33.4	17.0	-
SS- 1	10 LT	50+00	0.0- 1.5	A- 7- 5(3)	55	2	24.3	26.8	12.0	20.1	83.2	69.8	36.4	23.0	-



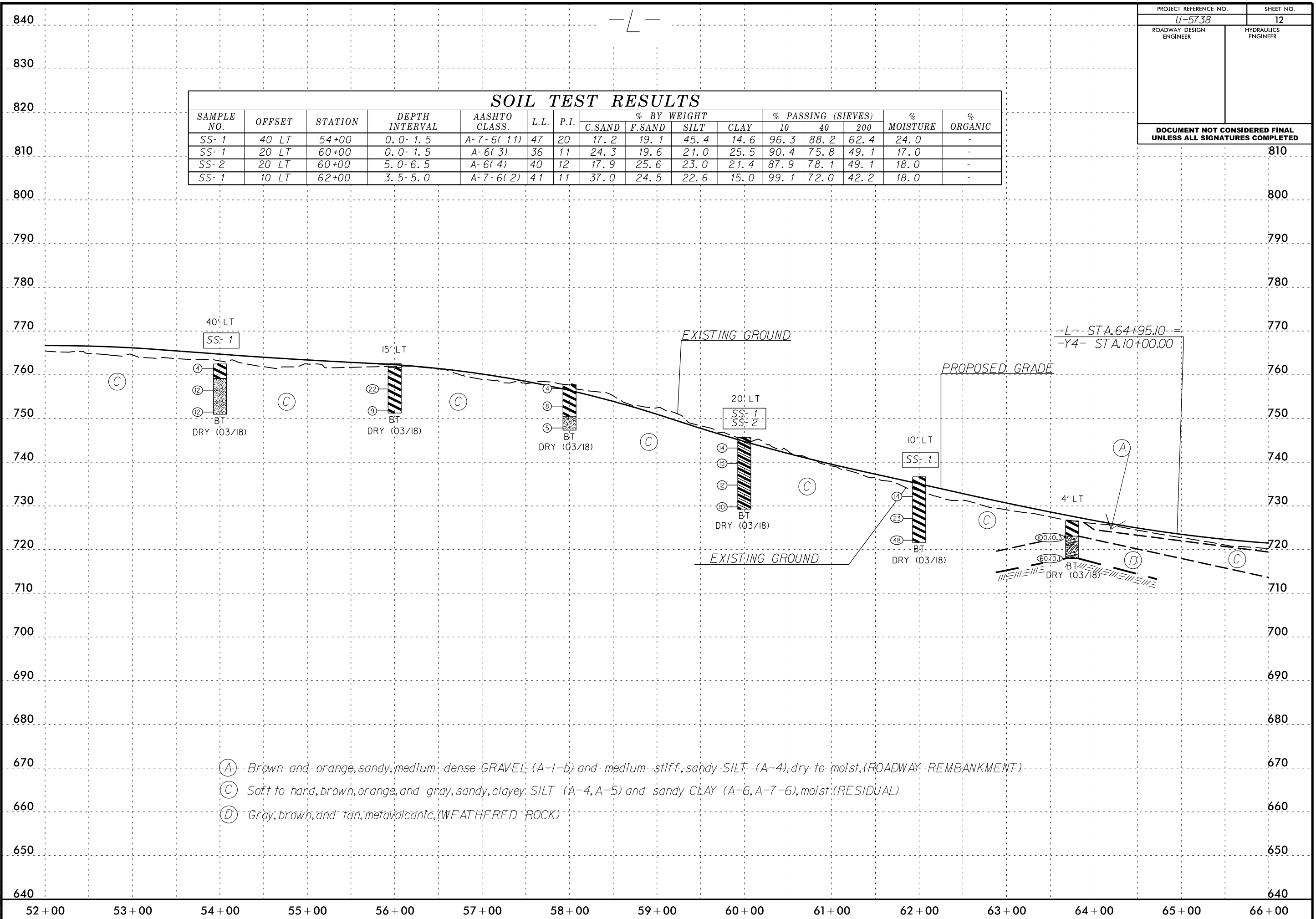
- (A) Soft to stiff, brown, red, and orange, sandy SILT (A-4), with wood fragments, dry to moist (ROADWAY EMBANKMENT)
- (C) Very soft to very stiff, brown, orange, and gray, sandy SILT (A-4) and CLAY (A-7-5, A-7-6), dry to moist, (RESIDUAL)
- (D) Gray, brown, and tan, metavolcanic, (WEATHERED ROCK)
- (E) Medium dense to very dense, brown, tan, and gray, SAND with rock fragments (A-1-b) and silty SAND (A-2-4), dry to moist (RESIDUAL)

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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	40 LT	54+00	0.0-1.5	A-7-6(11)	47	20	17.2	19.1	45.4	14.6	96.3	88.2	62.4	24.0	-
SS-1	20 LT	60+00	0.0-1.5	A-6(3)	36	11	24.3	19.6	21.0	25.5	90.4	75.8	49.1	17.0	-
SS-2	20 LT	60+00	5.0-6.5	A-6(4)	40	12	17.9	25.6	23.0	21.4	87.9	78.1	49.1	18.0	-
SS-1	10 LT	62+00	3.5-5.0	A-7-6(2)	41	11	37.0	24.5	22.6	15.0	99.1	72.0	42.2	18.0	-

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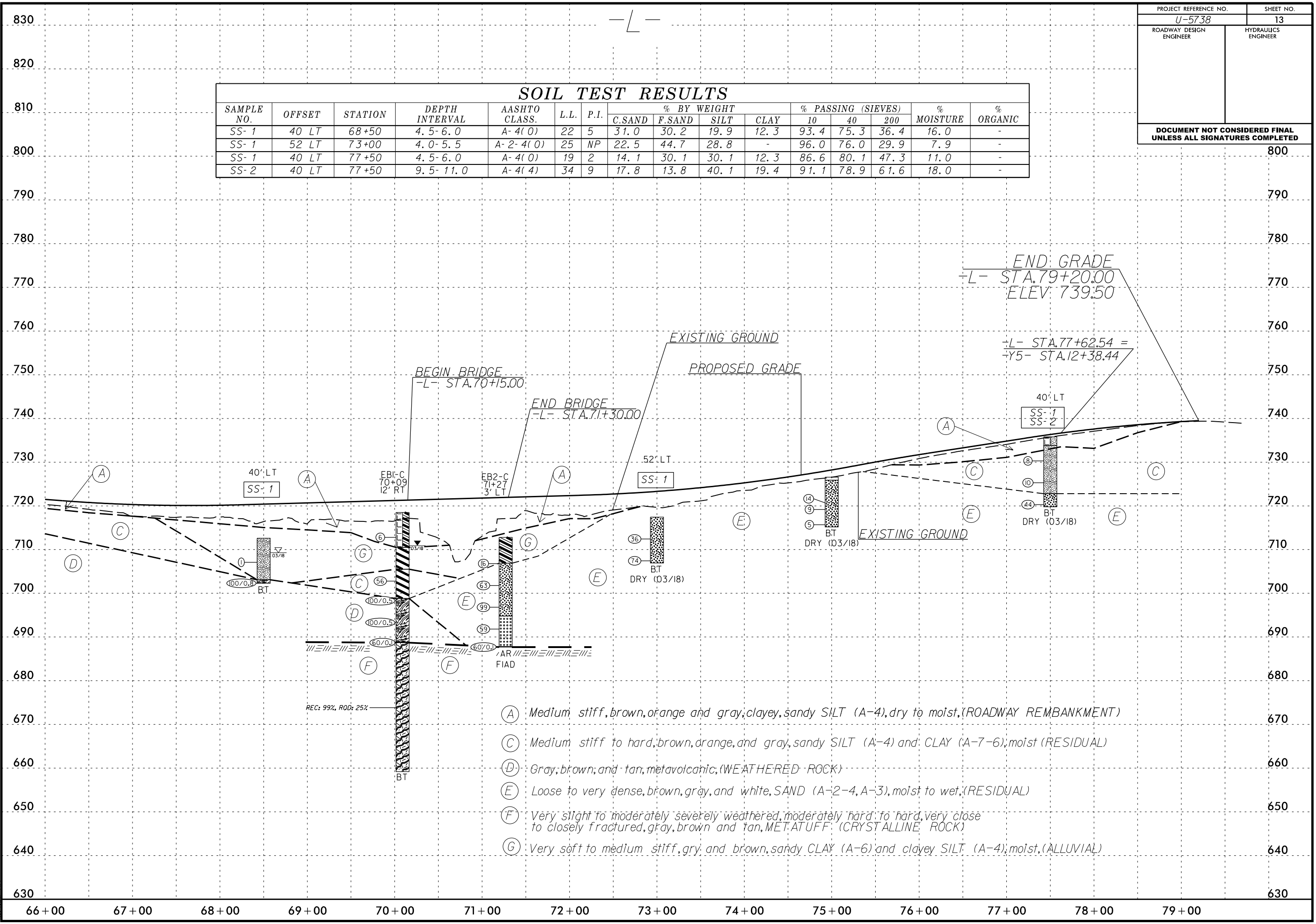


- (A) Brown and orange, sandy, medium dense GRAVEL (A-1-b) and medium stiff, sandy SILT (A-4), dry to moist, (ROADWAY REMBANKMENT)
- (C) Soft to hard, brown, orange, and gray, sandy, clayey SILT (A-4, A-5) and sandy CLAY (A-6, A-7-6), moist (RESIDUAL)
- (D) Gray, brown, and tan, meta-volcanic, (WEATHERED ROCK)

### 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	40 LT	68+50	4.5-6.0	A-4(0)	22	5	31.0	30.2	19.9	12.3	93.4	75.3	36.4	16.0	-
SS-1	52 LT	73+00	4.0-5.5	A-2-4(0)	25	NP	22.5	44.7	28.8	-	96.0	76.0	29.9	7.9	-
SS-1	40 LT	77+50	4.5-6.0	A-4(0)	19	2	14.1	30.1	30.1	12.3	86.6	80.1	47.3	11.0	-
SS-2	40 LT	77+50	9.5-11.0	A-4(4)	34	9	17.8	13.8	40.1	19.4	91.1	78.9	61.6	18.0	-

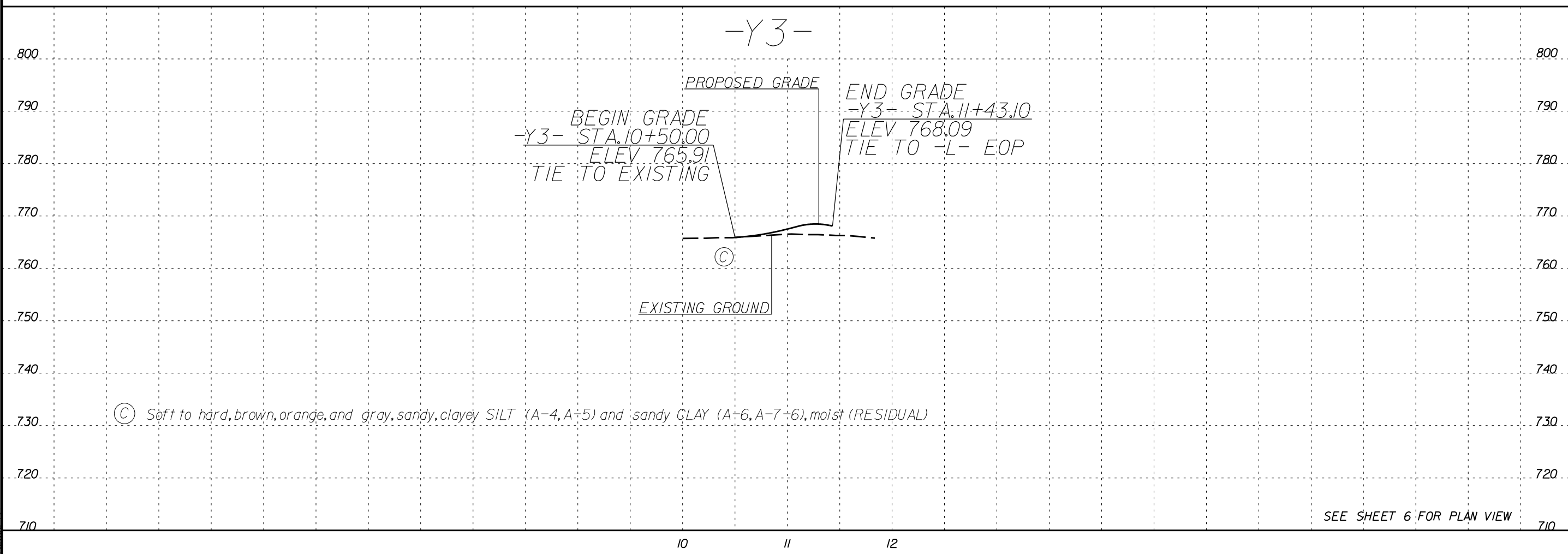
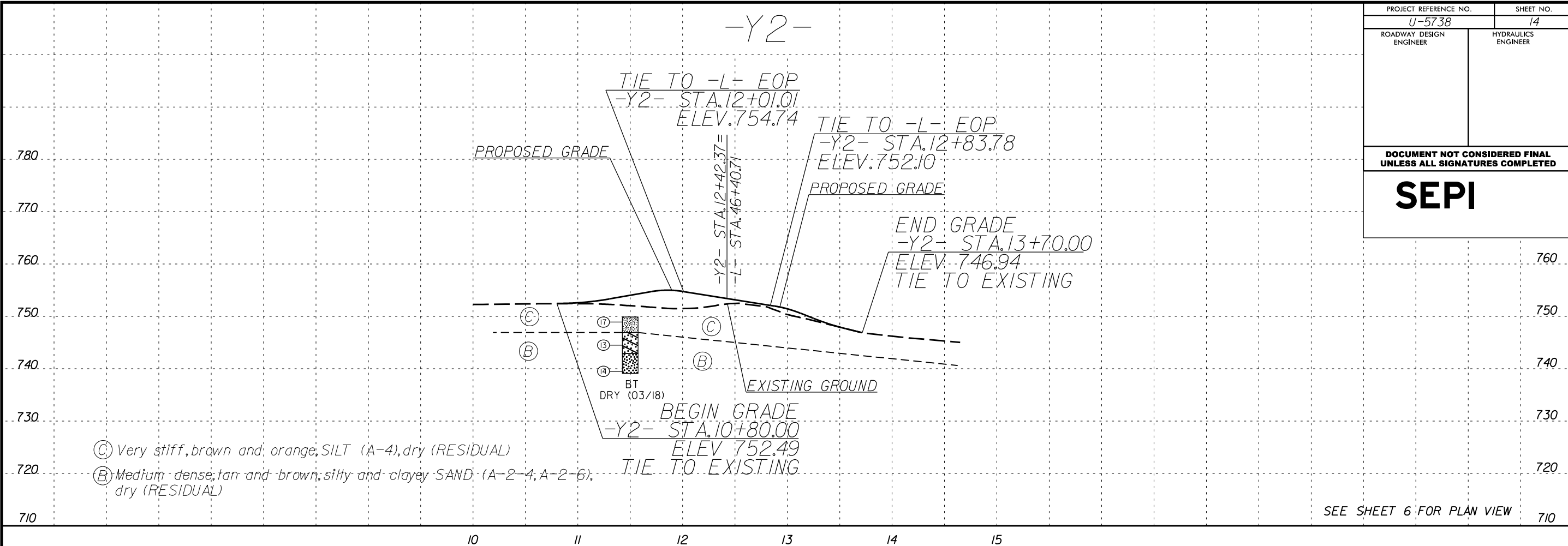
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- (A) Medium stiff, brown, orange and gray, clayey, sandy SILT (A-4), dry to moist, (ROADWAY REMBANKMENT)
- (C) Medium stiff to hard, brown, orange, and gray, sandy SILT (A-4) and CLAY (A-7-6); moist (RESIDUAL)
- (D) Gray, brown, and tan, metavolcanic, (WEATHERED ROCK)
- (E) Loose to very dense, brown, gray, and white, SAND (A-2-4, A-3), moist to wet, (RESIDUAL)
- (F) Very slight to moderately severely weathered, moderately hard to hard, very close to closely fractured, gray, brown and tan, METATUFF (CRYSTALLINE ROCK)
- (G) Very soft to medium stiff, gray and brown, sandy CLAY (A-6) and clayey SILT (A-4); moist, (ALLUVIAL)

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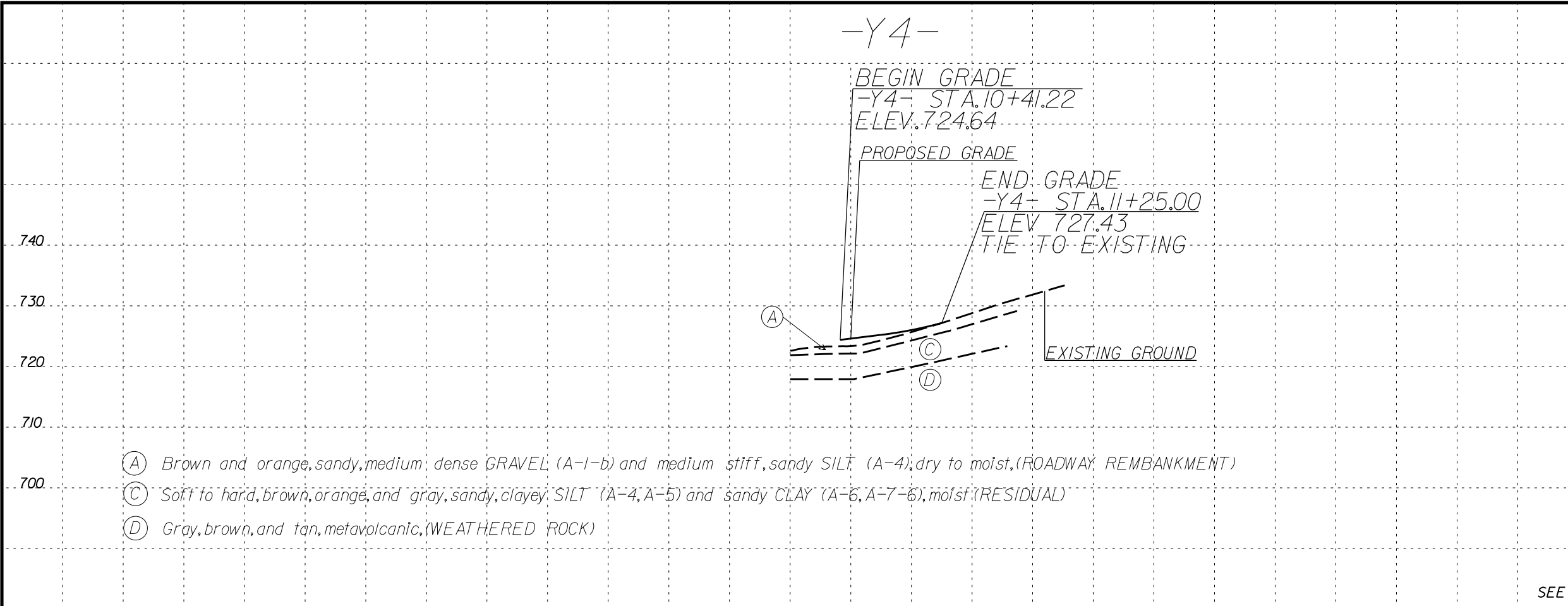
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	
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PROJECT REFERENCE NO. U-5738	SHEET NO. 15
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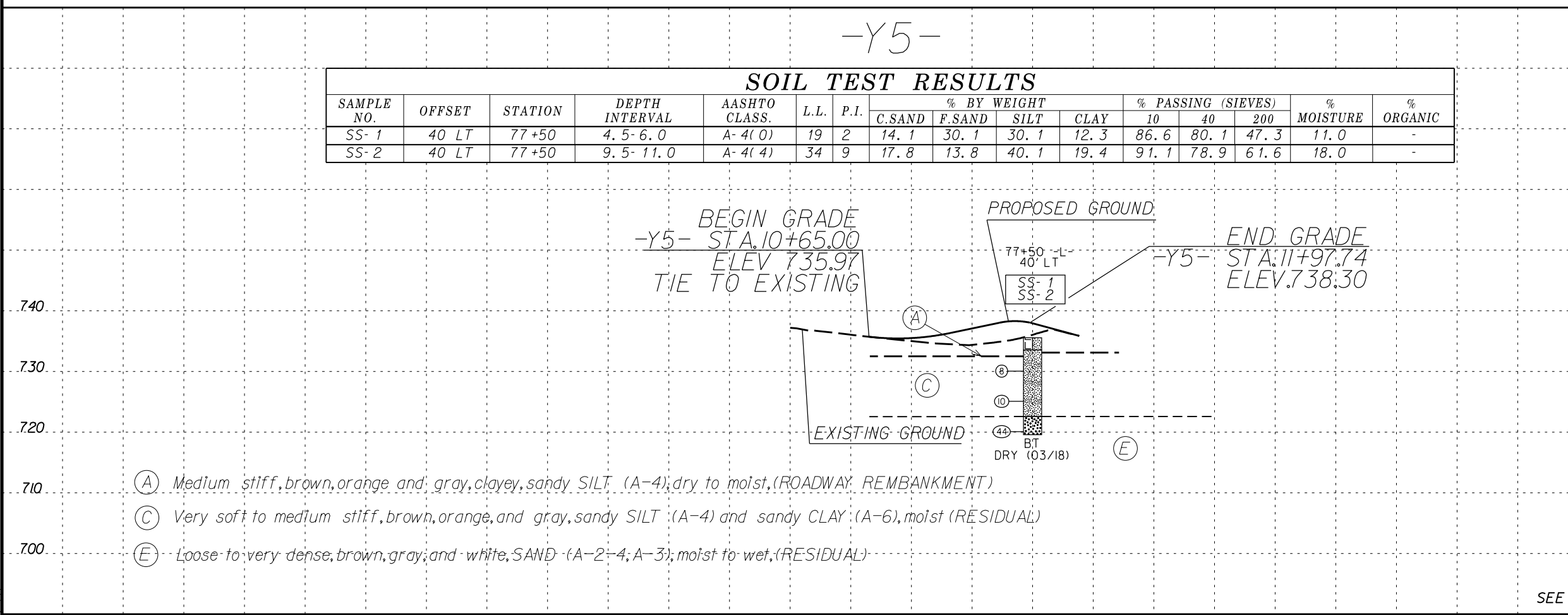
- (A) Brown and orange, sandy, medium dense GRAVEL (A-1-b) and medium stiff, sandy SILT (A-4), dry to moist, (ROADWAY REMBANKMENT)
- (C) Soft to hard, brown, orange, and gray, sandy, clayey SILT (A-4, A-5) and sandy CLAY (A-6, A-7-6), moist (RESIDUAL)
- (D) Gray, brown, and tan, metavolcanic, (WEATHERED ROCK)

SEE SHEET 7 FOR PLAN VIEW

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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	40 LT	77+50	4.5-6.0	A-4(0)	19	2	14.1	30.1	30.1	12.3	86.6	80.1	47.3	11.0	-
SS-2	40 LT	77+50	9.5-11.0	A-4(4)	34	9	17.8	13.8	40.1	19.4	91.1	78.9	61.6	18.0	-



- (A) Medium stiff, brown, orange and gray, clayey, sandy SILT (A-4), dry to moist, (ROADWAY REMBANKMENT)
- (C) Very soft to medium stiff, brown, orange, and gray, sandy SILT (A-4) and sandy CLAY (A-6), moist (RESIDUAL)
- (E) Loose to very dense, brown, gray, and white, SAND (A-2-4, A-3), moist to wet, (RESIDUAL)

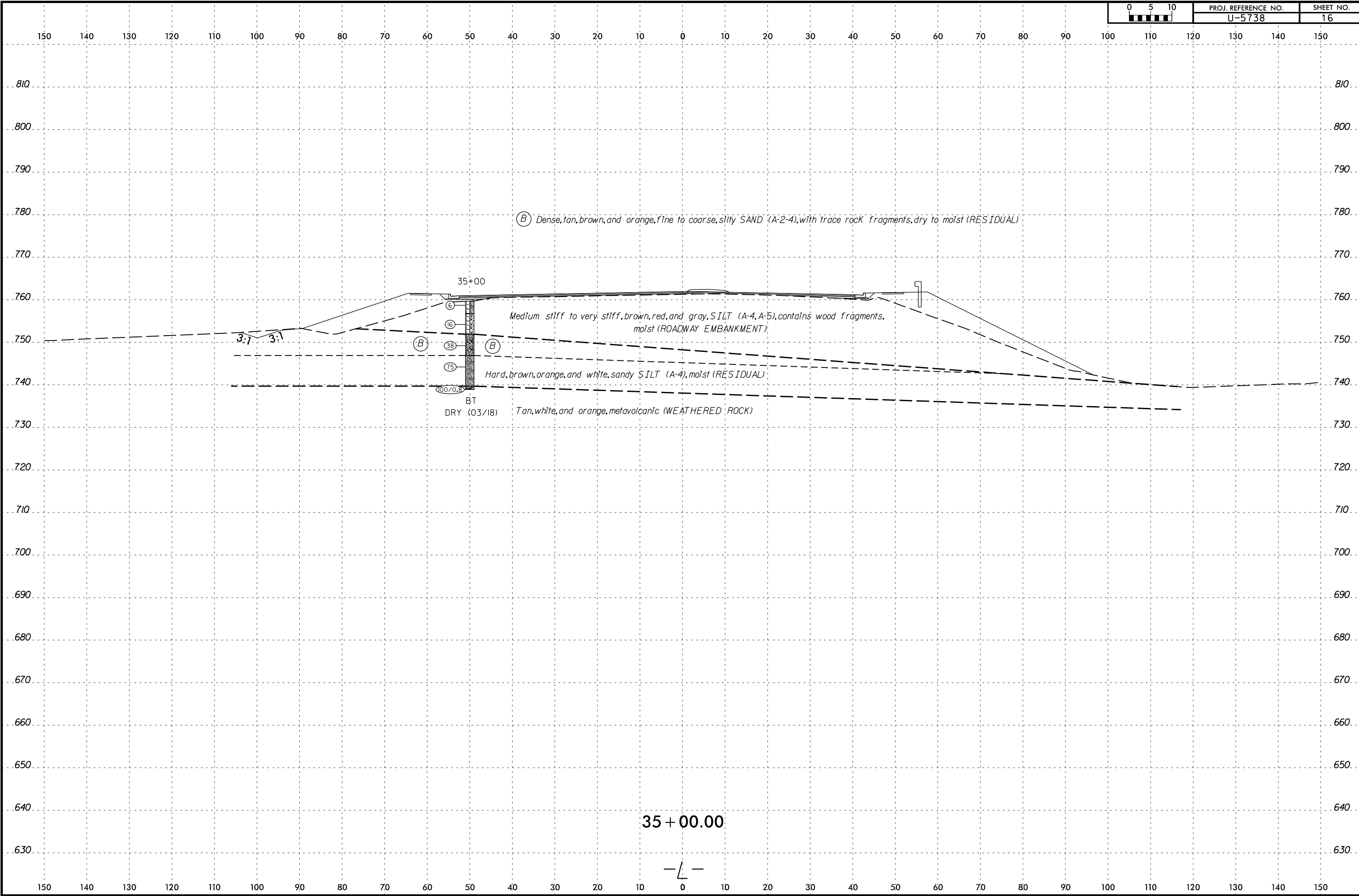
SEE SHEET 8 FOR PLAN VIEW

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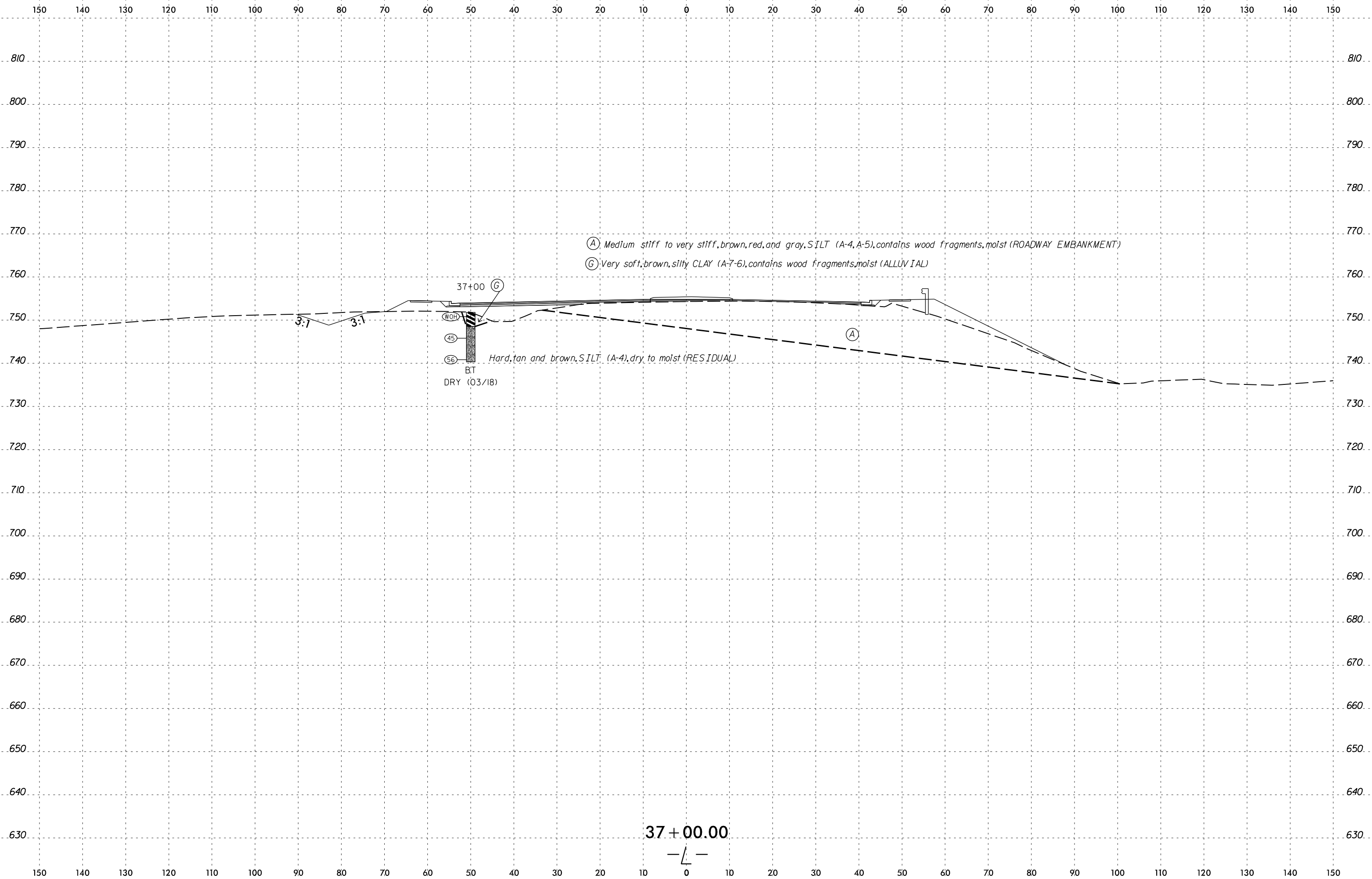
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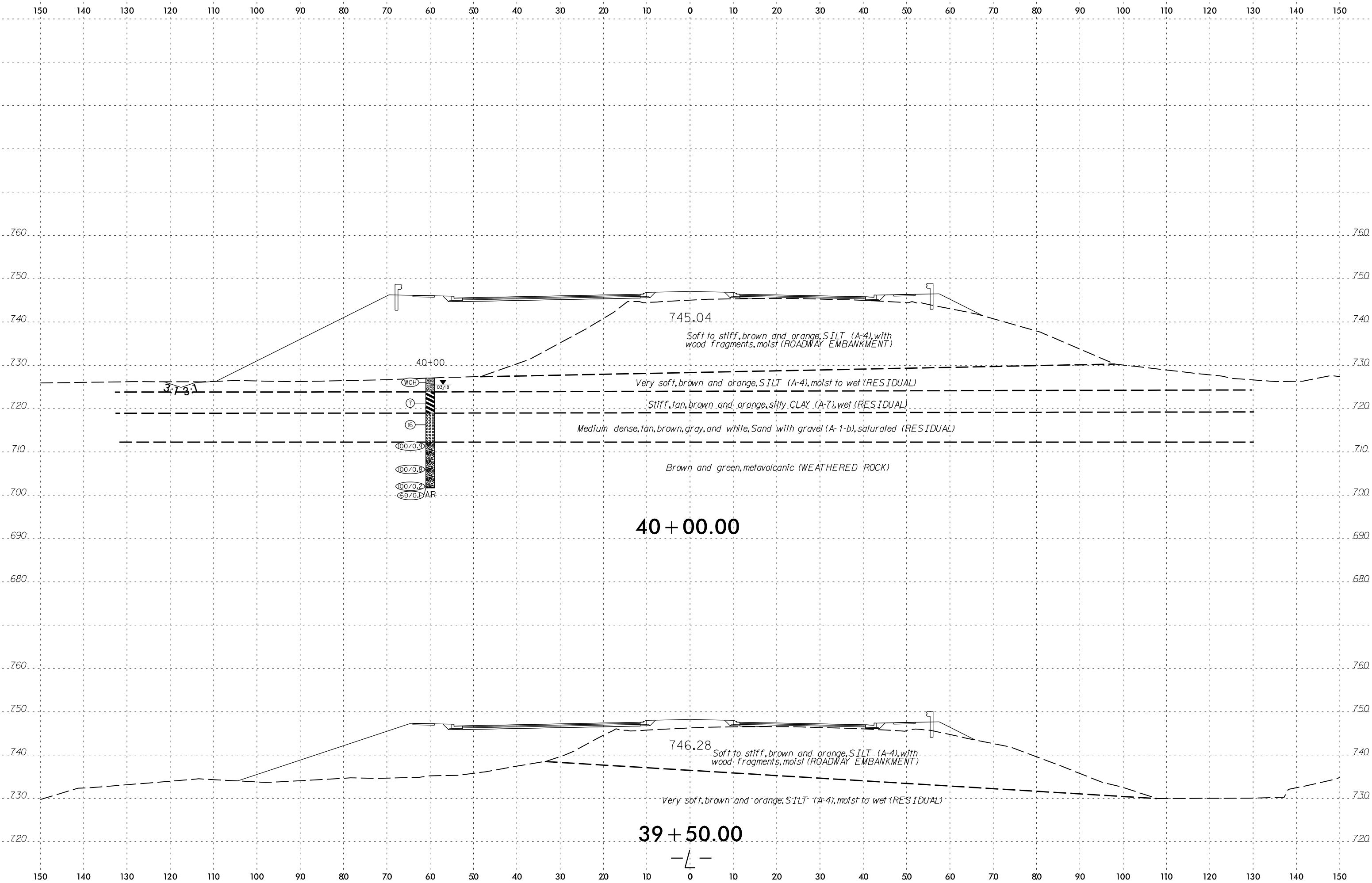
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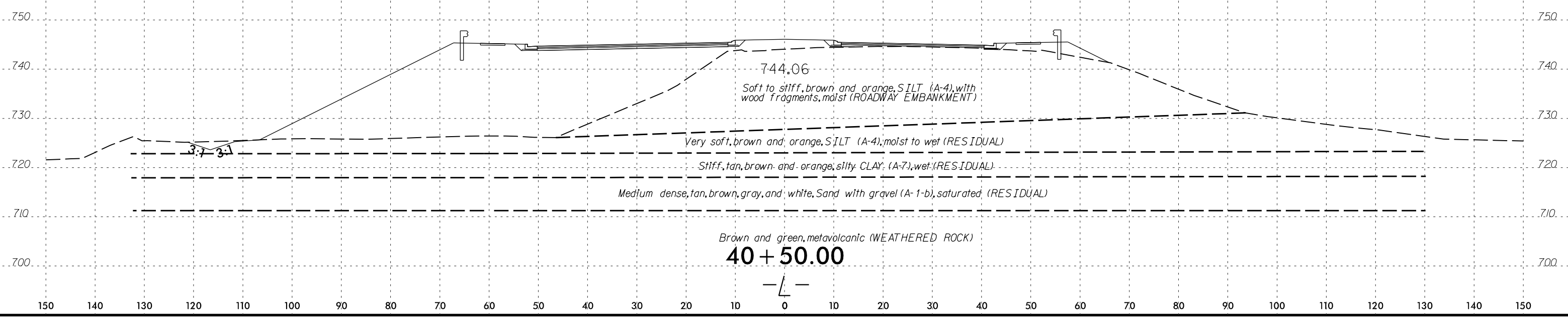
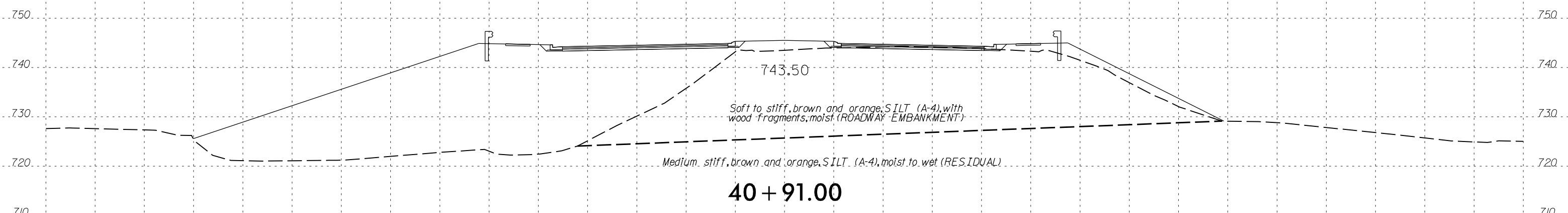
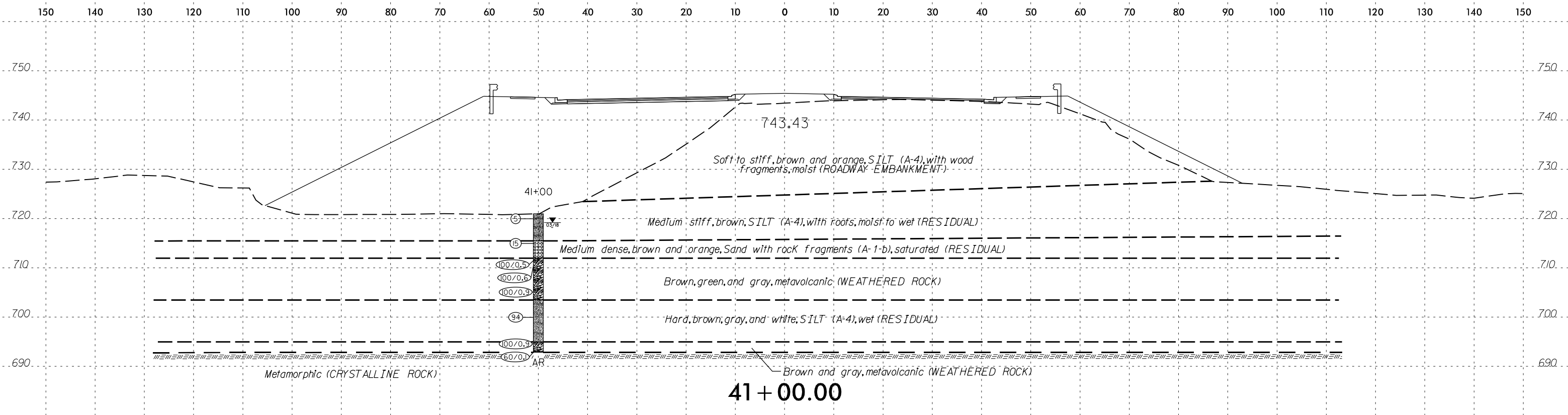


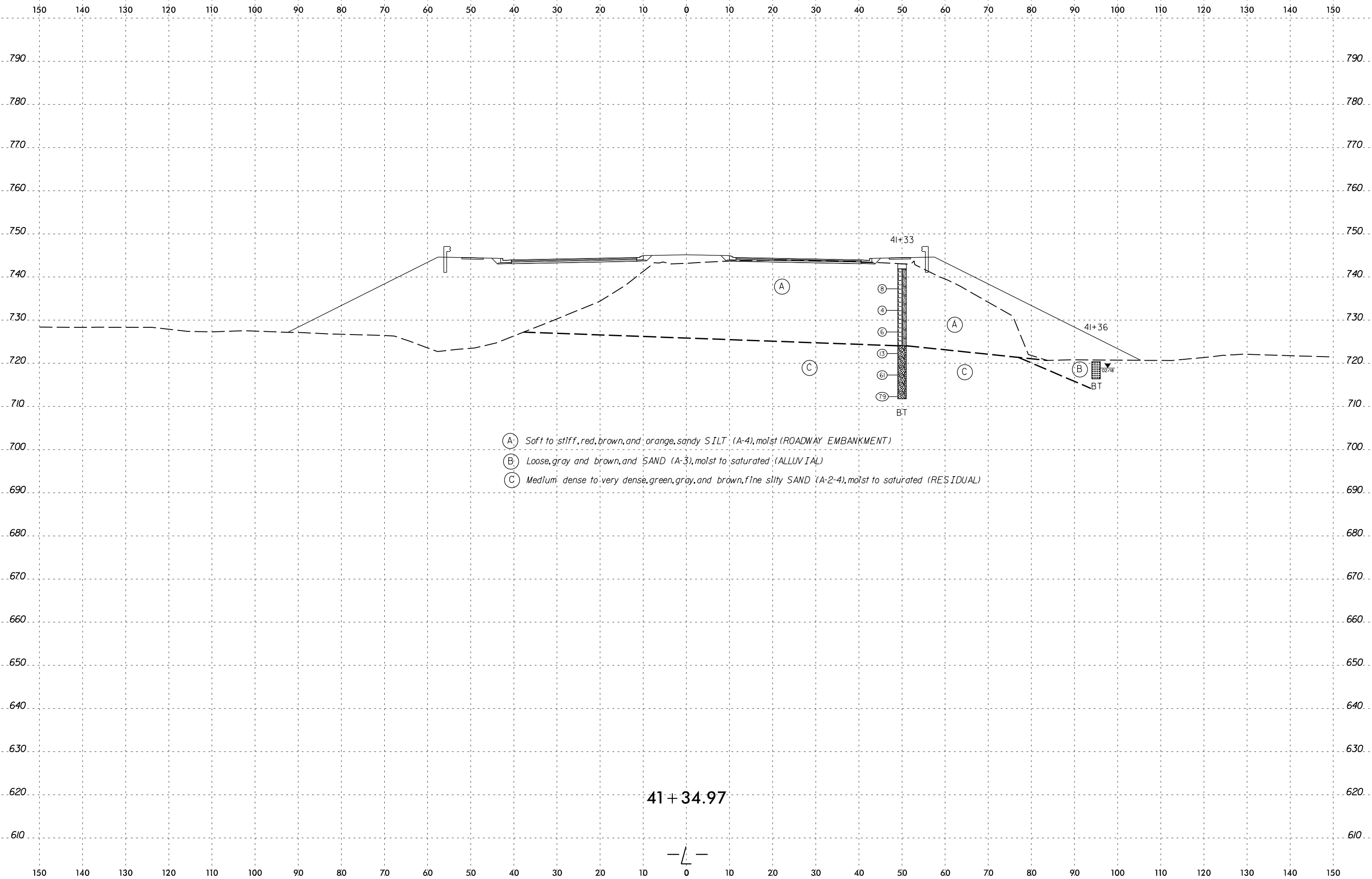
(A) Medium stiff to very stiff, brown, red, and gray, SILT (A-4, A-5), contains wood fragments, moist (ROADWAY EMBANKMENT)  
 (G) Very soft, brown, silty CLAY (A-7-6), contains wood fragments, moist (ALLUVIAL)

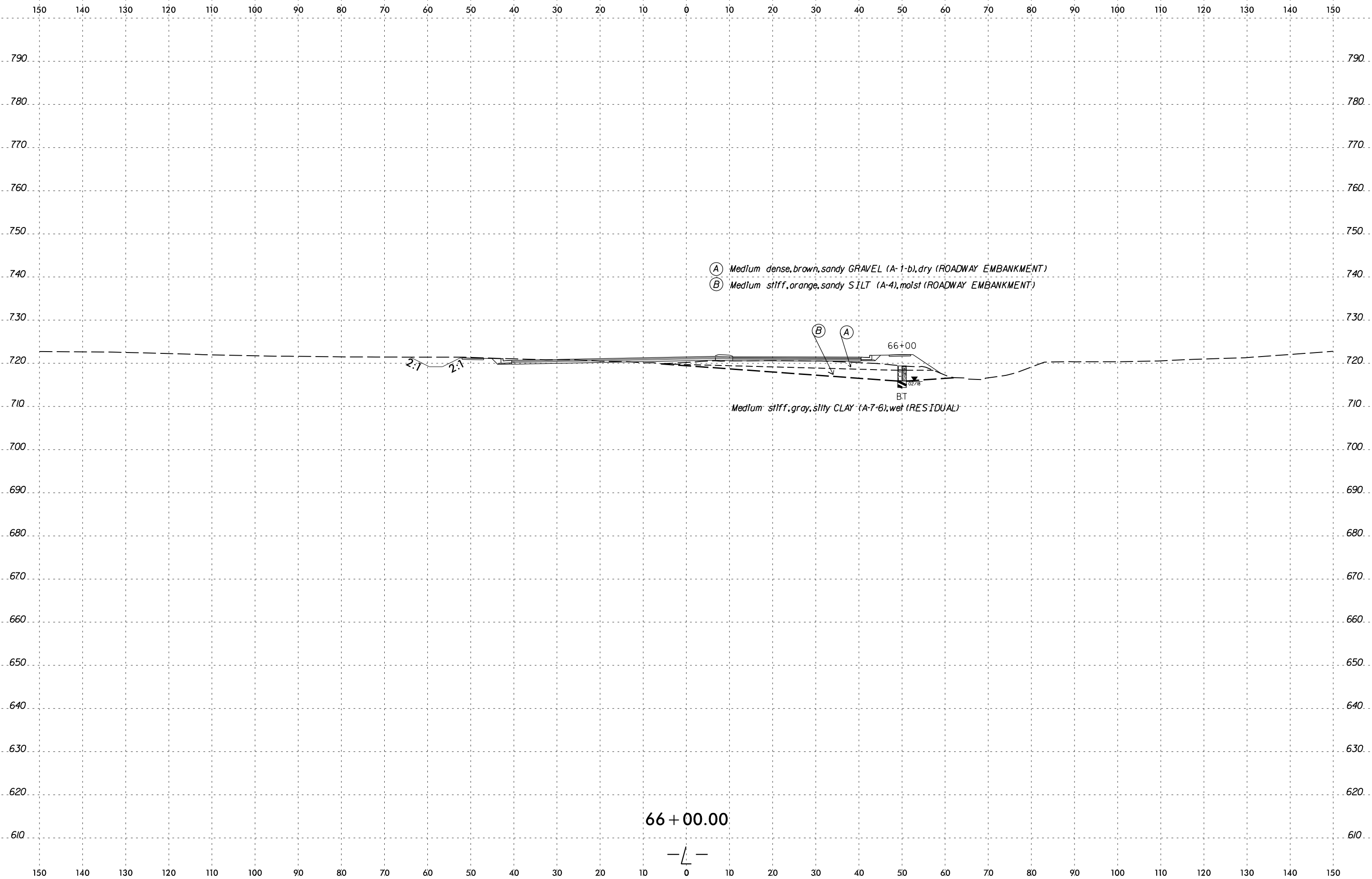
37+00 (G)  
 (WOH)  
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 (56) Hard, tan and brown, SILT (A-4), dry to moist (RESIDUAL)  
 BT  
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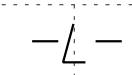


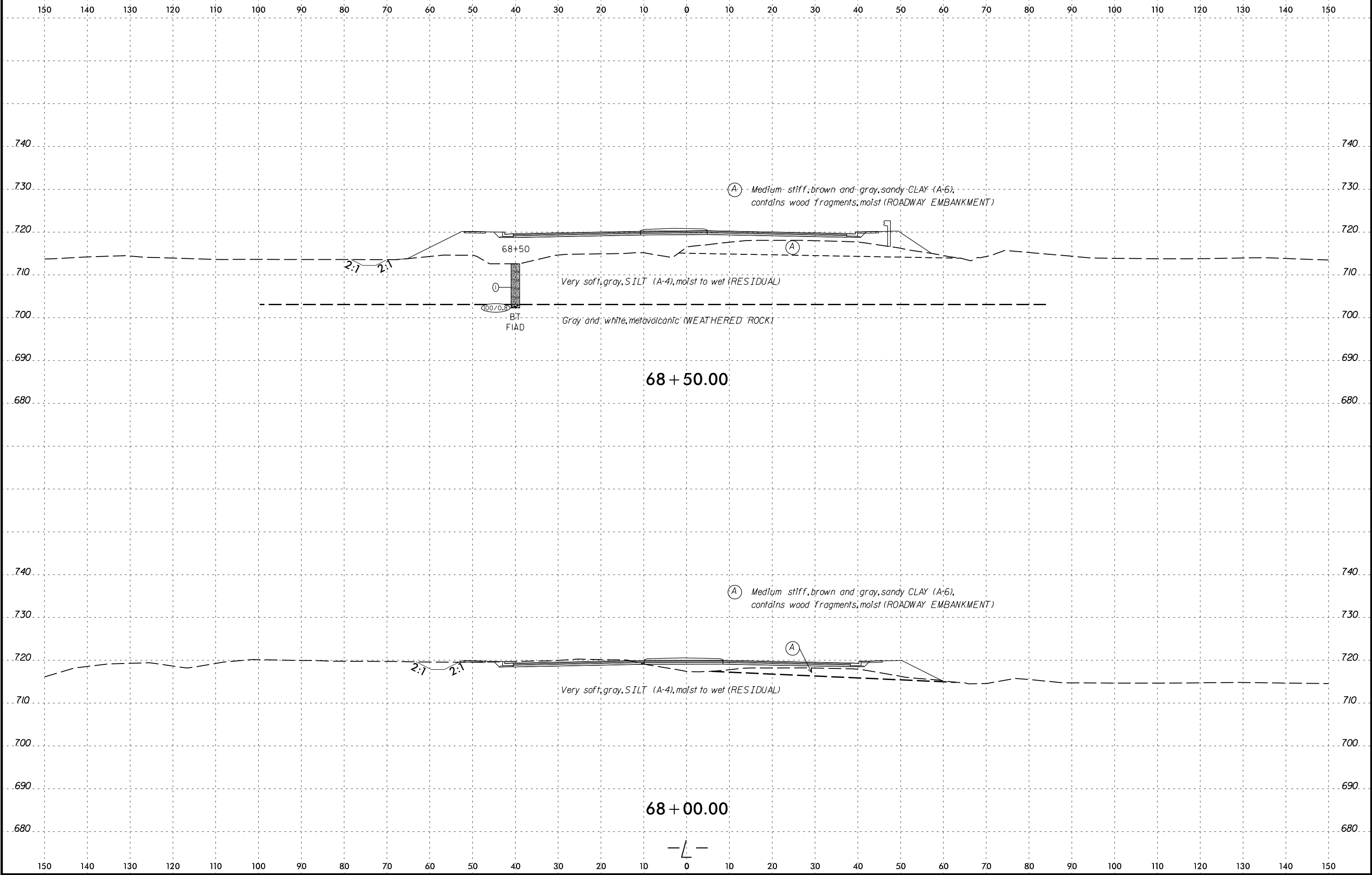


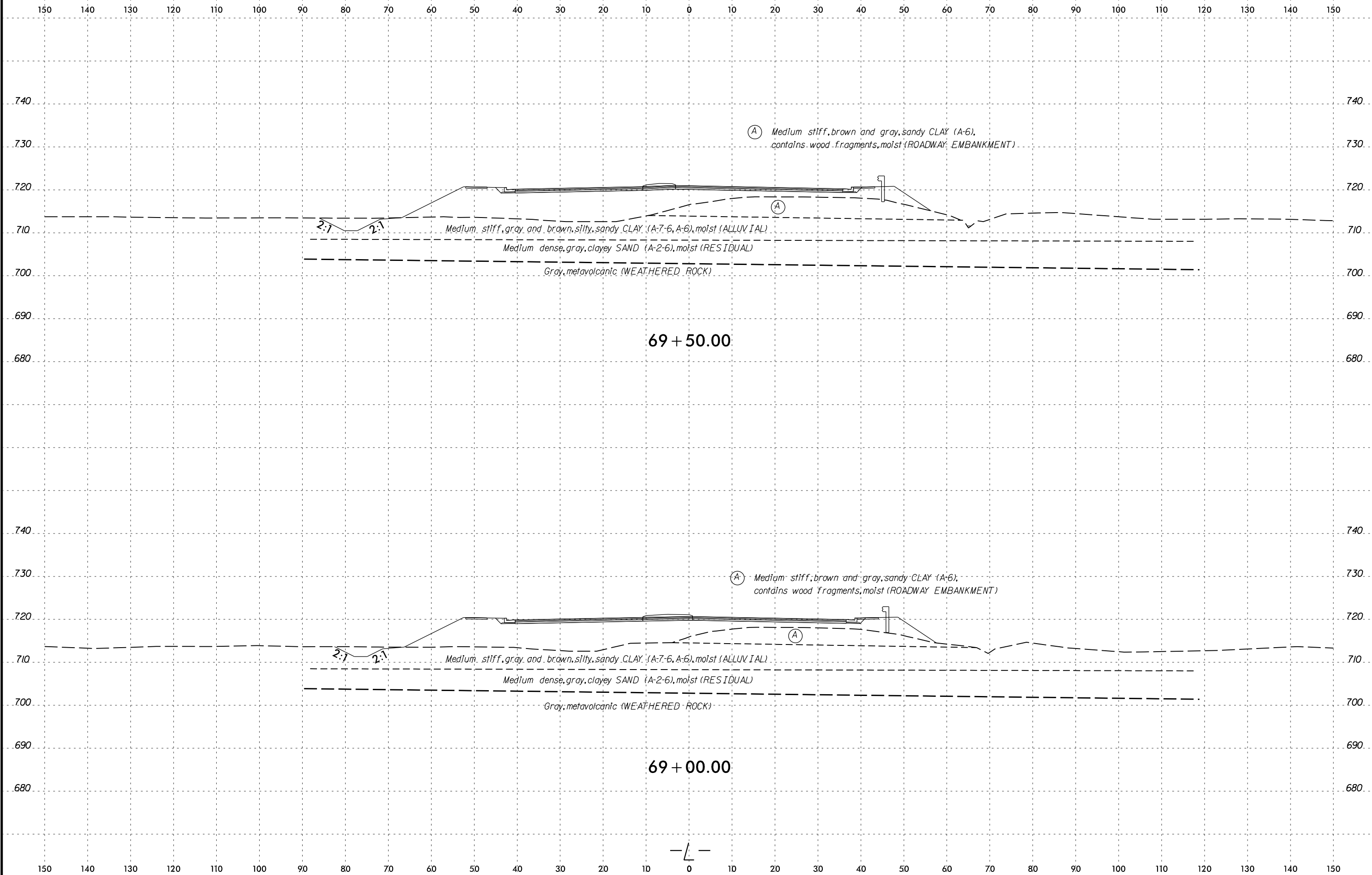
- (A) *Medium dense, brown, sandy GRAVEL (A-1-b), dry (ROADWAY EMBANKMENT)*
- (B) *Medium stiff, orange, sandy SILT (A-4), moist (ROADWAY EMBANKMENT)*

*Medium stiff, gray, silty CLAY (A-7-6); wet (RESIDUAL)*

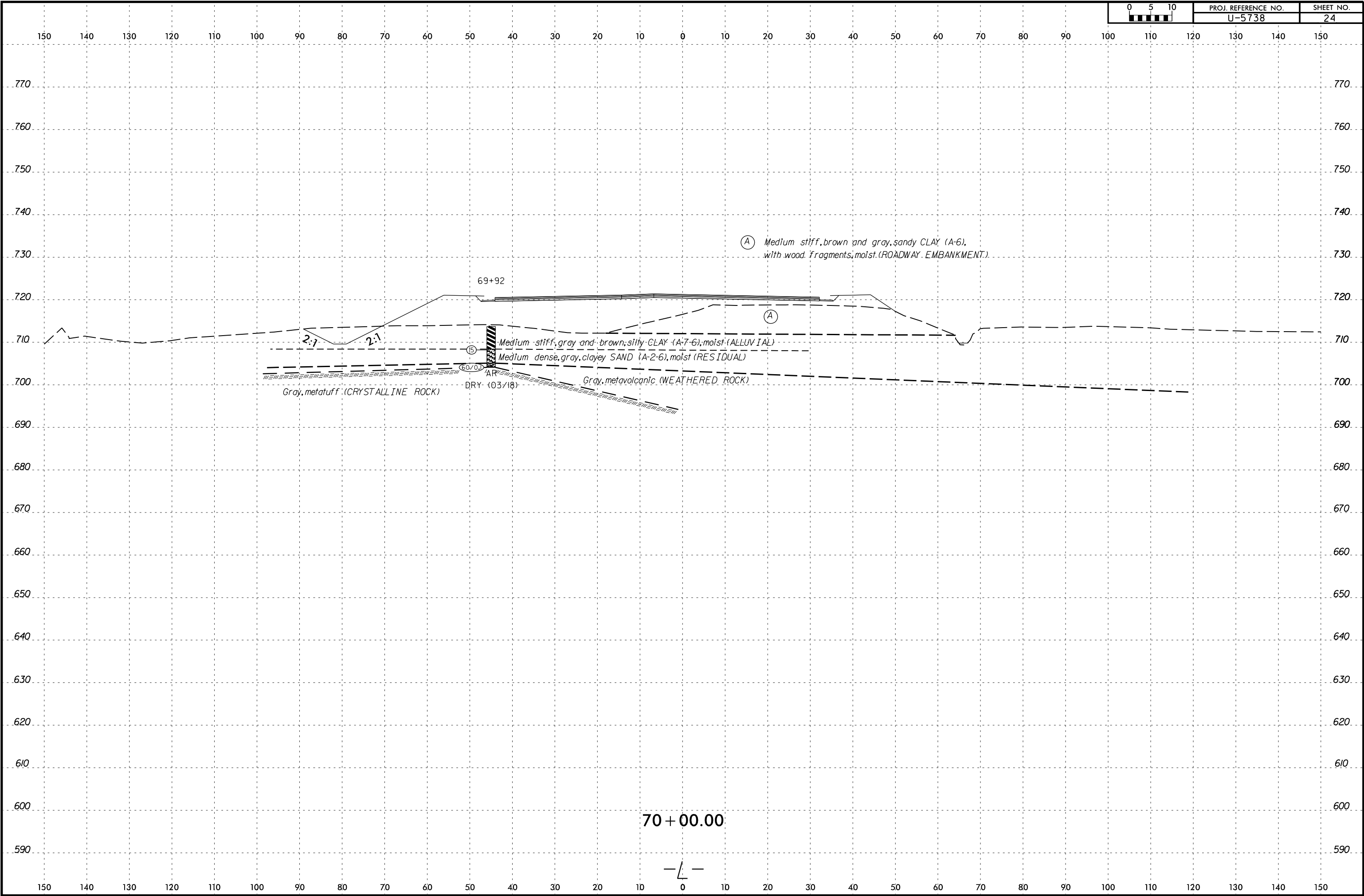
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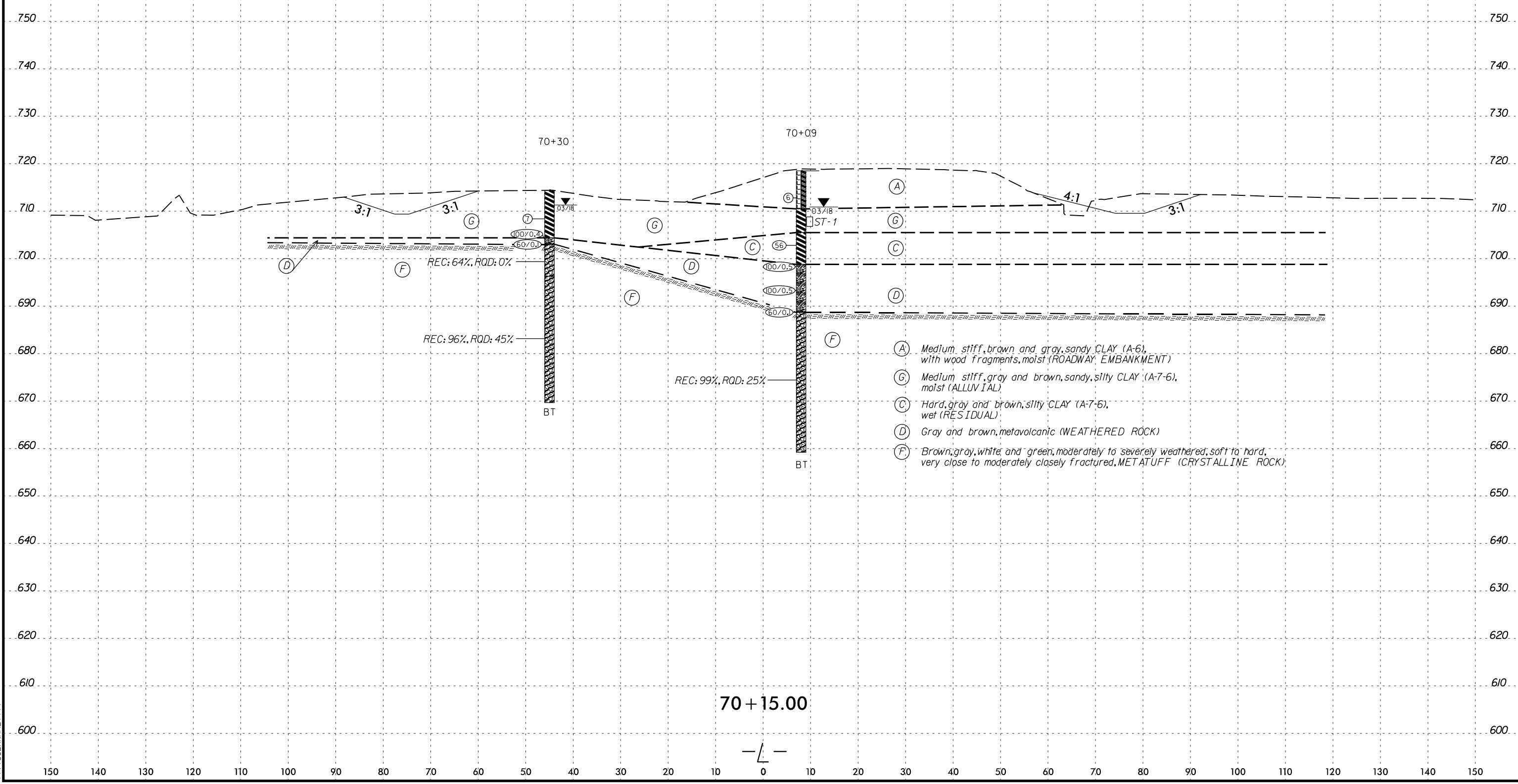






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<b>SOIL TEST RESULTS</b>															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
ST-1	8 RT	70+09	9.7-11.7	A-7-6(13)	49	22	15.0	17.7	38.6	22.1	93.4	85.2	63.2	37.0	-



- (A) Medium stiff, brown and gray, sandy CLAY (A-6), with wood fragments, moist (ROADWAY EMBANKMENT)
- (G) Medium stiff, gray and brown, sandy, silty CLAY (A-7-6), moist (ALLUVIAL)
- (C) Hard, gray and brown, silty CLAY (A-7-6), wet (RESIDUAL)
- (D) Gray and brown, metavolcanic (WEATHERED ROCK)
- (F) Brown, gray, white and green, moderately to severely weathered, soft to hard, very close to moderately closely fractured, METATUFF (CRYSTALLINE ROCK)

