

REFERENCE: U-5108

PROJECT: 42370

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
 PROJECT DESCRIPTION NORTHCROSS DRIVE EXTENSION
FROM EXISTING END OF NORTHCROSS DRIVE
TO WESTMORELAND DRIVE
 SITE DESCRIPTION BRIDGE NO. 591403 ON NORTHCROSS
DRIVE EXTENSION OVER MCDOWELL CREEK
-L- STA. 74 + 01

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5108	1	

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. 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

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INVESTIGATED BY ESP Associates, Inc.

DRAWN BY C.R. PASTRANA

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SUBMITTED BY ESP Associates, Inc.

DATE November 2023


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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 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 (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																													
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.																													
MINERALOGICAL COMPOSITION										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.										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.																			
COMPRESSIBILITY										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										WEATHERING										FRESH										ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.																													
GROUND WATER										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.										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.																			
MISCELLANEOUS SYMBOLS										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.										MODERATELY SEVERE (MOD. SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPT REFUSAL																			
RECOMMENDATION SYMBOLS										SEVERE (SEV.)										ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF										VERY SEVERE (IV 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																			
ABBREVIATIONS										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.										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.									
TEXTURE OR GRAIN SIZE										HARD										CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.										MODERATELY HARD										CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.																			
SOIL MOISTURE - CORRELATION OF TERMS										MEDIUM HARD										CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.										SOFT										CAN BE GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.																			
PLASTICITY										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.										FRACTURE SPACING										BEDDING																			
EQUIPMENT USED ON SUBJECT PROJECT										VERY CLOSE										MORE THAN 10 FEET										VERY THICKLY BEDDED										4 FEET																			
INDURATION										MODERATELY CLOSE										3 TO 10 FEET										THICKLY BEDDED										1.5 - 4 FEET																			
DRILL UNITS:										CLOSE										1 TO 3 FEET										THINLY BEDDED										0.16 - 1.5 FEET																			
ADVANCING TOOLS:										VERY CLOSE										LESS THAN 0.16 FEET										VERY THINLY BEDDED										0.03 - 0.16 FEET																			
HAMMER TYPE:										EXTREMELY CLOSE										LESS THAN 0.16 FEET										THICKLY LAMINATED										0.008 - 0.03 FEET																			
CORE SIZE:										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.										INDURATED										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																													
HAND TOOLS:										FRAGILE										RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.										MODERATELY INDURATED										GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																			
POST HOLE DIGGER										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.																			
HAND AUGER										INDURATED										GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.										EXTREMELY INDURATED										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																			
SOUNDING ROD										EXTREMELY INDURATED										SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																							
VANE SHEAR TEST																																																											
NOTES:																																																											
F.J.A.D. = FILLED IMMEDIATELY AFTER DRILLING																																																											

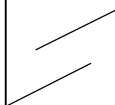
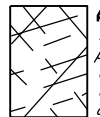
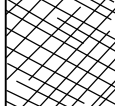

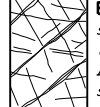



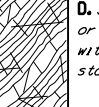

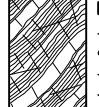

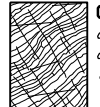

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

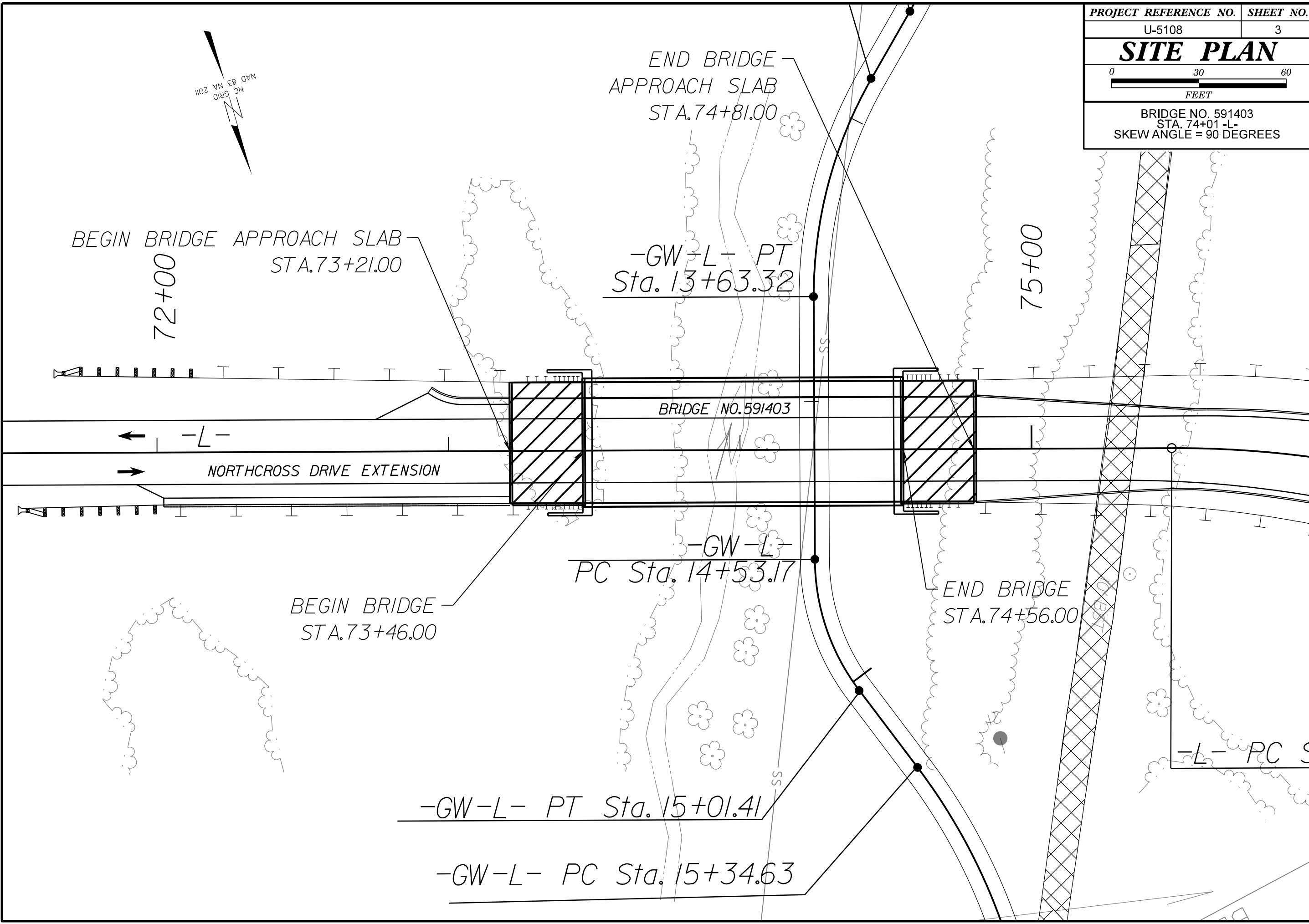
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)		SURFACE CONDITIONS					GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos, P and Hoek E., 2000)		SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)					
From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.		VERY GOOD	GOOD	FAIR	POOR	VERY POOR	
STRUCTURE		DECREASING SURFACE QUALITY →					COMPOSITION AND STRUCTURE							
	INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities	90			N/A	N/A		70						
	BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets	80					<i>A. Thick bedded, very blocky sandstone</i> The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.	60						
	VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets		70						50					
	BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity		60							40				
	DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces			50							30			
	LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes				40							20		
					30		<i>C, D, E, and G - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to F and H.</i>						10	
					20									
					10									
					N/A									

→ Means deformation after tectonic disturbance

PROJECT REFERENCE NO.	SHEET NO.
U-5108	3
SITE PLAN	
BRIDGE NO. 591403 STA. 74+01 -L- SKEW ANGLE = 90 DEGREES	



BEGIN BRIDGE APPROACH SLAB
STA. 73+21.00

72+00

END BRIDGE
APPROACH SLAB
STA. 74+81.00

-GW-L-PT
Sta. 13+63.32

75+00

BRIDGE NO. 591403

NORTHCROSS DRIVE EXTENSION

BEGIN BRIDGE
STA. 73+46.00

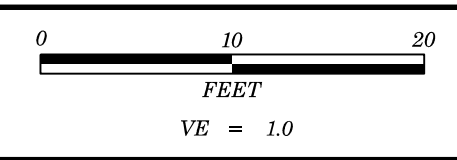
-GW-L-PC
Sta. 14+53.17

END BRIDGE
STA. 74+56.00

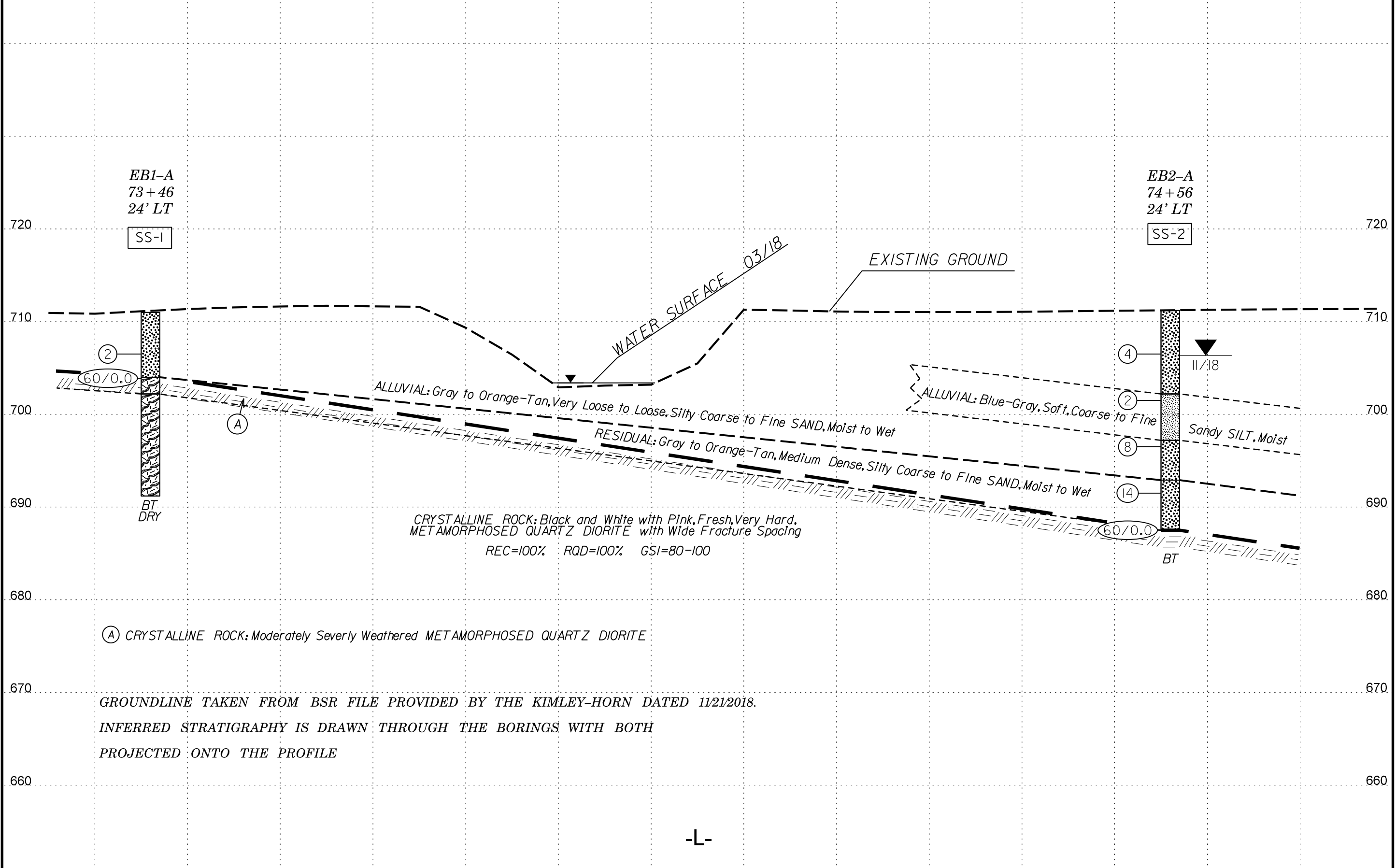
-GW-L-PT Sta. 15+01.41

-GW-L-PC Sta. 15+34.63

-L-PC S



PROJECT REFERENCE NO.	SHEET NO.
U-5108	4
PROFILE BORINGS PROJECTED ALONG -L-	



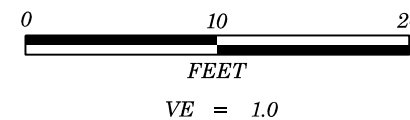
-L-

73+50

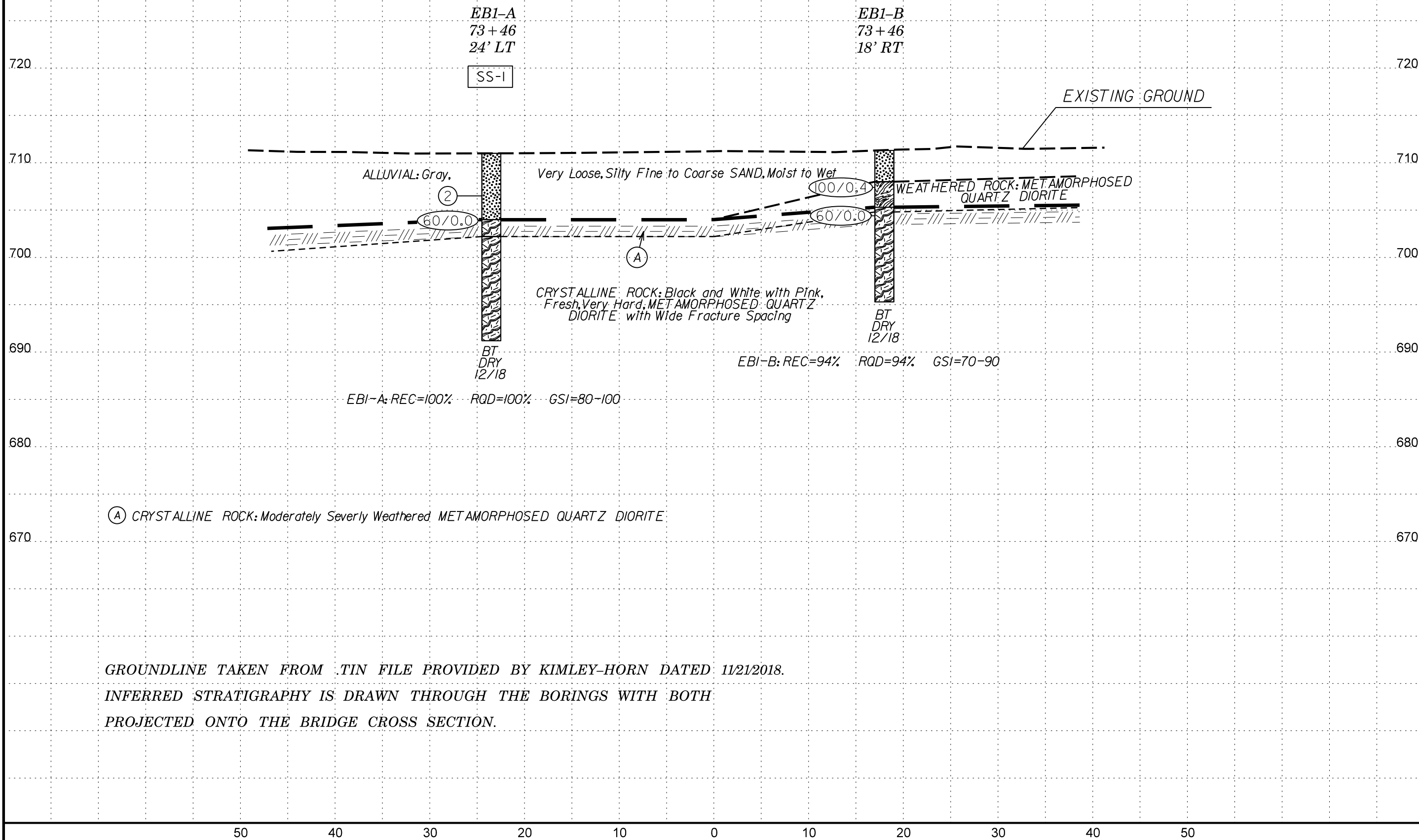
74+00

74+50

-L- 73+46



PROJECT REFERENCE NO.	SHEET NO.
U-5108	5
SECTION THROUGH END BENT 1 SKEW = 90 DEGREES	



CORE PHOTOGRAPHS

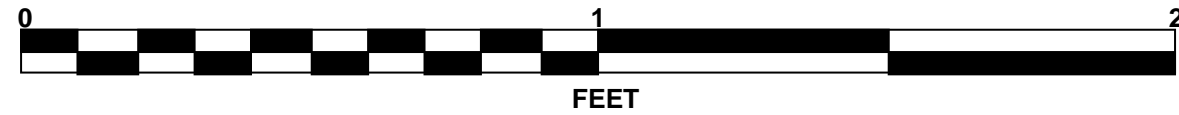
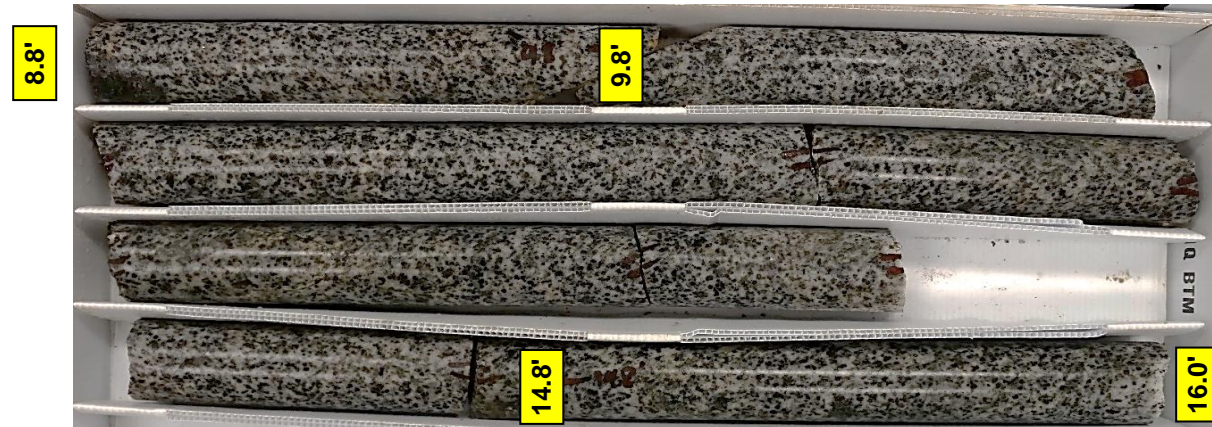
WBS No. 42370.1.1

TIP No. U-5108

Project Description: Bridge No. 591403 on Northcross Drive Extension
Over McDowell Creek
Mecklenburg County, North Carolina

EB1-A

Box 1: 8.8 Feet to 16.0 Feet



CORE PHOTOGRAPHS

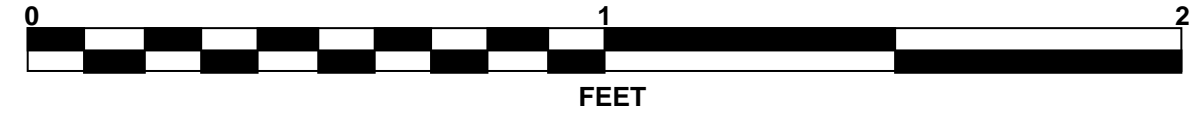
WBS No. 42370.1.1

TIP No. U-5108

Project Description: Bridge No. 591403 on Northcross Drive Extension
Over McDowell Creek
Mecklenburg County, North Carolina

EB1-A

Box 2: 16.0 Feet to 19.8 Feet



CORE PHOTOGRAPHS

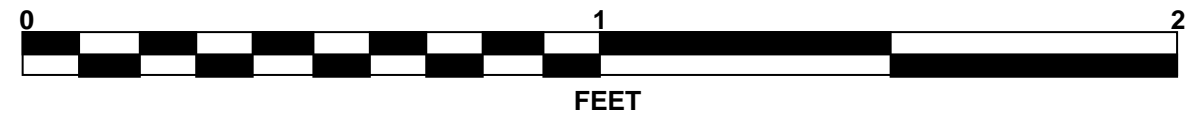
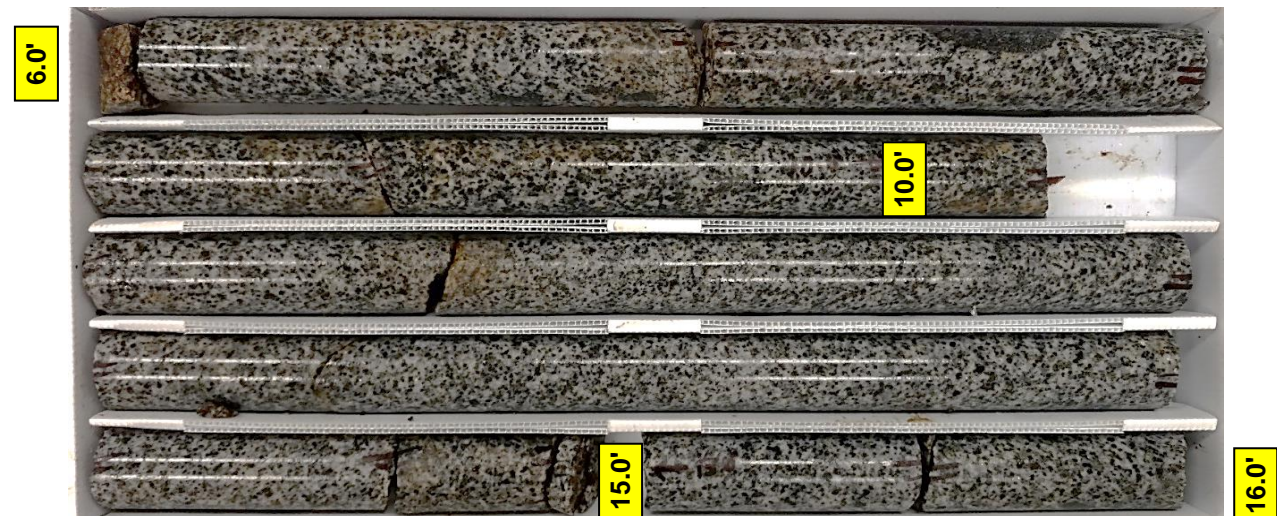
WBS No. 42370.1.1

TIP No. U-5108

Project Description: Bridge No. 591403 on Northcross Drive Extension
Over McDowell Creek
Mecklenburg County, North Carolina

EB1-B

Box 1: 6.0 Feet to 16.0 Feet



SOILS LABORATORY TESTS RESULTS

WBS NO.: 42370.1.1

TIP NO.: U-5108

COUNTY: Mecklenburg

SITE DESCRIPTION: Bridge No. 591403 on Northcross Drive Extension Over McDowell Creek

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		
EB1-A	SS-1	-L- STA. 73+46, 24' LT	3.5-5.0	A-2-4 (0)	2	NP	NP	61	26	5	8	99	57	16	22.3	-
EB2-A	SS-2	-L- STA. 74+56, 24' LT	8.7-10.2	A-4 (1)	2	31	7	19	41	21	19	100	93	49	36.6	-
EB2-B	SS-3	-L- STA. 74+56, 18' RT	8.7-10.2	A-7-6 (6)	3	41	20	28	28	17	27	95	80	47	26.2	-

Signed: 

NCDOT Certification No. 129-04-0411

REFERENCE: U-5108

PROJECT: 42370

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-5108	1	

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
PROJECT DESCRIPTION NORTHCROSS DRIVE EXTENSION
FROM EXISTING END OF NORTHCROSS DRIVE
TO WESTMORELAND DRIVE

INVENTORY

CONTENTS

LINE	STATION	PLAN	PROFILE
-L-	10+00 to 94+55	4-10	-
-LI-	10+00 to 20+10.59	10,11	-
-Y-	10+00 to 13+17.95	4	-
-YI-	10+00 to 12+27	10	-
-Y2-	10+00 to 11+04.60	10	-
-Y3-	10+00 to 11+12.63	10	-
-Y4-	10+00 to 11+11.04	11	-
-Y5-	10+00 to 11+71.64	11	-
-Y6-	10+00 to 25+59.95	11,12	-
-RABA-	10+00 to 12+32.91	11,11A	-
-RABB-	10+00 to 11+47.75	11,11A	-
-RABC-	10+00 to 12+41.61	11,11A	-
-RABD-	10+00 to 13+14.22	11,11A	-

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	26+50 to 94+50	13-55
-LI-	10+00 to 20+10.59	56-61
-Y6-	10+00 to 25+50	62-70
-RABA-	10+00 to 12+25	71-73
-RABB-	10+00 to 11+25	74-76
-RABC-	10+00 to 12+25	77-79
-RABD-	10+00 to 13+00	80-83

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY TEST RESULTS	84-85

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:
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

- P.M. WEAVER
- C.R. PASTRANA
- D.M. NANCE
- B.R. LONG
- HPC
- HDR

INVESTIGATED BY ESP Associates, Inc.
DRAWN BY C.R. PASTRANA
CHECKED BY P.M. WEAVER
SUBMITTED BY ESP Associates, Inc.
DATE November 2023

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

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 208, 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 DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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A-1	A-3	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7		SYMBOL																	% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 35 MX 35 MX	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN						MATERIAL PASSING #40 LL PI	-	-	NP	40 MX 10 MX	41 MN 11 MN	40 MX 11 MN	41 MN 11 MN	40 MX 36 MN	41 MN 36 MN	40 MX 36 MN	41 MN 36 MN						GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX									USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND	FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND	SILTY SOILS	CLAYEY SOILS												GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD					FAIR TO POOR					FAIR TO POOR	POOR	UNSATURABLE			PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30																	<table border="1"> <tr> <th colspan="10">MINERALOGICAL COMPOSITION</th> </tr> <tr> <td colspan="10">MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. 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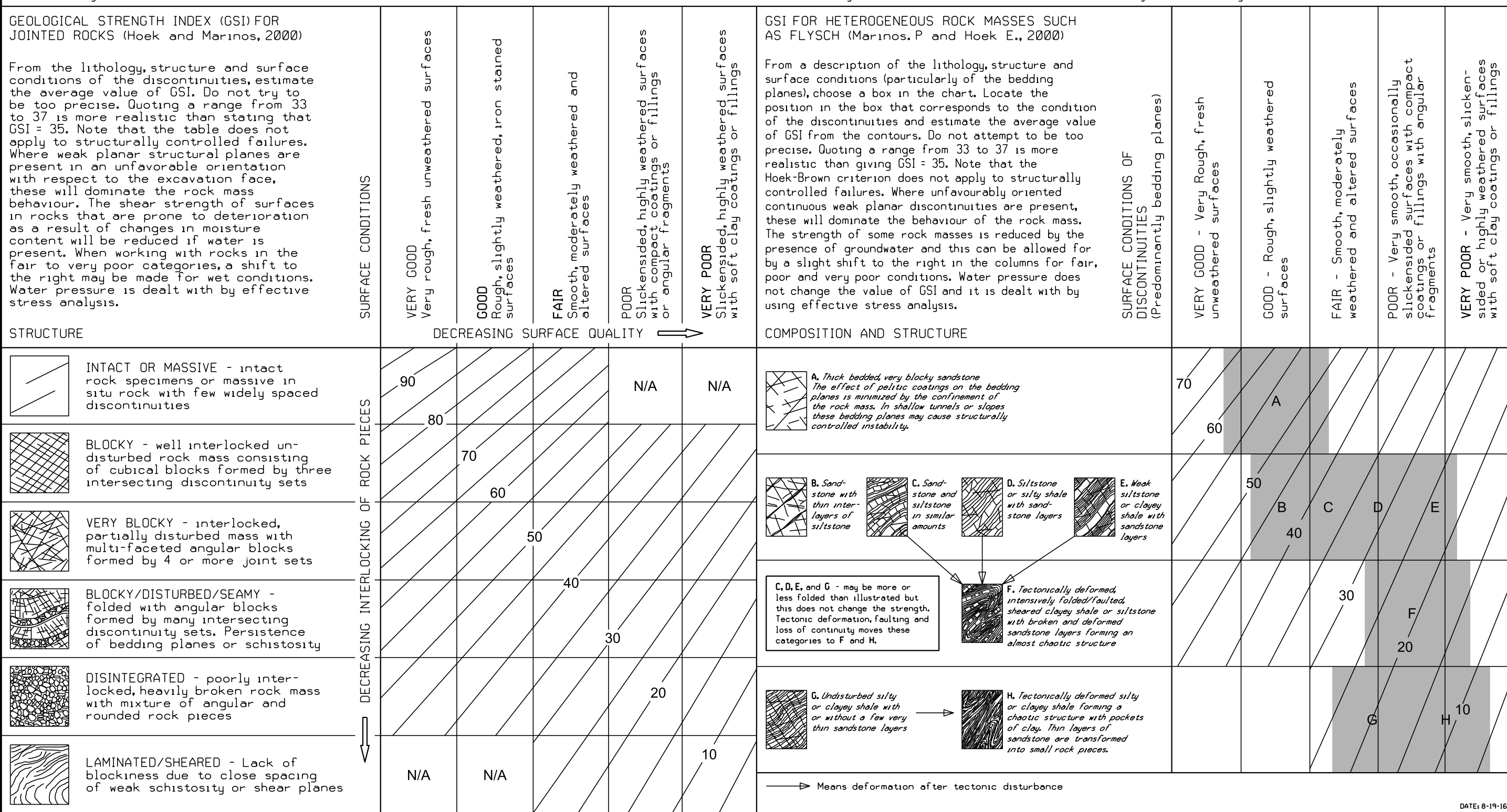
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

**SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES
 FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS**

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)



09/08/19

\$FILE\$
\$DATE\$

TIP PROJECT: U-5108

CONTRACT:

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

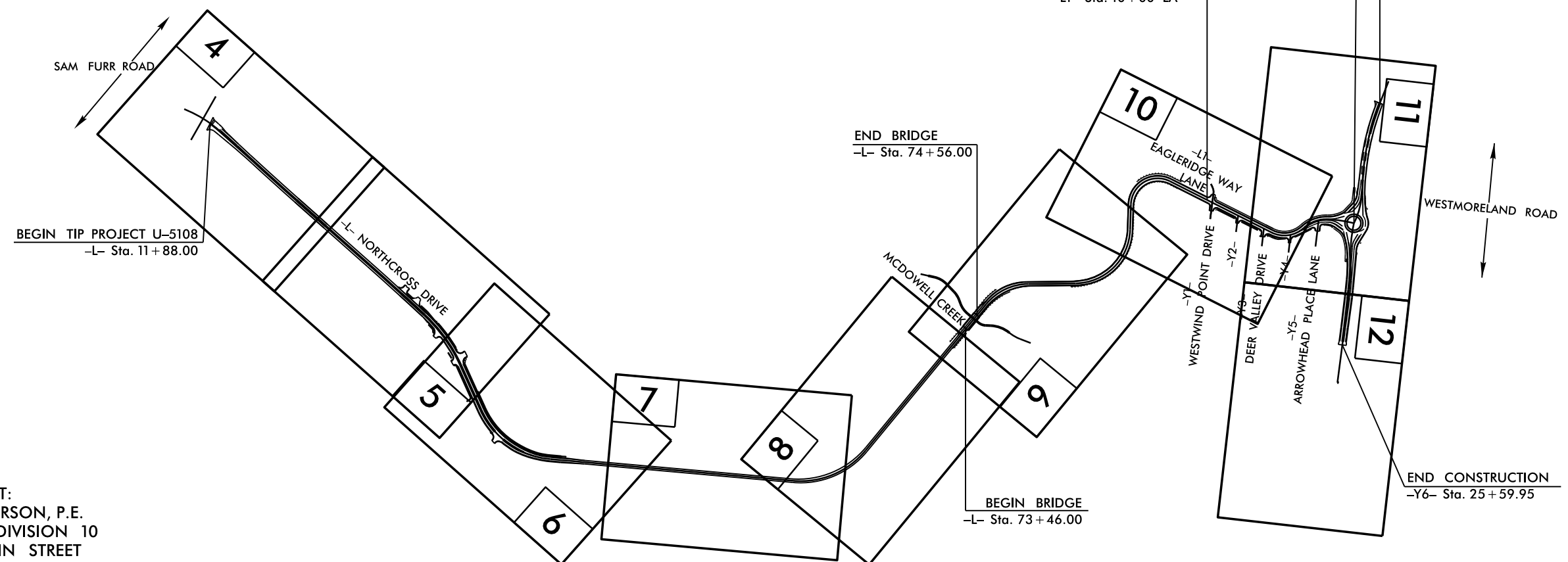
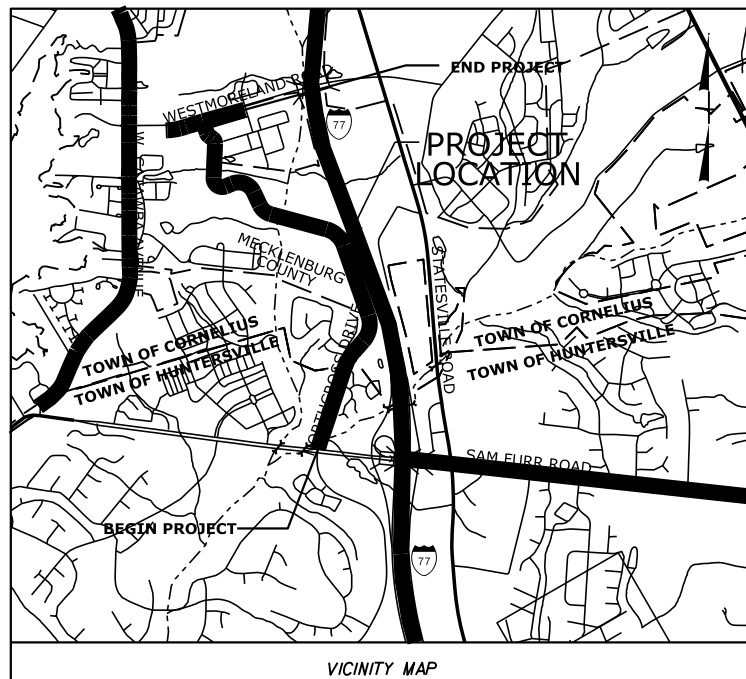
MECKLENBURG COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5108	3	90
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
42370.1.1		PE	
42370.2.2	STBGDA-1001(078)	RW & UTIL.	
42370.3.3	STBGDA-1001(078)	CONST.	

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

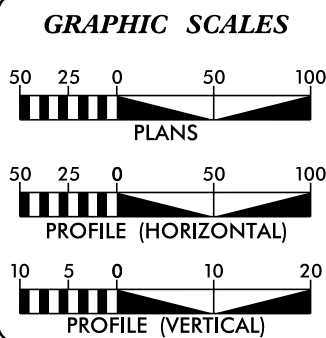
LOCATION: NORTHCROSS DRIVE EXTENSION FROM END OF NORTHCROSS DRIVE TO WESTMORELAND ROAD

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



NCDOT CONTACT:
SEAN EPPERSON, P.E.
NCDOT - DIVISION 10
716 W. MAIN STREET
ALBEMARLE, NC 28001

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY NCDOT METHOD III
THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF CORNELIUS AND HUNTERSVILLE



DESIGN DATA

ADT 2022	=	9900 VPD
ADT 2040	=	16800 VPD
K	=	10%
D	=	70%
T	=	4%*
V	=	25 - 40 MPH

FUNCTIONAL CLASSIFICATION: COLLECTOR
URBAN MAJOR REGIONAL TIER
* 1% TTST 3% DUAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5108	=	1.736 MILES
LENGTH STRUCTURE TIP PROJECT U-5108	=	0.021 MILES
TOTAL LENGTH TIP PROJECT U-5108	=	1.757 MILES

PLANS PREPARED FOR THE NCDOT BY:

Kimley»Horn
200 South Tryon, Suite 200
Charlotte, North Carolina 28202
NC License #F-0102

2019 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
JUNE 19, 2019

LETTING DATE:
JUNE 16, 2020

TONY SPACEK, P.E.
PROJECT ENGINEER

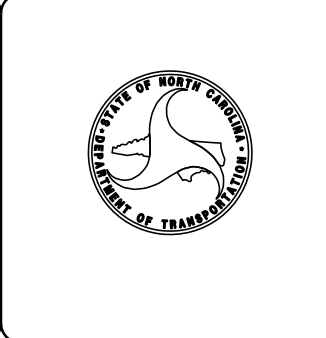
BRANDON MURR, EIT
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



RW PLANS

November 10, 2023

STATE PROJECT: 42370.1.1 (U-5108)
 COUNTY: Mecklenburg
 DESCRIPTION: Northcross Drive Extension from end of Northcross Drive to Westmoreland Drive
 SUBJECT: Geotechnical Inventory

Project Description

This proposed project is located in Cornelius, North Carolina and has a total project length of approximately 2 miles. The project begins at -L- Station 11+88 (the intersection of Northcross Drive and Sam Furr Road) and the proposed construction and improvements to the project corridor consists of the following:

- -L- Station 11+88 to -L- Station 27+65: milling and resurfacing of the existing roadway with no grade changes.
- -L- Station 27+65 to -L- Station 94+55: the construction of a new, two-lane roadway on a new location
- -L- Station 36+00 to -L- Station 43+50: the construction of a noise wall (-NB3-) varying between 23.5 feet and 29.0 feet left of -L-
- -L- Station 73+46 to -L- Station 74+46: the construction of a single-span bridge over McDowell Creek
- -L- Station 94+55: the project ties into the existing Eagleridge Way Lane (-L1-)
- -L1- (Eagleridge Way Lane) Station 10+00 to -L1- Station 20+10.59: widening and realignment of -L1- plus the construction of a multi-use path on the left side of the roadway and the addition of a roundabout at the intersection of -L1- and -Y6- (Westmoreland Drive)
- -L- Station 91+70(±): the installation of a 60-inch RCP-IV drainage pipe for the drainage feature at the bottom of the proposed embankment
- -Y6- Station 10+00 to -Y6 Station 25+59.95: widening of -Y6- and the construction of the roundabout mentioned in the bullet above

The project area is primarily consist of and single-family homes and businesses on the south end of the project and of single-family homes on the north end of the project. The middle portion of the project where the new roadway construction will be performed consists mainly of farmland. Intersections along the project includes Sam Furr Road (-Y-), Westwind Point Drive (-Y1-), -Y2-, Deer Valley Drive (-Y3-), -Y4-, Arrowhead Place Lane (-Y5-), and Westmoreland Drive (-Y6-).

It is our understanding that two Transco gas lines are present between approximately -L- Stations 46+50 and 48+00. The tops of the gas lines are reportedly approximately 5 feet below the existing groundline.

Proposed maximum project embankments heights are approximately 27 feet, while proposed maximum cut depths are approximately 5 feet.

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

Initial site scoping and the beginning of boring layout was performed on November 1, 2018. The field bridge/roadway investigation was performed from November 5 through 16, 2018 through and on December 17, 2018. ESP returned to the site on October 22, 2019 to layout the borings for the noise wall investigation, and performed the noise wall investigation on November 16, 2019. Standard Penetration Test borings were advanced with a D-50 drill machine equipped with an automatic hammer. Rock Coring was required at End Bent 1 of the bridge with a CME 45 drill machine using NQ-size coring equipment. Hand auger borings were also performed at selected locations. 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-	26+50 to 94+55.00
-L1-	10+00 to 20+10.59
-Y6-	10+00 to 25+59.95
-RABA-	10+00 to 12+32.91
-RABB-	10+00 to 11+47.75
-RABC-	10+00 to 12+41.61
-RABD-	10+00 to 13+14.22

Physiography and Geography

The project corridor is located in the Kings Mountain Belt of the Piedmont physiographic province. “The Kings Mountain Belt includes metasedimentary sequences with interlayered quartzite, metaconglomerate, marble, and schists derived from both sedimentary and volcanic protoliths” (*The Geology of the Carolinas*, Horton and Zullo, 1991). Rocks of the Kings Mountain Belt are intensely deformed and it is dominated by steeply dipping units striking northeast to north-northeast. The age of the rocks are Paleozoic to late Proterozoic, and the deformation on the leading edge of the Carolina terrane as it collided with North America may be recorded in the deformation of the rocks in the Kings Mountain Belt. Rock was encountered during this investigation in the borings performed for the bridge (-L- Stations 73+46 to 74+52), and in the boring at -L- Station 43+00. The rock encountered consisted of metamorphosed quartz diorite.

The topography along the project corridor generally consist of gently rolling hills. The proposed roadway along Northcross Drive (-L-) and Eagleridge Way Lane (-L1-) generally slopes up from the south to north with elevations ranging from approximately 704 feet (MSL) to approximately 777 feet (MSL), while the proposed roadway along Westmoreland Drive (-Y6-) generally slopes down from the west to east with elevations ranging from approximately 787 feet (MSL) to approximately 768 feet (MSL). Swampy areas are present in the vicinity of the proposed bridge over McDowell Creek and immediately adjacent to the drainage feature at approximately -L- Station 91+70.

Soil Properties

Soils encountered within this project area have been divided into four categories: alluvial deposits, artificial fill, residual soils, and weathered rock.

Asphalt pavement (either existing roadway or drive/parking areas) was present at the existing ground surface at the following borings: RWAL1-1, RWAL1-2, RWAL1-3, RWAL1-4, and L_4000. The asphalt encountered within these borings ranges in thickness from 1 inch to 1 foot. The pavement design investigation performed by the NCDOT for this project indicates that the asphalt pavement within the existing Northcross Drive roadway ranges from 1.75 to 5.5 inches in thickness with base stone thicknesses ranging from 2.5 to 8 inches, while the asphalt pavement within the existing Eagleridge Way Lane roadway ranges from 2.75 to 4 inches in thickness with base stone thicknesses ranging from 6.5 to 7 inches.

Surficial organic soils were encountered in all of the Borings for this project with the exception of the RWAL1 borings, L_4000, L_4100, L_4800 to L_5900, the four borings performed for the bridge (EB1-A, EB1-B, EB2-A, and EB2-B), and Y6_1772. The thickness of the topsoil encountered ranged from approximately 2 inches to approximately 10 inches with the average topsoil thickness being approximately 5 inches.

Soils identified as alluvial deposits were encountered in the borings drilled for the bridge (EB1-A, EB1-B, EB2-A, and EB2-B), and in borings L_7550 and L_9175. The alluvial deposits range in depth from approximately 3 feet to approximately 20 feet below the existing ground surface and were generally classified as soft, sandy silt (A-4), sandy clay (A-6), and silty clay (A-7), and as very loose to loose, silty sand (A-2-4). Standard Penetration Test (SPT) blow counts within the alluvium ranged from 2 to 8 blows per foot (bpf).

Material identified as artificial fill was encountered in boring RWAL1-5. Artificial fill is fill material placed outside of the roadway embankment by entities other than the NCDOT and thus without the quality and compaction controls inherent in roadway embankment construction. The artificial fill extended to a depth of approximately 1 foot below the existing ground surface and sampled as a gravel and topsoil mix.

Residual soils were encountered in all borings drilled for this project with the exception of borings EB1-A, EB2-B, Y6_1450RT, Y6_2100, Y6_2300LT, Y6_2300RT, and Y6_2500. The residual soils generally classified as very loose to very dense, silty sand (A-2-4) and moderately plastic clayey sand (A-2-7), and as soft to hard, sandy silt (A-4), clayey silt (A-5), sandy clay (A-6), and silty clay (A-7-5 and A-7-6). The majority of the residual soils encountered were silty clays ranging from slightly to highly plastic. SPT blow counts within the residual soil ranged from 2 to 94 bpf. All borings with the exception of L_4300, L_7250, EB1-A, EB1-B, EB2-A, EB2-B, L-7550, and L_9175 were terminated within residual soils.

Weathered rock is defined as material that has weathered from the parent bedrock and that exhibits SPT N values greater than 100 blows per foot but less than 60 blows per 0.1 foot. The weathered rock on this project is Metamorphosed Quartz Diorite and was encountered directly underlying alluvial material or underlying the residual soil at depths ranging from approximately 3 feet to approximately 39 feet below the existing ground surface. Borings L_7250, L_7550, and L_9175 were terminated within weathered rock.

Rock Properties

Crystalline rock was encountered either directly underlying the alluvium in boring EB1-A, directly underlying the residual soil in borings L_4300, EB2-A, and EB2-B, and underlying the weathered rock in boring EB1-B. The depths to the top of the crystalline rock ranged from approximately 6 feet to approximately 24 feet below the existing ground surface. The crystalline rock classifies as Metamorphosed Quartz Diorite. The crystalline rock cored in borings EB1-A and EB1-B had recovery (REC) values ranging from 94 percent to 100 percent, Rock Quality Designation (RQD) values ranging from 94 percent to 100 percent, and Geological Strength Index

(GSI) values ranging from 70 to 100 indicating very good quality rock. Borings L_4300, EB1-A, EB1-B, EB2-A, and EB2-B were terminated on or in crystalline rock.

Groundwater Properties

Ground water data was collected in November and December, 2018. Ground water depths ranged from approximately 2 to 12 feet below the existing ground surface, and groundwater elevations ranged from approximately 703 to approximately 733 feet above sea level.

Areas of Special Geotechnical Interest

- 1) The following areas sections were found to contain potentially (or existing) unstable slope conditions:

Alignment	Station(±)	Offset(±)
-L-	74+56 to 75+75	70' lt. to 27' lt. & 23' rt. to 56' rt.

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

Alignment	Station(±)
-L-	53+25 to 54+75
-L-	90+75 to 93+25
-Y6-	13+75 to 16+00
-RABB-	10+00 to 10+60
-RABC-	10+00 to 10+60

- 3) The following sections contain soils with greater than 4 percent organic content (including topsoil greater than 4 inches thick) which have the potential to cause embankment/subgrade and or slope stability problems during construction:

Alignment	Station(±)
-L-	29+75 to 30+75
-L-	33+75 to 39+25
-L-	41+75 to 43+75
-L-	44+75 to 47+25
-L-	59+75 to 73+25
-L-	74+75 to 94+55
-L1-	14+50 to 18+50
-Y6-	10+00 to 16+00
-RABB-	10+00 to 10+60
-RABC-	10+60 to 12+41.61
-RABD-	12+10 to 13+14.22
-Y6-	20+50 to 25+59.95

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

Alignment	Station(±)
-L-	26+00 to 43+75
-L-	47+25 to 72+25
-L-	77+75 to 82+75
-L-	93+25 to 94+55
-L1-	10+00 to 20+10.59
-RABA-	10+00 to 11+35
-RABB-	10+60 to 11+47.75
-RABC-	10+60 to 12+41.61
-RABD-	10+00 to 12+10

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

Alignment	Station(±)
-L-	44+75 to 47+25
-L-	73+25 to 77+75
-L-	90+75 to 91+75

- 6) The following section contains groundwater within 6 feet of the proposed grade:

Alignment	Station(±)
-L-	76+25 to 77+75

- 7) The following section contains artificial fill material. Artificial fill is fill material placed outside of the roadway embankment by entities other than the NCDOT and thus without the quality and compaction controls inherent in roadway embankment construction. The artificial fill encountered extended to a depth of approximately 1 foot below the existing ground surface:

Alignment	Station to Station (±)	Offset (±)
-L-	32+75 to 33+25	12' LT to +49' LT

Water Wells

Water wells were not identified within the project boundaries during the site investigation for this project. Should any water wells be found within the proposed right of way limits on this project, they should be sealed in accordance with the North Carolina Department of Transportation Standard Specification, Section 205, "Sealing Abandoned Wells".

-L-

PI Sta 27+73.78	PI Sta 32+12.48
$\Delta = 1^{\circ}21'44.0"$ (RT)	$\Delta = 22^{\circ}43'29.1"$ (RT)
D = 0'17"11.3"	D = 5'43"46.5"
L = 475.51'	L = 396.62'
T = 237.77'	T = 200.95'
R = 20,000.00'	R = 1,000.00'
SE = MATCH EXIST.	SE = 3.4%
RO = MATCH EXIST.	RO = 94'
	DS = 40 MPH

FOR -L- PROFILE, SEE SHEET 13

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NC LICENSE #F-0102
200 SOUTH TRYON, SUITE 200
CHARLOTTE, N.C. 28202

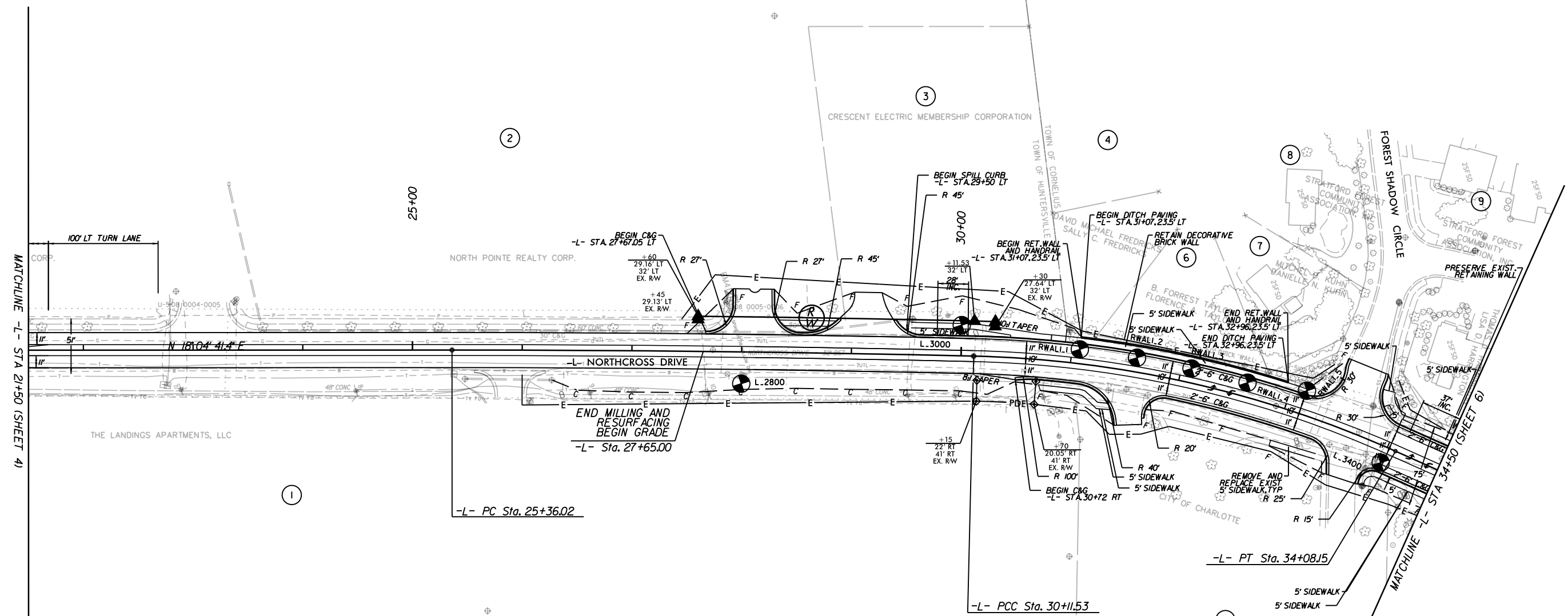
RIGHT-OF-WAY REV.
CONST. REV.

PROJECT REFERENCE NO. U-510B	SHEET NO. 5
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

REVISIONS



MATCHLINE -L- STA 21+50 (SHEET 4)

MATCHLINE -L- STA 34+50 (SHEET 6)

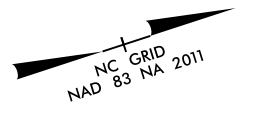
\$DATE\$
\$FILE\$

-L-
 FOR -L- PROFILE, SEE SHEET 14
 PI Sta 40+28.98
 $\Delta = 60' 35" 59.4" (LT)$
 $D = 10' 44" 58.8"$
 $L = 563.74'$
 $T = 311.46'$
 $R = 533.00'$
 $SE = 4\%$
 $RO = 112'$
 $DS = 40 \text{ MPH}$

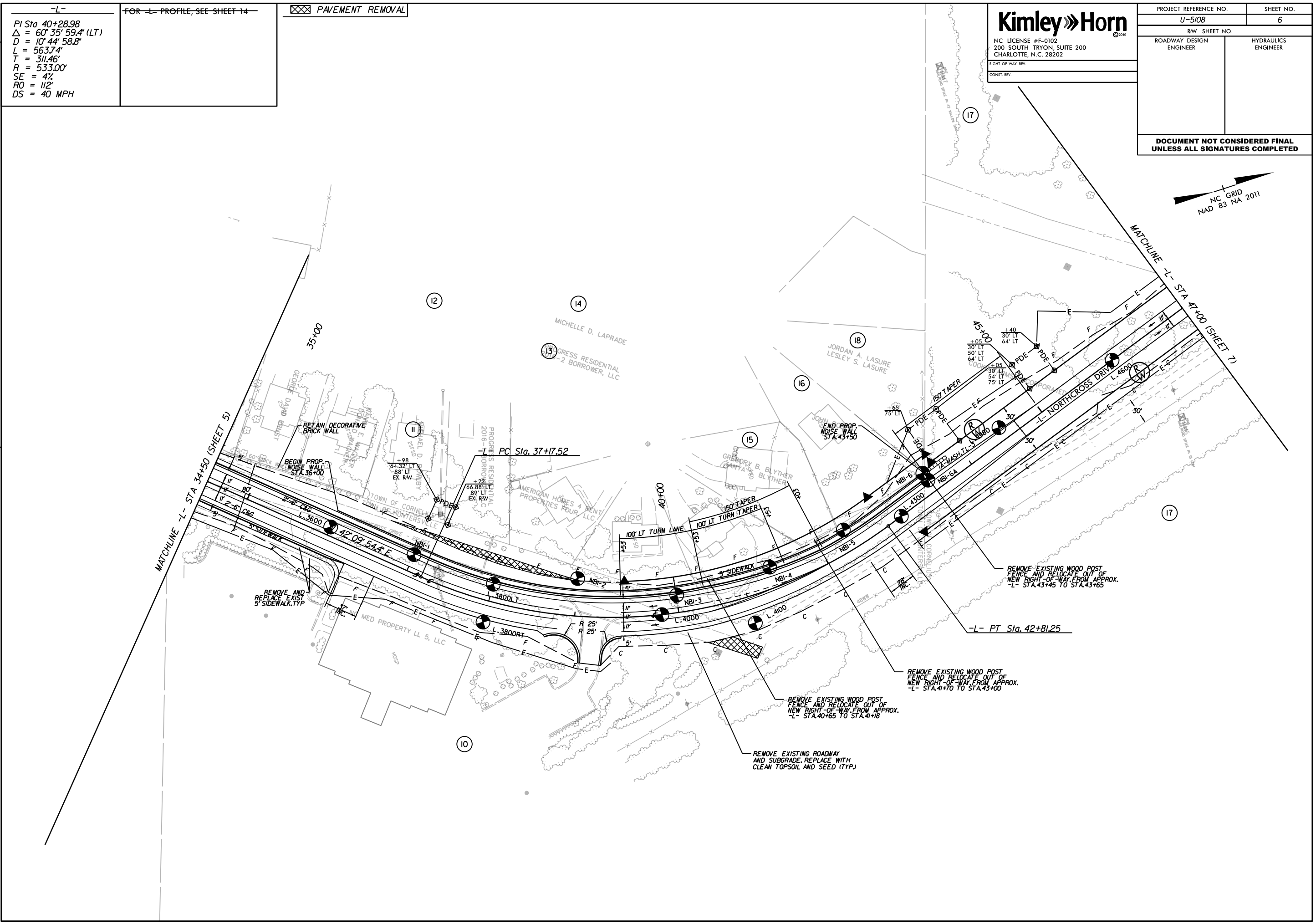
☒ PAVEMENT REMOVAL

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 NC LICENSE #F-0102
 200 SOUTH TRYON, SUITE 200
 CHARLOTTE, N.C. 28202
 RIGHT-OF-WAY REV.
 CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS



\$DATE\$
\$FILE\$

-L-
 PI Sta 61+08.65
 $\Delta = 55^\circ 36' 10.2" (LT)$
 $D = 10^\circ 44' 58.8"$
 $L = 517.25'$
 $T = 281.04'$
 $R = 533.00'$
 $SE = 4\%$
 $RO = 112'$
 $DS = 40 \text{ MPH}$

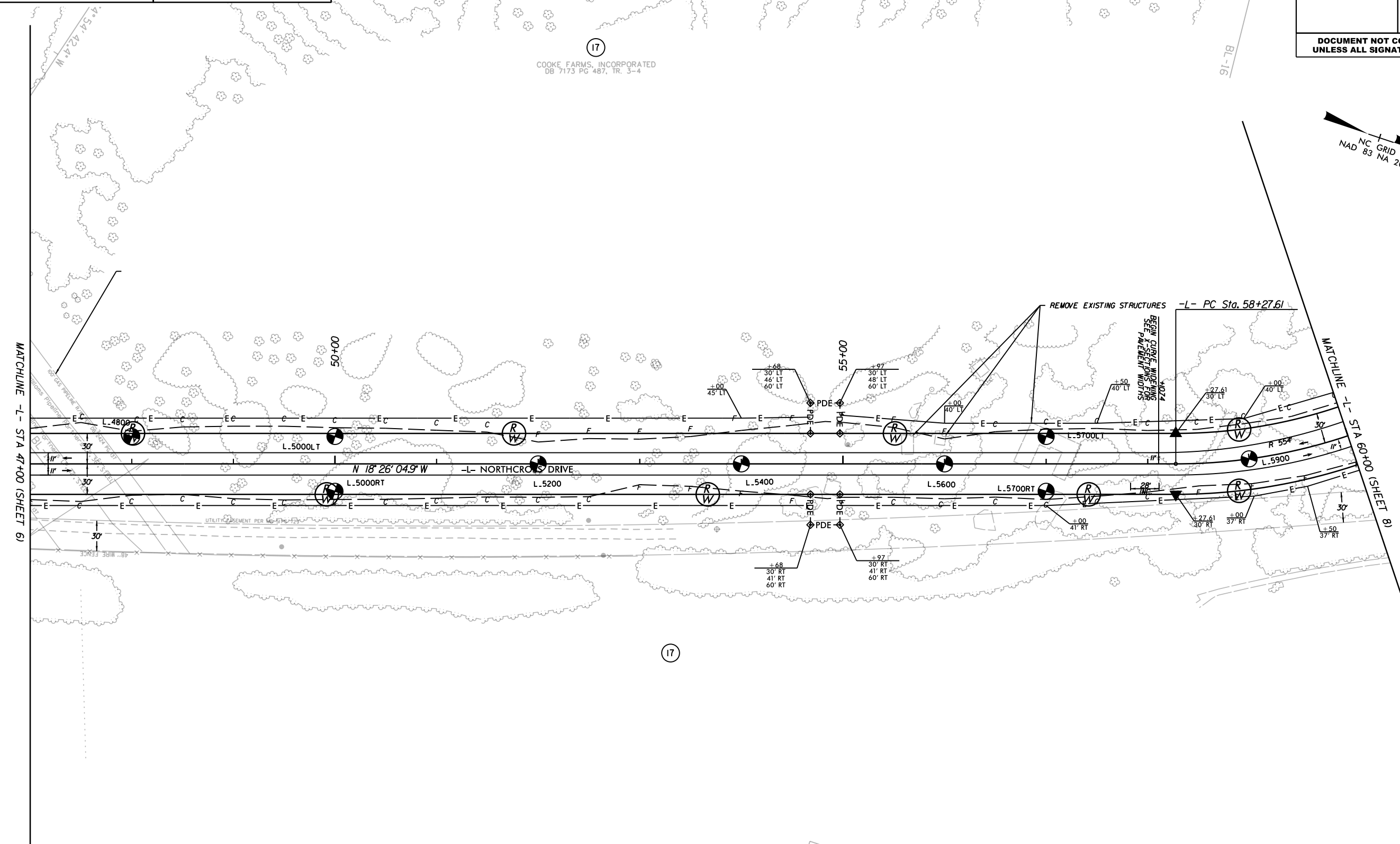
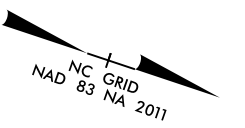
FOR -L- PROFILE, SEE SHEET 14

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 NC LICENSE #F-0102
 200 SOUTH TRYON, SUITE 200
 CHARLOTTE, N.C. 28202
 RIGHT-OF-WAY REV.
 CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

REVISIONS

(17)
 COOKE FARMS, INCORPORATED
 DB 7173 PG 487, TR. 3-4



MATCHLINE -L- STA 47+00 (SHEET 6)

MATCHLINE -L- STA 60+00 (SHEET 8)

THE LOCALIZED...
 IS BASED ON...
 WITH NAD 83/NA...
 NORTHING: 5922...
 THE AVERAGE CORNER...
 (ORIGIN...
 THE N.C. C...
 LOCALIZED HOR...
 15405-1...
 ALL LINEAR DIMENSIONS...
 VERTICAL DI...

\$DATE\$
 \$FILE\$

-L-
 PI Sta 61+08.65
 $\Delta = 55^\circ 36' 10.2" (LT)$
 $D = 10^\circ 44' 58.8"$
 $L = 517.25'$
 $T = 281.04'$
 $R = 533.00'$
 $SE = 4\%$
 $RO = 112'$
 $DS = 40 \text{ MPH}$

FOR -L- PROFILE, SEE SHEET 15

Kimley»Horn

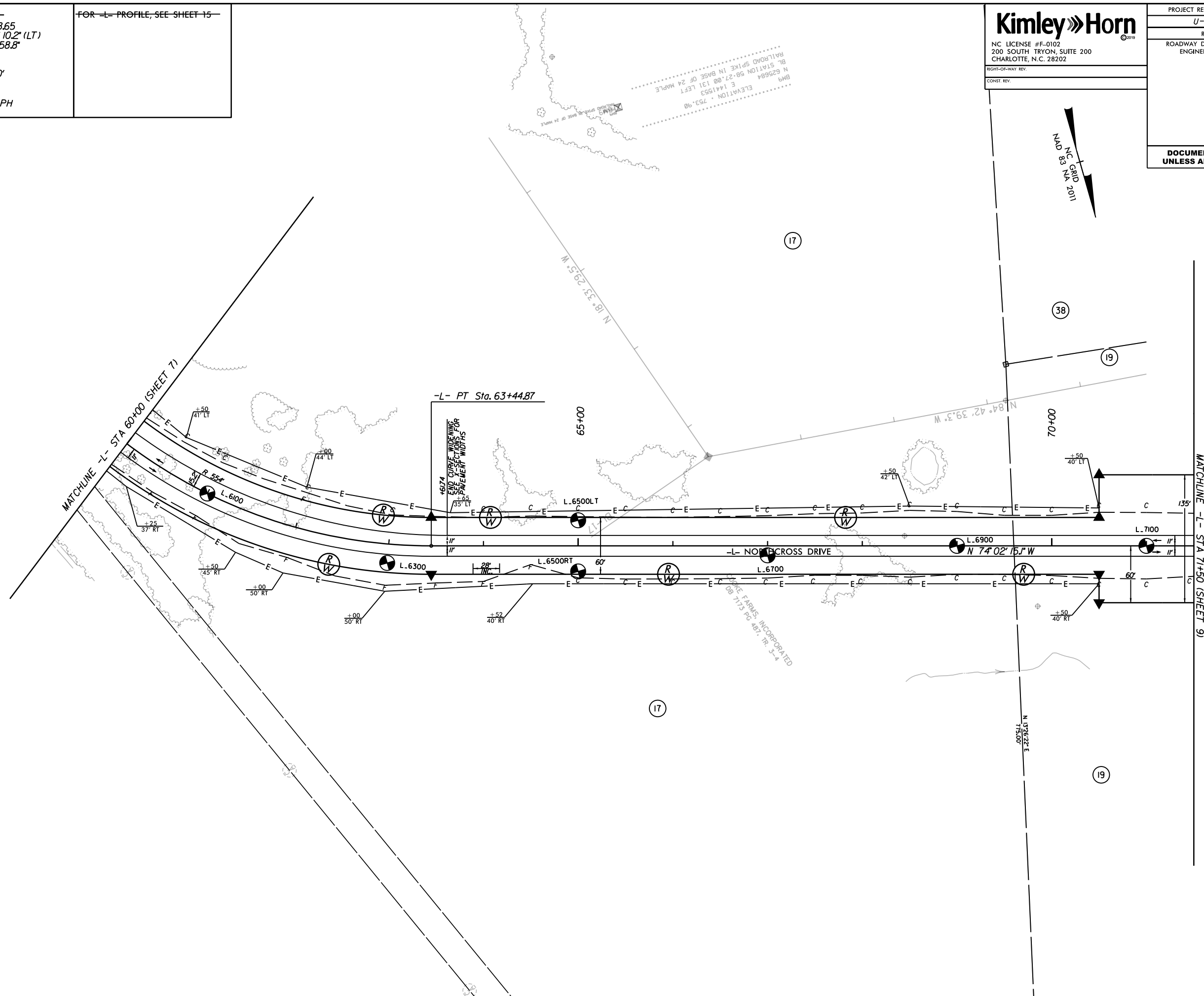
NC LICENSE #F-0102
 200 SOUTH TRYON, SUITE 200
 CHARLOTTE, N.C. 28202

RIGHT-OF-WAY REV.
 CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 8
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

REVISIONS



\$DATE\$
 \$FILE\$

GREENWAY REMOVAL

BEGIN CONSTRUCTION

-GW-L- POT Sta.10+00.00

-GW-L- PC Sta.11+27.84

-GW-L- PC Sta.11+96.69

-GW-L- PT Sta.10+40.82

PI Sta 77+10.59
 $\Delta = 49^{\circ} 48' 21.7''$ (RT)
 $D = 16^{\circ} 22' 12.8''$
 $L = 304.25'$
 $T = 162.49'$
 $R = 350.00'$
 $SE = 2\%$
 $RO = 56'$
 $DS = 30$ MPH

PI Sta 84+87.20
 $\Delta = 87^{\circ} 27' 55.6''$ (LT)
 $D = 16^{\circ} 22' 12.8''$
 $L = 534.30'$
 $T = 334.85'$
 $R = 350.00'$
 $SE = 2\%$
 $RO = 56'$
 $DS = 30$ MPH

-FOR L- PROFILE, SEE SHEET 15 AND 16

-FOR GW-L- PROFILE, SEE SHEET 18

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200 SOUTH TRYON, SUITE 200
CHARLOTTE, N.C. 28202

RIGHT-OF-WAY REV.
CONST. REV.

PROJECT REFERENCE NO. SHEET NO.

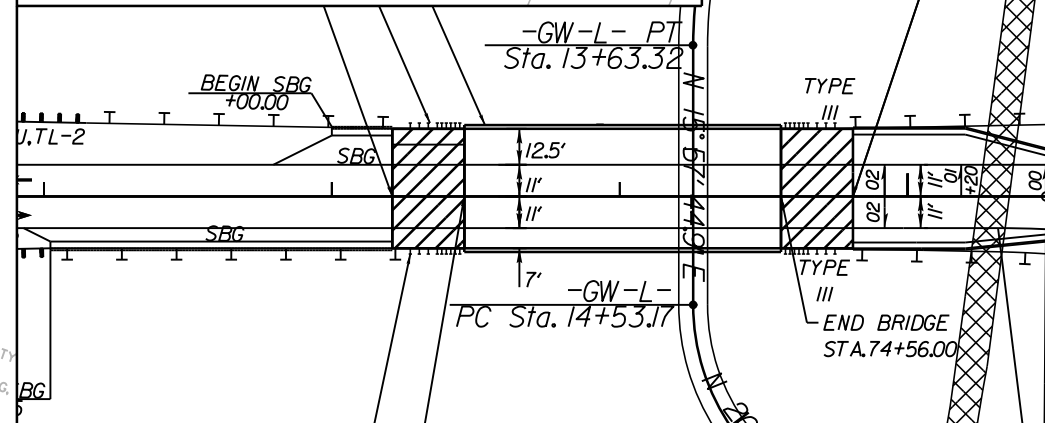
U-5108 9

RW SHEET NO.

ROADWAY DESIGN ENGINEER HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

-GW-L-		
PI Sta 10+85.59 $\Delta = 33^{\circ} 14' 24.9''$ (RT) $D = 38^{\circ} 11' 49.9''$ $L = 87.02'$ $T = 44.77'$ $R = 150.00'$	PI Sta 12+27.84 $\Delta = 23^{\circ} 27' 58.5''$ (RT) $D = 38^{\circ} 11' 49.9''$ $L = 61.43'$ $T = 31.15'$ $R = 150.00'$	PI Sta 13+24.98 $\Delta = 29^{\circ} 59' 33.4''$ (LT) $D = 38^{\circ} 11' 49.9''$ $L = 78.52'$ $T = 40.18'$ $R = 150.00'$
PI Sta 14+78.16 $\Delta = 36^{\circ} 51' 21.8''$ (LT) $D = 76^{\circ} 23' 39.7''$ $L = 48.24'$ $T = 24.99'$ $R = 75.00'$	PI Sta 16+00.77 $\Delta = 36^{\circ} 35' 43.0''$ (RT) $D = 28^{\circ} 38' 52.4''$ $L = 127.74'$ $T = 66.13'$ $R = 200.00'$	PI Sta 17+02.38 $\Delta = 18^{\circ} 10' 50.5''$ (LT) $D = 22^{\circ} 55' 05.9''$ $L = 79.33'$ $T = 40.00'$ $R = 250.00'$

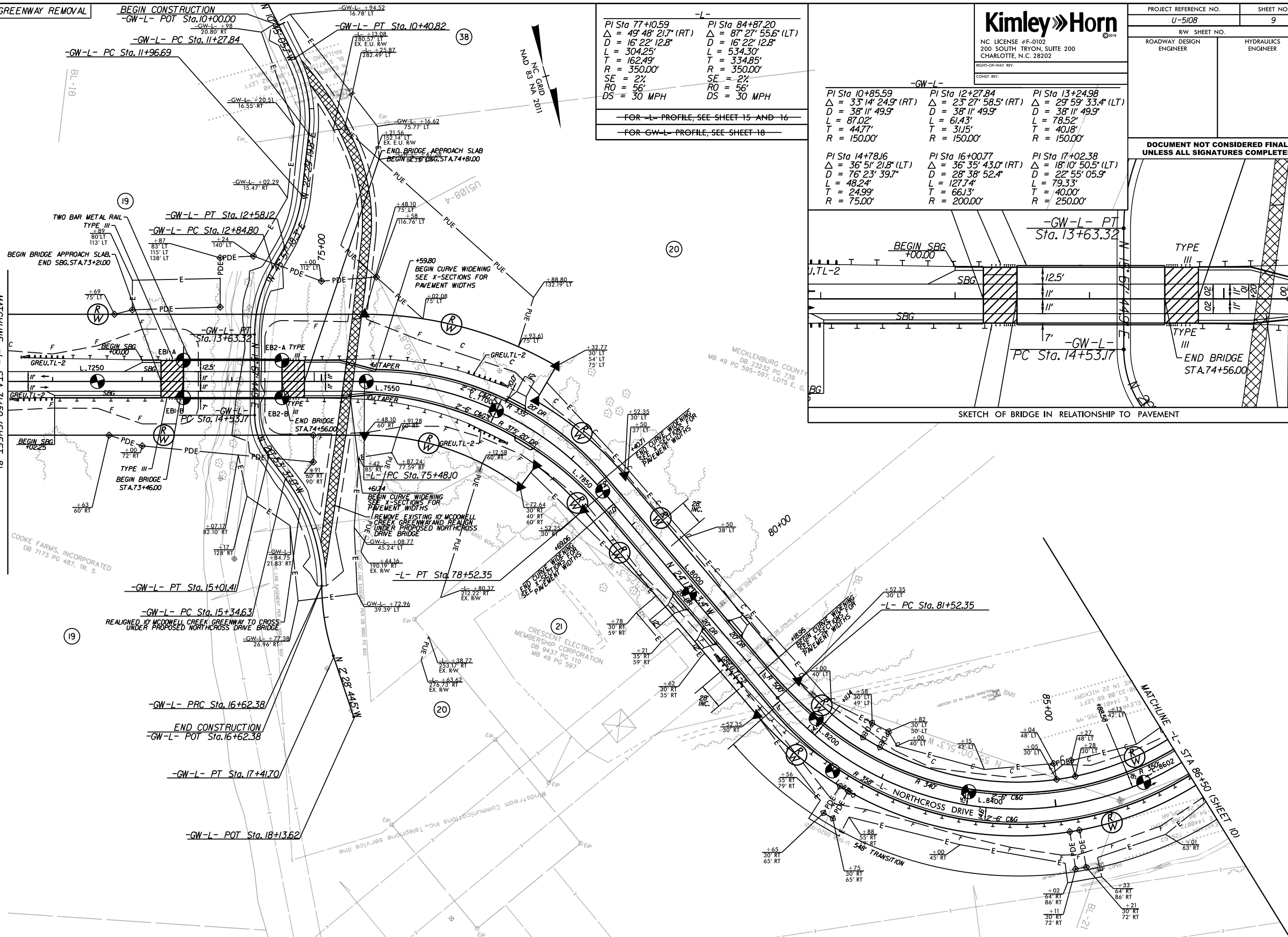


SKETCH OF BRIDGE IN RELATIONSHIP TO PAVEMENT

REVISIONS

MATCHLINE -L- STA 71+50 (SHEET 8)

MATCHLINE -L- STA 86+50 (SHEET 10)



\$DATE\$
\$FILE\$

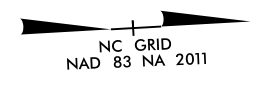
-L-	-LI-	-YI-	-YI-
PI Sta 91+15.66	PI Sta 15+81.77	PI Sta 10+16.68	PI Sta 10+46.56
$\Delta = 14^\circ 56' 03.7" (RT)$	$\Delta = 69^\circ 12' 48.7" (LT)$	$\Delta = 8^\circ 28' 49.9" (RT)$	$\Delta = 27^\circ 05' 58.4" (RT)$
$D = 33^\circ 42' 12.2"$	$D = 31^\circ 49' 51.6"$	$D = 25^\circ 27' 53.2"$	$D = 104^\circ 10' 26.9"$
$L = 341.02'$	$L = 217.44'$	$L = 33.30'$	$L = 26.01'$
$T = 266.51'$	$T = 124.21'$	$T = 16.68'$	$T = 13.25'$
$R = 170.00'$	$R = 180.00'$	$R = 225.00'$	$R = 55.00'$
SE = 4%	SE = NC	SE = NC	SE = NC
RO = 56'	RO = NONE	RO = NONE	RO = NONE
DS = 25 MPH	DS = 20 MPH		

-FOR=L- PROFILE, SEE SHEET 16
-FOR=LI- PROFILE, SEE SHEET 16

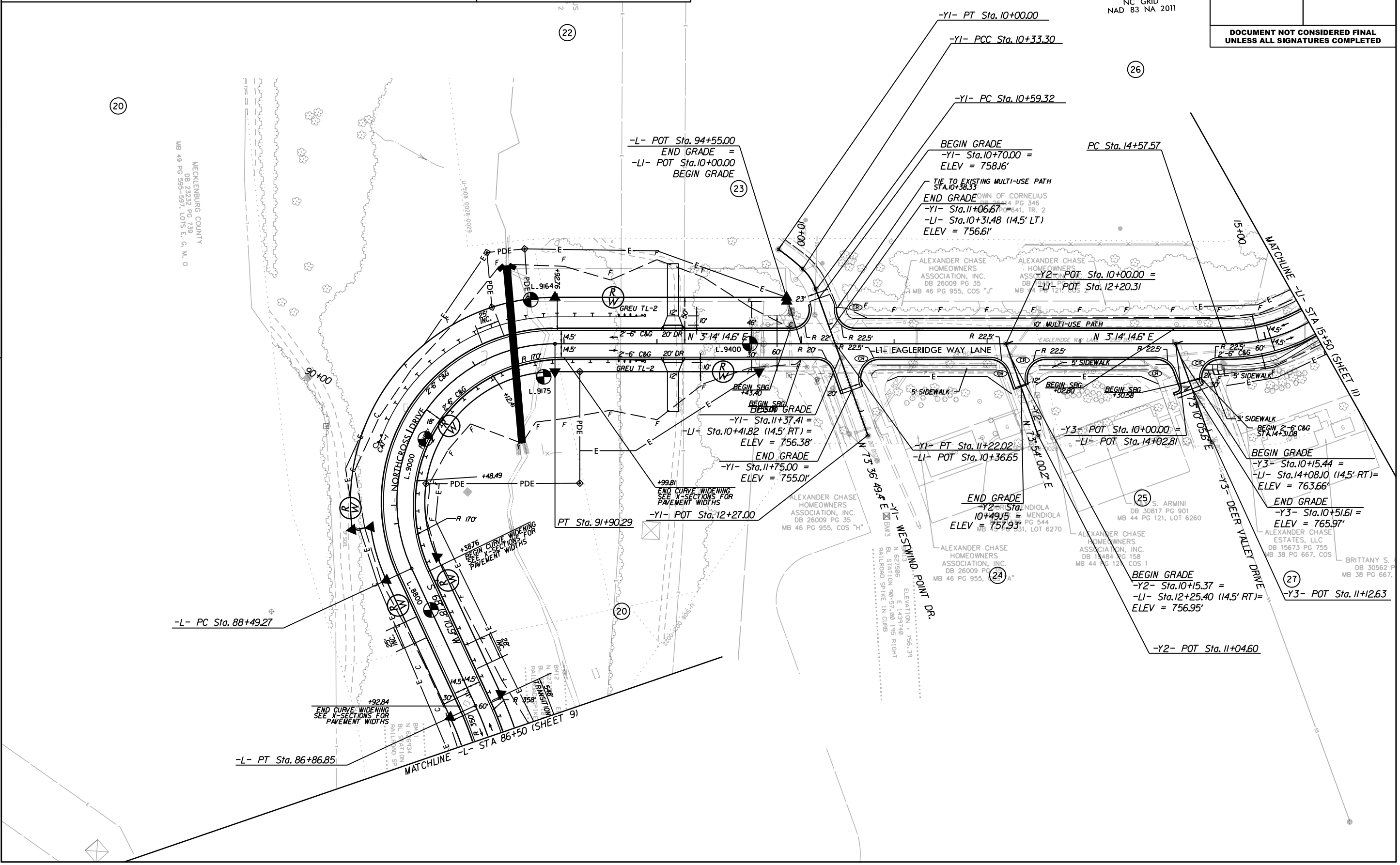
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 200 SOUTH TRYON, SUITE 200
 CHARLOTTE, N.C. 28202
 RIGHT-OF-WAY REV.
 CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 10
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	

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UNLESS ALL SIGNATURES COMPLETED**



REVISIONS



\$DATE\$
\$FILE\$

-LI-		
PI Sta 15+81.77	PI Sta 17+67.02	PI Sta 19+29.95
$\Delta = 69^{\circ} 12' 48.7" (LT)$	$\Delta = 46^{\circ} 20' 24.1" (RT)$	$\Delta = 10^{\circ} 04' 12.5" (RT)$
$D = 31^{\circ} 49' 51.6"$	$D = 26^{\circ} 38' 57.1"$	$D = 6^{\circ} 13' 40.1"$
$L = 217.44'$	$L = 173.89'$	$L = 161.70'$
$T = 124.21'$	$T = 92.02'$	$T = 81.06'$
$R = 180.00'$	$R = 215.00'$	$R = 920.00'$
SE = NC	SE = NC	SE = NC
RO = NONE	RO = NONE	RO = NONE
DS = 20 MPH	DS = 20 MPH	DS = 20 MPH

-Y6-		
PI Sta 12+85.45	PI Sta 16+74.96	PI Sta 19+15.56
$\Delta = 20^{\circ} 43' 41.1" (LT)$	$\Delta = 25^{\circ} 18' 12.4" (RT)$	$\Delta = 15^{\circ} 39' 38.4" (LT)$
$D = 3^{\circ} 41' 47.4"$	$D = 11^{\circ} 27' 33.0"$	$D = 5^{\circ} 58' 05.9"$
$L = 560.75'$	$L = 220.81'$	$L = 262.40'$
$T = 283.47'$	$T = 112.24'$	$T = 132.02'$
$R = 1,550.00'$	$R = 500.00'$	$R = 960.00'$
SE = 6.2%	SE = NC	SE = NC
RO = 223	RO = NONE	RO = NONE
DS = 50 MPH	DS = 20 MPH	DS = 20 MPH

-FOR -Y6- PROFILE, SEE SHEET 17-

RAB DETAIL, SEE SHEET 11B

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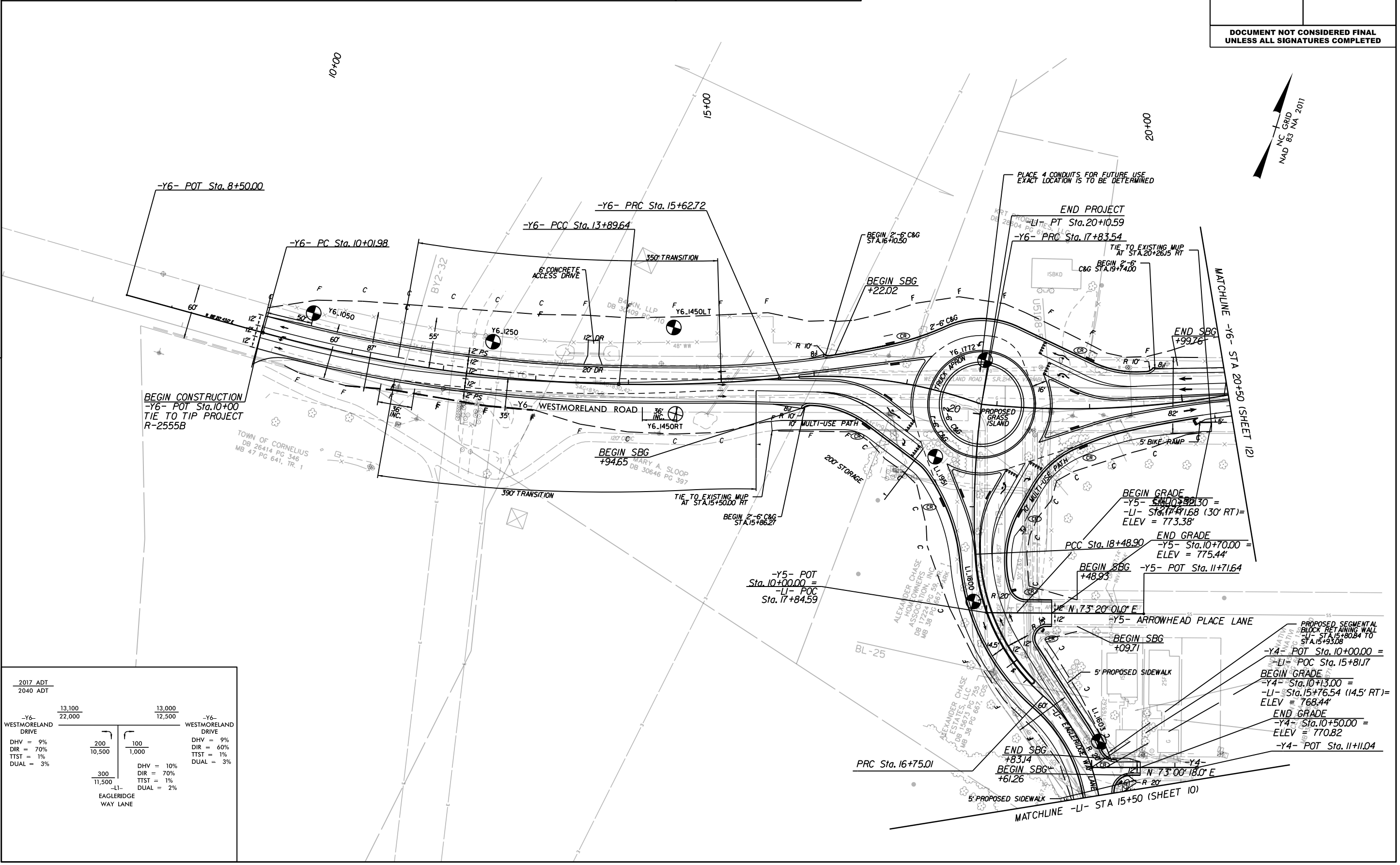
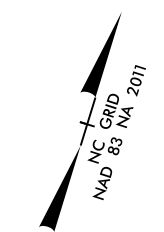
NC LICENSE #F-0102
200 SOUTH TRYON, SUITE 200
CHARLOTTE, N.C. 28202

RIGHT-OF-WAY REV.
CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 11
RW SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	

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

REVISIONS



2017 ADT	2040 ADT
13,100	13,000
22,000	12,500

-Y6- WESTMORELAND DRIVE		-Y6- WESTMORELAND DRIVE	
DHV = 9%	DIR = 70%	DHV = 9%	DIR = 60%
TTST = 1%	DUAL = 3%	TTST = 1%	DUAL = 3%

-LI- EAGLERIDGE WAY LANE		-LI- EAGLERIDGE WAY LANE	
DHV = 10%	DIR = 70%	DHV = 10%	DIR = 70%
TTST = 1%	DUAL = 2%	TTST = 1%	DUAL = 2%

\$DATE\$
\$FILE\$

ROUNDAABOUT GEOMETRY SHEET

Kimley Horn

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200 SOUTH TRYON, SUITE 200
CHARLOTTE, N.C. 28202

PROJECT REFERENCE NO. U-5108	SHEET NO. 11A
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

-RABB- PI Sta 10+42.11 Δ = 4° 49' 21.5" (LT) D = 5' 43' 46.5" L = 84.17' T = 42.11' R = 1,000.00'	-RABB- PI Sta 11+16.08 Δ = 12° 08' 33.8" (LT) D = 19' 05' 54.9" L = 63.58' T = 31.91' R = 300.00'
---	---

-RABB- Sta.10+00.00 =
-Y6- Sta.16+00.00 (17.54' LT)
ELEV = 772.35'

-Y6- Sta.17+25.50
-RAB- Sta.12+62.22
ELEV = 775.15'

-RABB- +40.00
774.19 (HP)
-RABB- Sta.11+47.45 =
-RAB- Sta.12+12.69 =
-Y6- Sta.17+27.97 (67.80' LT)
ELEV = 774.24'

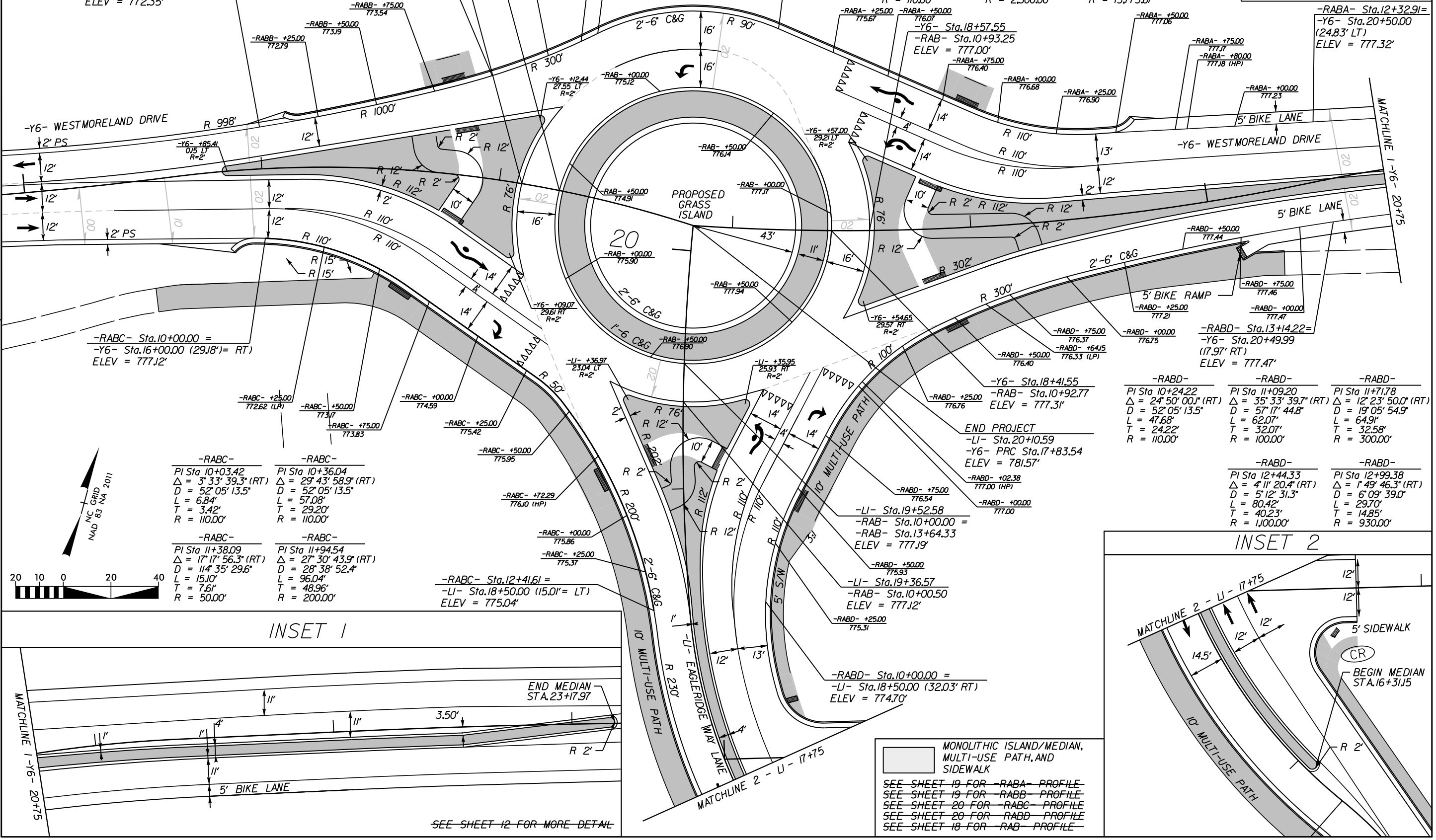
-RAB- Sta.11+62.24 =
-RABA- Sta.10+00.00 =
-Y6- Sta.18+16.71 (84.24' LT)
ELEV = 775.22'

-RABA-
PI Sta 11+5.80
Δ = 27° 38' 35.8" (LT)
D = 52' 05' 13.5"
L = 53.07'
T = 27.06'
R = 110.00'

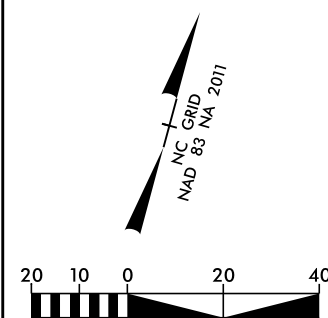
-RABA-
PI Sta 11+45.10
Δ = 0° 09' 03.6" (RT)
D = 2' 17' 30.6"
L = 6.59'
T = 3.29'
R = 2.500.00'

-RABA-
PI Sta 11+80.60
Δ = 0° 16' 04.5" (LT)
D = 0' 24' 57.5"
L = 64.40'
T = 32.20'
R = 13,773.61'

-RABA- Sta.12+32.91 =
-Y6- Sta.20+50.00
(24.83' LT)
ELEV = 777.32'



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-RABC- PI Sta 10+03.42 Δ = 3° 33' 39.3" (RT) D = 52' 05' 13.5" L = 6.84' T = 3.42' R = 110.00'	-RABC- PI Sta 10+36.04 Δ = 29° 43' 58.9" (RT) D = 52' 05' 13.5" L = 57.08' T = 29.20' R = 110.00'
--	---

-RABC- PI Sta 11+38.09 Δ = 17° 17' 56.3" (RT) D = 114' 35' 29.6" L = 15.10' T = 7.61' R = 50.00'	-RABC- PI Sta 11+94.54 Δ = 27° 30' 43.9" (RT) D = 28' 38' 52.4" L = 96.04' T = 48.96' R = 200.00'
--	---

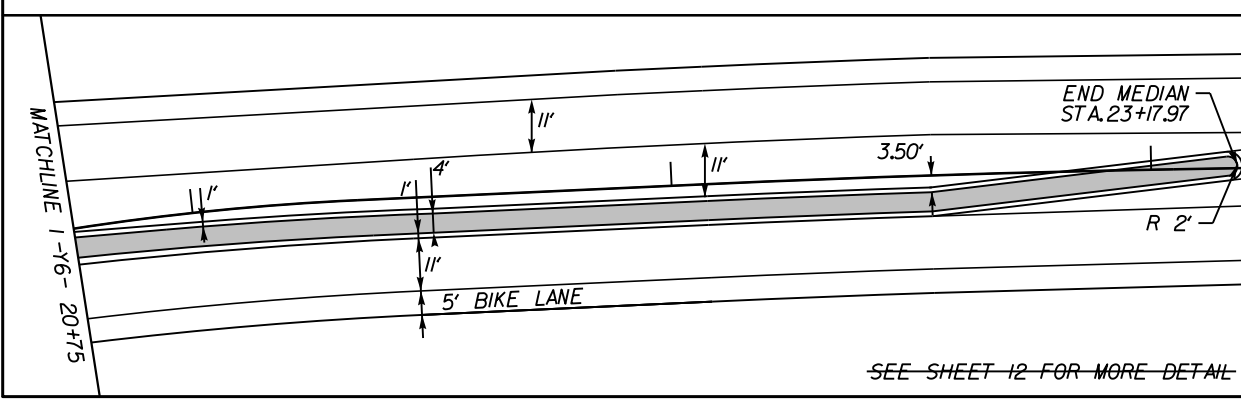
-RABC- Sta.12+41.61 =
-LI- Sta.18+50.00 (15.01' LT)
ELEV = 775.04'

END PROJECT
-LI- Sta.20+10.59
-Y6- PRC Sta.17+83.54
ELEV = 781.57'

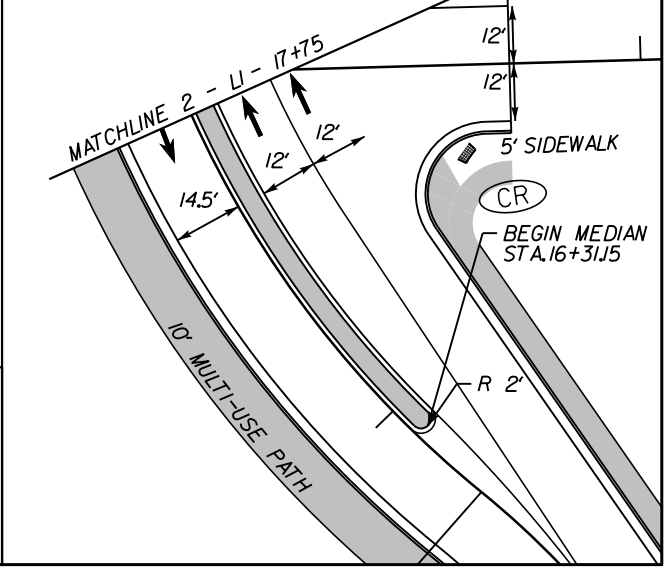
-RABD- PI Sta 10+24.22 Δ = 24° 50' 00.1" (RT) D = 52' 05' 13.5" L = 47.68' T = 24.22' R = 110.00'	-RABD- PI Sta 11+09.20 Δ = 35° 33' 39.7" (RT) D = 57' 17' 44.8" L = 62.07' T = 32.07' R = 100.00'	-RABD- PI Sta 11+71.78 Δ = 12° 23' 50.0" (RT) D = 19' 05' 54.9" L = 64.91' T = 32.58' R = 300.00'
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-RABD- PI Sta 12+44.33 Δ = 4° 11' 20.4" (RT) D = 5' 12' 31.3" L = 80.42' T = 40.23' R = 1,000.00'	-RABD- PI Sta 12+99.38 Δ = 1° 49' 46.3" (RT) D = 6' 09' 39.0" L = 29.70' T = 14.85' R = 930.00'
---	---

INSET 1



INSET 2



MONOLITHIC ISLAND/MEDIAN,
MULTI-USE PATH, AND
SIDEWALK
SEE SHEET 19 FOR RABA- PROFILE
SEE SHEET 19 FOR RABB- PROFILE
SEE SHEET 20 FOR RABC- PROFILE
SEE SHEET 20 FOR RABD- PROFILE
SEE SHEET 18 FOR RAB- PROFILE

\$DATE\$
\$FILES\$

SEE SHEET 12 FOR MORE DETAIL

-Y6-
 PI Sta 20+90.34 PI Sta 22+56.02
 $\Delta = 9'13''52.1''$ (RT) $\Delta = 1'35''37.1''$ (RT)
 $D = 10'25''02.7''$ $D = 1'38''13.3''$
 $L = 88.61'$ $L = 97.35'$
 $T = 44.40'$ $T = 48.68'$
 $R = 550.00'$ $R = 3,500.00'$
 $SE = NC$ $SE = MATCH EXIST.$
 $RO = NONE$ $RO = MATCH EXIST.$
 $DS = 20 MPH$

FOR -Y6- PROFILE, SEE SHEET 17-

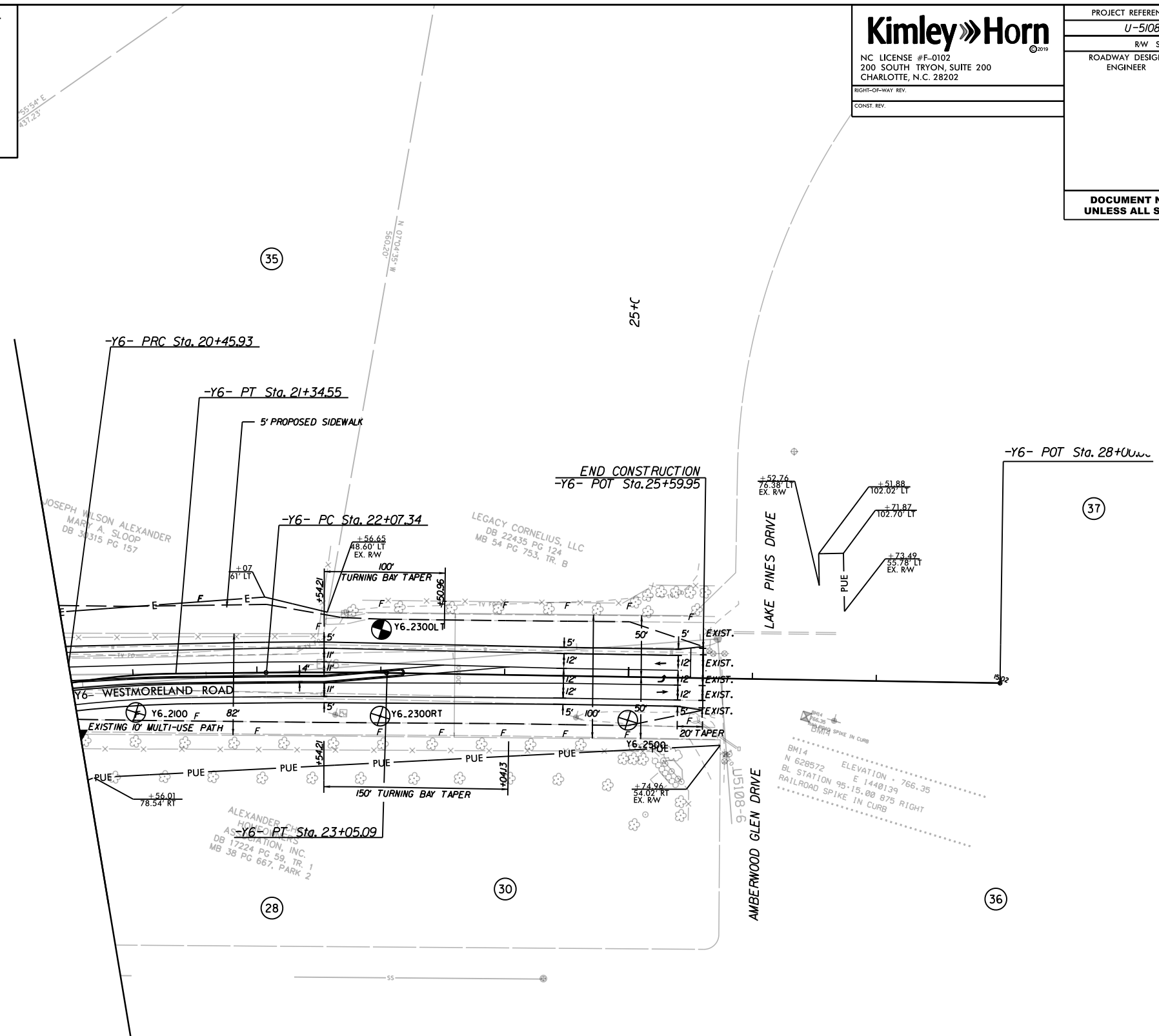
Kimley»Horn

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 200 SOUTH TRYON, SUITE 200
 CHARLOTTE, N.C. 28202

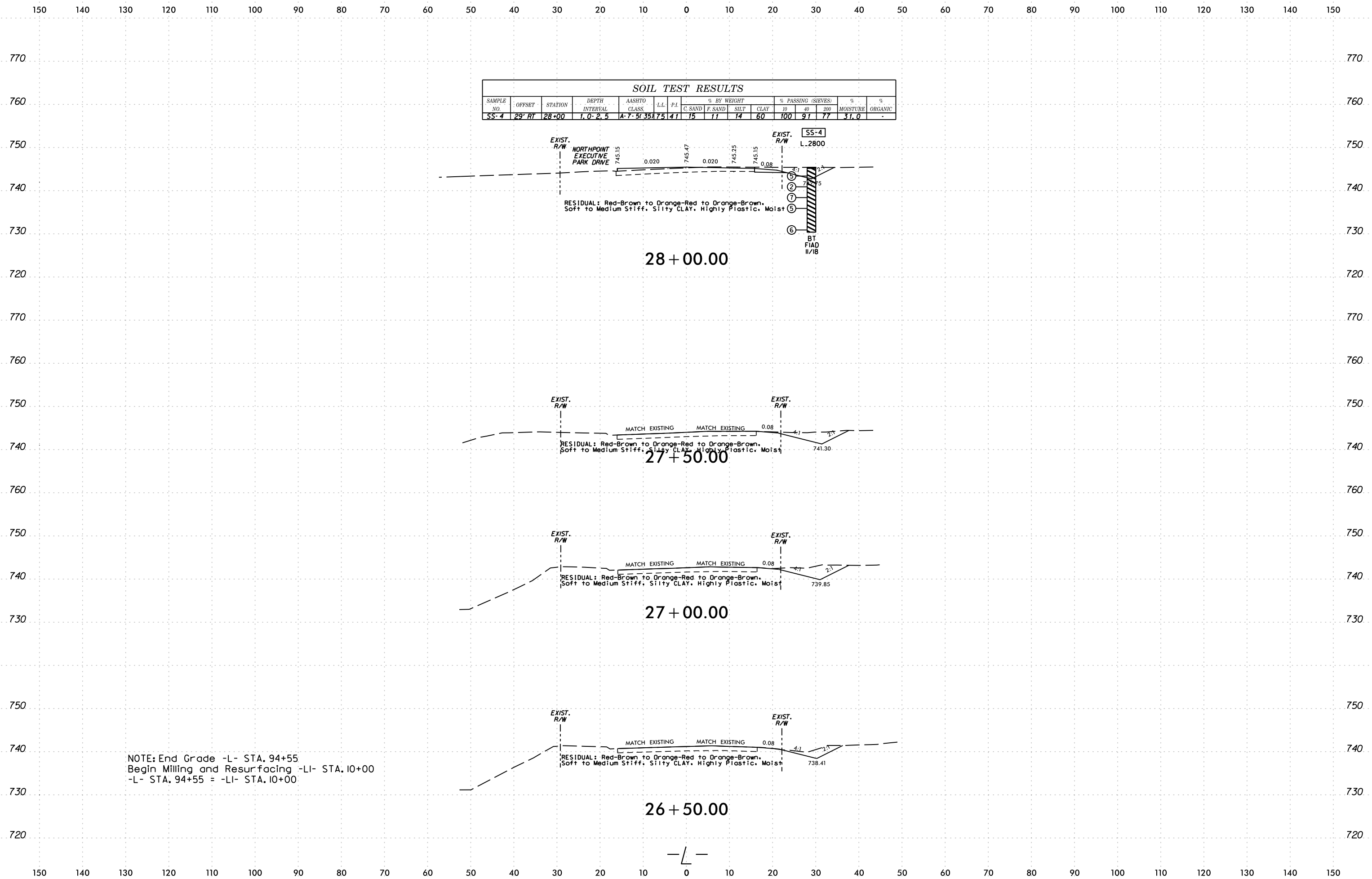
RIGHT-OF-WAY REV.
 CONST. REV.

PROJECT REFERENCE NO. U-5108	SHEET NO. 12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

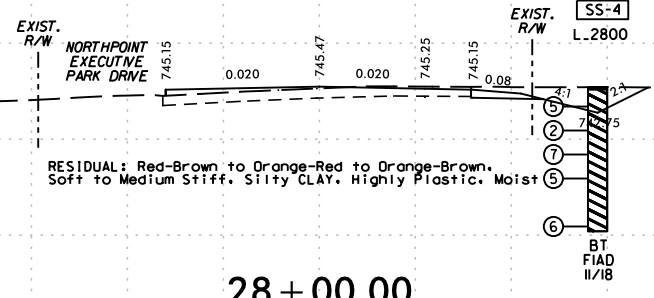
REVISIONS



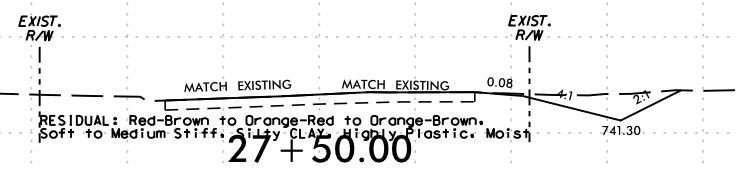
\$DATE\$
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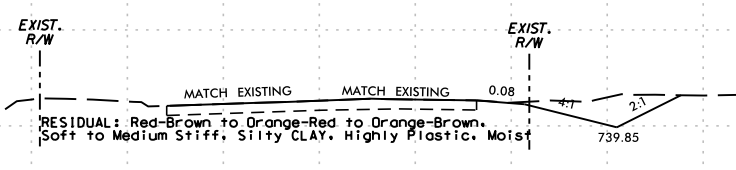
SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
SS-4	29' RT	28+00	1.0-2.5	A-7-5	35	75	41	15	11	14	60	100	91	77	31.0	-



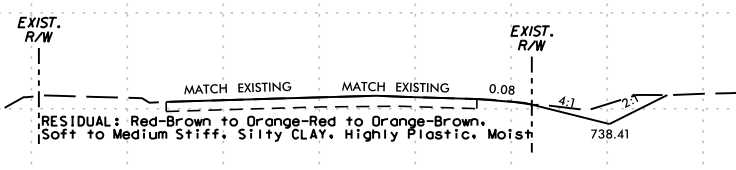
28 + 00.00



27 + 50.00

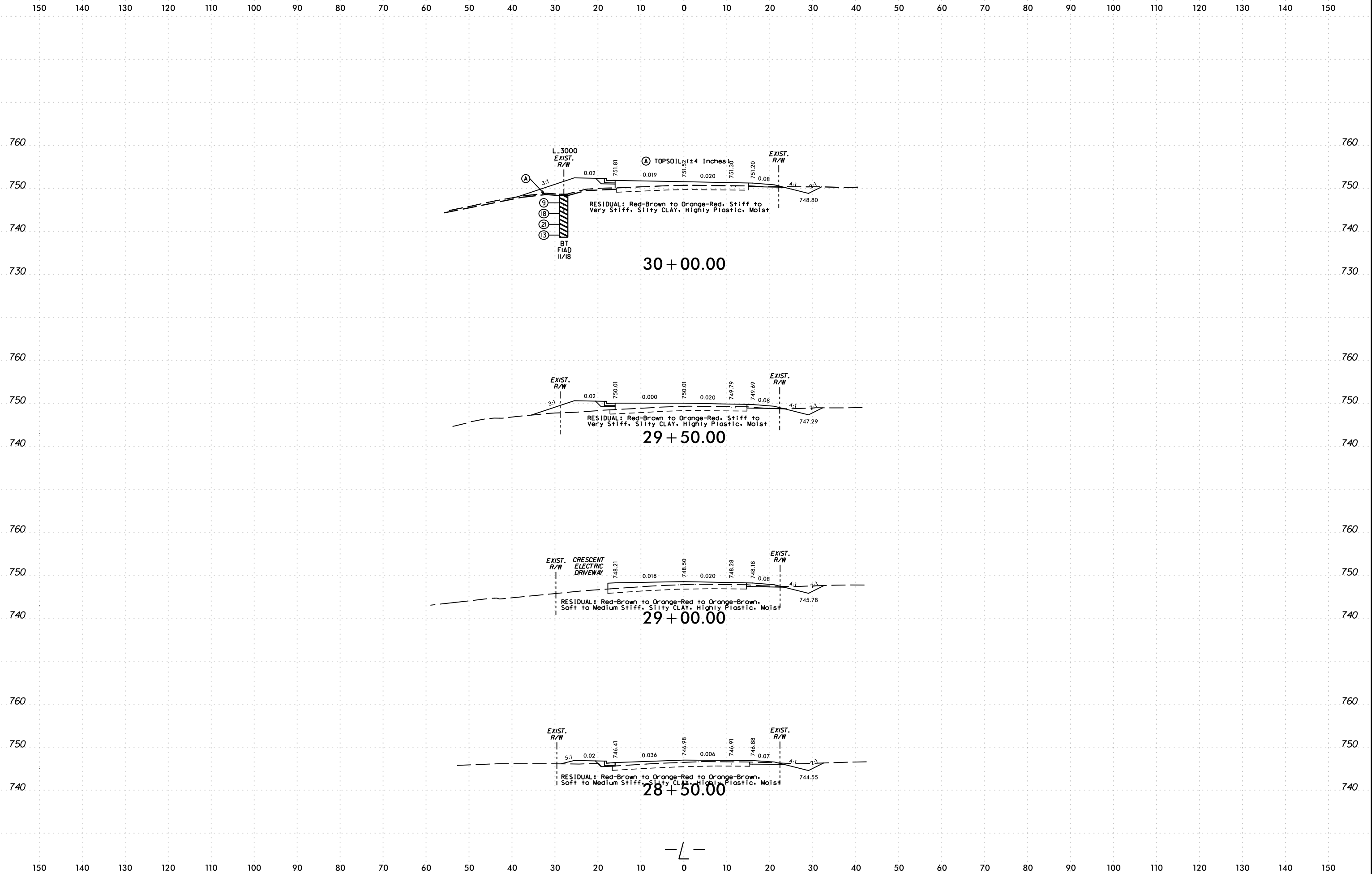


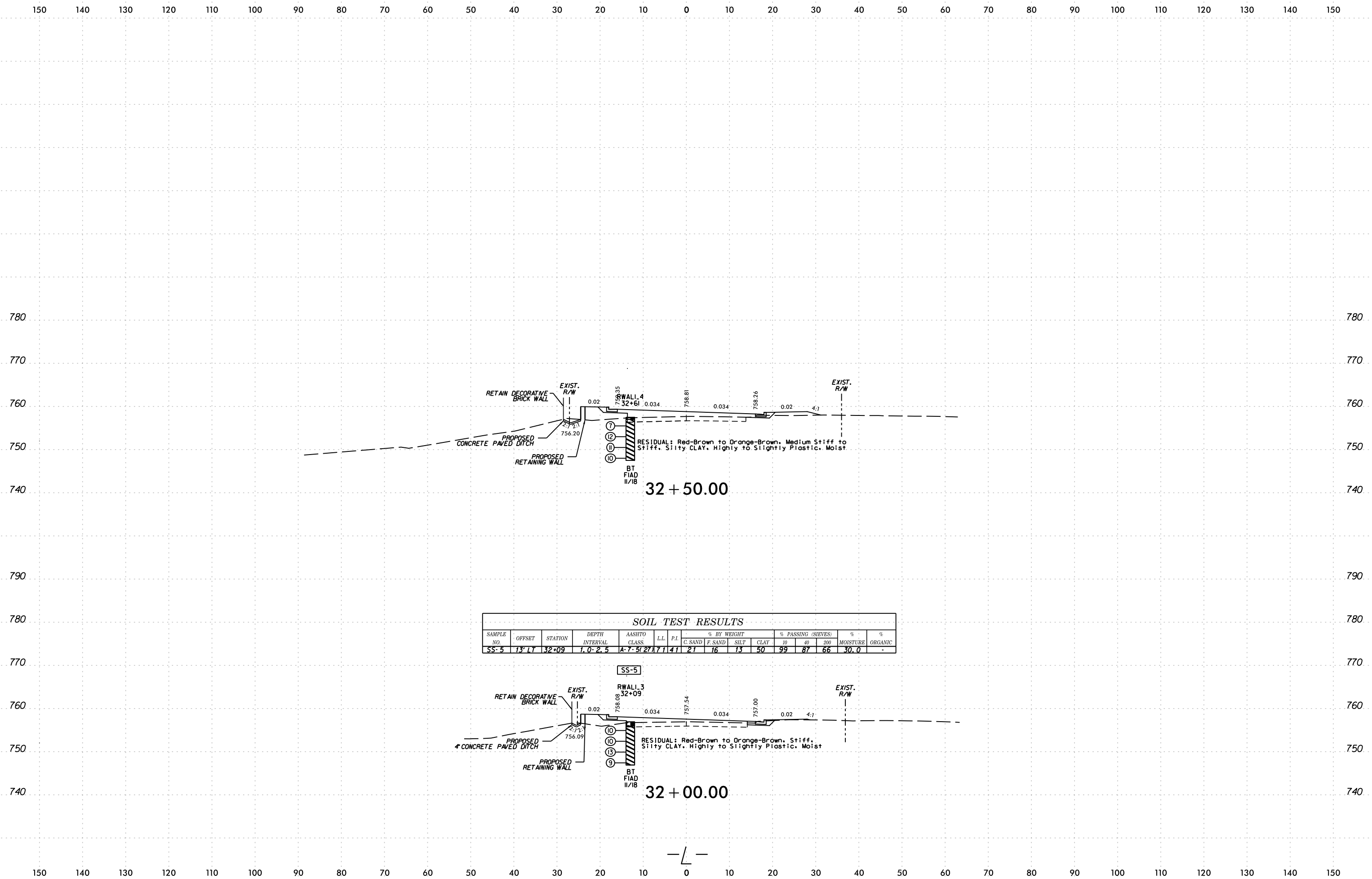
27 + 00.00



26 + 50.00

NOTE: End Grade -L- STA. 94+55
 Begin Milling and Resurfacing -LI- STA. 10+00
 -L- STA. 94+55 = -LI- STA. 10+00

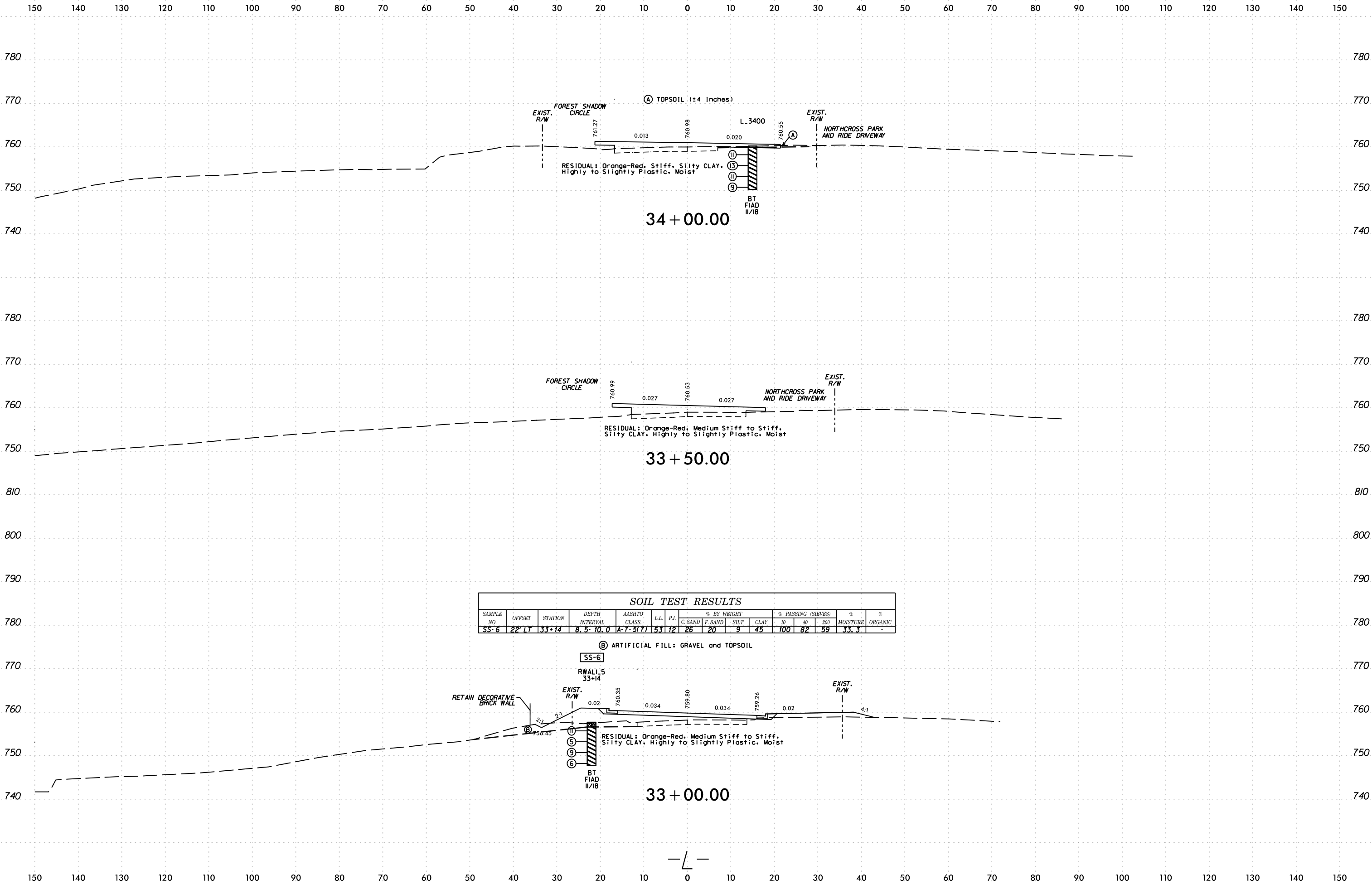




SOIL TEST RESULTS

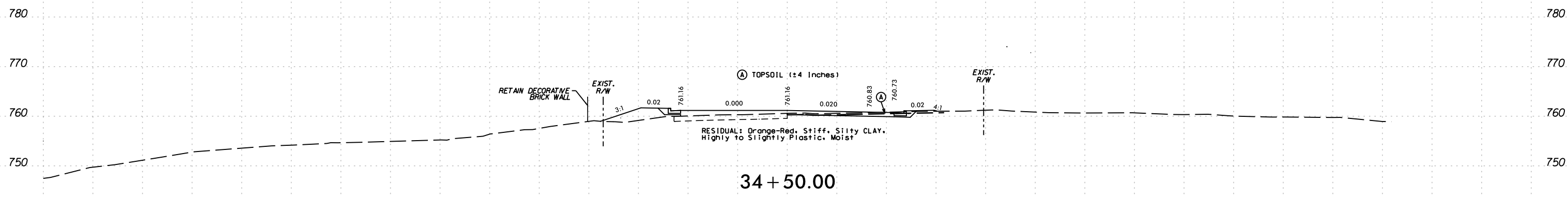
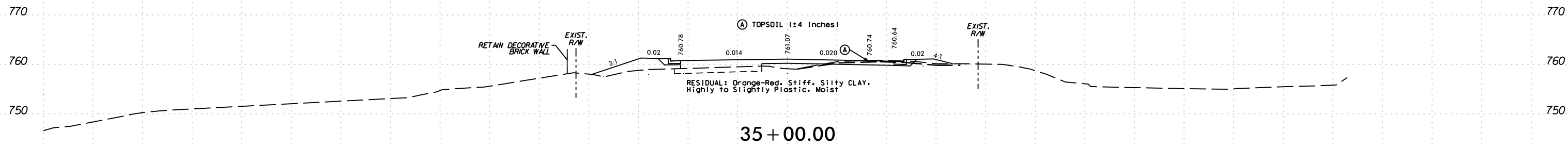
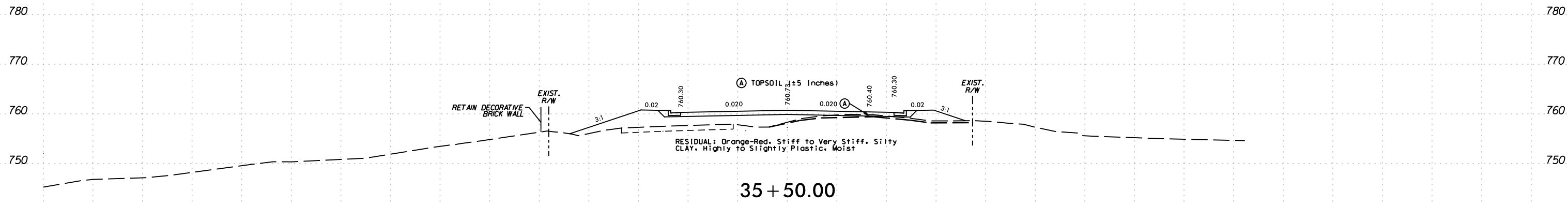
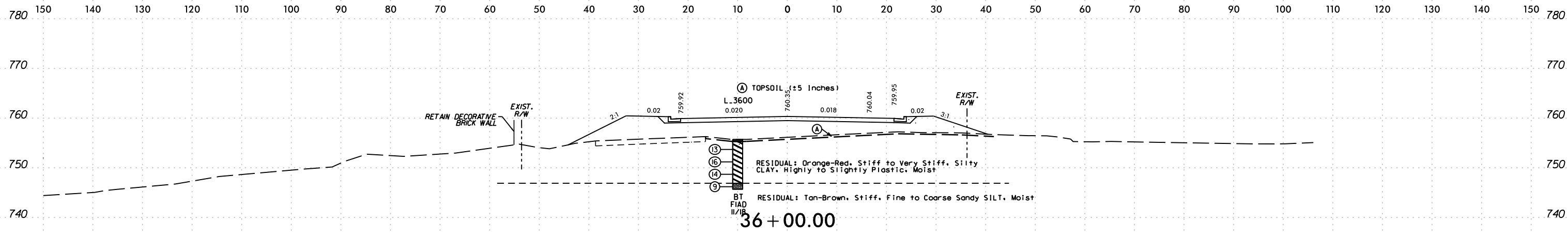
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
SS-5	13' LT	32+09	1.0-2.5	A-7-5	27	11	41	21	16	13	50	99	87	66	30.0	-

12/9/2019 9:30:50 AM
 Z:\Projects\2018\G\G\05\3001_U-5108 (Northcross)\US108_GEO\RDWY\CADD_GEO\TECH\SSC\U-5108_Geo_xsi.L.dgn
 r.pastorano



SOIL TEST RESULTS

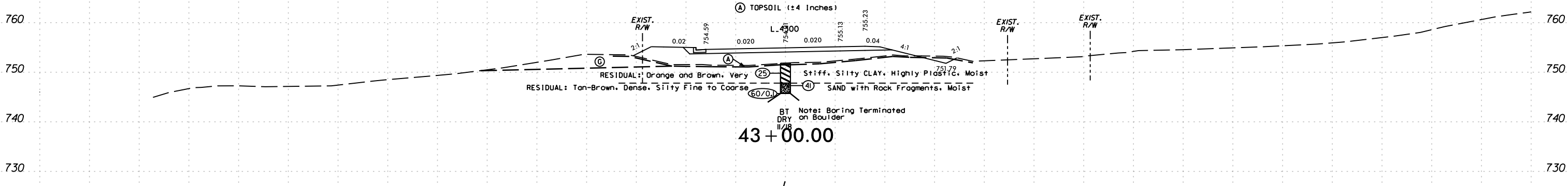
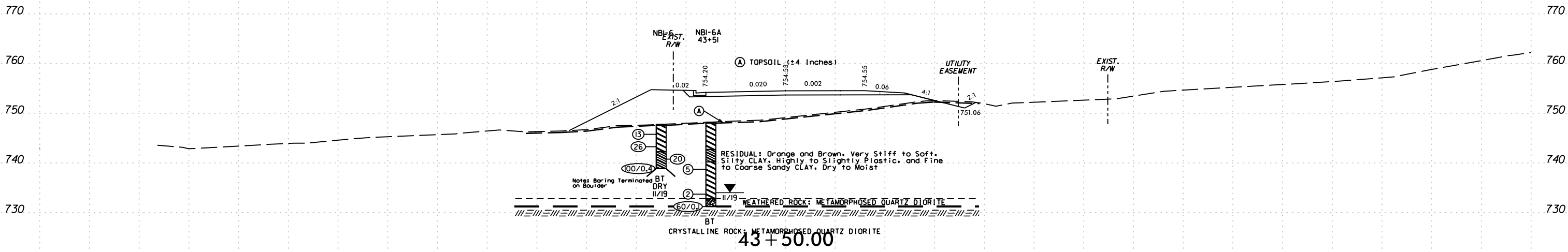
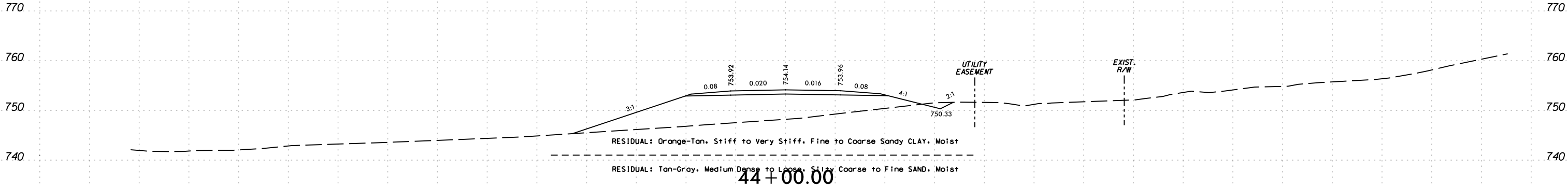
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-6	22' LT	33+14	8.5 - 10.0	A-7.5(7)	53	12	26	20	9	45	100	82	59	33.3	-



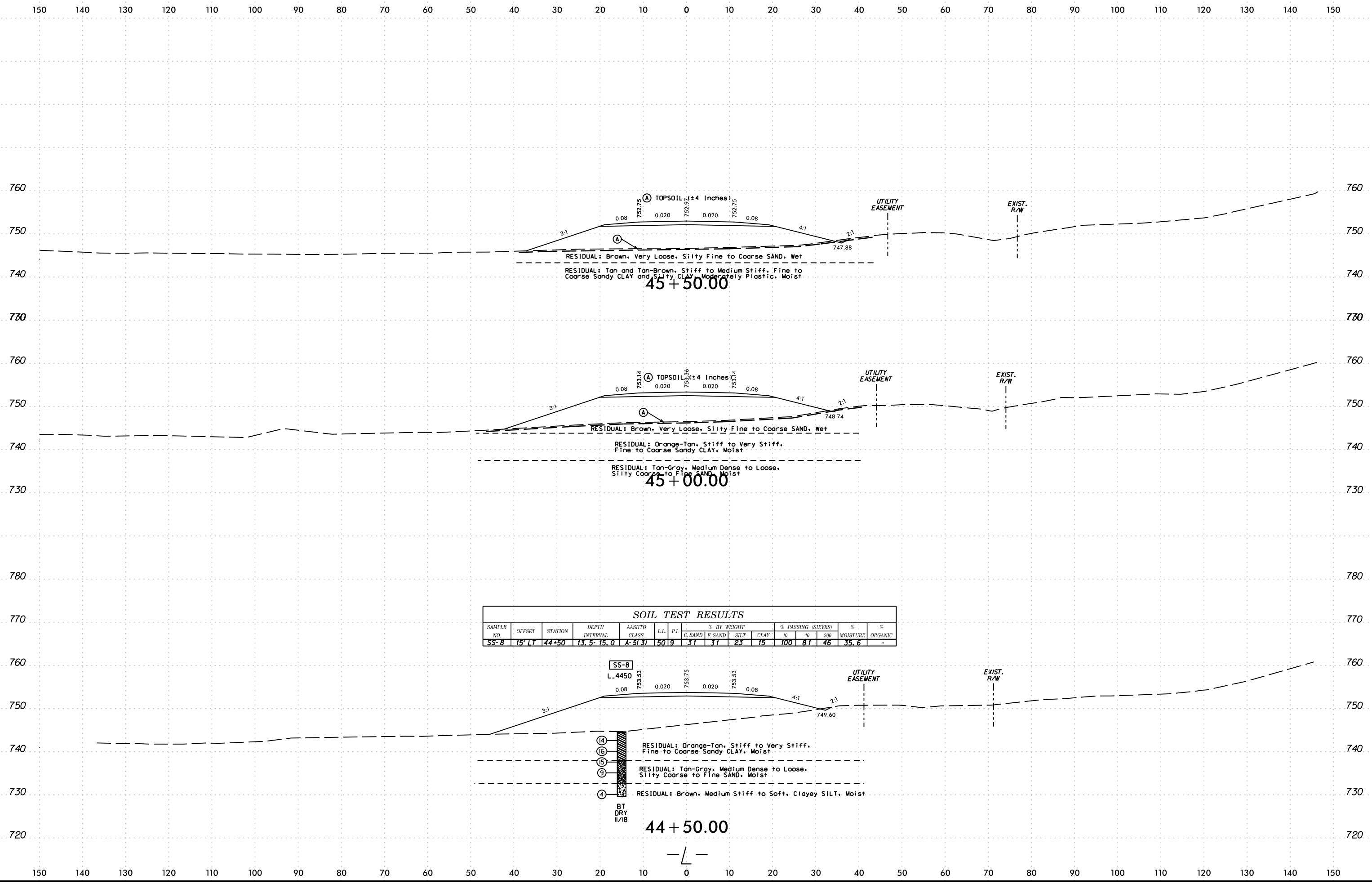
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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

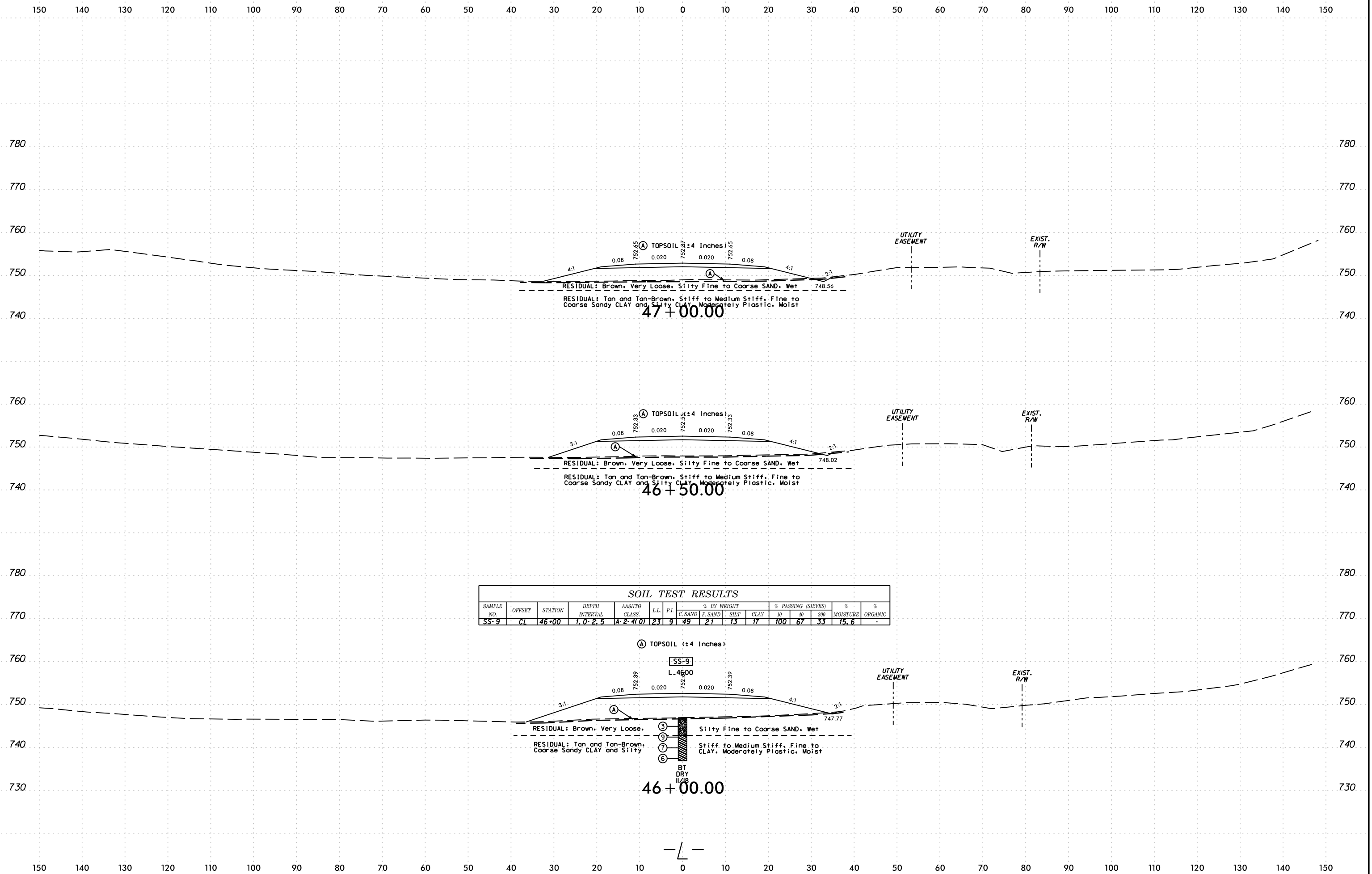


150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150



SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-8	15' LT	44+50	13.5-15.0	A-5(3)	50	19	31	31	23	15	100	81	46	35.6	-

12/9/2019 9:30:57 AM
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 r.pastorano



47 + 00.00

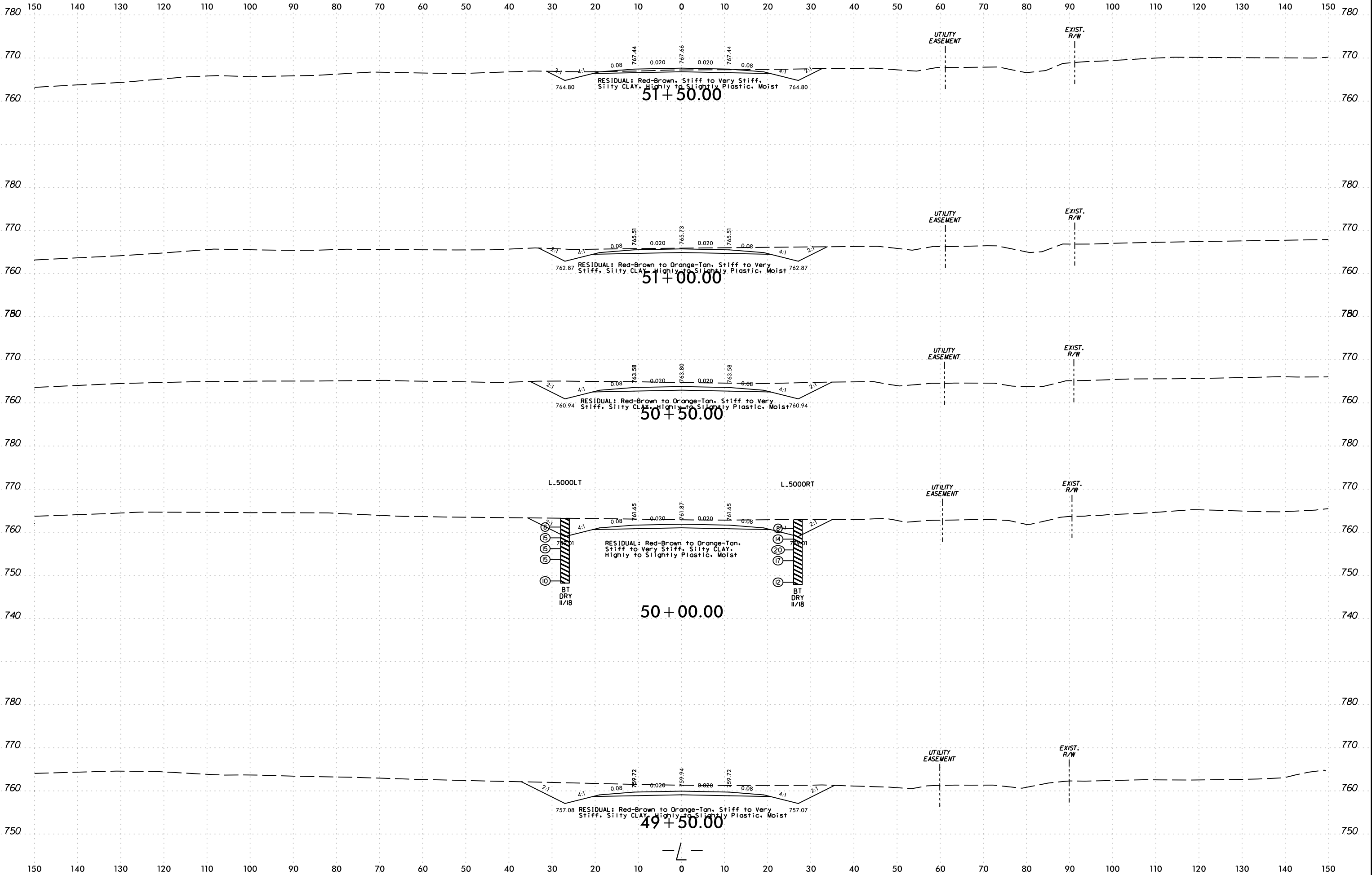
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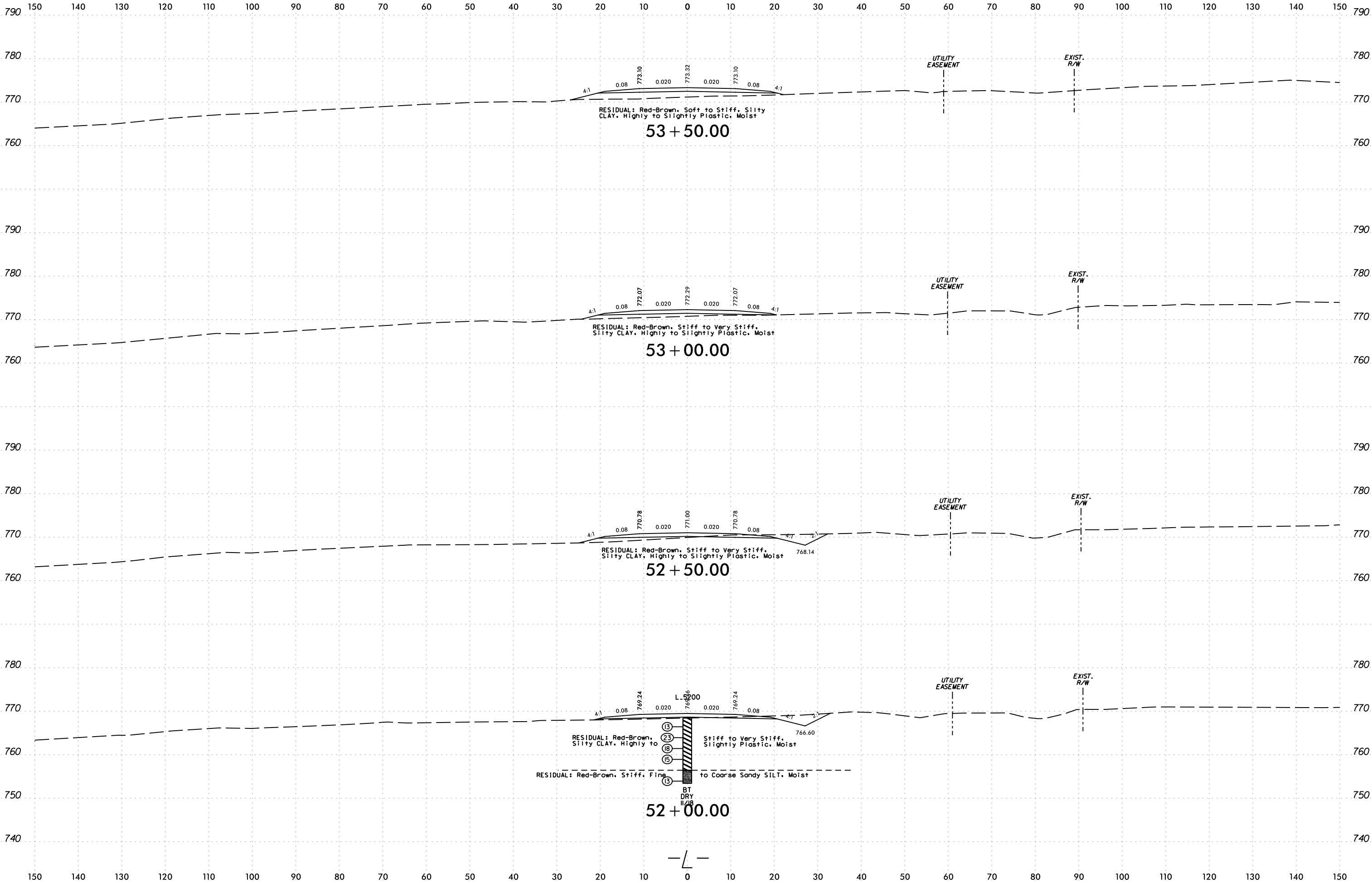
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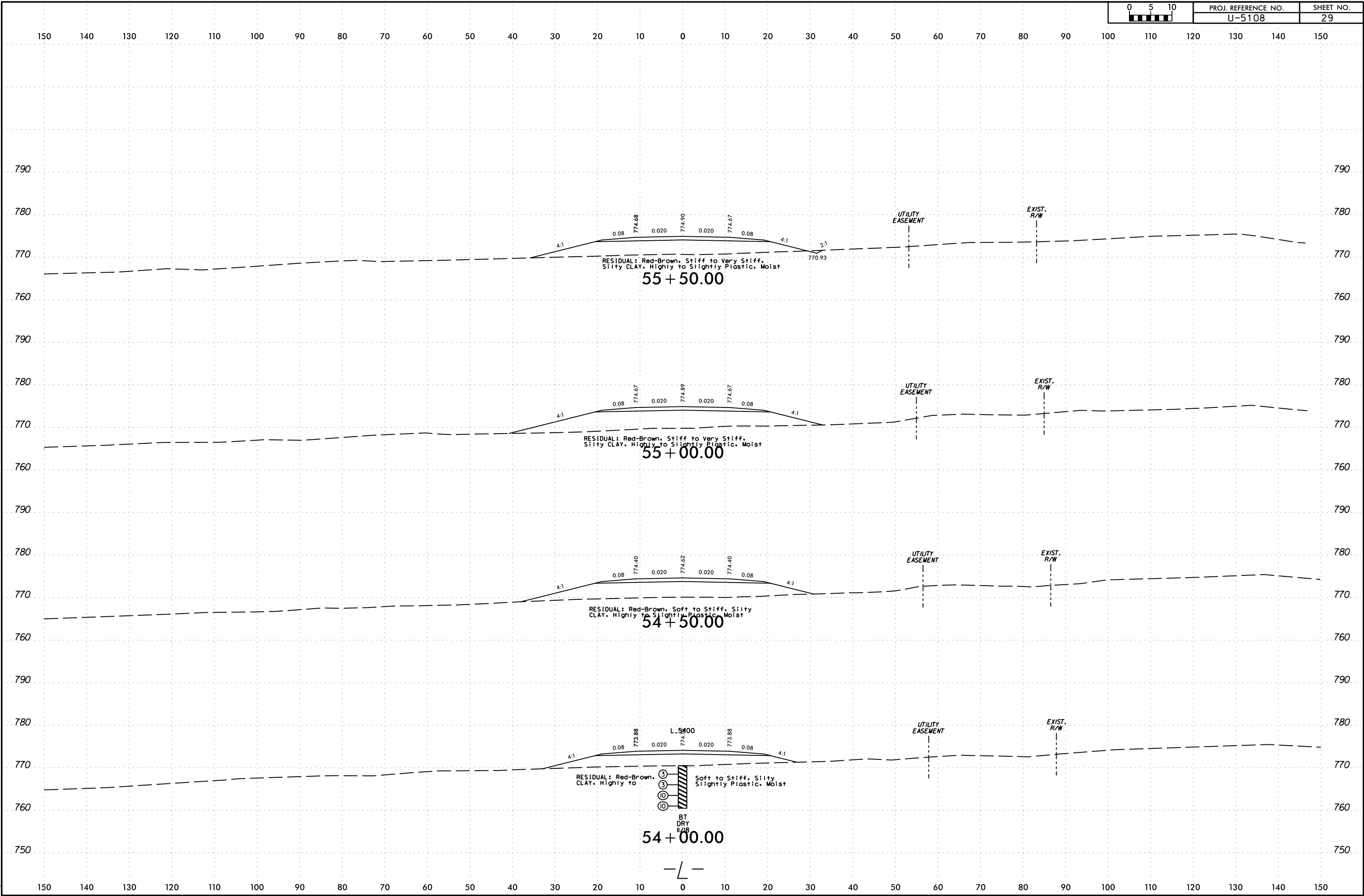
SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-9	CL	46+00	1.0-2.5	A-2-4(0)	23	9	49	21	13	17	100	67	33	15.6	-

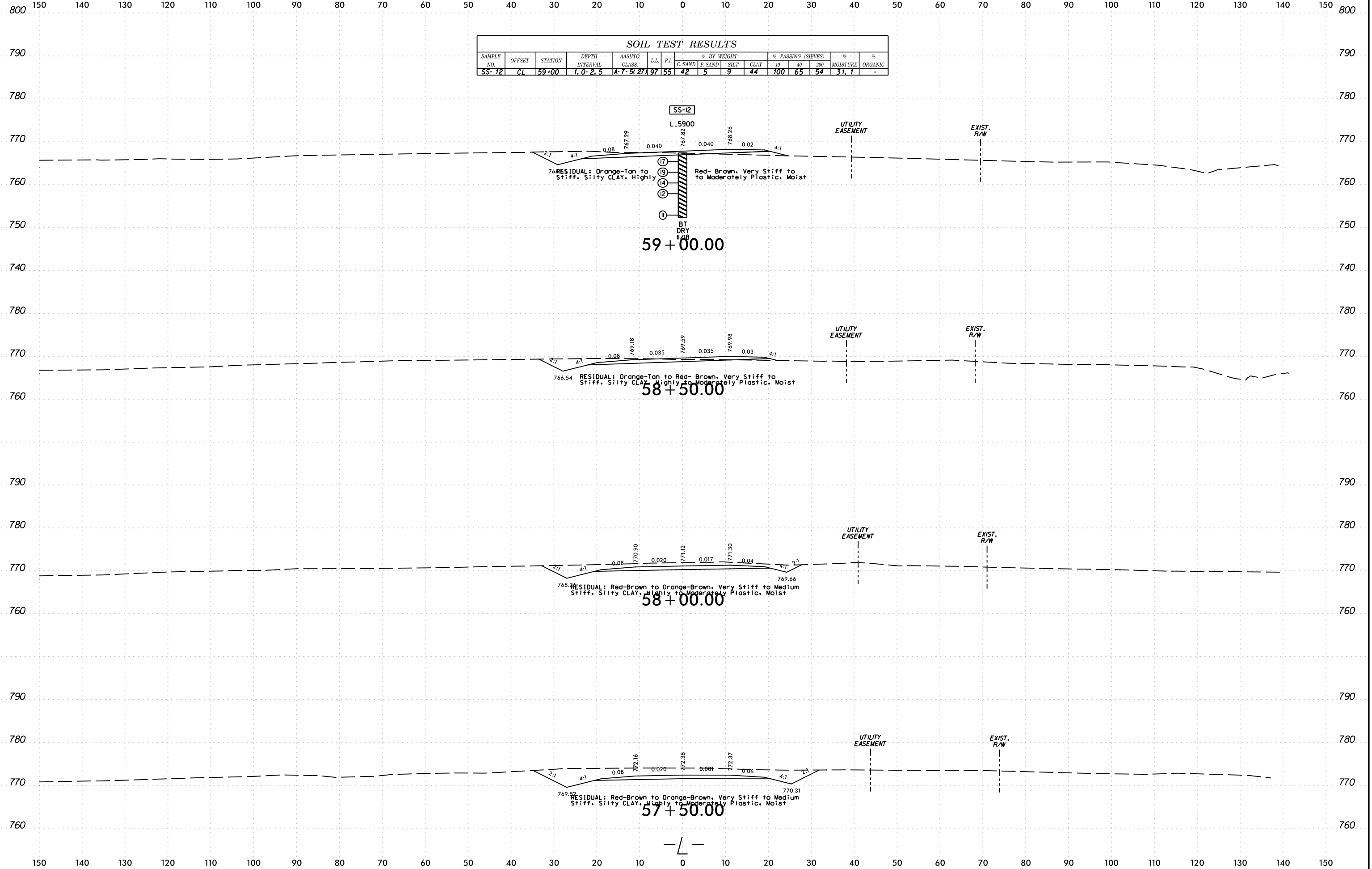
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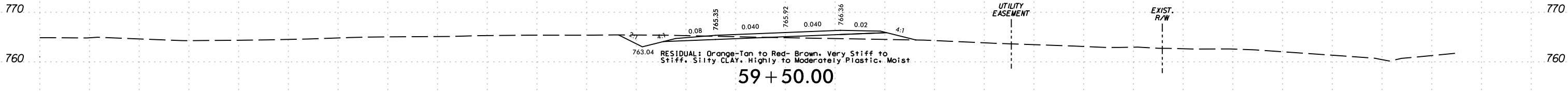
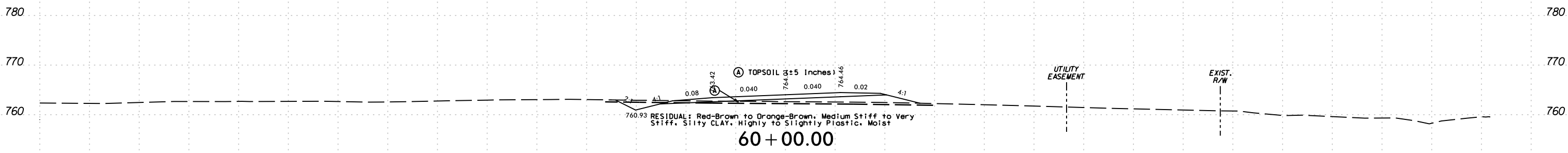
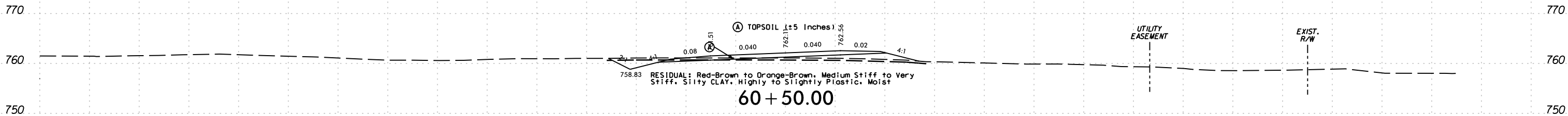
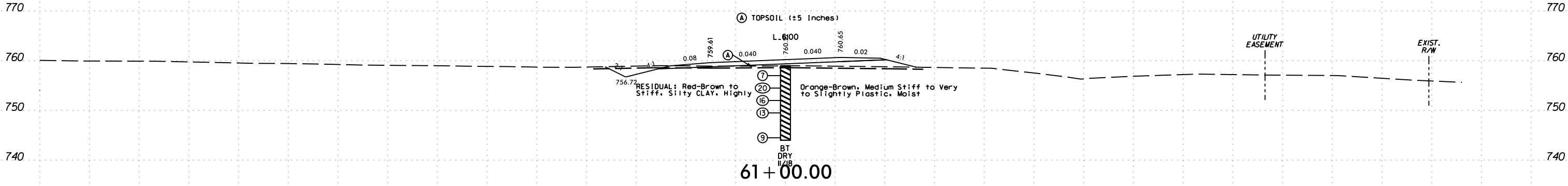




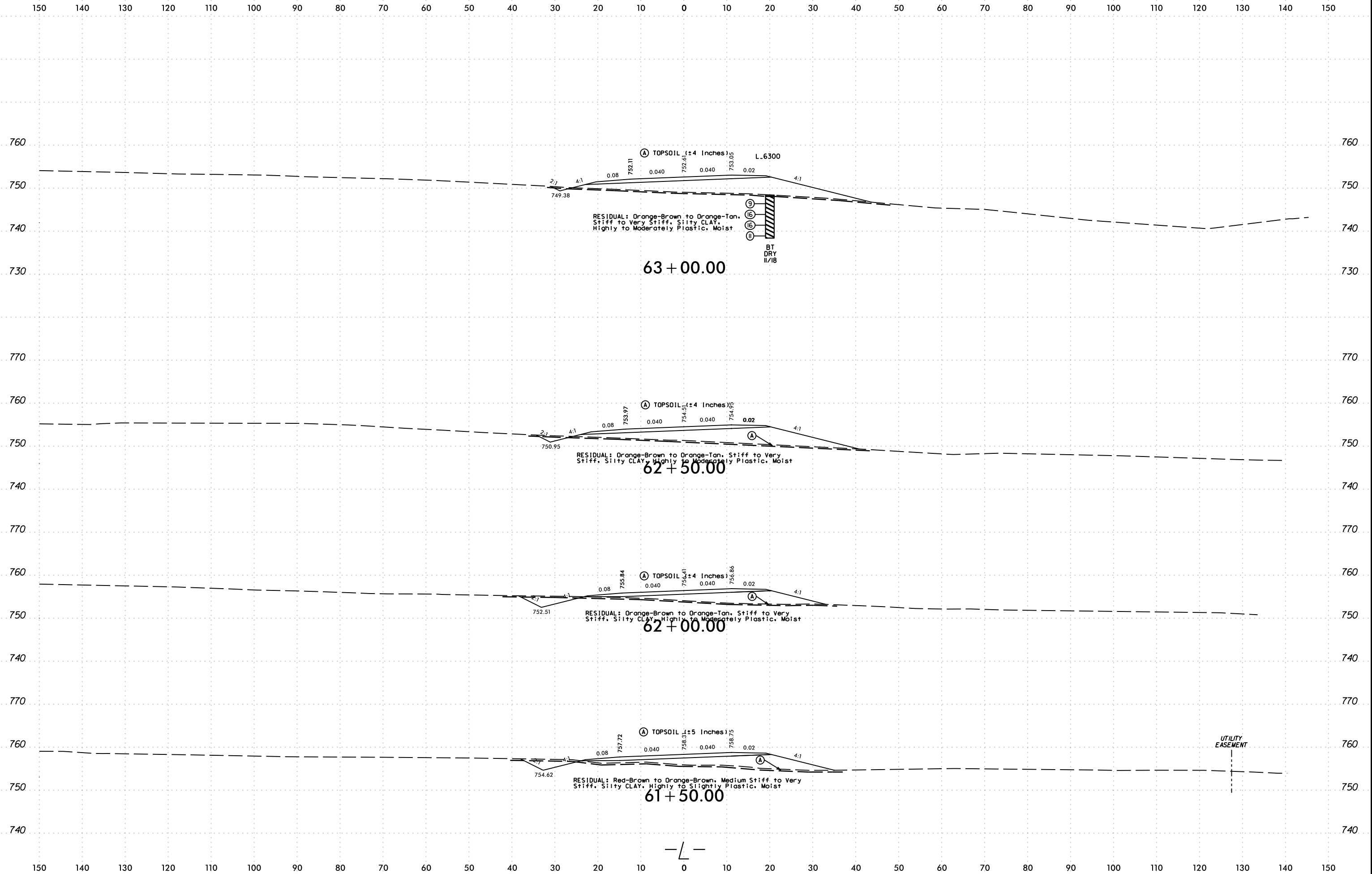
SOIL TEST RESULTS																
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			MOISTURE	ORGANIC	
							C SAND	F SAND	SILT	CLAY	10	40	200			
SS-12	CL	59+00	1.0-2.5	A-7.5	27	19	55	42	5	9	44	100	65	54	31.1	-



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



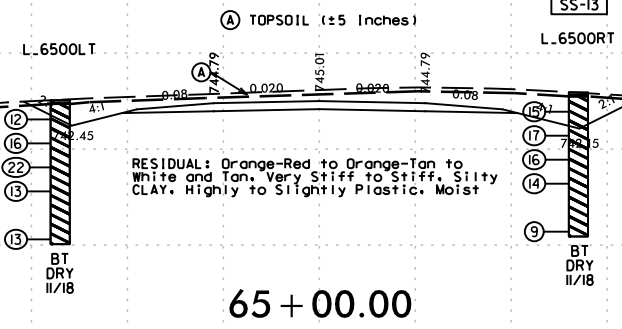
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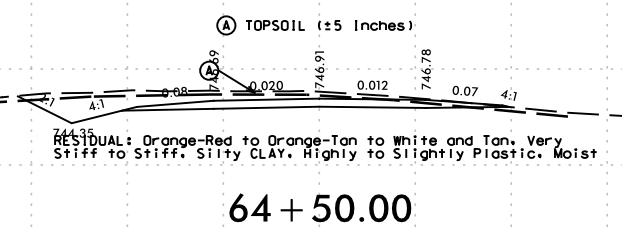
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770 760 750 740 730 720 760 750 740 730 720 760 750 740 730 720 760 750 740 730 720 760 750 740 730 720

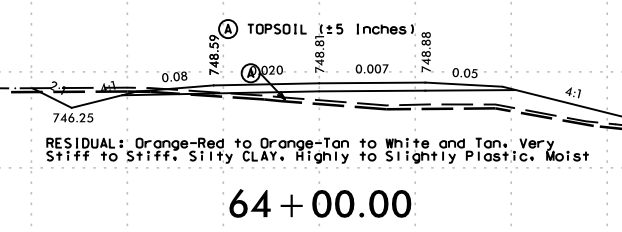
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-13	27' RT	65+00	8.5-10.0	A-7.5(9)	51	18	28	21	28	23	99	79	56	15.8	-



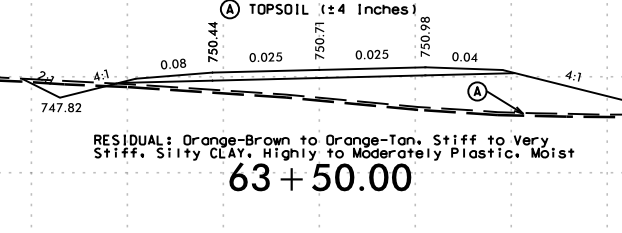
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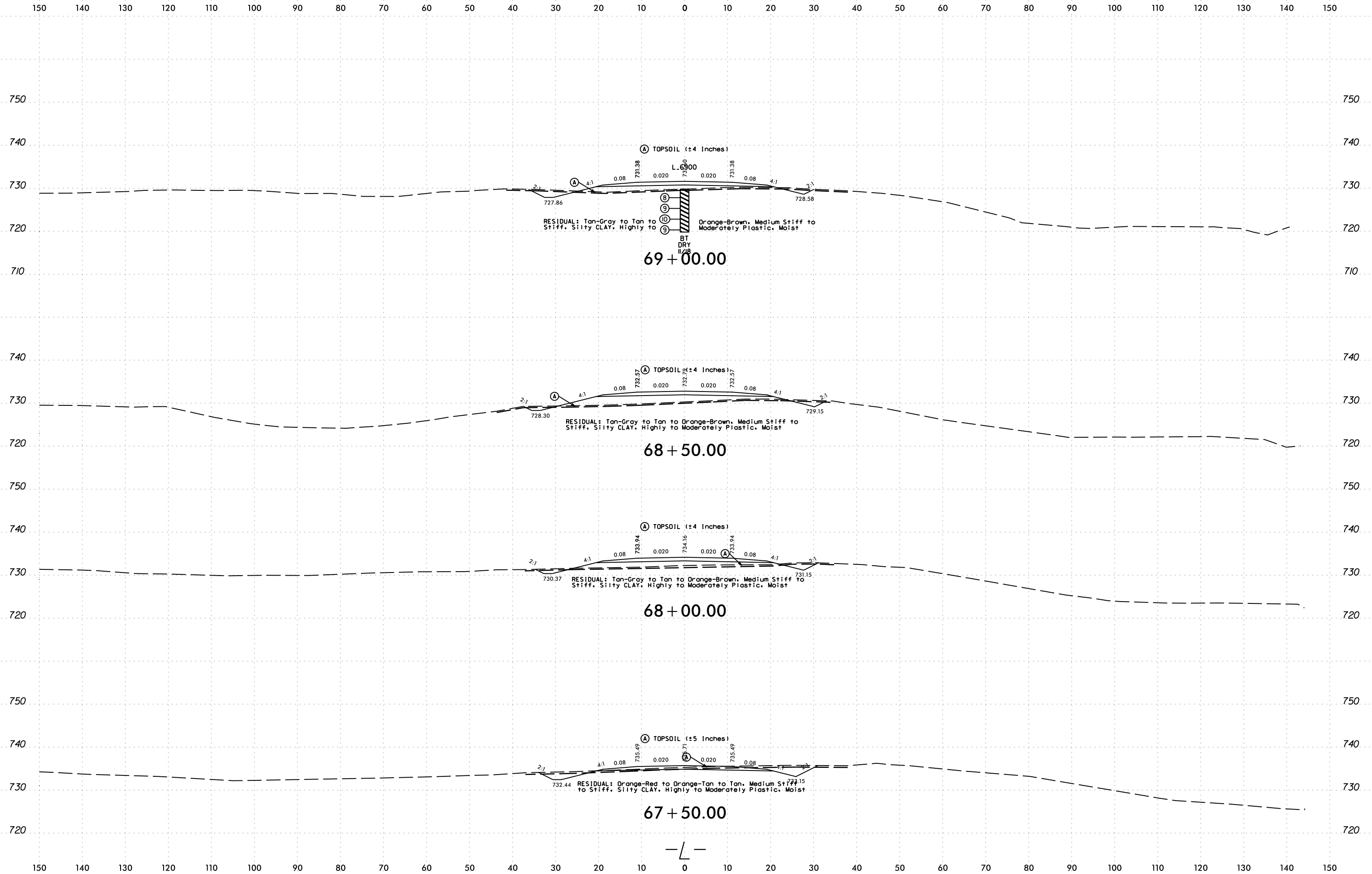


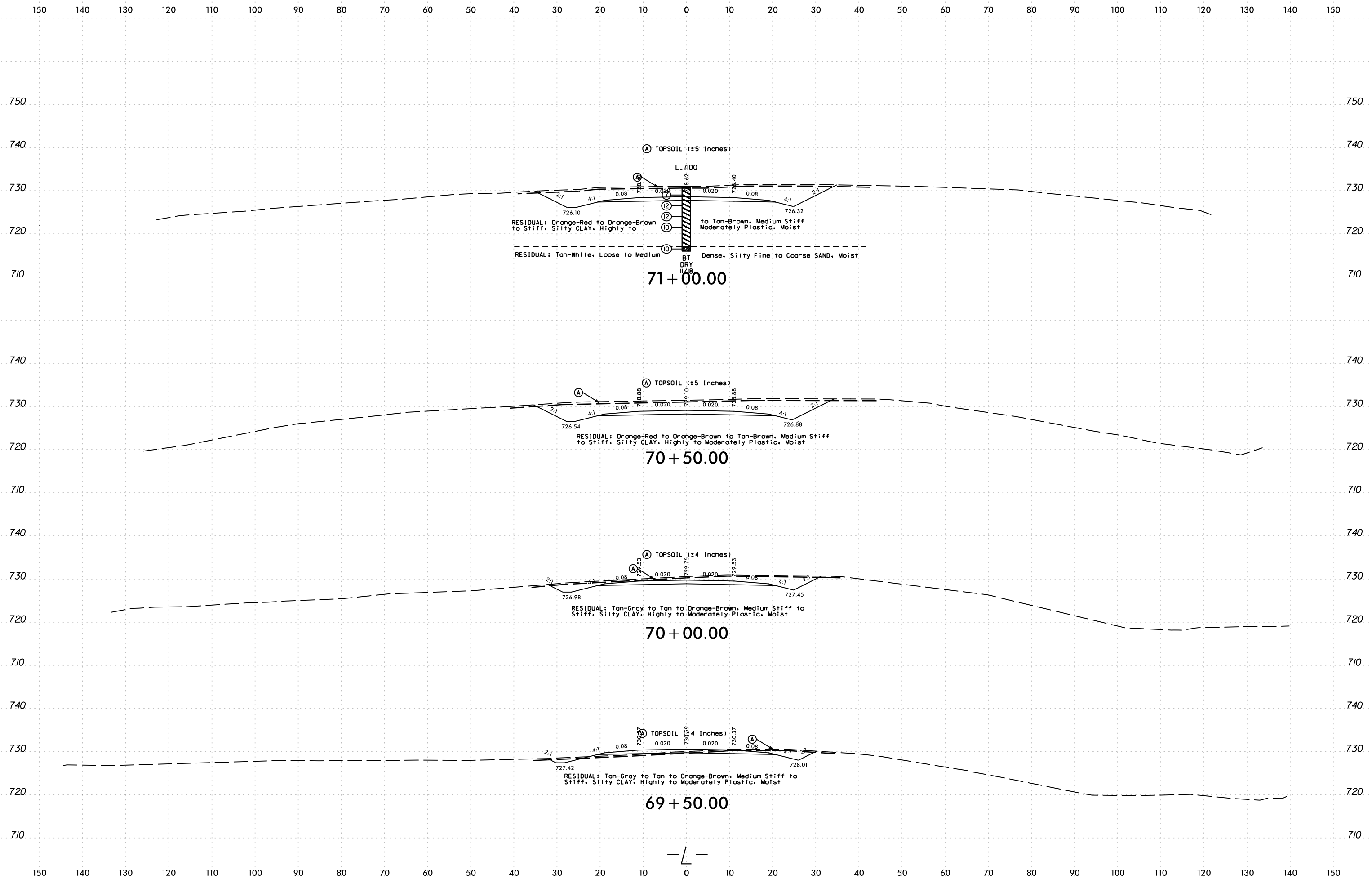
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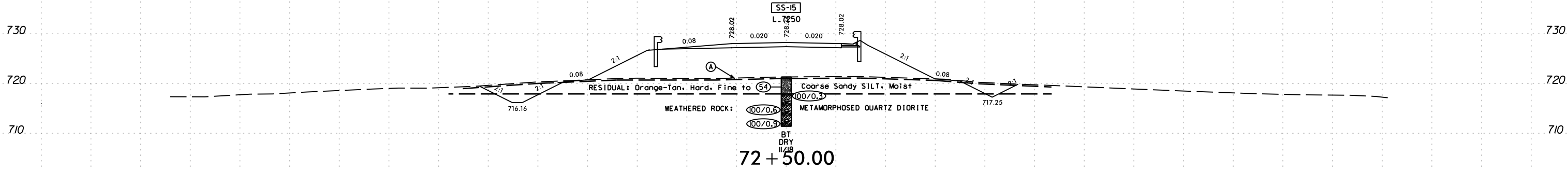
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 rps@...

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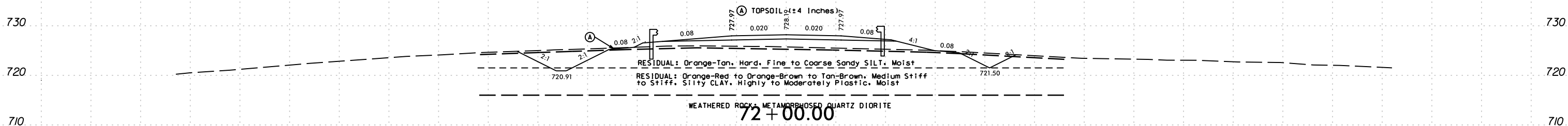
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-15	CL	72+50	1.0-2.5	A-4(0)	NP	NP	36	32	21	11	96	72	37	15.8	-

(A) TOPSOIL (±4 Inches)



72 + 50.00

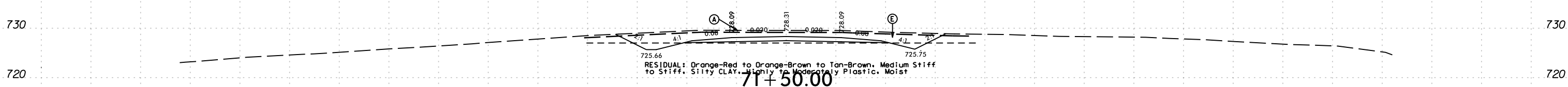
(A) TOPSOIL (±4 Inches)



72 + 00.00

(A) TOPSOIL (±5 Inches)

(E) RESIDUAL: Orange-Tan, Hard, Fine to Coarse Sandy SILT, Moist



71 + 50.00

-L-

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

740 740

730 730

720 720

710 710

700 700

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710 710

700 700

690 690

680 680

740 740

730 730

720 720

710 710

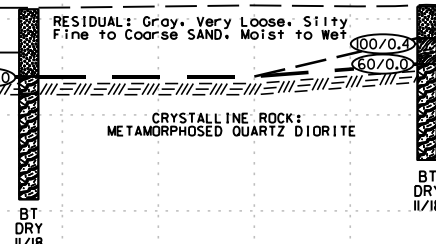
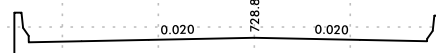
700 700

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

Note: See U-5108 Bridge Inventory Report: Bridge over McDowell Creek dated January 2019 for more detailed subsurface information

74 + 00.00

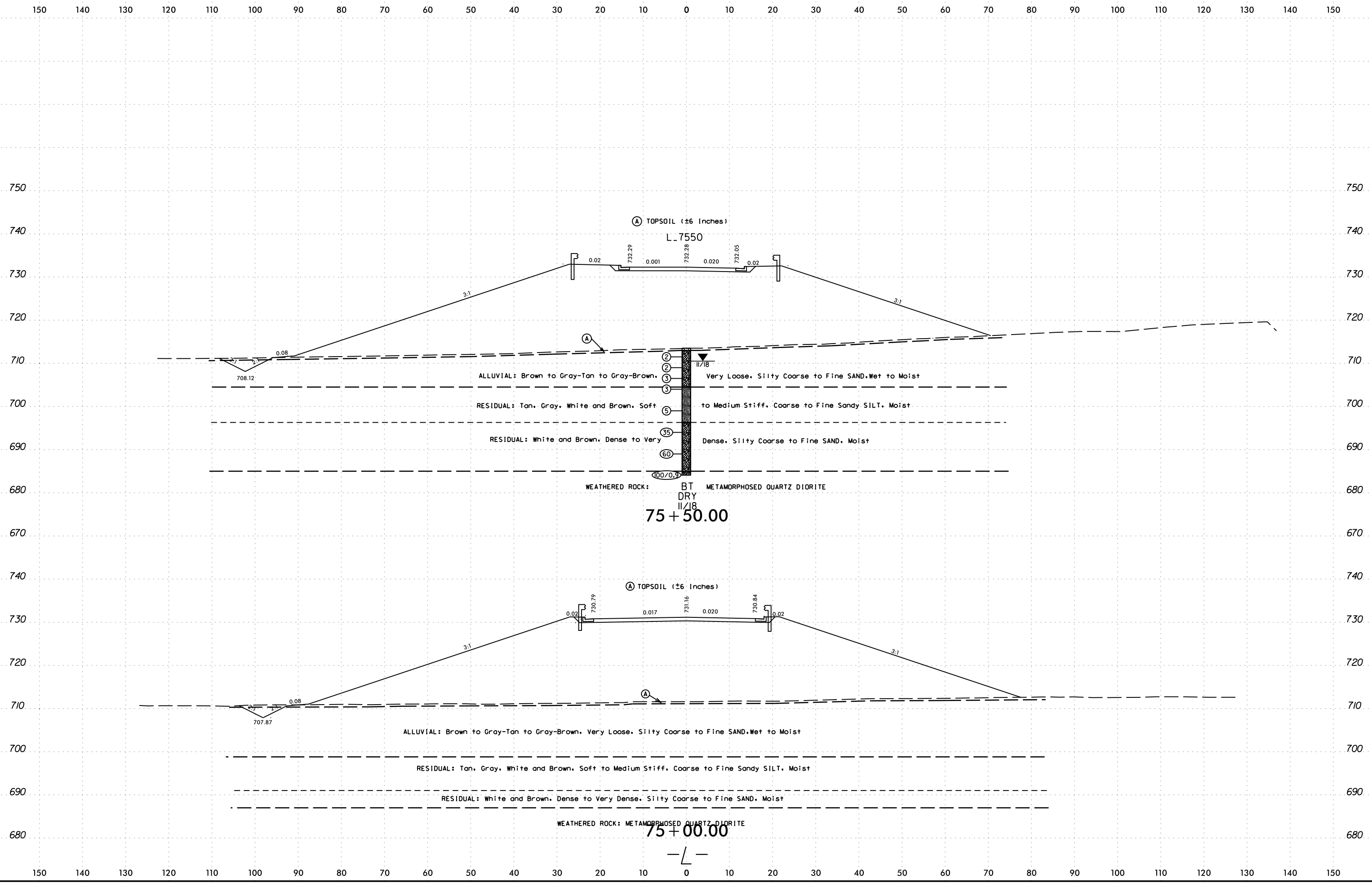
SOIL TEST RESULTS															
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							C SAND	F SAND	SILT	CLAY	10	40	200		
SS-1	24' LT	73+46	3.5'-5.0'	A-2-4(0)	NP	NP	61	26	5	8	99	57	16	22.3	-



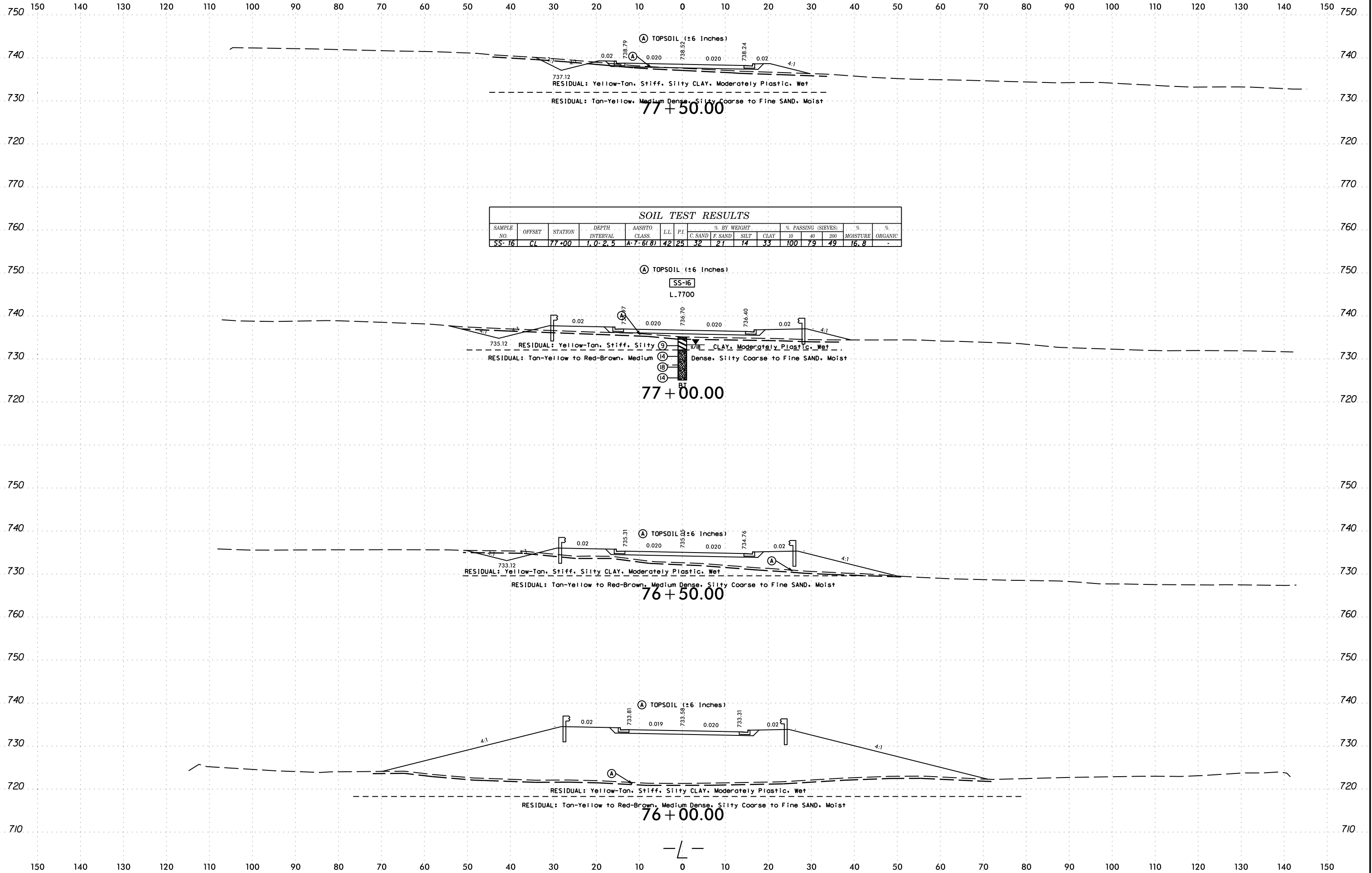
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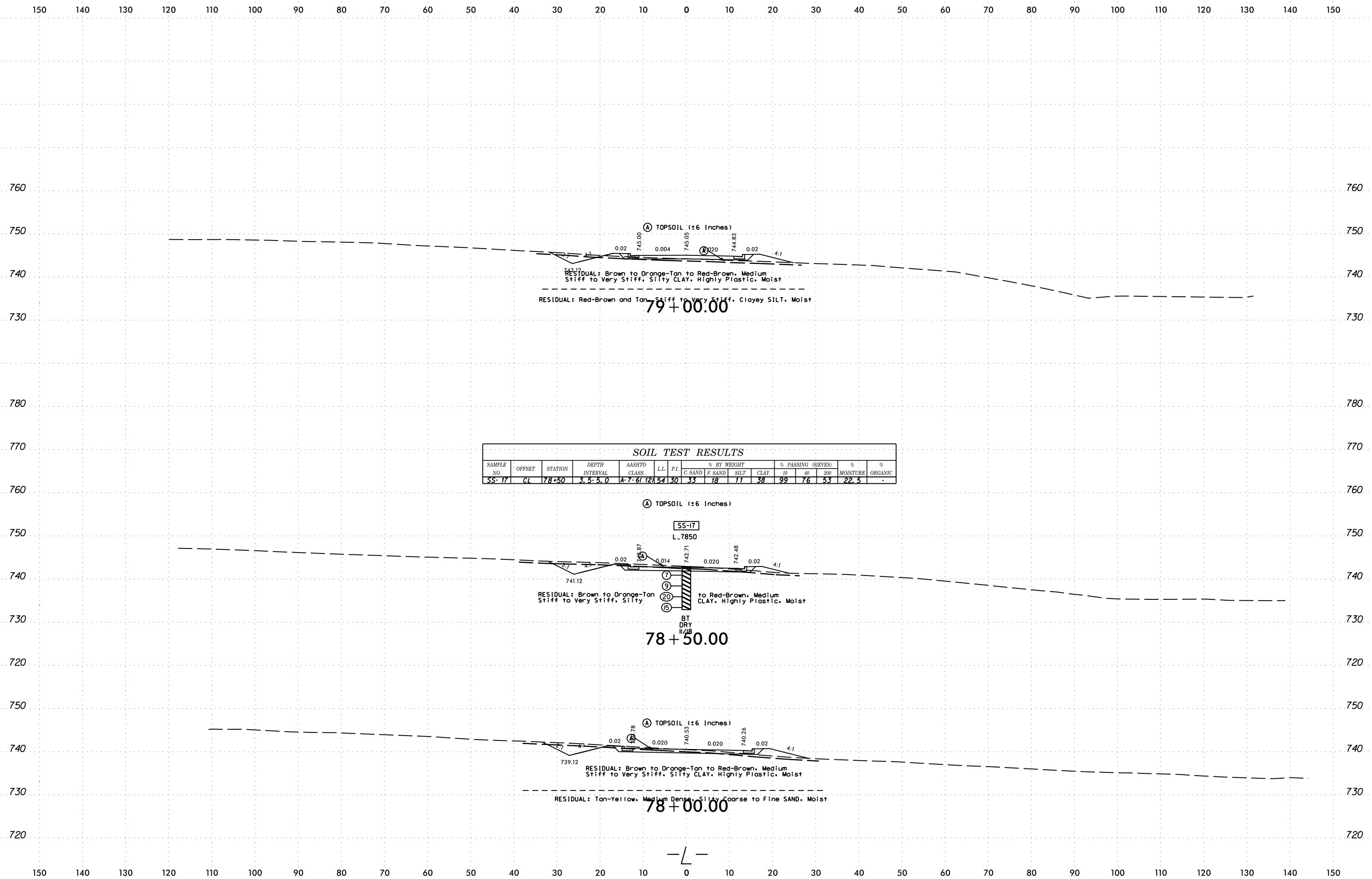
73 + 00.00

73 + 00.00



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 r.pastore

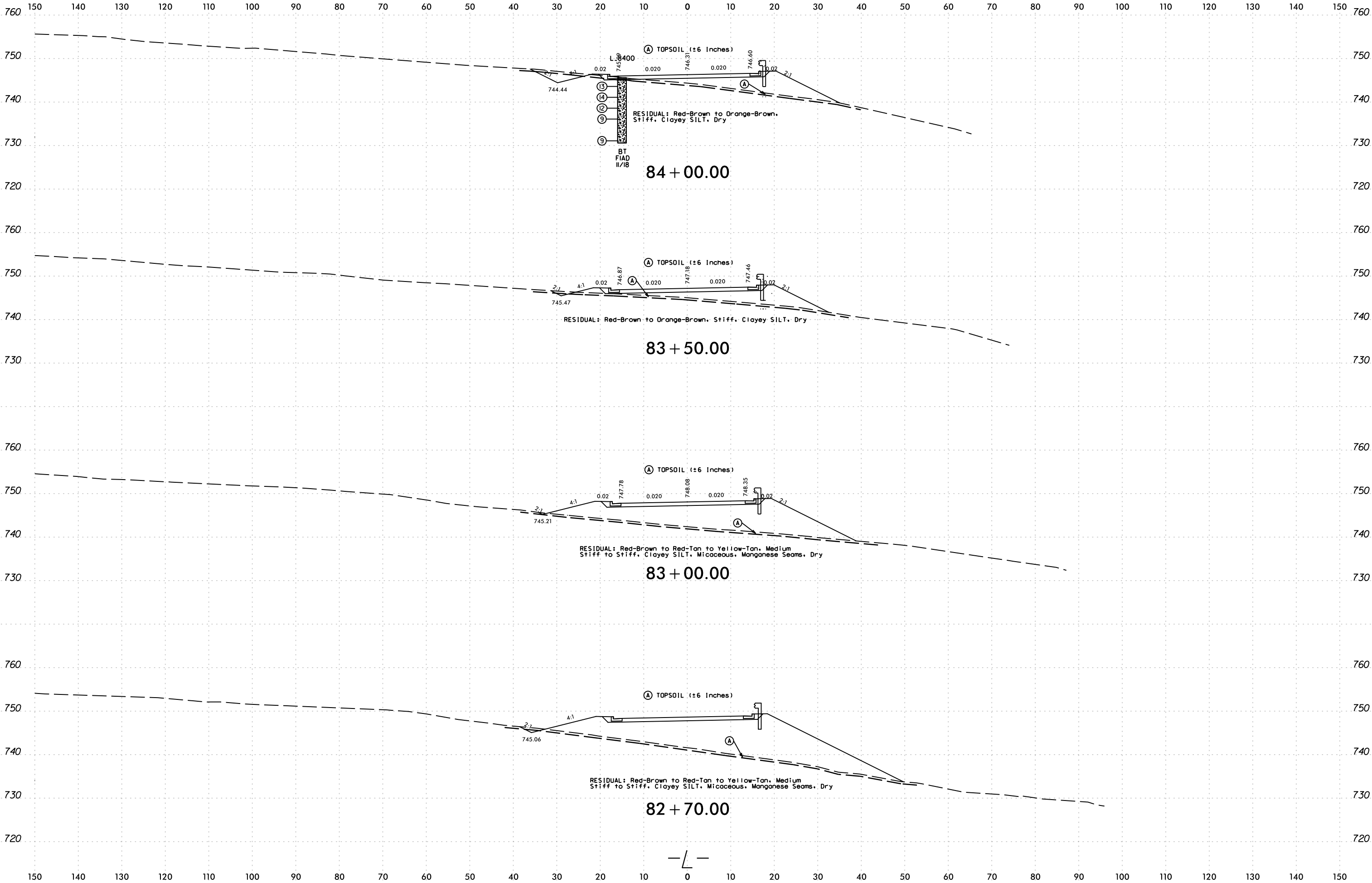


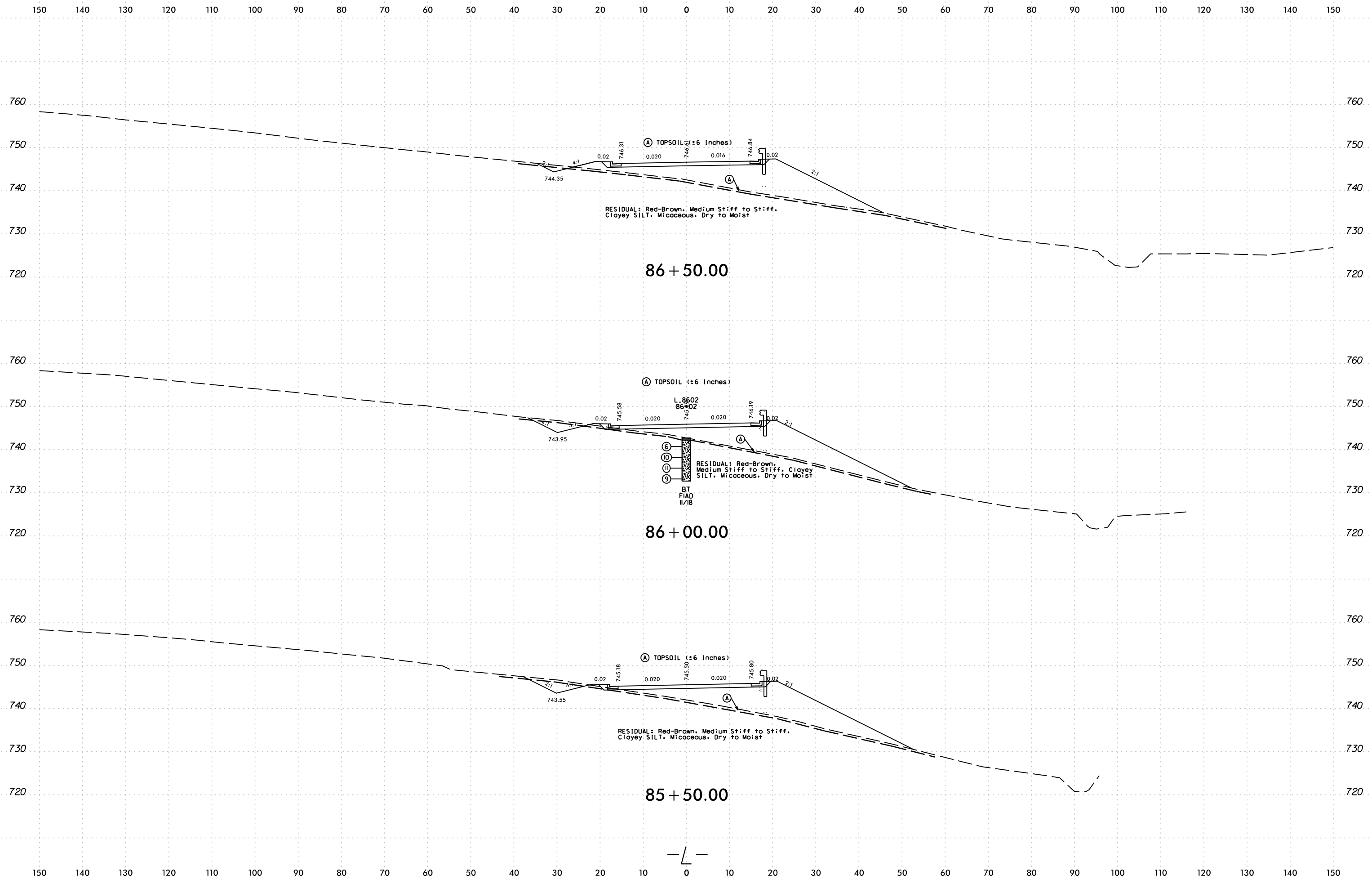


SOIL TEST RESULTS

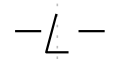
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC	
							C. SAND	F. SAND	SILT	CLAY	10	40	200			
SS-17	CL	78+50	3.5-5.0	A-7-61	121	54	30	33	18	11	38	99	76	53	22.5	-

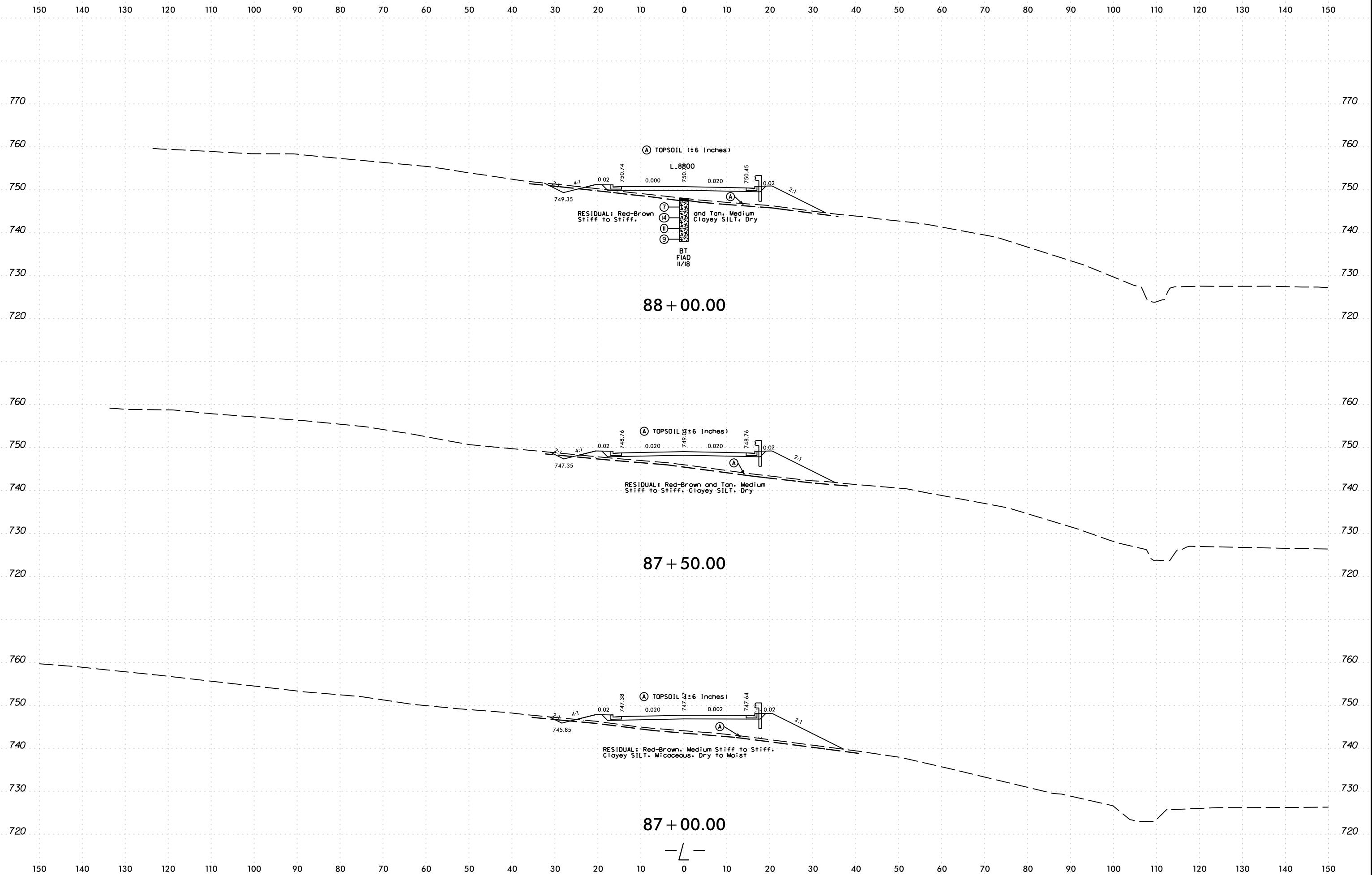
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 r.pastorano





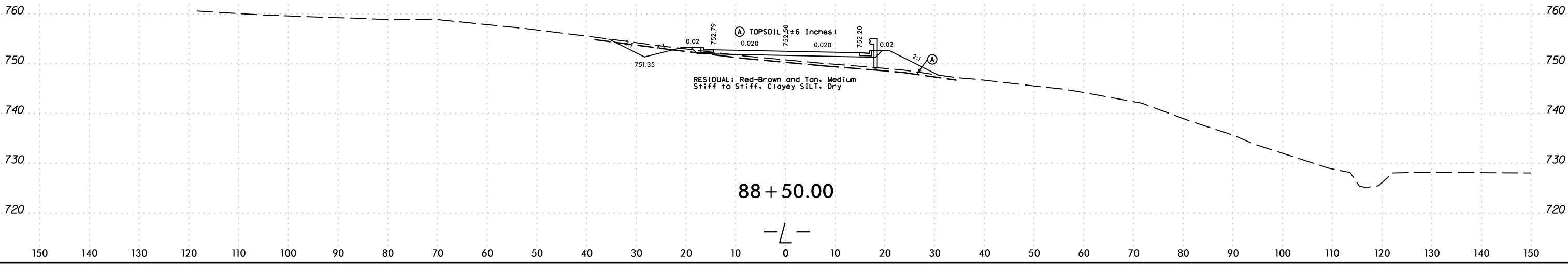
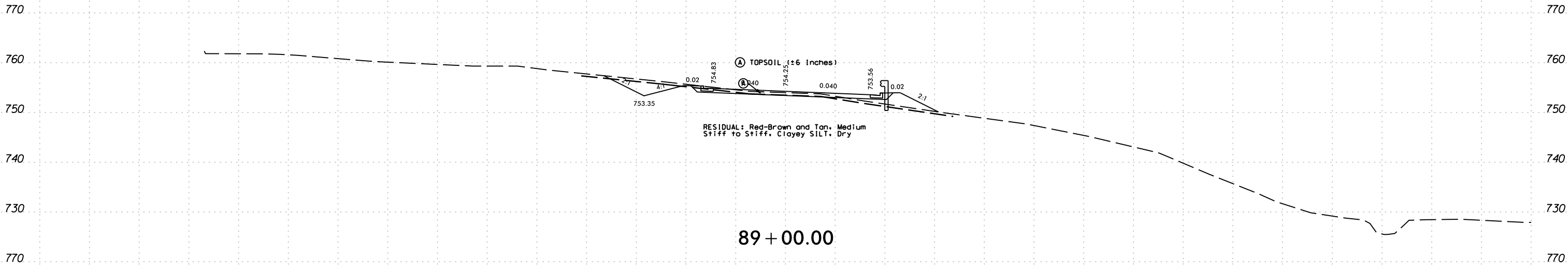
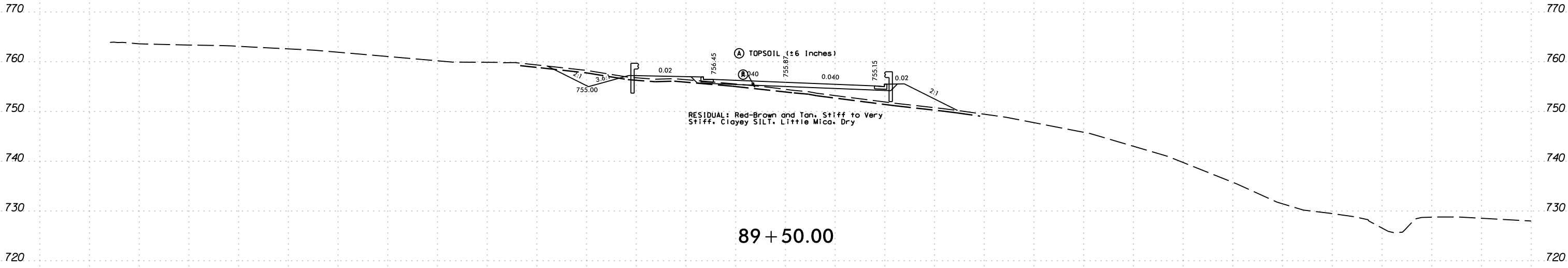
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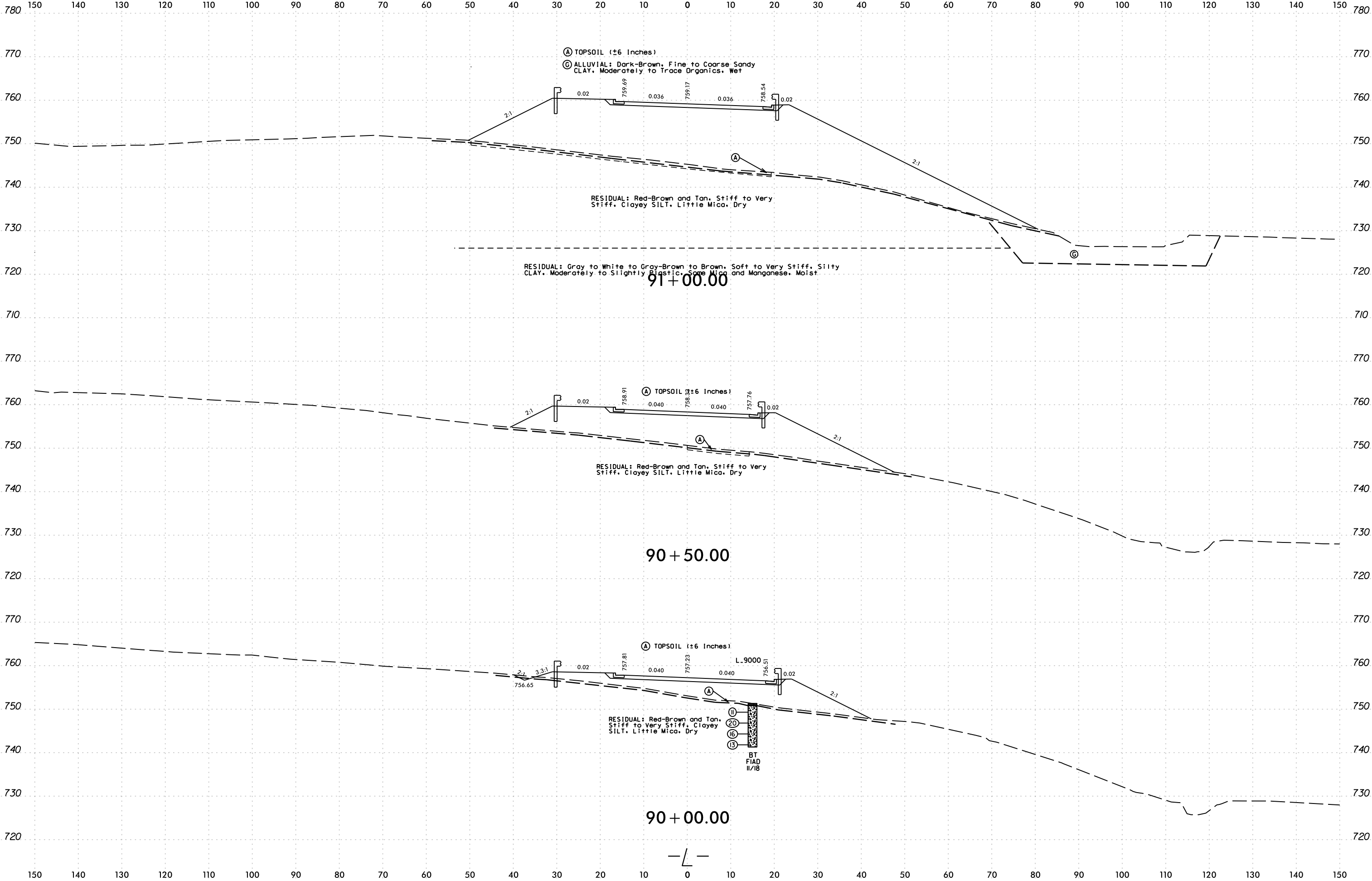




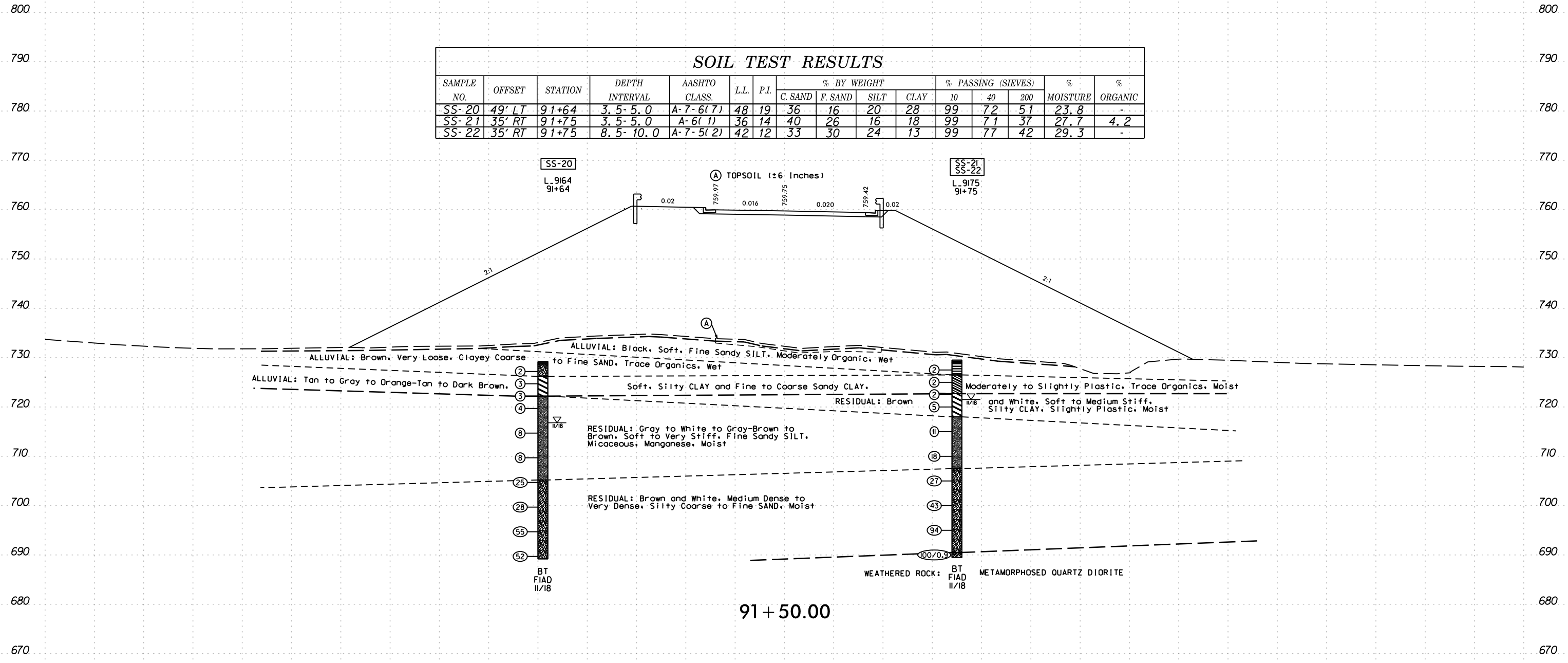


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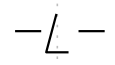
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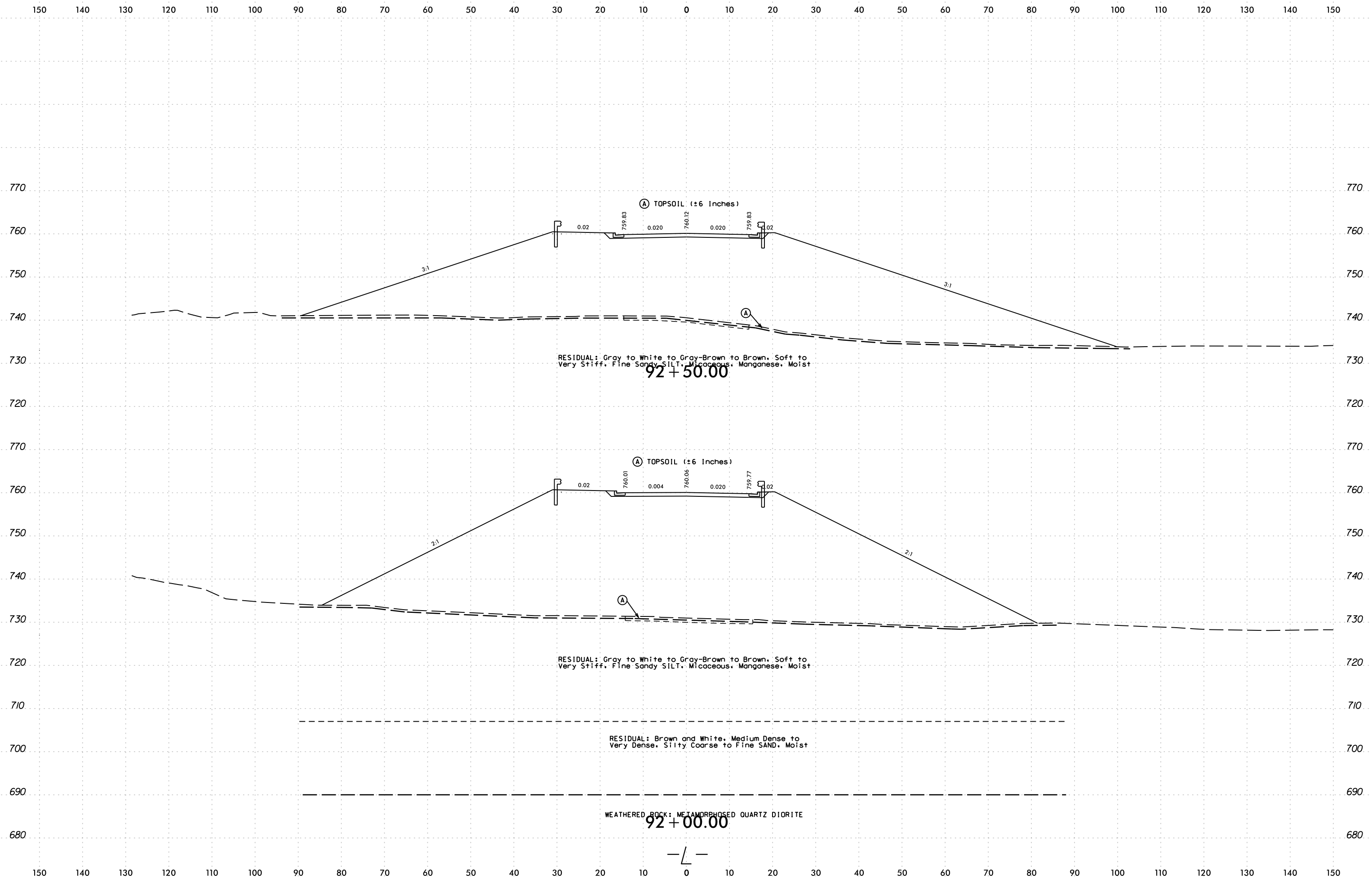


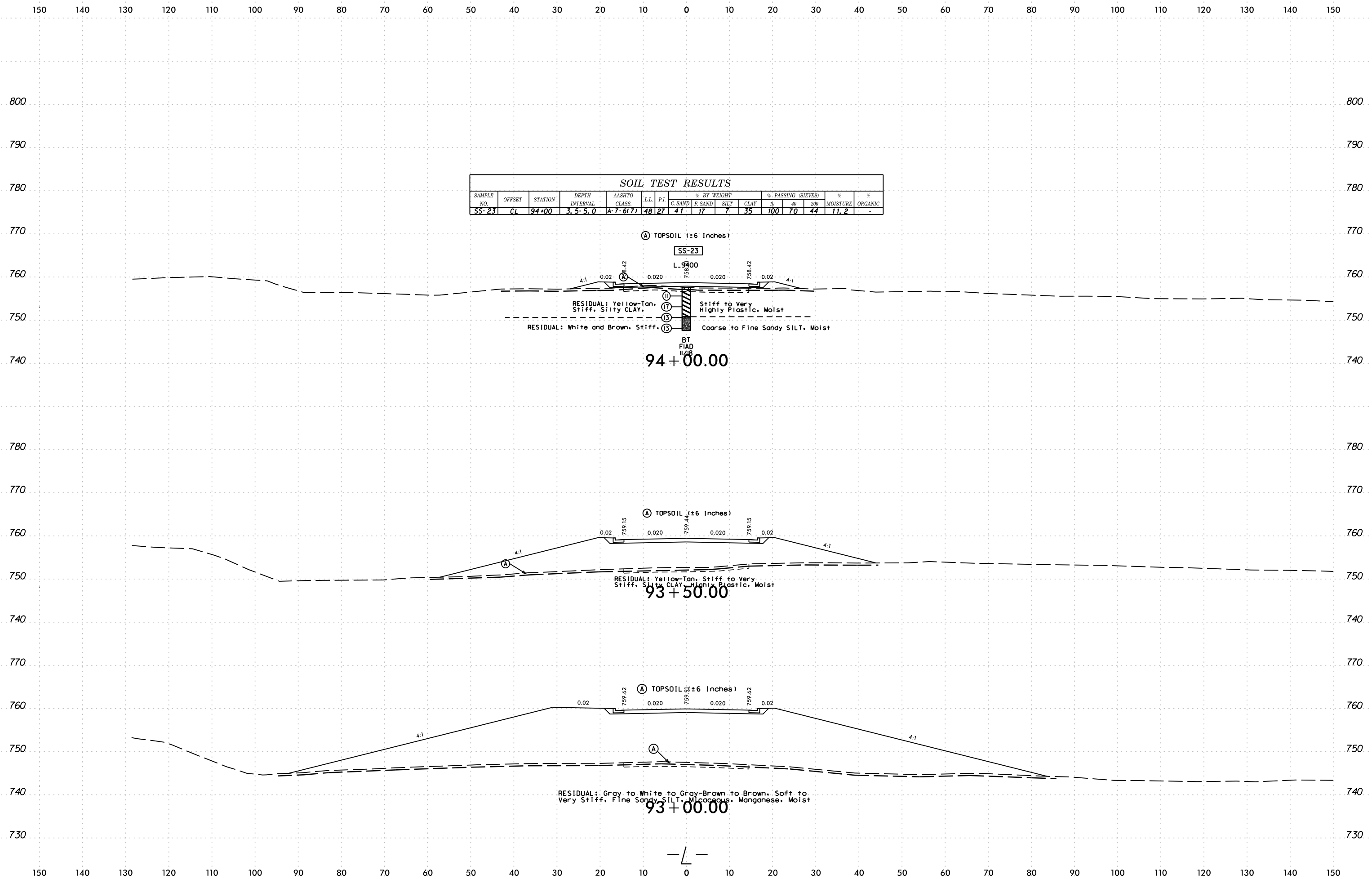
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-20	49' LT	91+64	3.5-5.0	A-7-6(7)	48	19	36	16	20	28	99	72	51	23.8	-
SS-21	35' RT	91+75	3.5-5.0	A-6(1)	36	14	40	26	16	18	99	71	37	27.7	4.2
SS-22	35' RT	91+75	8.5-10.0	A-7-5(2)	42	12	33	30	24	13	99	77	42	29.3	-

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 r.pastorano

91+50.00

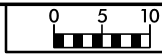






SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	LL	PI	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-23	CL	94+00	3.5-5.0	A-7-6(7)	48.27	41	17	7	35	100	70	44	11.2	-	

6/23/16



PROJ. REFERENCE NO.	SHEET NO.
U-5108	55

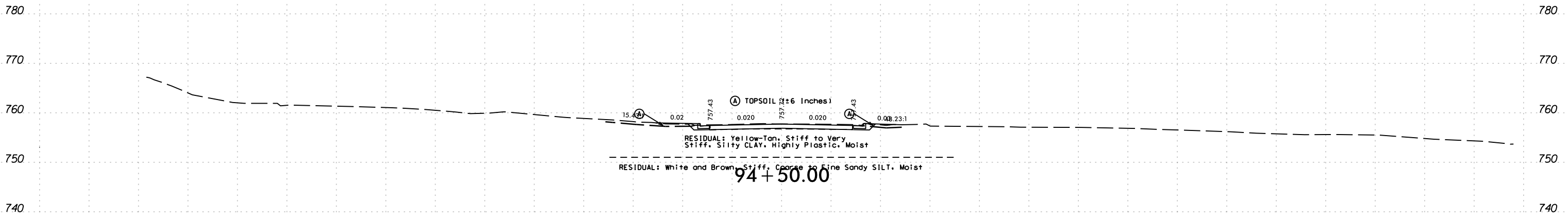
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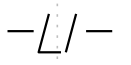
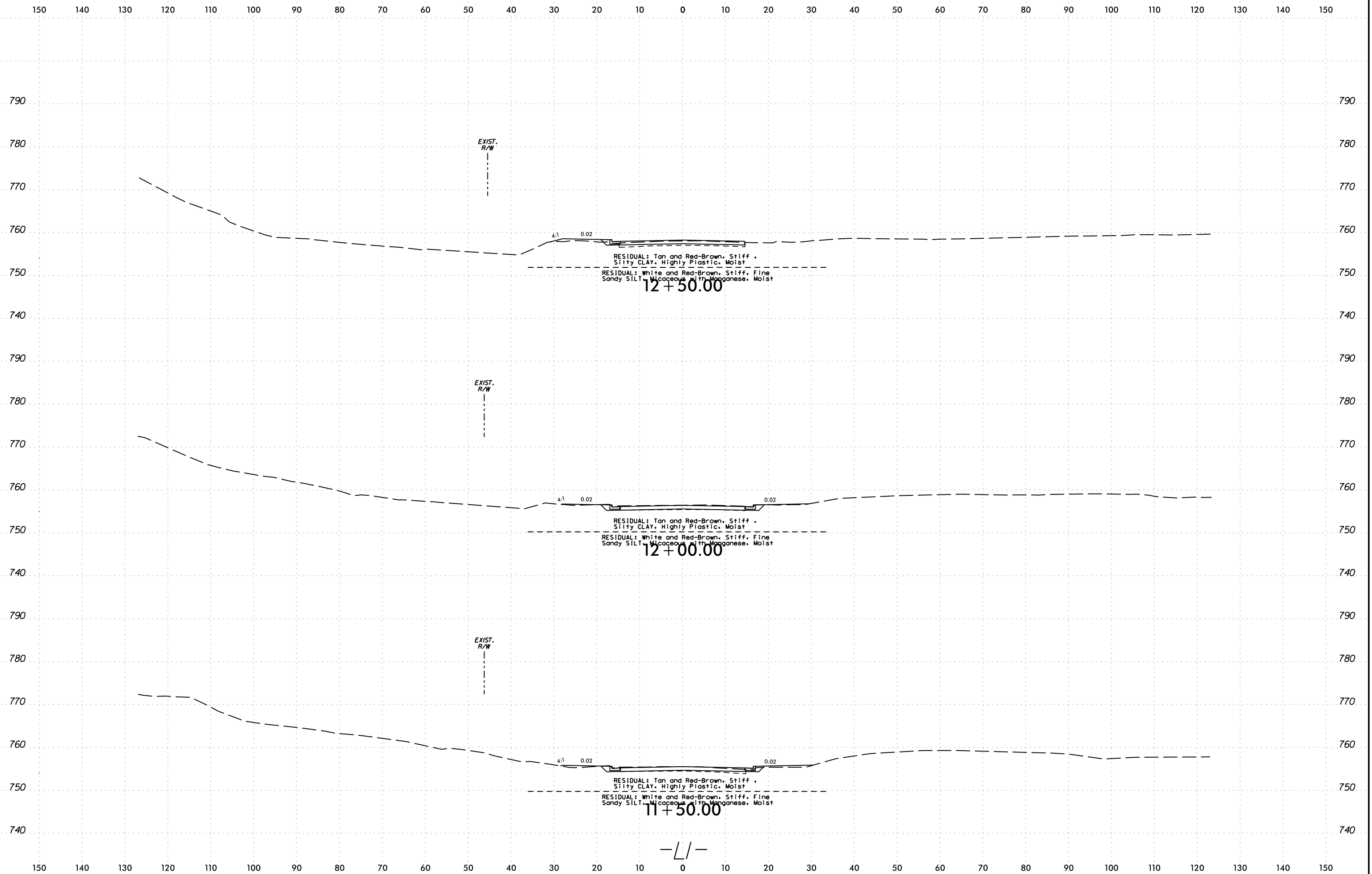
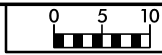
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760
750
740

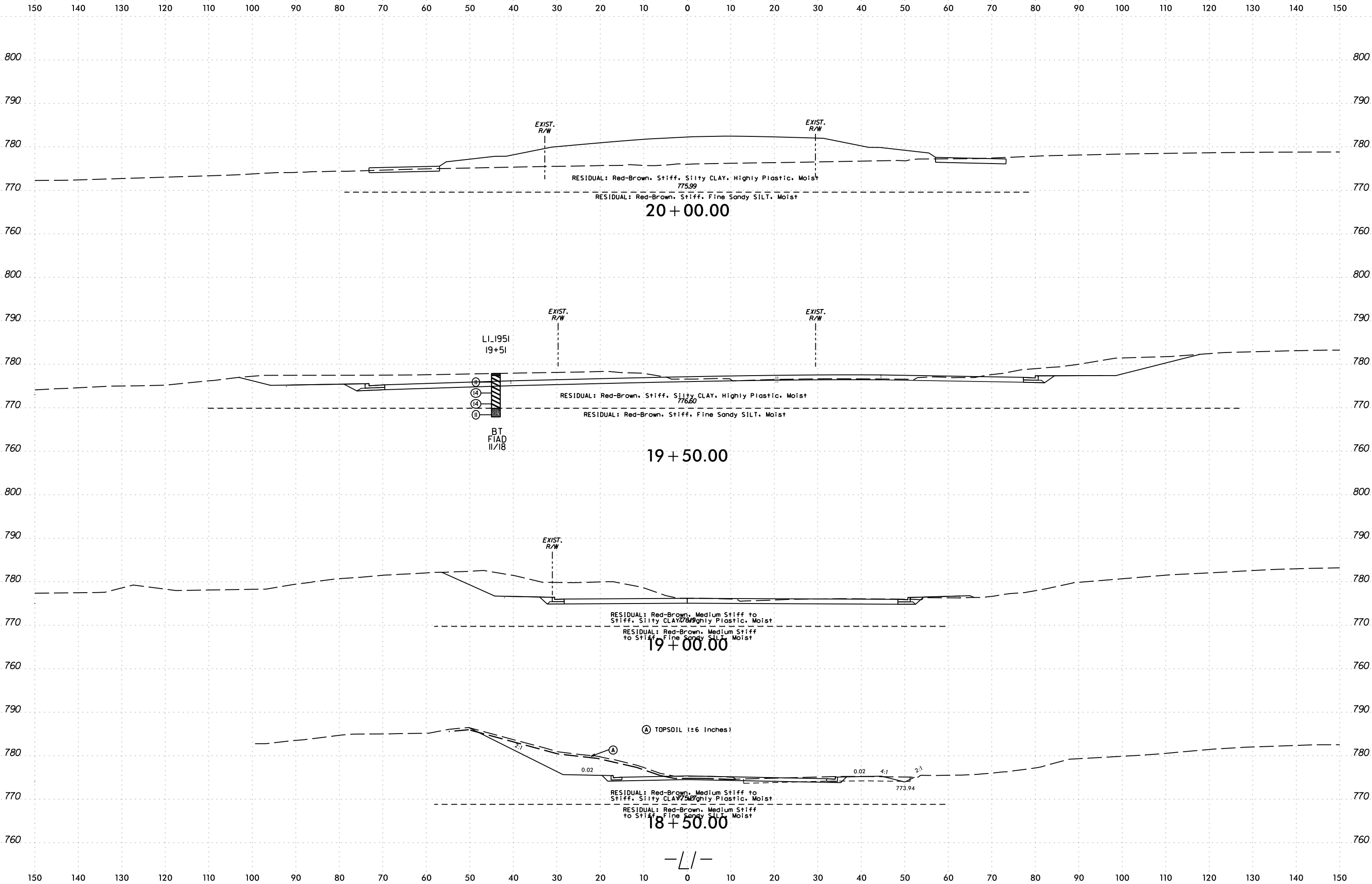
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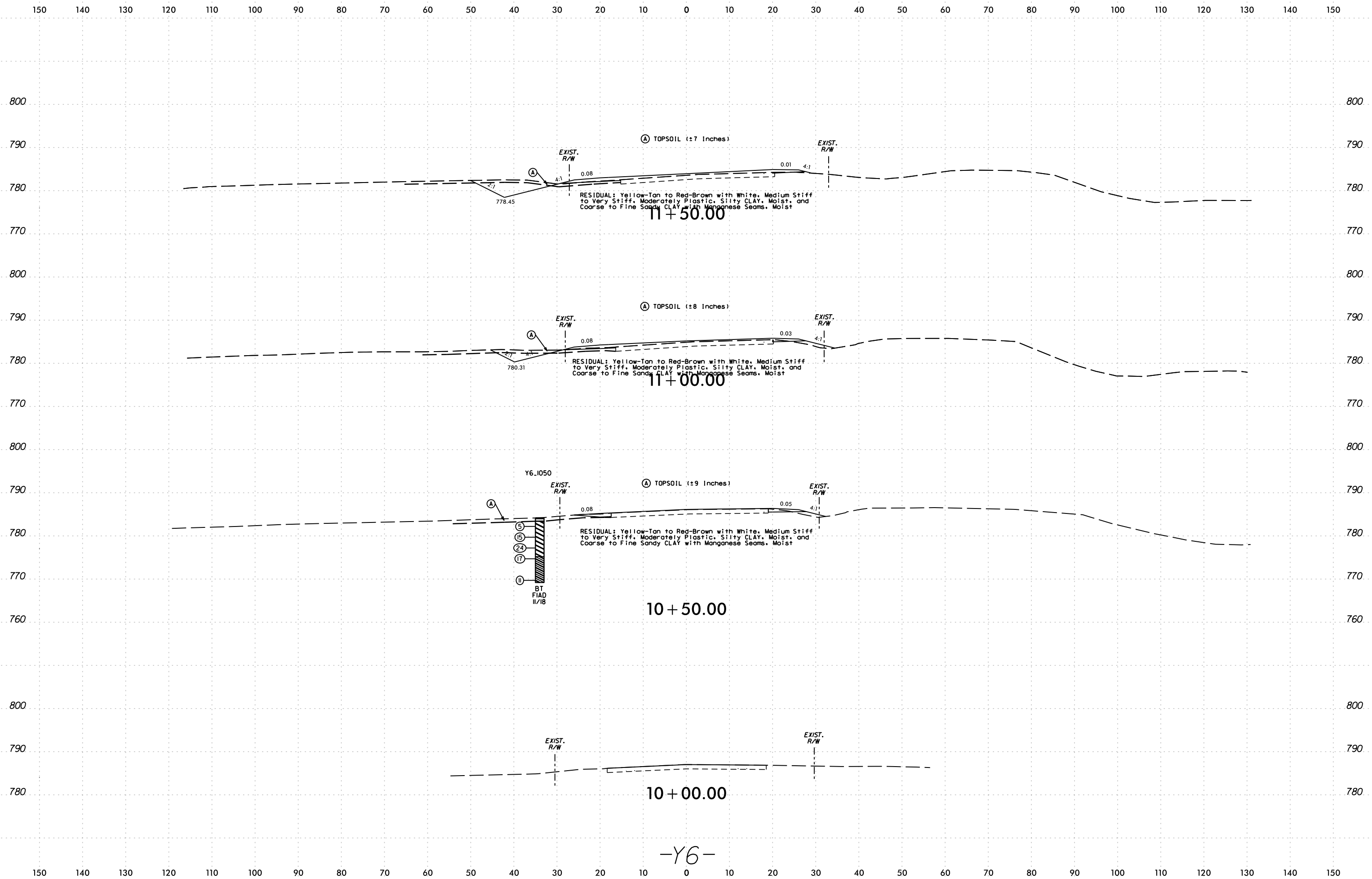
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 rps@u-5108

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



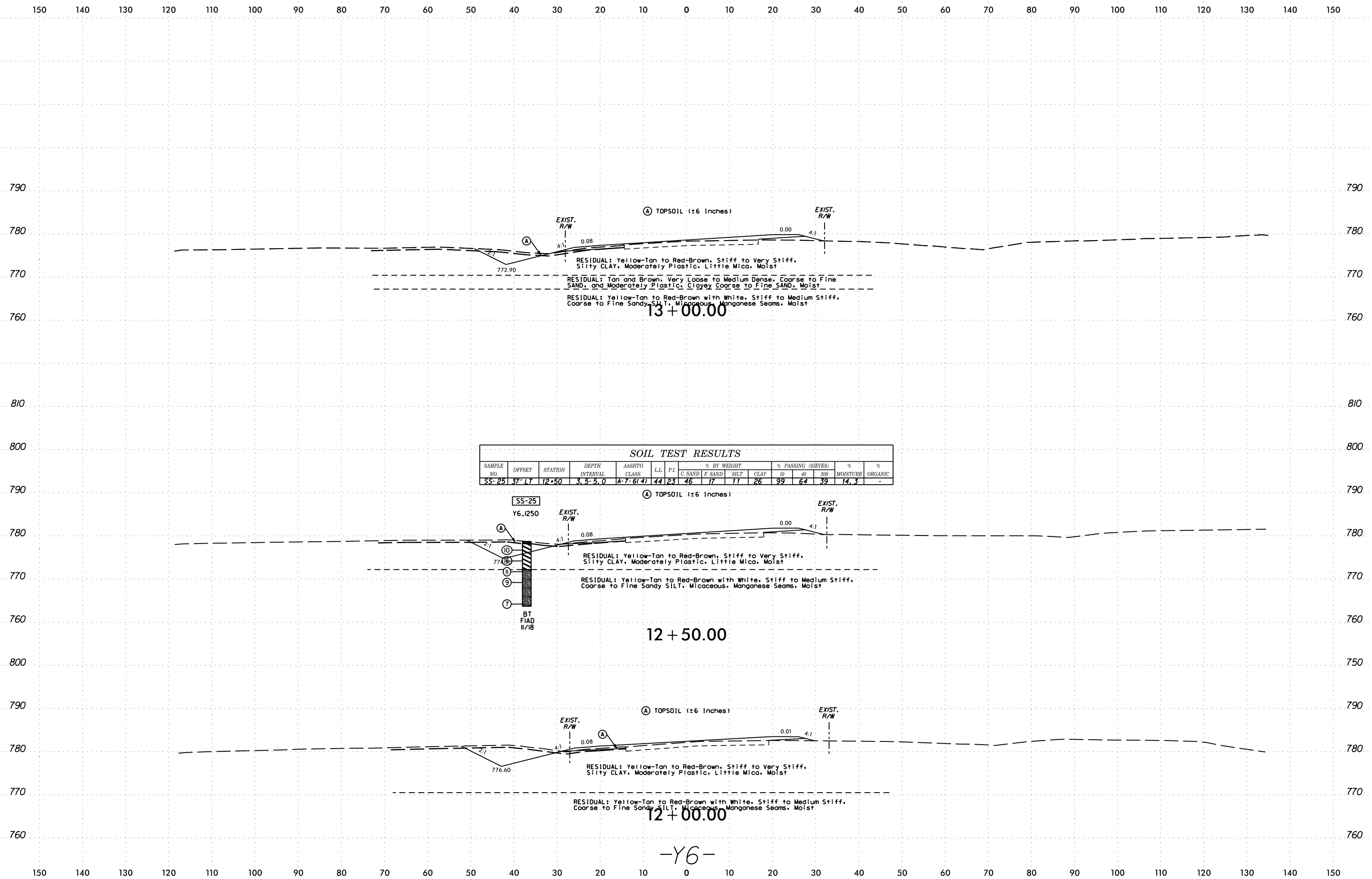






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-Y6-



12/6/2019 10:47:01 AM
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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

800 800

790 790

780 780

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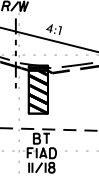
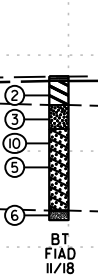
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SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS	LL	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-26	6' LT	14+50	8.5-10.0	A-2-7(2)	41	24	50	20	10	20	99	63	32	15.0	-

SS-26
Y6.1450LT

(A) TOPSOIL (±6 Inches)

Y6.1450RT



RESIDUAL: Tan to Brown to Yellow-Tan, Soft, Silty CLAY, Moderately Plastic, Moist

RESIDUAL: Tan and Brown, Very Loose to Medium Dense, Coarse to Fine SAND, and Moderately Plastic, Clayey Coarse to Fine SAND, Moist

RESIDUAL: White and Brown, Medium Stiff to Stiff, Coarse to Fine Sandy SILT, Moist

14 + 50.00

(A) TOPSOIL (±6 Inches)

EXIST. R/W

EXIST. R/W

RESIDUAL: Tan to Brown to Yellow-Tan, Soft, Silty CLAY, Moderately Plastic, Moist

RESIDUAL: Tan and Brown, Very Loose to Medium Dense, Coarse to Fine SAND, and Moderately Plastic, Clayey Coarse to Fine SAND, Moist

14 + 00.00

(A) TOPSOIL (±6 Inches)

EXIST. R/W

EXIST. R/W

RESIDUAL: Yellow-Tan to Red-Brown, Stiff to Very Stiff, Silty CLAY, Moderately Plastic, Little Mica, Moist

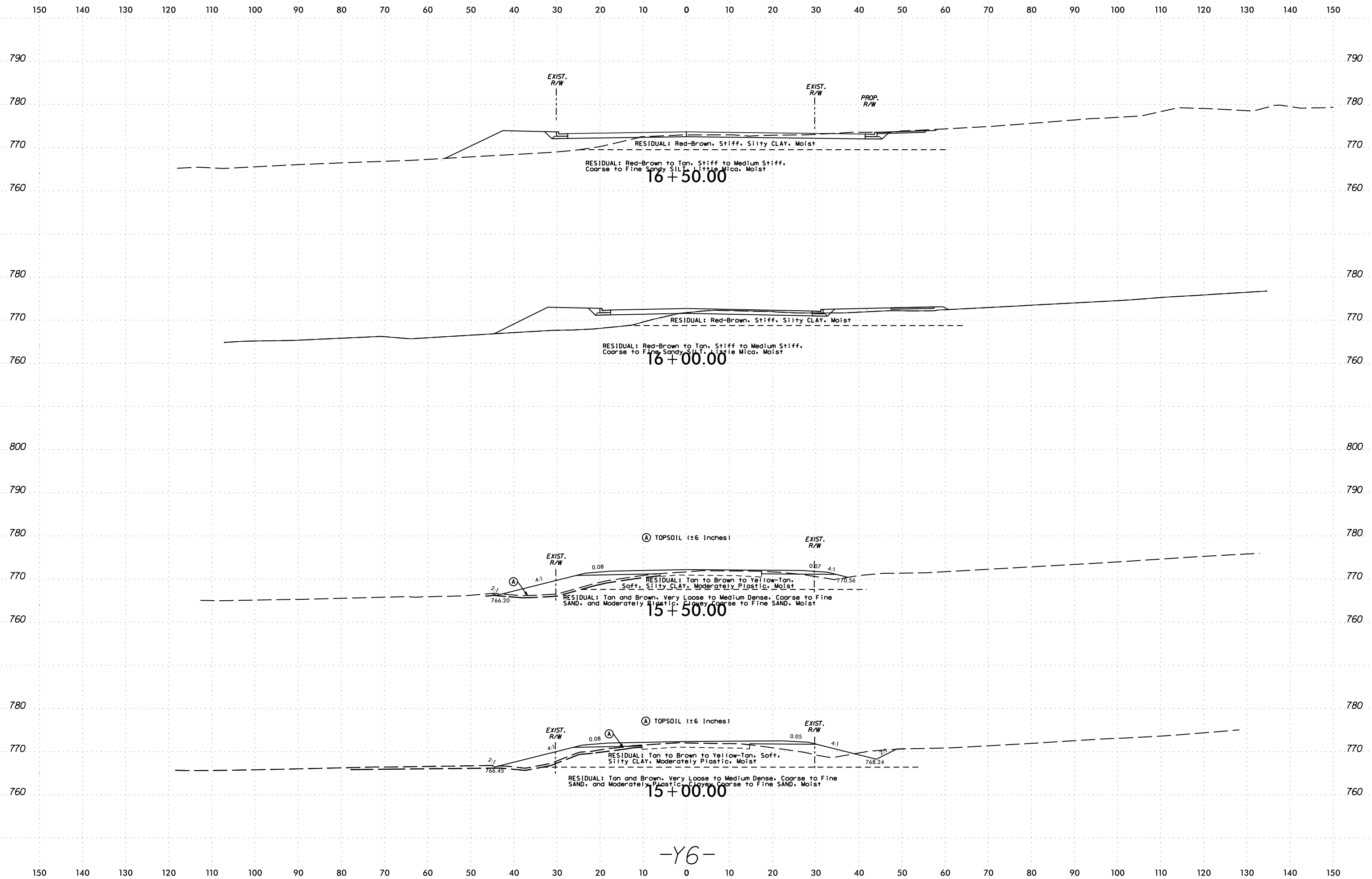
RESIDUAL: Tan and Brown, Very Loose to Medium Dense, Coarse to Fine SAND, and Moderately Plastic, Clayey Coarse to Fine SAND, Moist

RESIDUAL: Yellow-Tan to Red-Brown with White, Stiff to Medium Stiff, Coarse to Fine Sandy SILT, Micaceous, Manganese Seams, Moist

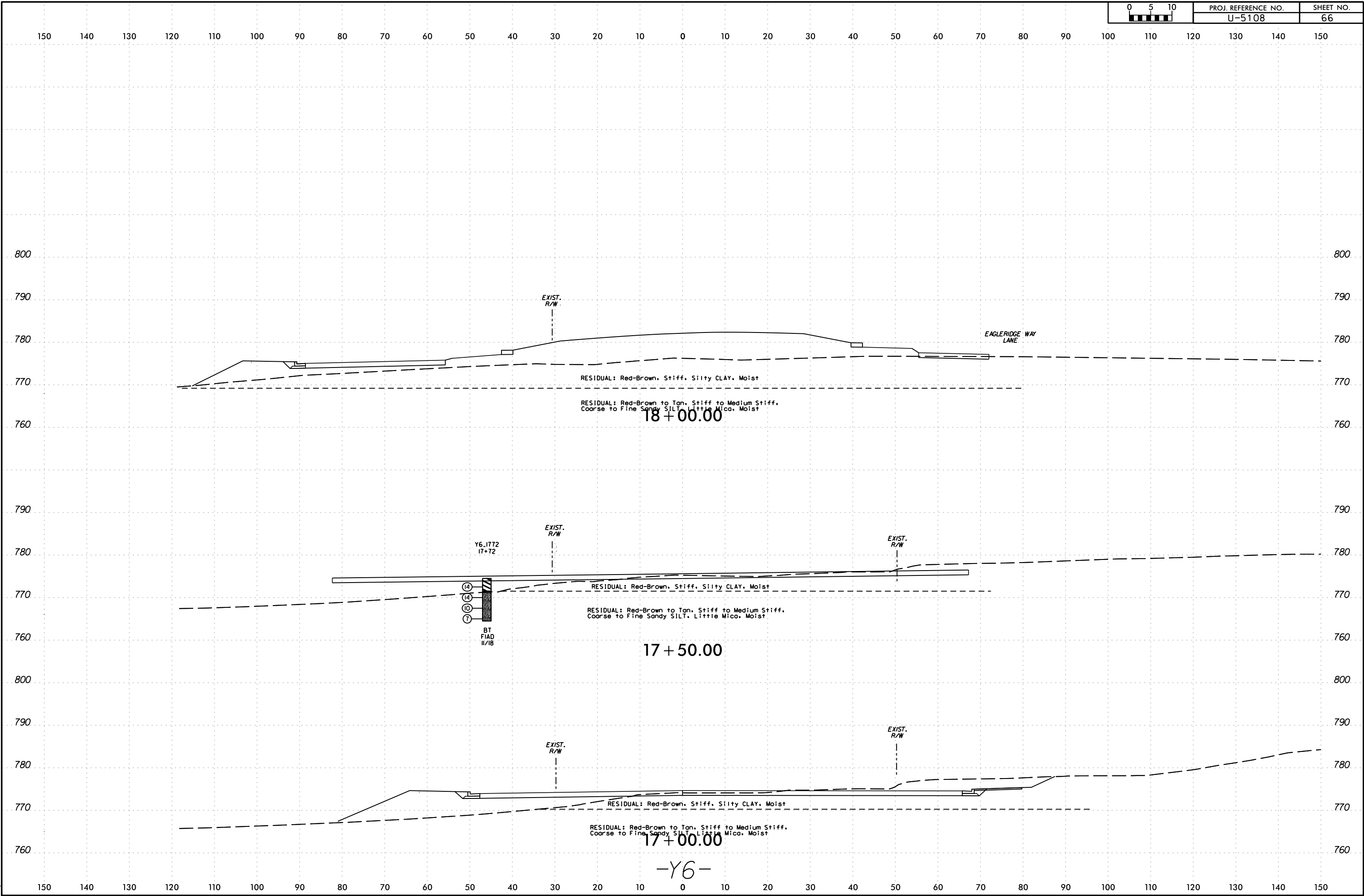
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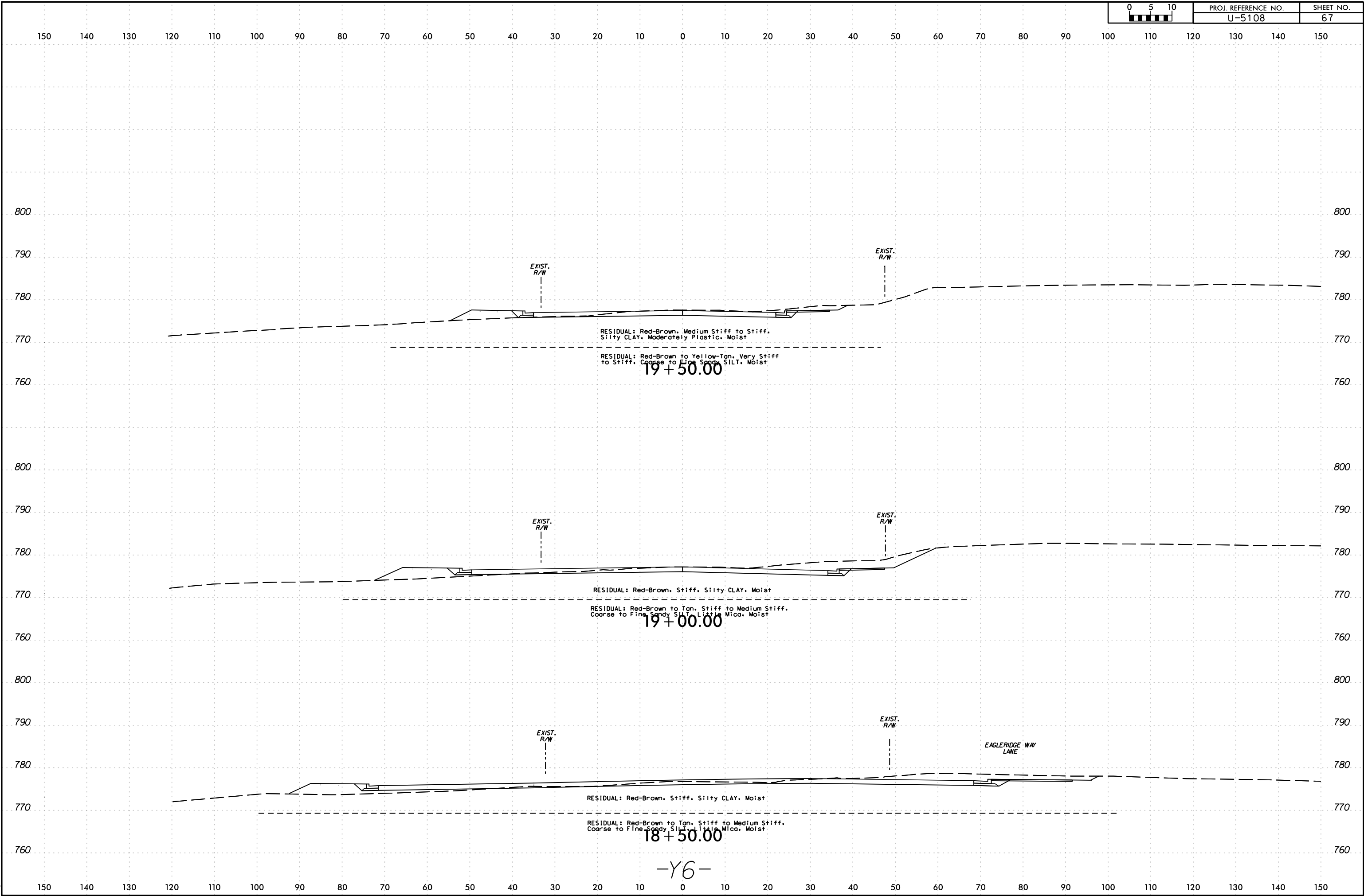
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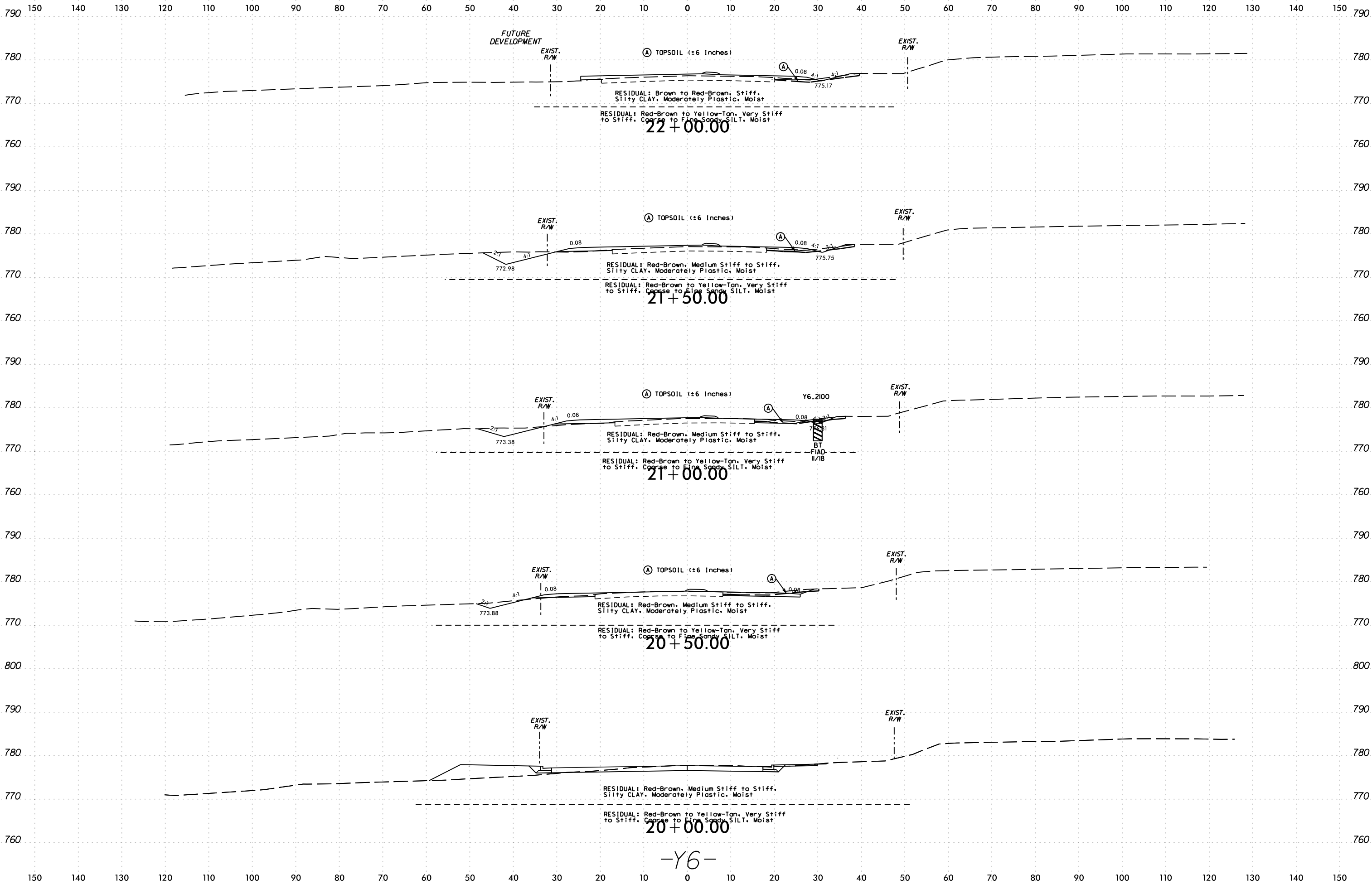
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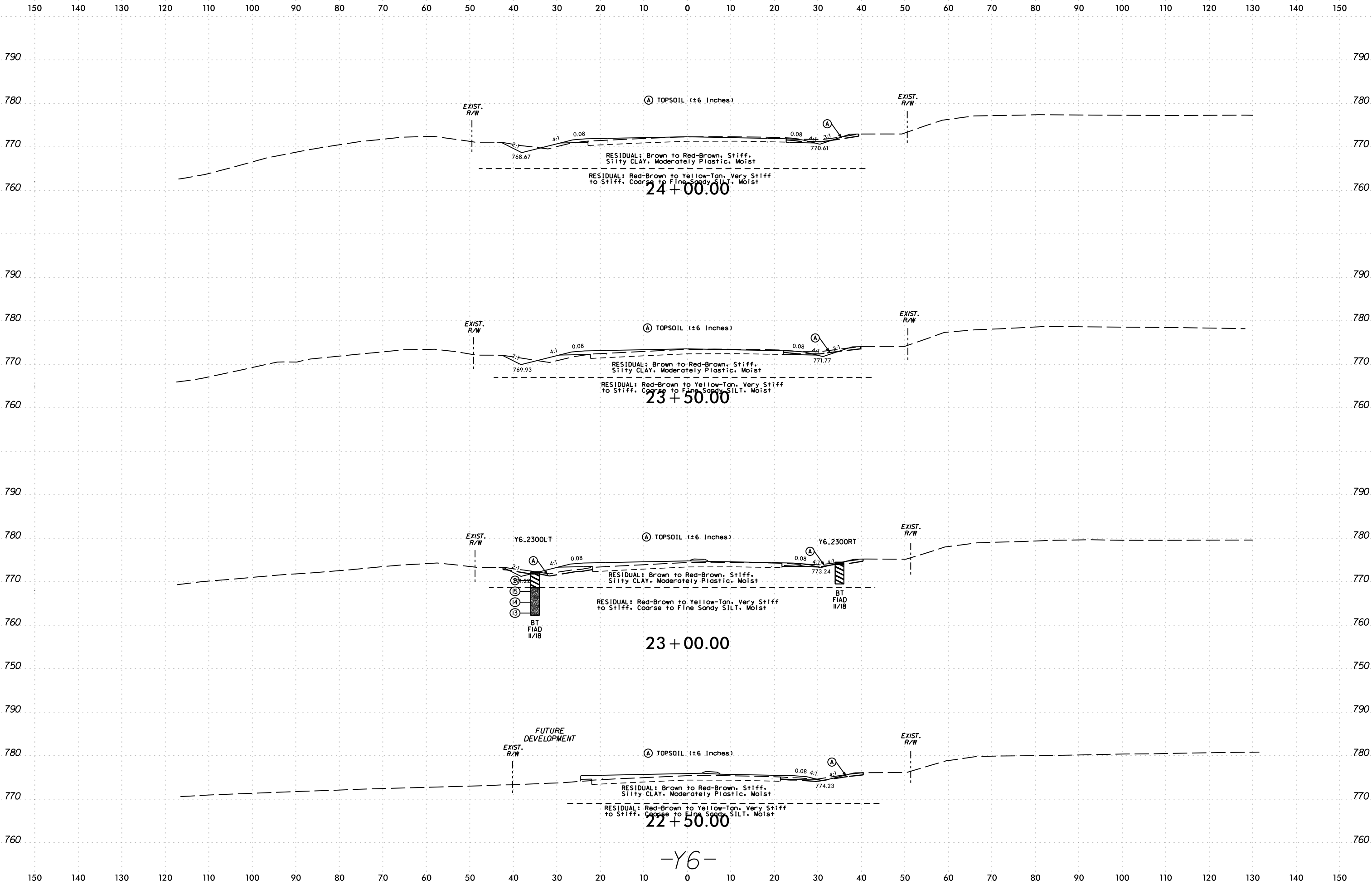
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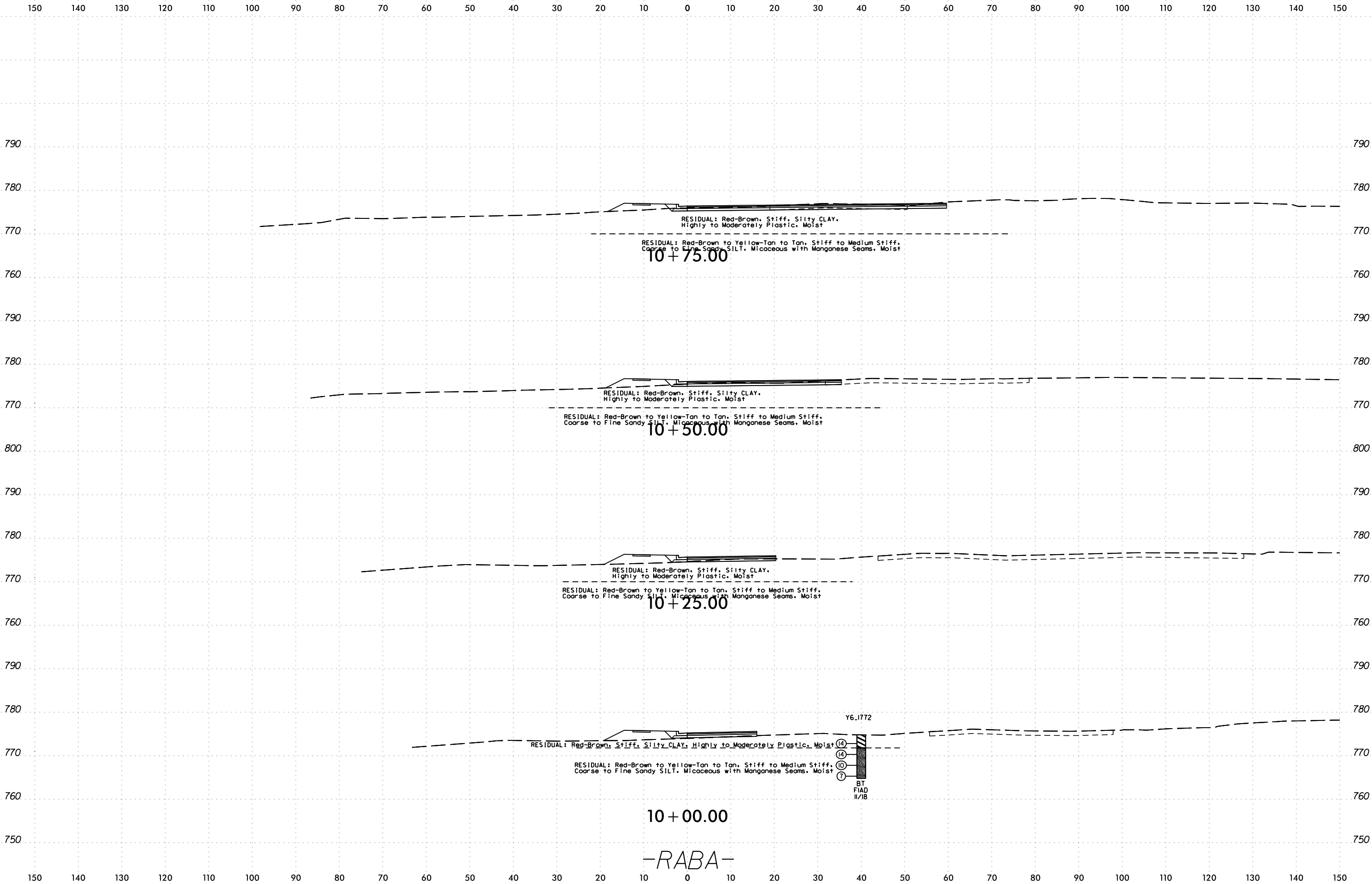


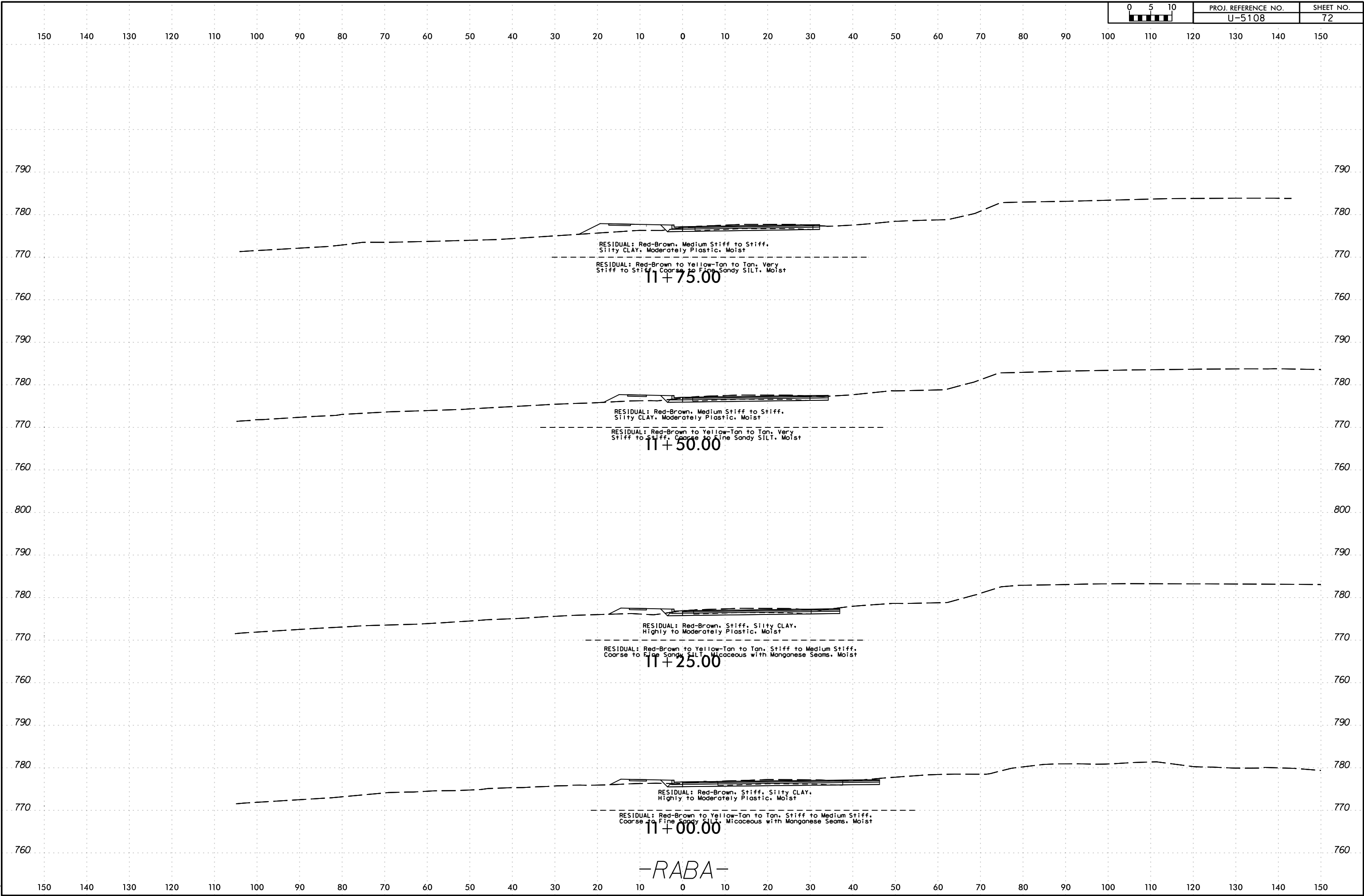


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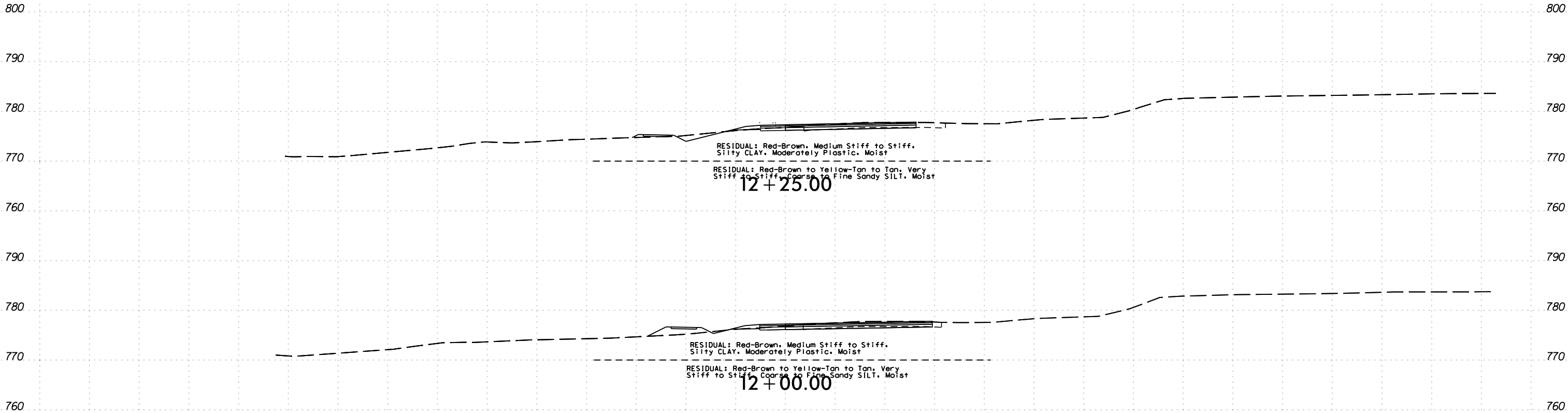
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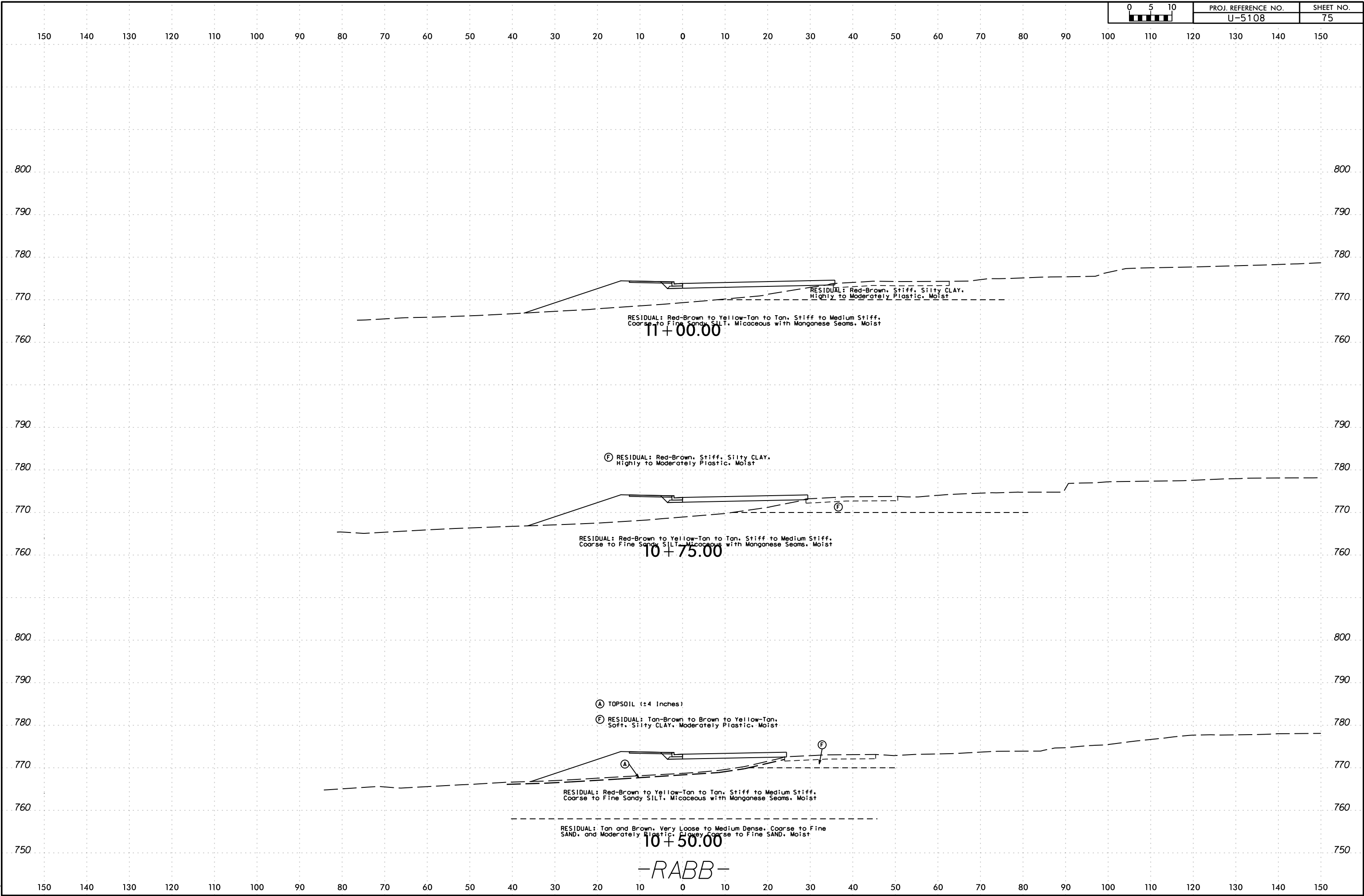


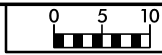
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-RABA-





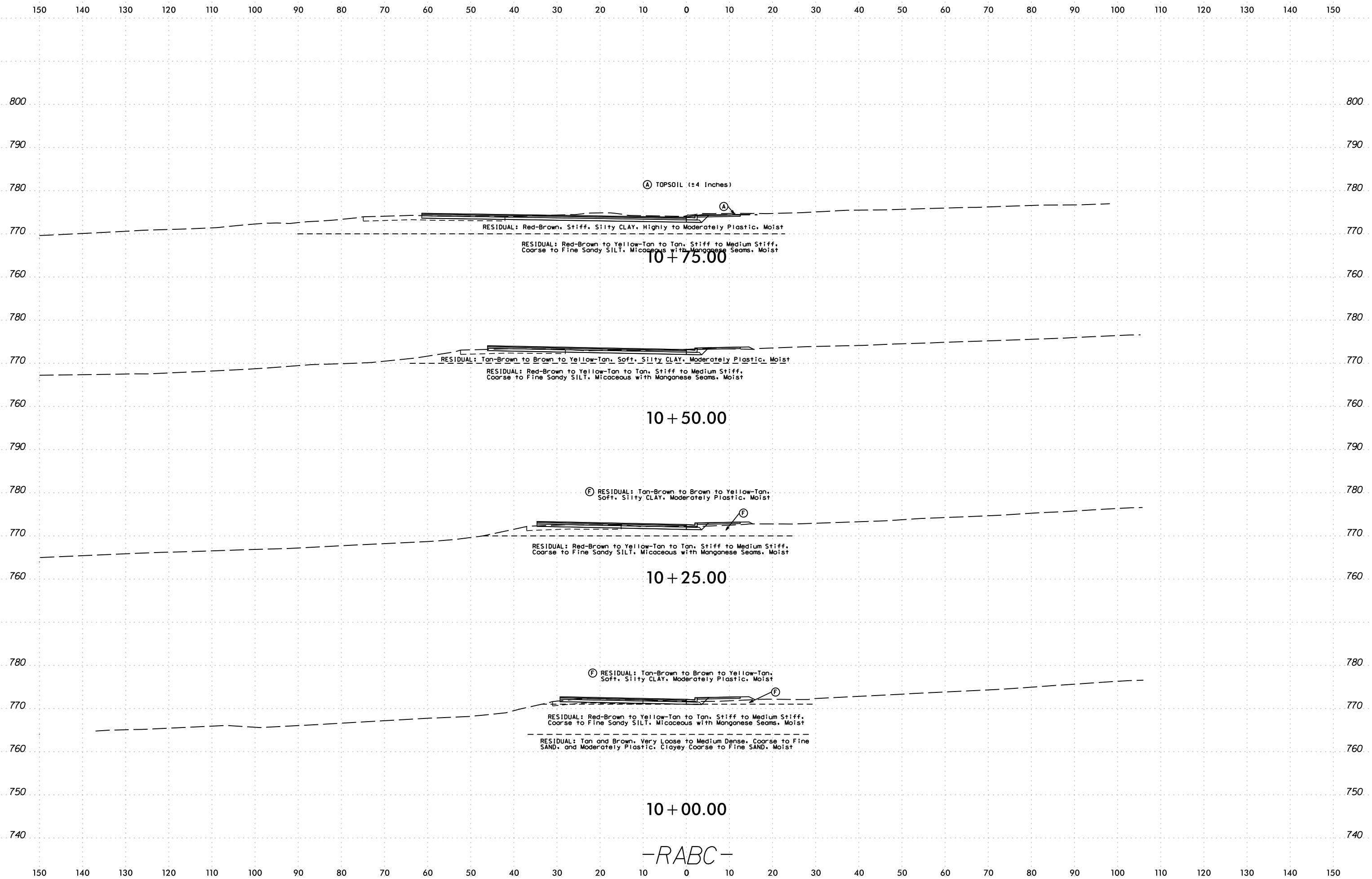
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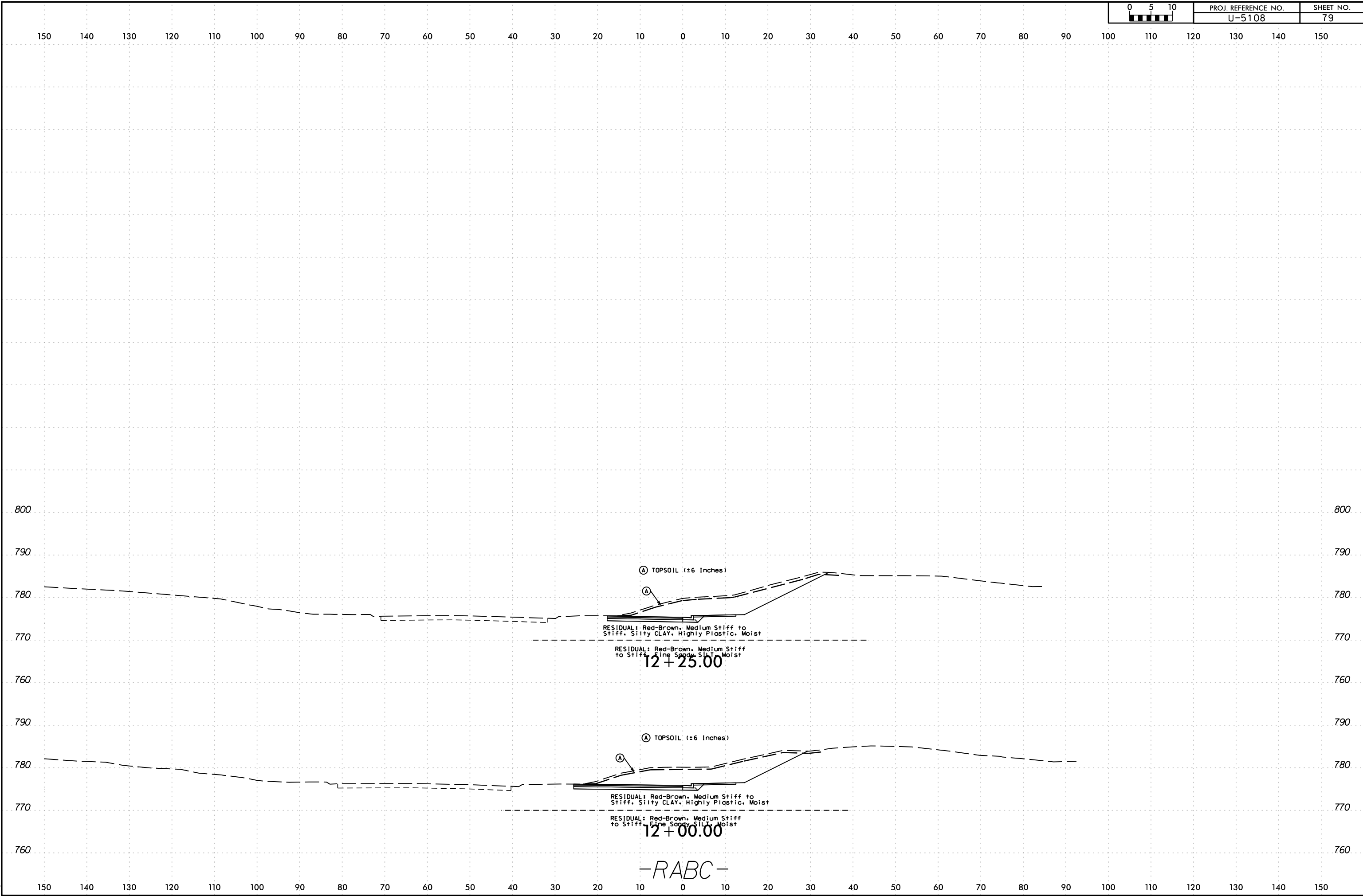
RESIDUAL: Red-Brown to Yellow-Tan to Tan, Stiff to Medium Stiff, Coarse to Fine Sandy Silty Micaeous with Manganese Seams, Moist
RESIDUAL: Red-Brown, Stiff, Silty CLAY, Highly to Moderately Plastic, Moist

11+25.00
-RABB-

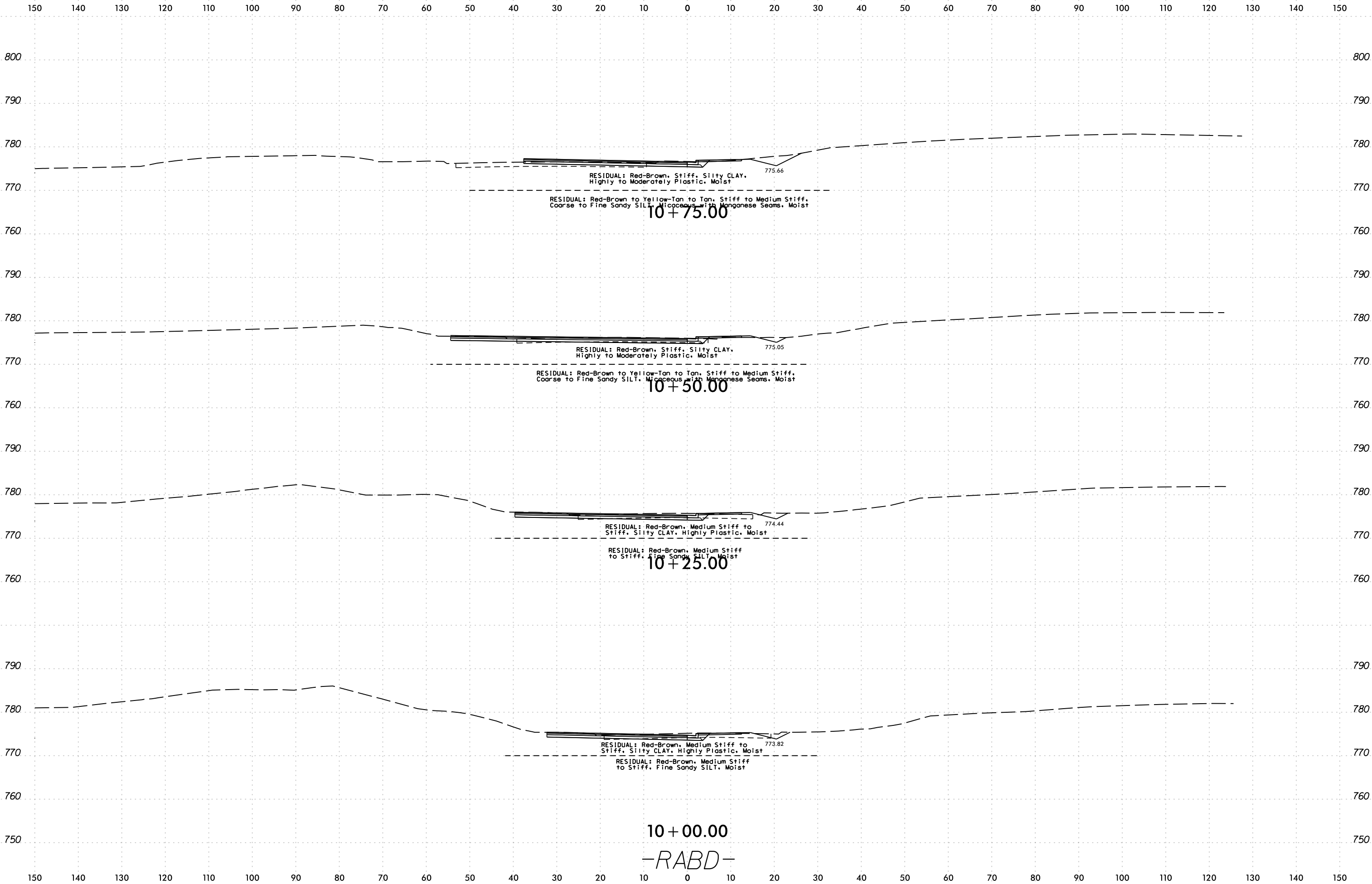


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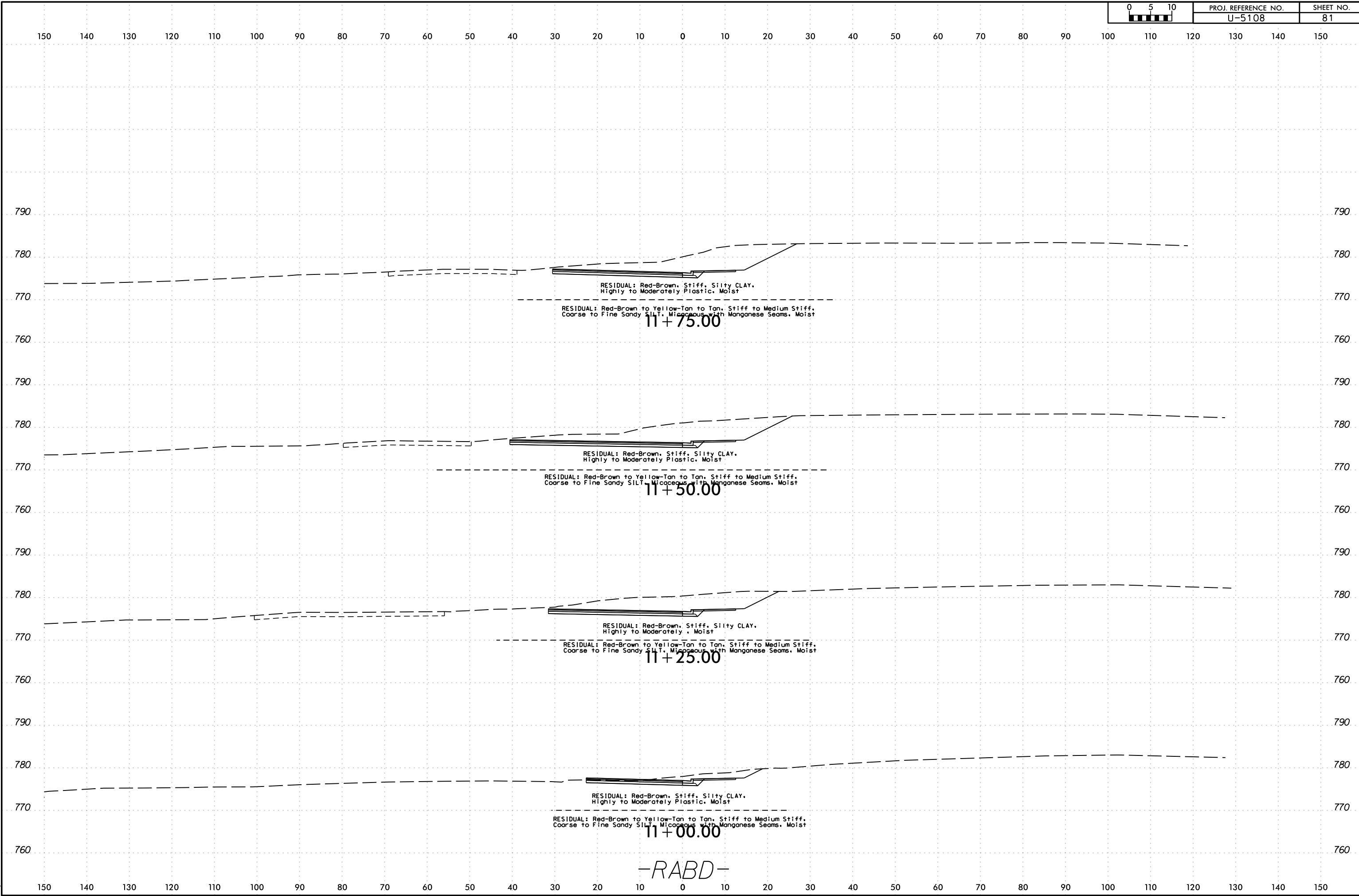
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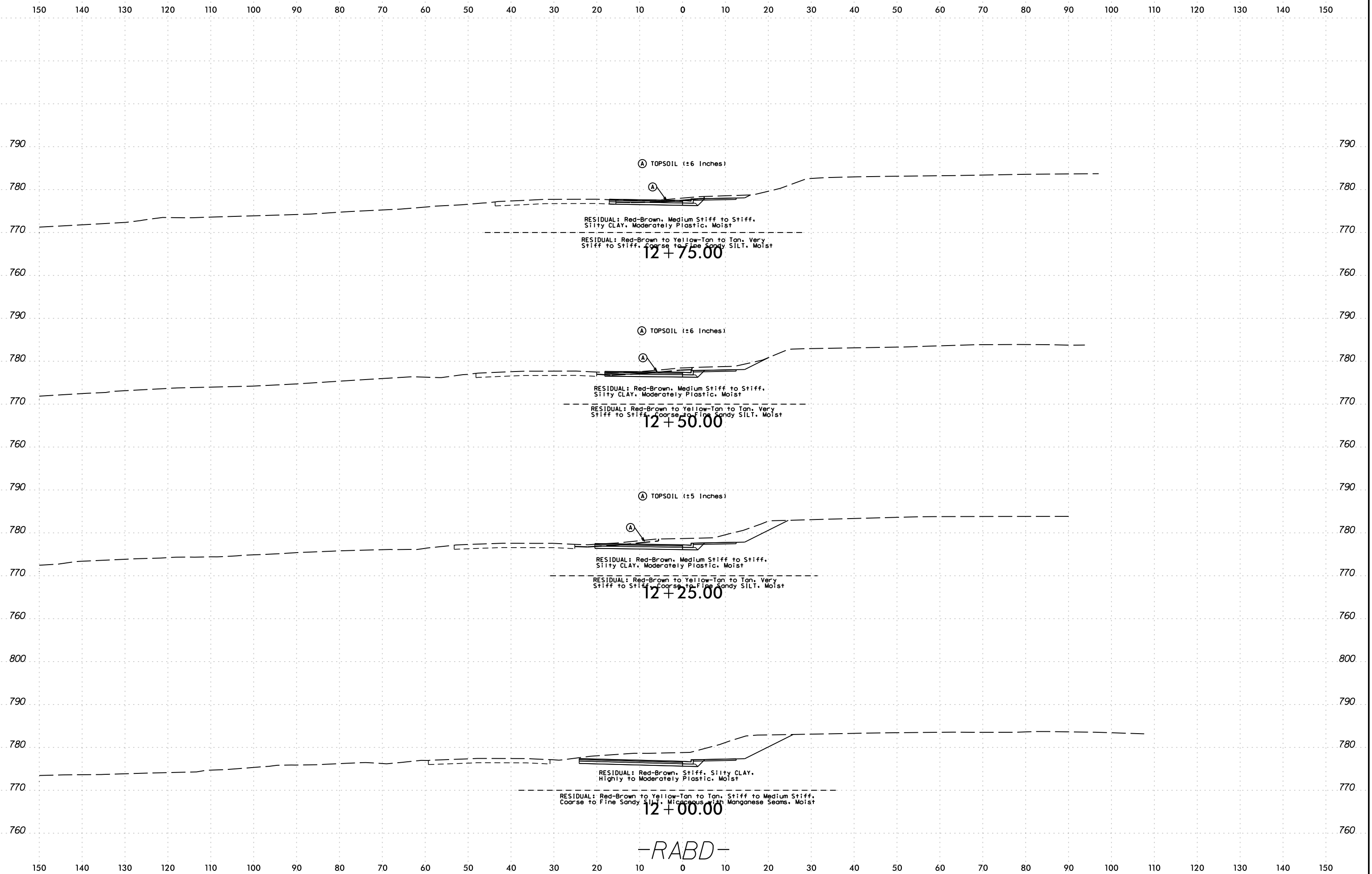
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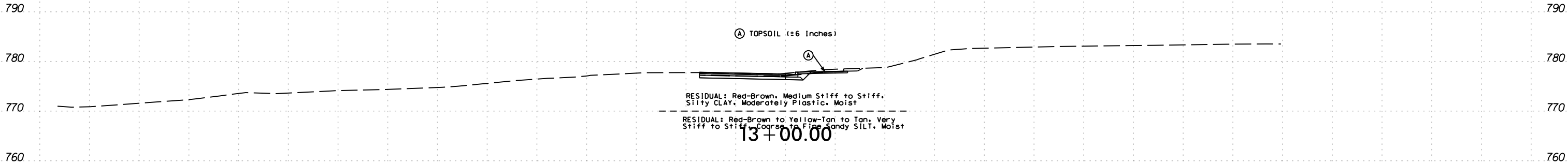


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-RABD-

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

REFERENCE: U-5108

PROJECT: 42370



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

SOILS LABORATORY TESTS RESULTS

WBS NO.: 42370.1.1

TIP NO.: U-5108

COUNTY: Mecklenburg

SITE DESCRIPTION: Northcross Drive Extension From End of Northcross Drive to Westmoreland Drive

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		
EB1-A	SS-1	-L- STA. 73+46, 24' LT	3.5-5.0	A-2-4 (0)	2	NP	NP	61	26	5	8	99	57	16	22.3	-
EB2-A	SS-2	-L- STA. 74+56, 24' LT	8.7-10.2	A-4 (1)	2	31	7	19	41	21	19	100	93	49	36.6	-
EB2-B	SS-3	-L- STA. 74+56, 18' RT	8.7-10.2	A-7-6 (6)	3	41	20	28	28	17	27	95	80	47	26.2	-
L_2800	SS-4	-L-STA. 28+00, 29' RT	1.0-2.5	A-7-5 (35)	5	75	41	15	11	14	60	100	91	77	31.0	-
RWAL1-3	SS-5	-L- STA. 32+09, 13' LT	1.0-2.5	A-7-5 (27)	7	71	41	21	16	13	50	99	87	66	30.0	-
RWAL1-5	SS-6	-L- STA. 33+14, 22' LT	8.5-10.0	A-7-5 (7)	10	53	12	26	20	9	45	100	82	59	33.3	-
L_3800LT	SS-7	-L- STA. 38+00, 20' LT	1.0-2.5	A-7-5 (22)	6	68	38	33	7	9	51	100	73	61	25.8	-
L_4450	SS-8	-L- STA. 44+50, 15' LT	13.5-15.0	A-5 (3)	4	50	9	31	31	23	15	100	81	46	35.6	-
L_4600	SS-9	-L- STA. 46+00, CL	1.0-2.5	A-2-4 (0)	3	23	9	49	21	13	17	100	67	33	15.6	-
L_5600	SS-10	-L- STA. 56+00, CL	3.5-5.0	A-7-5 (11)	16	63	21	30	18	23	29	100	80	55	28.3	-
L_5700LT	SS-11	-L- STA. 57+00, 27' LT	13.5-15.0	A-7-5 (11)	13	62	22	29	19	28	24	100	80	56	17.9	-
L_5900	SS-12	-L- STA. 59+00, CL	1.0-2.5	A-7-5 (27)	17	97	55	42	5	9	44	100	65	54	31.1	-
L_6500RT	SS-13	-L- STA. 65+00, 27' RT	8.5-10.0	A-7-5 (9)	14	51	18	28	21	28	23	99	79	56	15.8	-
L_6700	SS-14	-L- STA. 67+00, 10' RT	1.0-2.5	A-7-5 (24)	8	63	33	21	10	14	55	100	84	71	30.7	-
L_7250	SS-15	-L- STA. 72+50, CL	1.0-2.5	A-4 (0)	54	NP	NP	36	32	21	11	96	72	37	15.8	-
L_7700	SS-16	-L- STA. 77+00, CL	1.0-2.5	A-7-6 (8)	9	42	25	32	21	14	33	100	79	49	16.8	-
L_7850	SS-17	-L- STA. 78+50, CL	3.5-5.0	A-7-6 (12)	9	54	30	33	18	11	38	99	76	53	22.5	-
L_8250	SS-18	-L- STA. 82+50, 20' RT	3.5-5.0	A-5 (3)	8	51	10	36	21	20	23	100	75	48	27.8	-
L_8250	SS-19	-L- STA. 82+50, 20' RT	8.5-10.0	A-5 (1)	8	52	9	37	28	22	13	100	75	42	21.2	-
L_9164	SS-20	-L- STA. 91+64, 49' LT	3.5-5.0	A-7-6 (7)	3	48	19	36	16	20	28	99	72	51	23.8	-
L_9175	SS-21	-L- STA. 91+75, 35' RT	3.5-5.0	A-6 (1)	2	36	14	40	26	16	18	99	71	37	27.7	4.2
L_9175	SS-22	-L- STA. 91+75, 35' RT	8.5-10.0	A-7-5 (2)	5	42	12	33	30	24	13	99	77	42	29.3	-
L_9400	SS-23	-L- STA. 94+00, CL	3.5-5.0	A-7-6 (7)	17	48	27	41	17	7	35	100	70	44	11.2	-
L1_1951	SS-24	-L1- STA. 19+51, 44' LT	1.0-2.5	A-7-5 (22)	11	75	35	28	11	17	44	99	77	63	28.5	-
Y6_1250	SS-25	-Y6- STA. 12+50, 37' LT	3.5-5.0	A-7-6 (4)	16	44	23	46	17	11	26	99	64	39	14.3	-
Y6_1450LT	SS-26	-Y6- STA. 14+50, 61' LT	8.5-10.0	A-2-7 (2)	5	41	24	50	20	10	20	99	63	32	15.0	-

Signed:



NCDOT Certification No.

129-04-0411



March 14, 2024

MEMORANDUM TO: John L. Pilipchuk, LG, PE
 State Geotechnical Engineer
 NCDOT

FROM: ESP Associates, Inc.

STATE PROJECT: 42370.1.1 (U-5108)
 F.A. PROJECT: STBGDA-1001(078)
 COUNTY: Mecklenburg
 DESCRIPTION: Northcross Drive Extension from end of Northcross Drive to Westmoreland Drive

SUBJECT: Sound Barrier Wall Foundation Recommendations

The Geotechnical Engineering Unit (GEU) has received the following proposed sound barrier wall location, completed a subsurface investigation for the referenced project and recommends the following standard sound barrier wall foundation table as shown:

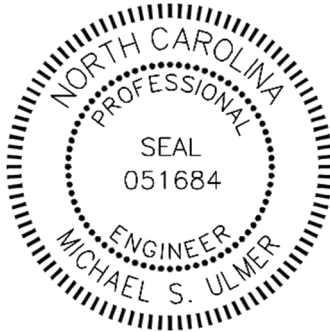
Sound Barrier Wall No.	Begin Station & Offset	End Station & Offset	Estimated Maximum Wall Height	Standard Sound Barrier Wall Foundation Table No.
No. 1	36+00.00 -L- 29.00' LT 10+00.00 -NB3-	43+50.00 -L- 23.50' LT 17+20.00 -NB3-	11 ft.	2

The standard sound barrier wall foundations table is based on 36” dia. holes and a maximum wall height of 25 ft. For 30” dia. holes, add an additional 1 ft to pile excavation depth (D) in standard foundation tables.

Please contact Shiping Yang, Ph.D., P.E. at (704) 455-8902 or Shane Clark, P.E. at (828) 298-3228 if there are any questions concerning this memorandum.

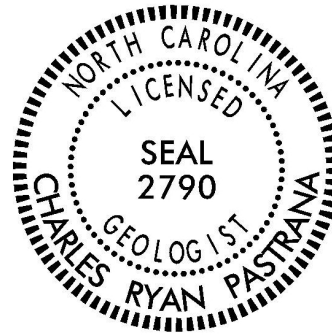
Thank you for the opportunity to be of service on this project.

Prepared by,



Michael S. Ulmer, PE
Senior Geotechnical Engineer

Prepared by,



3/14/2024

Ryan C. Pastrana, PG
Project Geologist

MSU/CRP

Attachments: U-5108_GEO_WALL_InventoryReport

REFERENCE: U-5108

PROJECT: 42370

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG
 PROJECT DESCRIPTION NORTHCROSS DRIVE EXTENSION
FROM EXISTING END OF NORTHCROSS DRIVE
TO WESTMORELAND DRIVE
 SITE DESCRIPTION NOISE WALL NO.1
-NB3- STA. 10+00 TO 17+20 /
-L- STA. 36+00 TO 43+50

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4-5	PROFILE
6	SOIL TEST RESULTS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5108	1	6

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 T07-6850. 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.

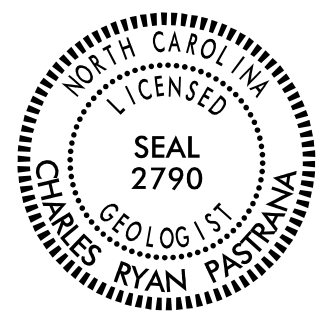
NOTES:
 1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR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


PERSONNEL

P.M. WEAVER
C.R. PASTRANA
D.M. NANCE
HPC

INVESTIGATED BY ESP Associates, Inc.
 DRAWN BY C.R. PASTRANA
 CHECKED BY C.R. PASTRANA
 SUBMITTED BY ESP Associates, Inc.
 DATE March 2024

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

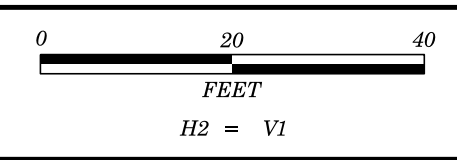


 3/14/2024
 SIGNATURE DATE

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

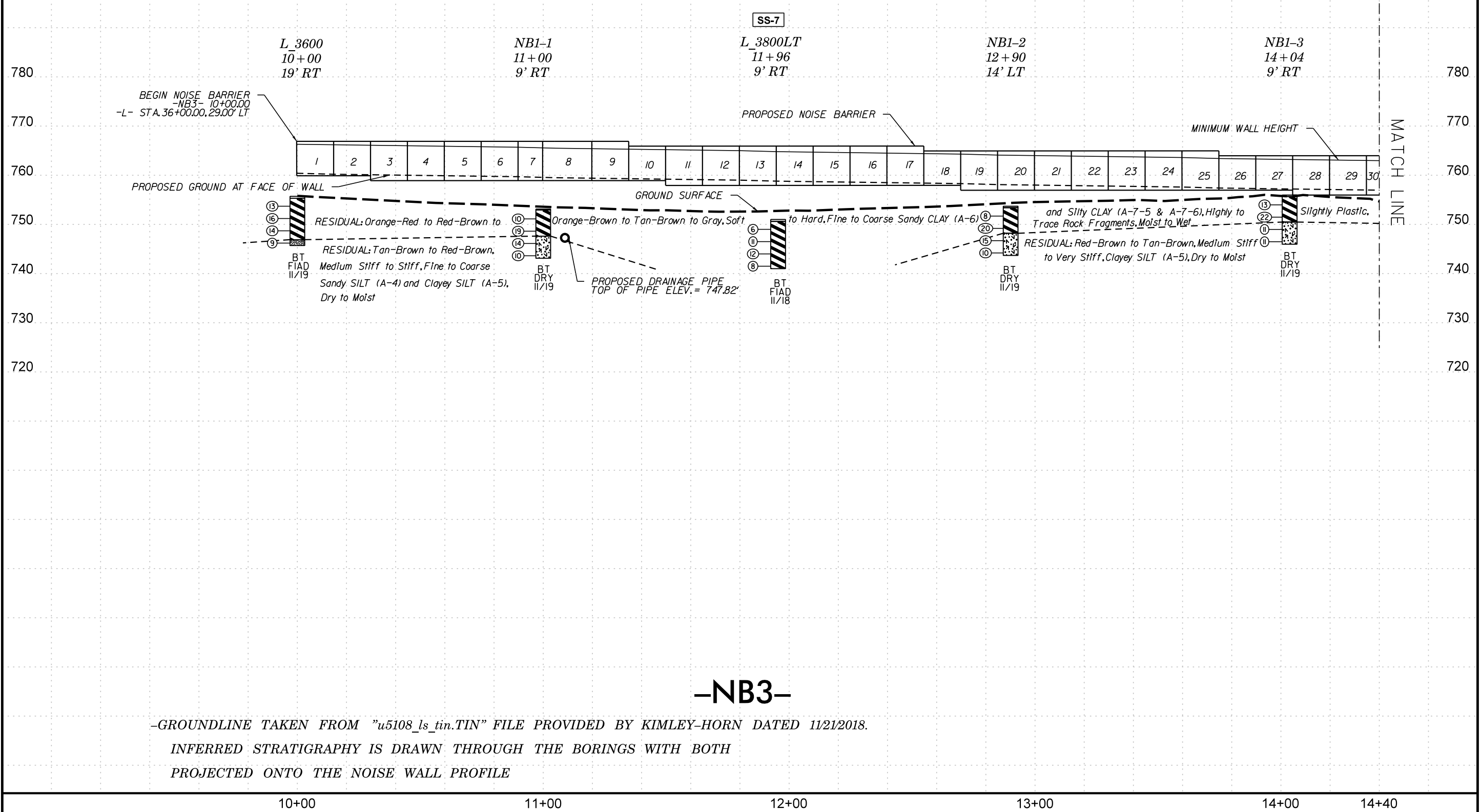
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

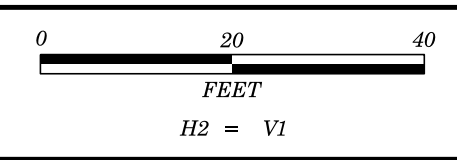
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																								
<p>SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.</p>										<p>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:</p>										<p>ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																								
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<p align="center">MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p align="center">COMPRESSION</p> <p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p align="center">WEATHERING</p> <p>FRESH - ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV 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. SLIGHT (SL.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. 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. MODERATELY SEVERE (MOD. SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> SEVERE (SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> VERY SEVERE (IV 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> COMPLETE - ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. FABRIC MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.</p>										<p align="center">PERCENTAGE OF MATERIAL</p> <table border="1"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE 1 - 10%</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE 10 - 20%</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME 20 - 35%</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>> 10%</td> <td>> 20%</td> <td>HIGHLY 35% AND ABOVE</td> </tr> </table>										ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE 1 - 10%	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE 10 - 20%	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME 20 - 35%	HIGHLY ORGANIC	> 10%	> 20%	HIGHLY 35% AND ABOVE																																																																																																																																																											
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<p align="center">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP</p>										<p align="center">MISCELLANEOUS SYMBOLS</p> <p> ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE</p>										<p align="center">RECOMMENDATION SYMBOLS</p> <p> UNDERCUT SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</p>										<p align="center">ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL. - CLAY CPT - CONE PENETRATION TEST CSE. - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY 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 WEA. - WEATHERED % - UNIT WEIGHT %g - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>																																																																																																																																																																																								
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OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE																																																																																																																																																																																																																				
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE																																																																																																																																																																																																																				
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<input type="checkbox"/> CME-45C	<input type="checkbox"/> CLAY BITS	<input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL																																																																																																																																																																																																																				
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<p align="center">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>										<p align="center">FRACATURE SPACING</p> <p>BEDDING</p>										<p align="center">FRACATURE SPACING</p> <p>BEDDING</p>										<p align="center">FRACATURE SPACING</p> <p>BEDDING</p>																																																																																																																																																																																								
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PROJECT REFERENCE NO.	SHEET NO.
U-5108	4
PROFILE ALONG NOISE WALL NO.1	

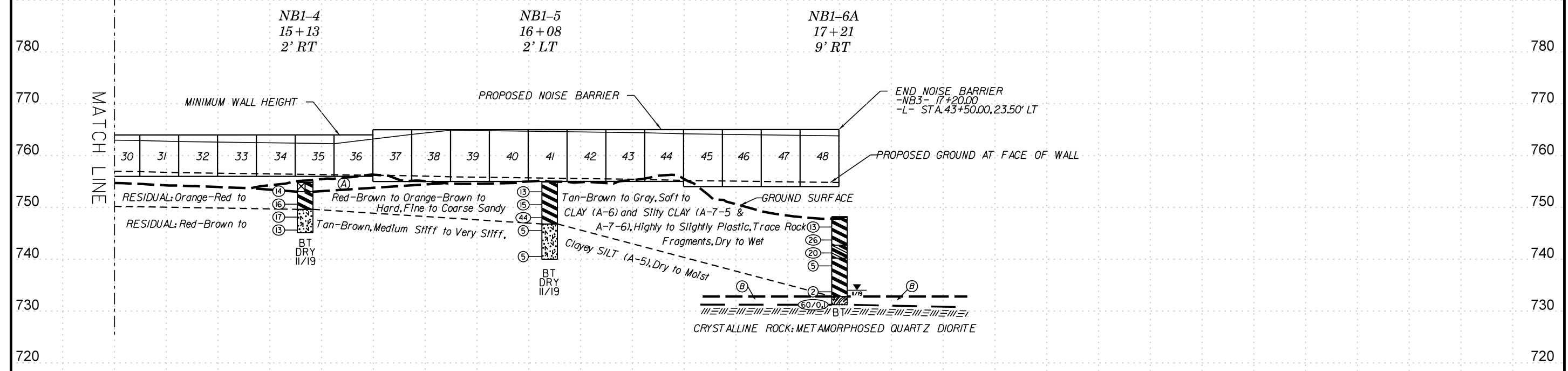
PANEL NO.	1-9	10-17	18-25	26-36	37-48
TOP ELEVATION	767'	766'	765'	764'	765'
LENGTH	135'	120'	120'	165'	180'





PROJECT REFERENCE NO.	SHEET NO.
U-5108	5
PROFILE ALONG NOISE WALL NO. 1	

PANEL NO.	1-9	10-17	18-25	26-36	37-48
TOP ELEVATION	767'	766'	765'	764'	765'
LENGTH	135'	120'	120'	165'	180'



- (A) ARTIFICIAL FILL: Red-Brown to Tan, Hard, Silty CLAY (A-7-5), Trace Gravel
Note: Blow Count Influenced by Gravel
- (B) WEATHERED ROCK: METAMORPHOSED QUARTZ DIORITE

-NB3-

-GROUNDLINE TAKEN FROM "u5108_ls_tin.TIN" FILE PROVIDED BY KIMLEY HORN DATED 4/20/2018.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE NOISE WALL PROFILE

SOILS LABORATORY TESTS RESULTS

WBS NO.: 42370.1.1

TIP NO.: U-5108

COUNTY: Mecklenburg

SITE DESCRIPTION: Northcross Drive Extension From End of Northcross Drive to Westmoreland Drive - Noise Wall

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_3800LT	SS-7	-L- STA. 38+00, 20' LT	1.0-2.5	A-7-5 (22)	6	68	38	33	7	9	51	100	73	61	25.8	-

Signed:  _____

NCDOT Certification No. 129-04-0411 _____