REFERENCE: B-5777

PROJECT: 45733

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *DAVIDSON*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 58 ON NC 109 OVER US 64*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5777	1	

CAUTION NOTICE

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

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

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO PERFORM INDEPENDENT SUBSURFACE INVESTIGATIONS AND MAKE INTERPRETATIONS AS NECESSARY TO CONFIRM CONDITIONS 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

A. SUTTLE, P.G.

C. OSBORNE

INVESTIGATED BY *ECS SOUTHEAST, LLP*

DRAWN BY *A. SUTTLE, P.G.*

CHECKED BY *M. MULLA, P.E.*

SUBMITTED BY *ECS SOUTHEAST, LLP*

DATE *JUNE 2024*

Prepared in the Office of:

ECS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINERING
FIRM # F-1078

NORTH CAROLINA LICENSED SEAL 2768 GEOLOGIST AMANDA R. SUTTLE

DocuSigned by:
Amanda R. Suttle 06/12/2024
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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
B-5777	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	6 MX			NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

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.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- 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

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
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
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-750X
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] DIEDRICH D-70
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [X] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q2

HAND TOOLS:
- [ ] POST HOLE DIGGER
- [ ] HAND AUGER
- [ ] SOUNDING ROD
- [ ] VANE SHEAR TEST
- [ ] _____

ROCK DESCRIPTION

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:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
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 YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
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.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V 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.
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*
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 (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

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.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

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 (RQD) - 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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK:
BM-1 (N737693 E1673323)
STA. 23+07, 121' RT ELEVATION: 779.6 FEET

NOTES:

ROADWAY DESIGN FILES, .DTM FILE PROVIDED BY NCDOT.

NORTHING AND EASTINGS OBTAINED USING A TRIMBLE GEO7X.

ELEVATIONS FOR BRIDGE BORINGS OBTAINED USING BENCHMARK BM-1 (N737693 E1673323)

FIAD = FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
B-5777	2A

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

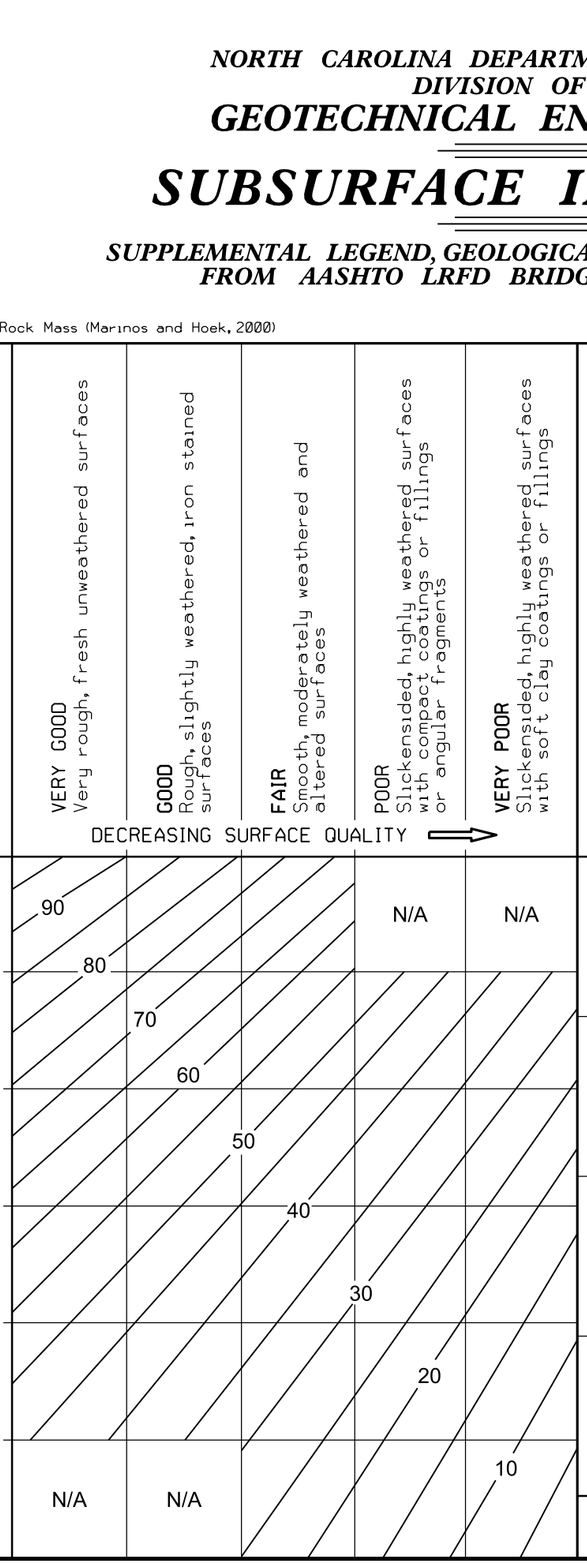
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

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.

STRUCTURE

- INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities
- BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets
- VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
- BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity
- DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
- LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

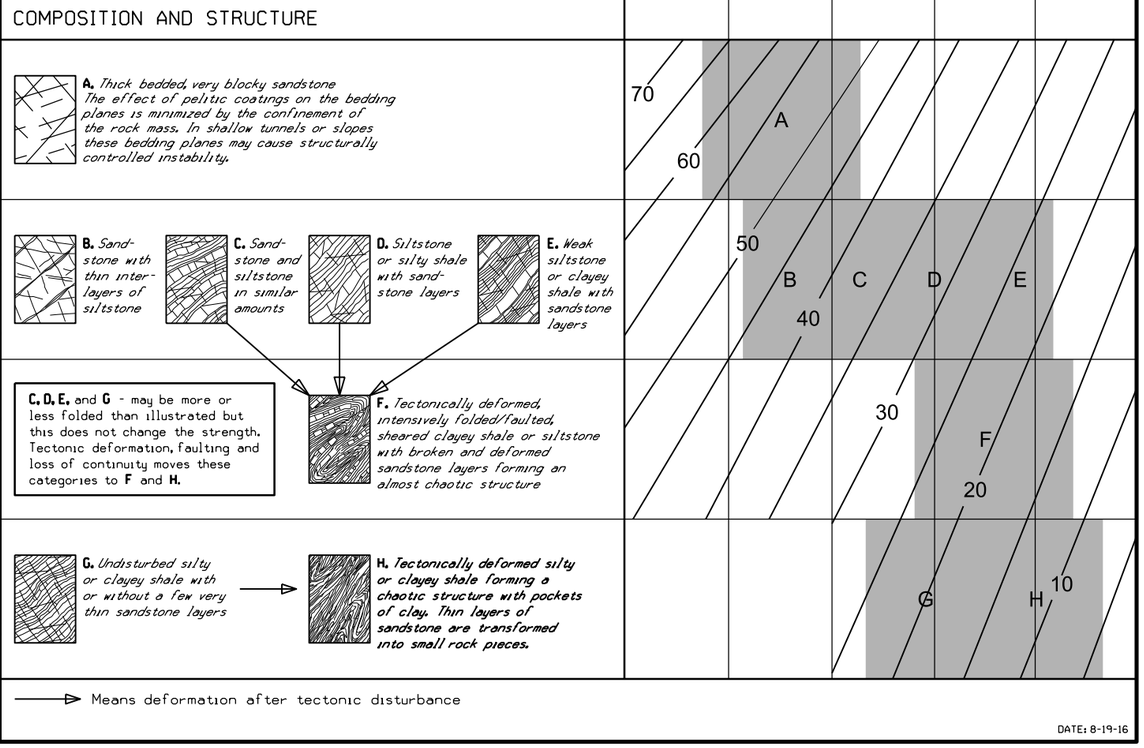


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

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.

COMPOSITION AND STRUCTURE



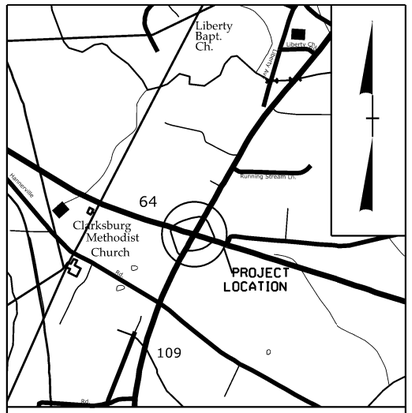
DATE: 8-19-16

09/08/99

TIP PROJECT: B-5777

CONTRACT:

See Sheet 1A For Index of Sheets



VICINITY MAP (NTS)

30% PLANS

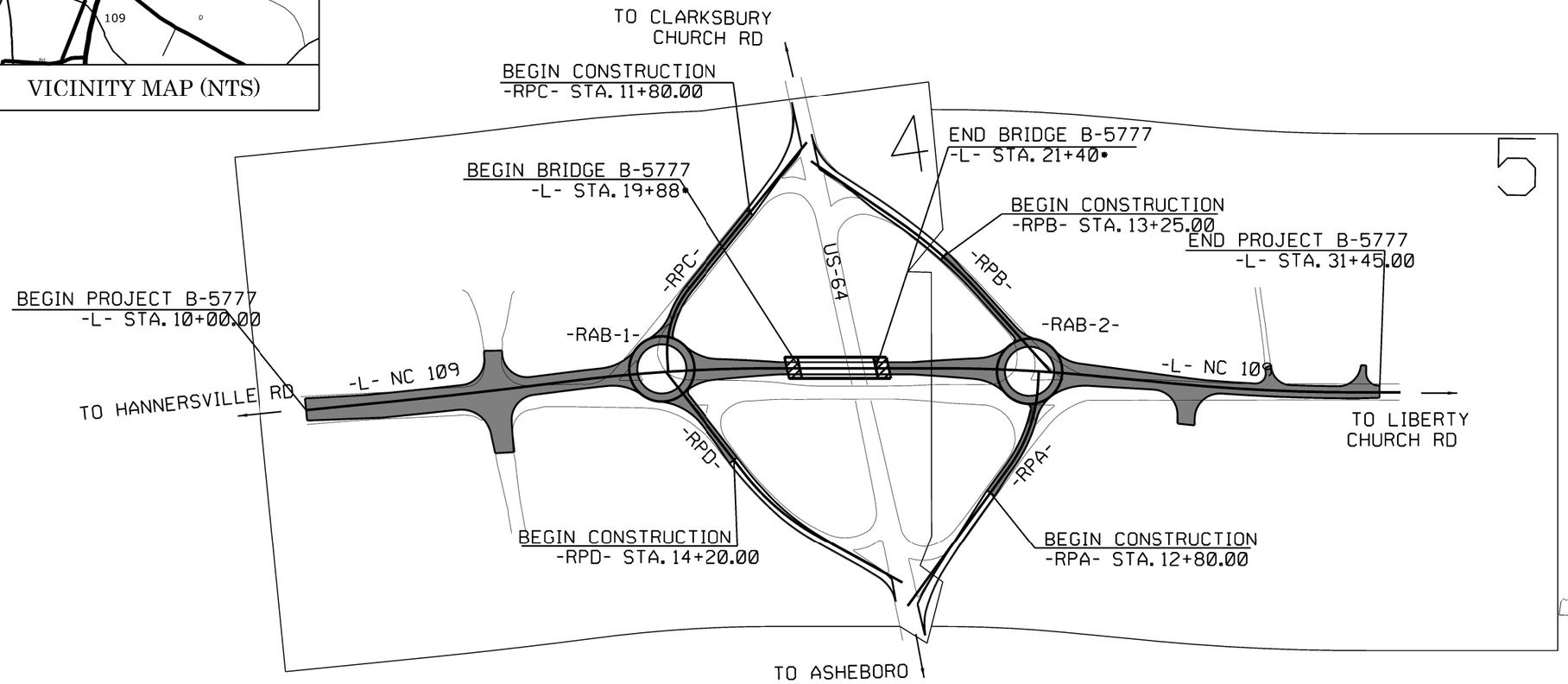
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

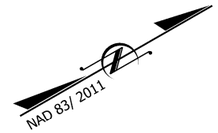
DAVIDSON COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5777	3	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
45733.1.1		PE	

LOCATION: *BRIDGE NO. 58 OVER US 64 ON NC 109*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE, AND STRUCTURE (BRIDGE)*

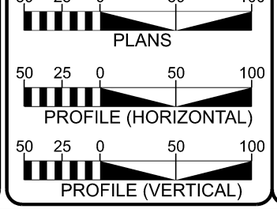




THIS IS A PARTIAL CONTROLLED ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS SHOWN ON THE PLANS.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.

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

GRAPHIC SCALES



DESIGN DATA

ADT 2025 = 11,800
ADT 2045 = 13,000
K = 9 %
D = 60 %
T = 3 %
V = 60 MPH

FUNC CLASS = PRINCIPAL ARTERIAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5777 0.377 MILES

LENGTH STRUCTURE TIP PROJECT B-5777 0.029 MILES

TOTAL LENGTH TIP PROJECT B-5777 0.406 MILES

PREPARED IN THE OFFICE OF:
RS&H
8521 SIX FORKS ROAD, SUITE 400
RALEIGH, NC 27615
NC FIRM LICENSE No: F-0493
FOR THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2024 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JANUARY 31, 2024

LETTING DATE: JUNE 17, 2025

STEVEN SHUMAN, PE
PROJECT ENGINEER

DANA PACZEK, PE
PROJECT DESIGN ENGINEER

RYAN NEWCOMB, PE
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

ECS Southeast, LLC

1812 Center Park Drive, Suite D
Charlotte, NC 28217
T 704.525.5152 I F 704.357.0023
www.ecslimited.com

May 14, 2024

WBS NO:	45733.1.1
TIP NO:	B-5777
PROJECT ID:	43907
COUNTY:	Davidson
DESCRIPTION:	Replace Bridge No. 58 on NC 109 over US 64
SUBJECT:	**Geotechnical Report – Inventory**

Project Description

The project consists of the replacement of Bridge No. 58 on NC 109 over US 64 in Thomasville, Davidson County, North Carolina. As a part of the replacement, a portion of NC 109 (-L- alignment), from Station 10+00 to Station 31+45 for an overall length of 2,145 feet (0.406 miles) will be realigned to the northwest to incorporate the new bridge structure. Roadway improvements will be made to Ramp A (-RPA- alignment), Ramp B (-RPB- alignment), Ramp C (-RPC- alignment), and Ramp D (-RPD- alignment) as well as the addition of two (2) new roundabouts (-RAB1-, -RAB2-) where they intersect with NC 109.

A new 150-foot long, 2-span bridge will be constructed on NC 109 (-L- alignment) over US64. The bridge will be located on new alignment and will begin at Station 19+89 and end at Station 21+39. The new bridge will likely be founded on a deep foundation system consisting of driven steel piles at the end bents and spread footings at the interior bent. Mechanically Stabilized Earth (MSE) walls will be constructed at the bridge abutments.

The provided roadway plans generally indicate new maximum embankment fill heights of approximately 15 feet along the -L- and -RAB2- alignments, and maximum cut depths of approximately 3 feet along the -L- and -RPD- alignments. Slopes are planned to be oriented at a 2:1 (horizontal:vertical) geometry.

A geotechnical field investigation was performed by ECS between April 2024 and May 2024. During this time period, a total of twenty-three (23) standard penetration test (SPT) roadway/structure borings were advanced using a Diedrich D-70 drill rig equipped with an automatic hammer. Representative soil samples were collected for visual classification in the field and selected for laboratory analysis by ECS's NCDOT approved testing laboratory.

The following alignments are included as a part of this investigation:

Line	Station (±)
-L- (NC 109)	10+00 to 31+45
-RPA-	10+26 to 15+46
-RPB-	10+00 to 16+40
-RPC-	10+00 to 15+50
-RPD-	10+00 to 16+42
-RAB1- (NC 109)	10+00 to 14+08
-RAB2- (NC 109)	10+00 to 14+08

Physiography and Geology

The site is located in the Carolina Slate Belt within the Piedmont Physiographic Province of North Carolina. In accordance with the Geologic Map of North Carolina, 1985, the predominant rock types under this site are mapped meta-argillite, interbedded with metasandstone, metaconglomerate and metavolcanic rock. Weathered rock and non-crystalline rock encountered during this investigation consists of Meta-Argillite. The virgin soils are the residual product of in-place chemical weathering of rock that was similar to the rock presently underlying the site.

Soil Properties

Soils within the area of this project have been divided into five categories: surficial materials (topsoil), roadway embankment, and residual soils.

Surficial Materials: The surficial organic soils (topsoil/rootmat) that were encountered ranged in thickness from approximately 0.1 to 0.6 feet.

Roadway Embankment: Roadway Embankment (R.E.) soils from the previous bridge construction are present throughout the project and generally consist of very dense, fine to coarse sandy gravel (a-1-b), medium dense, fine to coarse silty sand (A-2-4); medium stiff to hard, fine to coarse sandy/clayey silt (A-4, A-5); and stiff, slightly to highly plastic, sandy/silty clay (A-6, A-7-5/6). Varying amounts of gravel and asphalt were encountered throughout the roadway embankment soils. The roadway embankment extends to depths up to approximately 18.5 feet below existing grades. Laboratory testing of the Roadway Embankment soils indicated PI's ranging from 5 to 9 for the silty (A-4) soils, and PI's ranging from 12 to 30 for the clayey (A-7-5/6) soils.

Residual Soils: Residual soils were encountered throughout the project corridor are derived from the weathering of the underlying parent bedrock. The residual soils encountered generally consist of stiff to hard, fine to coarse sandy/clayey silt (A-4, A-5); and medium stiff to very stiff, slightly to moderately plastic,

sandy/silty clay (A-6, A-7-5). Varying amounts of rock fragments were encountered throughout the residual soils. Laboratory testing of the residual soils indicated a PI of 9 for the silty (A-4, A-5) soils, and PI's ranging from 15 to 23 for the clayey (A-6, A-7-5) soils.

Rock Properties

Weathered Rock: The top of the weathered rock varied significantly along the corridor and was encountered at depths ranging from approximately 0.0 to 18.5 feet below the existing ground surface; corresponding to elevations ranging from approximately 780.5 feet to 755.8 feet. The weathered rock encountered generally consists of Meta-Argillite.

Non-Crystalline Rock: The top of the crystalline rock varied significantly along the corridor and was encountered at depths ranging from approximately 2.4 to 38.6 feet below the existing ground surface; corresponding to elevations ranging from approximately 778.7 feet to 743.2 feet. The non-crystalline rock encountered generally consists of Meta-Argillite.

Groundwater Properties

At the time of drilling, Groundwater was encountered in one (1) boring at depth of approximately 36.3 feet below the existing ground surface; corresponding to an approximate elevation 745.6 feet. After a stabilization period of at least 24 hours, groundwater was encountered in three (3) borings at depths ranging from approximately 8.5 to 15.4 feet below the existing ground surface; corresponding to elevations ranging from approximately 768.7 to 762.1 feet. The recovered soil samples were generally described as moist above the groundwater level and moist below the groundwater level.

Areas of Special Geotechnical Interest

1) High Plasticity Soils: The following areas contain high plasticity soils with plasticity indices (PI's) in excess of 25. High plasticity soils have the potential to cause subgrade instability during construction, embankment stability or long term settlement problems.

Line	Station (±)	Offsets
-L-	26+50 to 28+00	LT

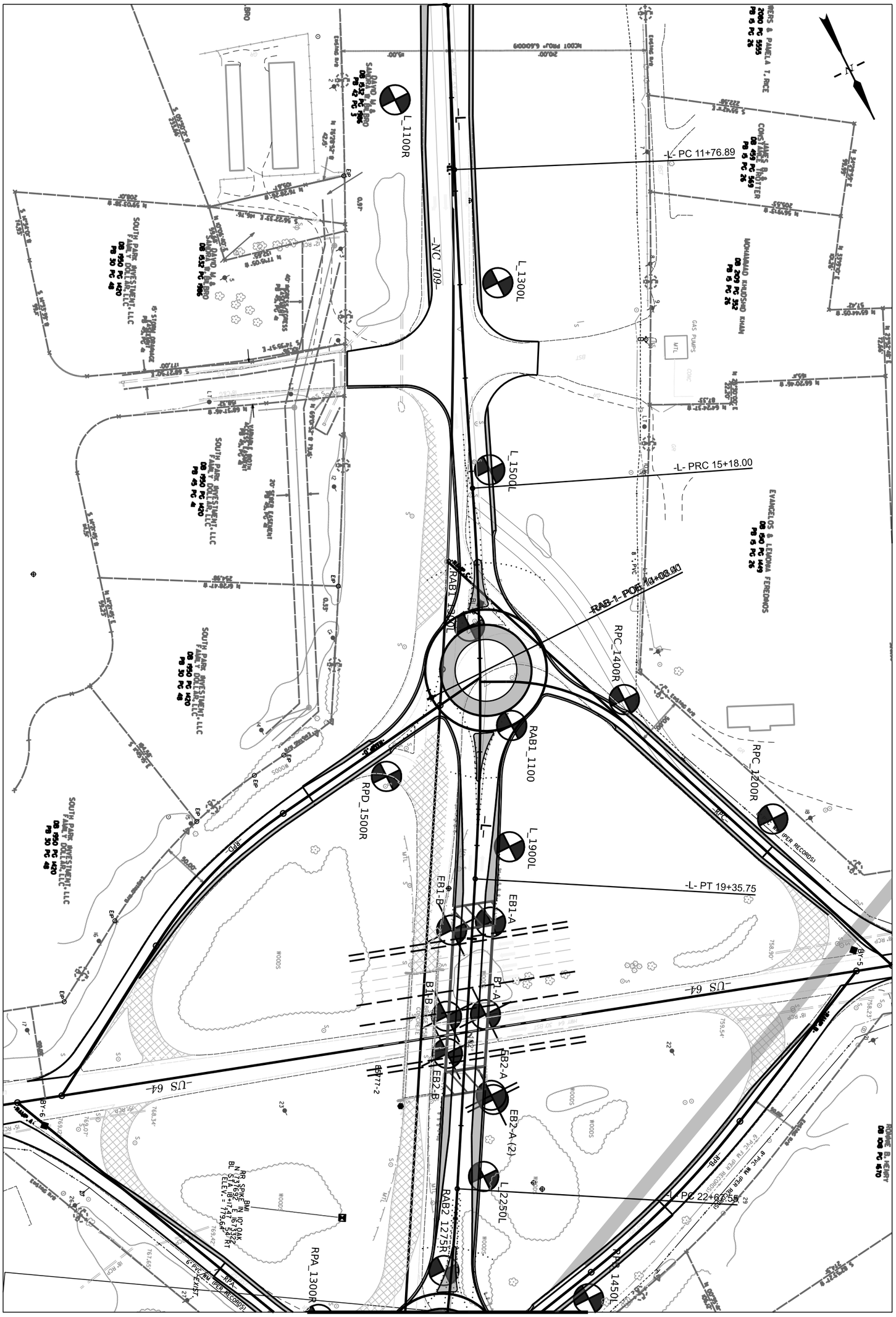
2) Shallow Rock: The following areas were found to contain rock above or within 6 feet of proposed subgrade:

Line	Station (±)	Offsets
-RPC-	11+50 to 12+50	RT
-RPD-	14+25 to 15+50	RT

Respectfully Submitted,

DocuSigned by:
Amanda R. Suttle
399DBE42974A494...
Amanda R. Suttle, P.G.
Project Geologist

DocuSigned by:
Mohammed A. Mulla
4EFECE6AFC504B8...
Mohammed A. Mulla, P.E.
Principal Engineer



B-5777

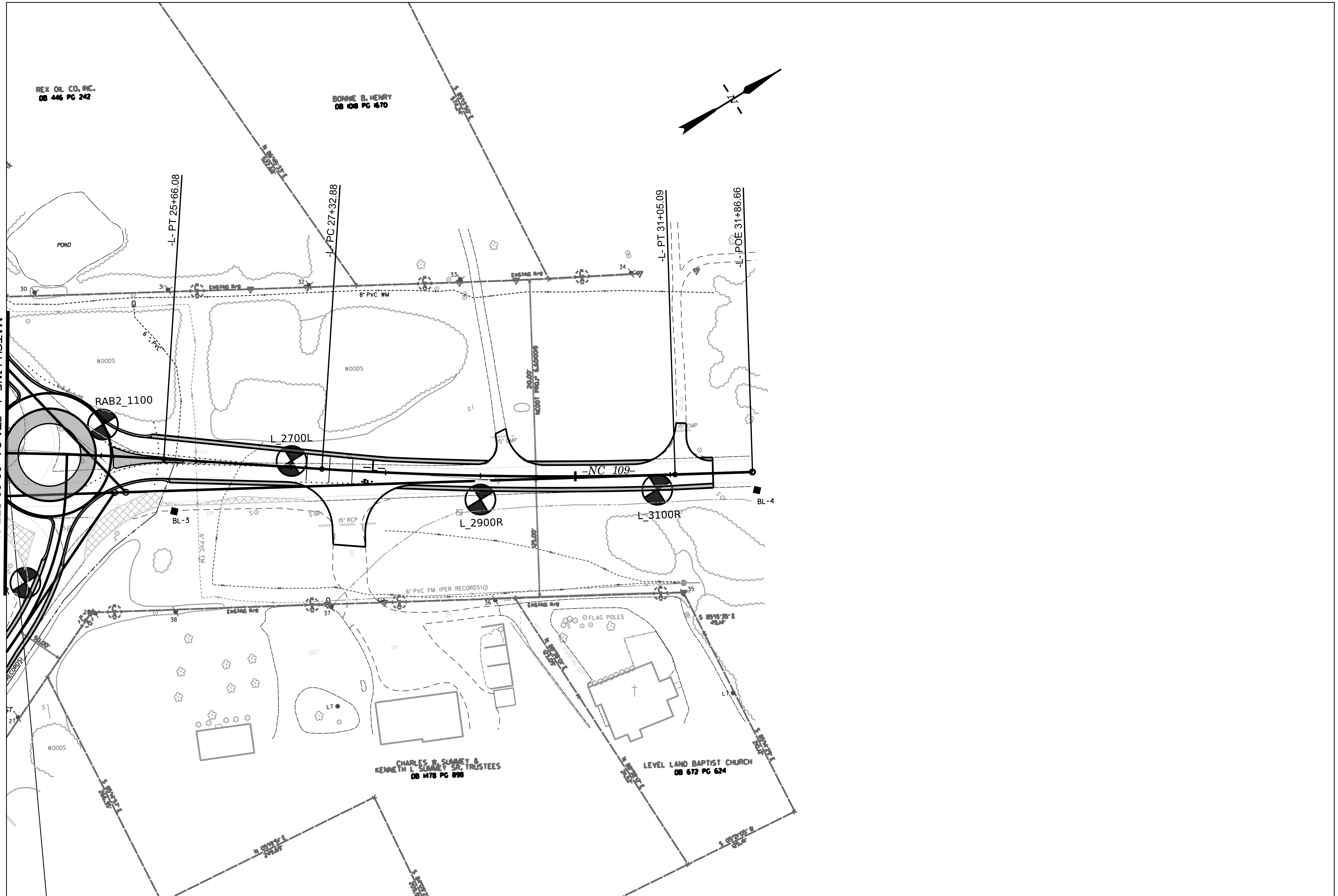
Replace Bridge No. 58 on NC 109 over US 64

PREPARED BY
GOTECHNICAL UNIT

Prepared For:
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

B-5777
GEO_004

5/26/20



B–5777

GEO | 005

NORTH CAROLINA
DEPARTMENT
OF TRANSPORTATION

Prepared For:

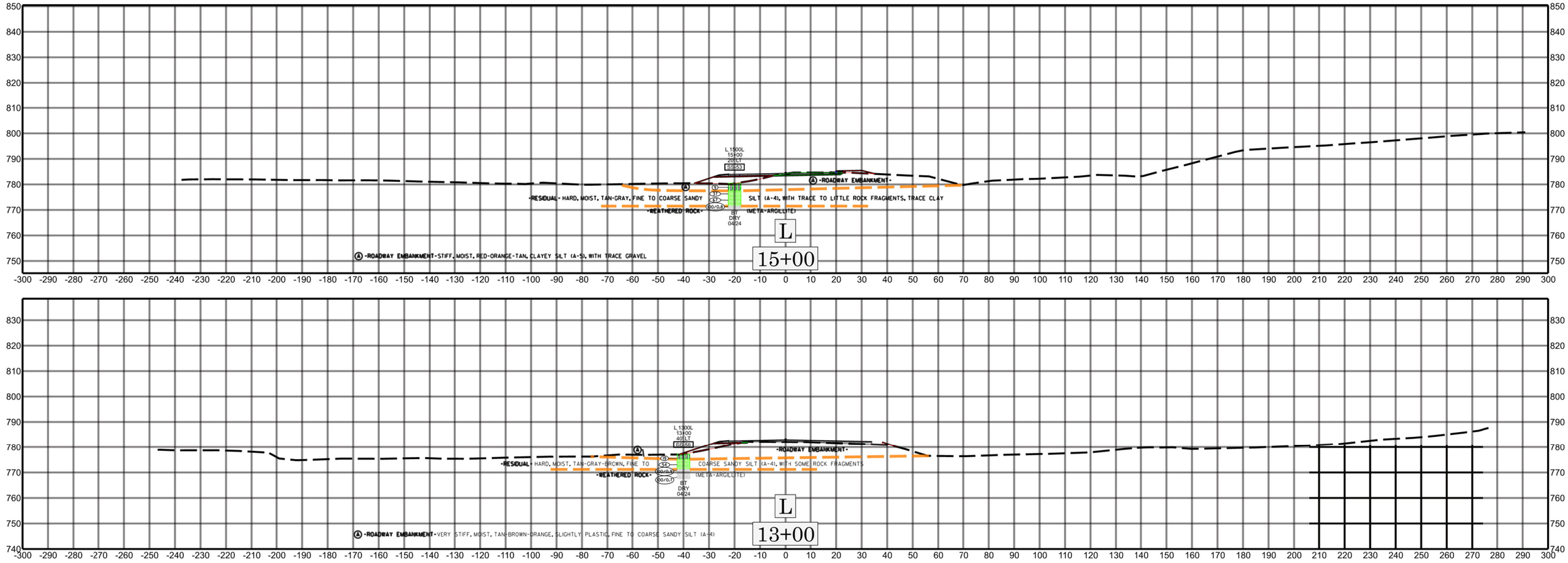
GOTECHNICAL UNIT

PREPARED BY

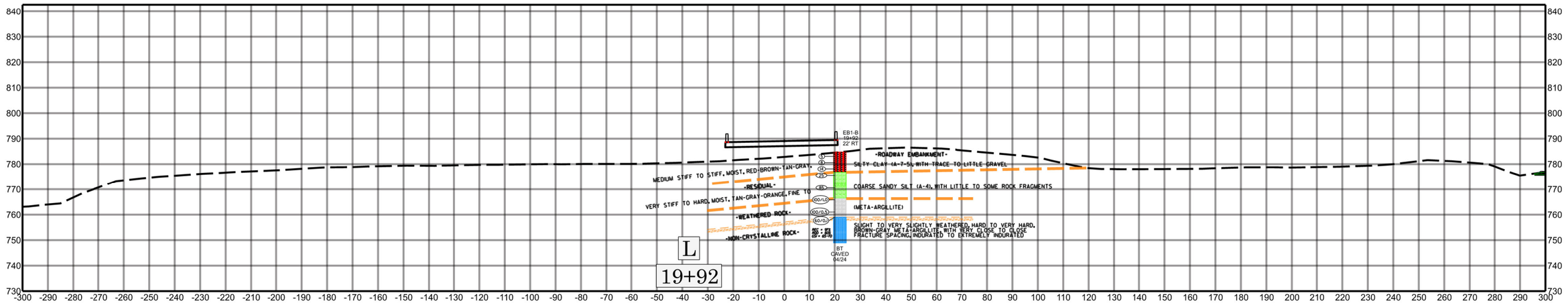
B-5777

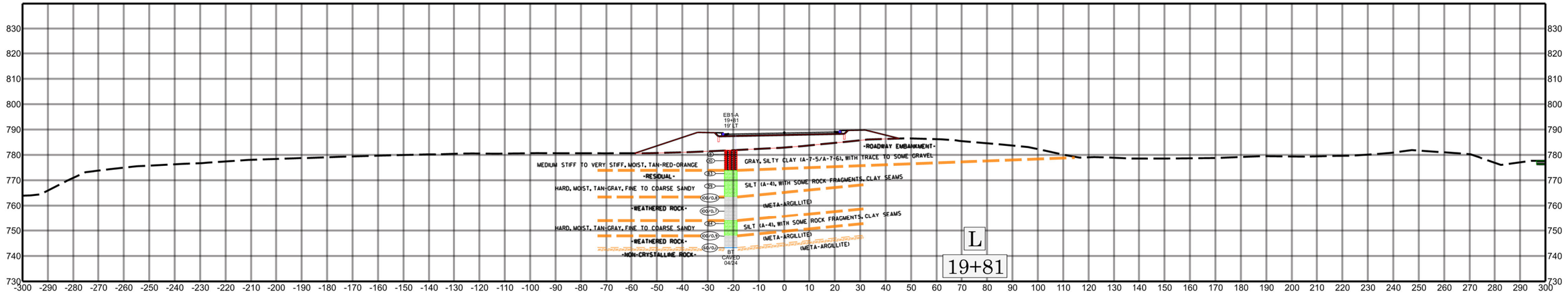
Replace Bridge No. 58 on NC 109 over US 64

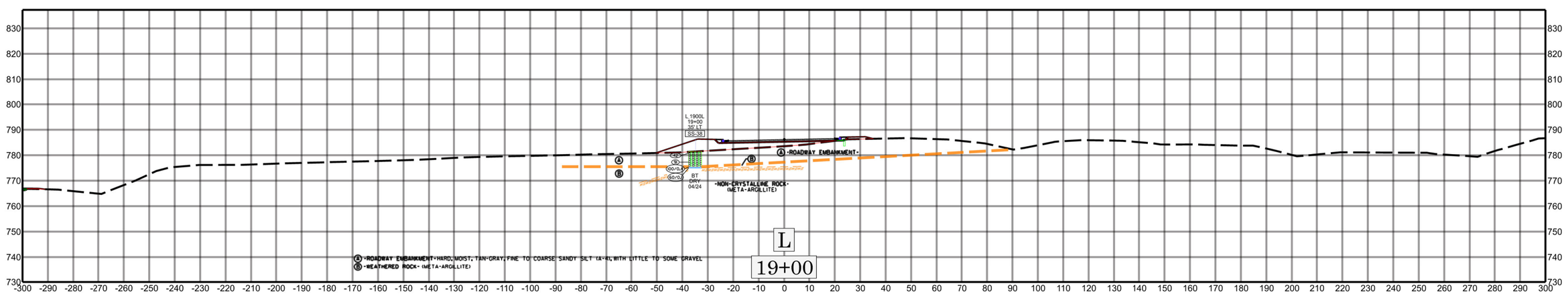
10/18/23


L 1500L
15+00
20 LT
SS553
-ROADWAY EMBANKMENT-
-RESIDUAL- HARD, MOIST, TAN-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE TO LITTLE ROCK FRAGMENTS, TRACE CLAY
-WEATHERED ROCK-
(META-ARGILLITE)
BT
DRY
04/24
-ROADWAY EMBANKMENT-STIFF, MOIST, RED-ORANGE-TAN, CLAYEY SILT (A-5), WITH TRACE GRAVEL
L
15+00
L 1200L
13+00
40 LT
SS556
-ROADWAY EMBANKMENT-
-RESIDUAL- HARD, MOIST, TAN-GRAY-BROWN, FINE TO COARSE SANDY SILT (A-4), WITH SOME ROCK FRAGMENTS
-WEATHERED ROCK-
(META-ARGILLITE)
BT
DRY
04/24
-ROADWAY EMBANKMENT-VERY STIFF, MOIST, TAN-BROWN-ORANGE, SLIGHTLY PLASTIC, FINE TO COARSE SANDY SILT (A-4)
L
13+00
L 1100R
11+00
60 RT
SS560
-ROADWAY EMBANKMENT-
-RESIDUAL- STIFF, MOIST, TAN-ORANGE-GRAY, MODERATELY PLASTIC, SILTY CLAY (A-7-6), WITH TRACE ROCK FRAGMENTS
-WEATHERED ROCK-
(META-ARGILLITE)
BT
DRY
04/24
-ROADWAY EMBANKMENT-VERY STIFF, MOIST, TAN-BROWN-ORANGE, SLIGHTLY PLASTIC, FINE TO COARSE SANDY SILT (A-4)
L
11+00

10/18/23







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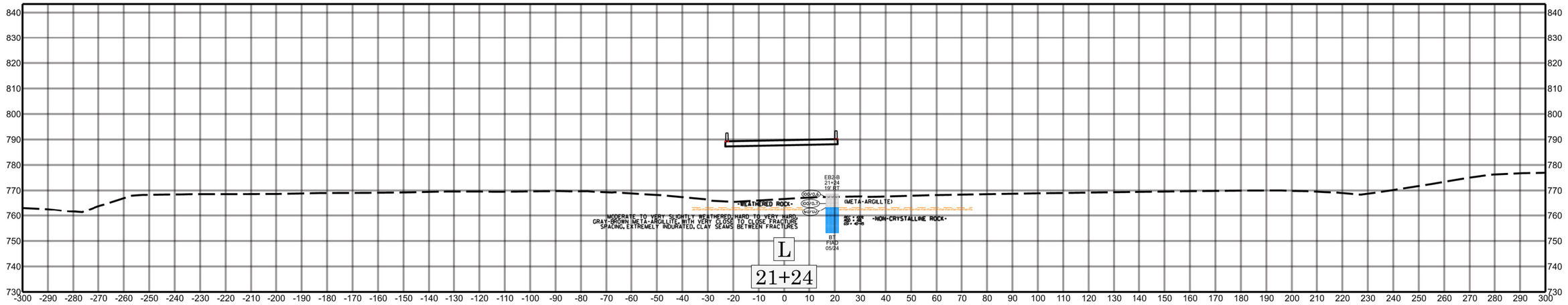
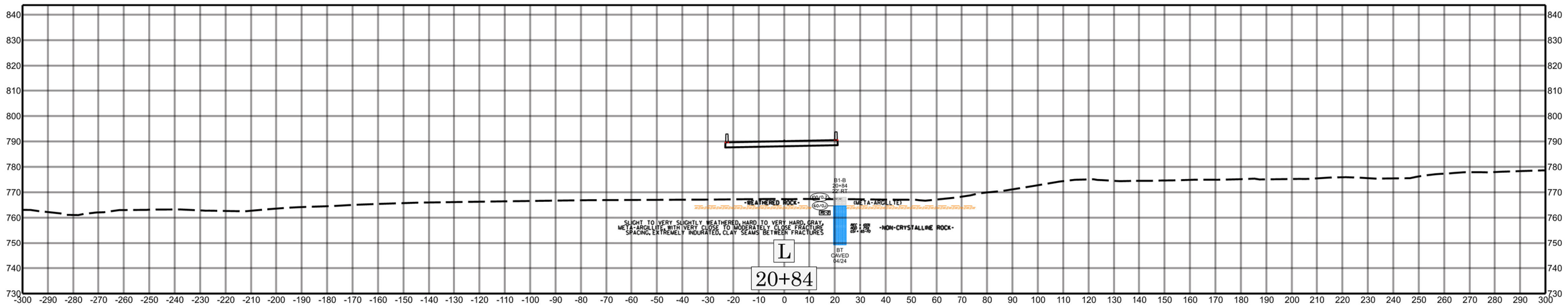
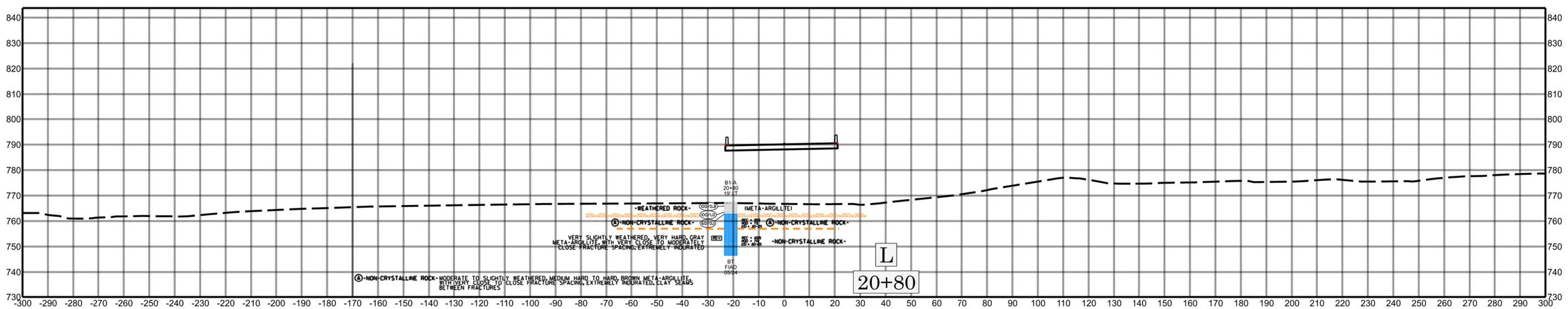
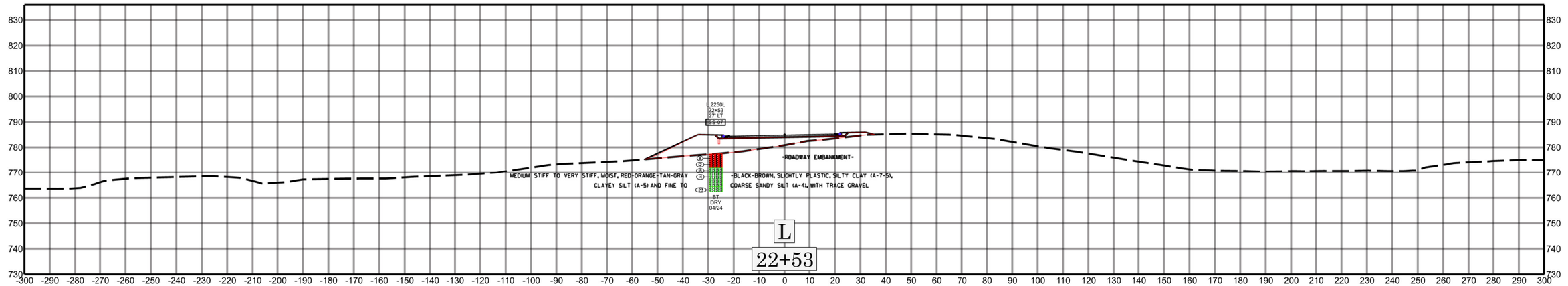
10/18/23

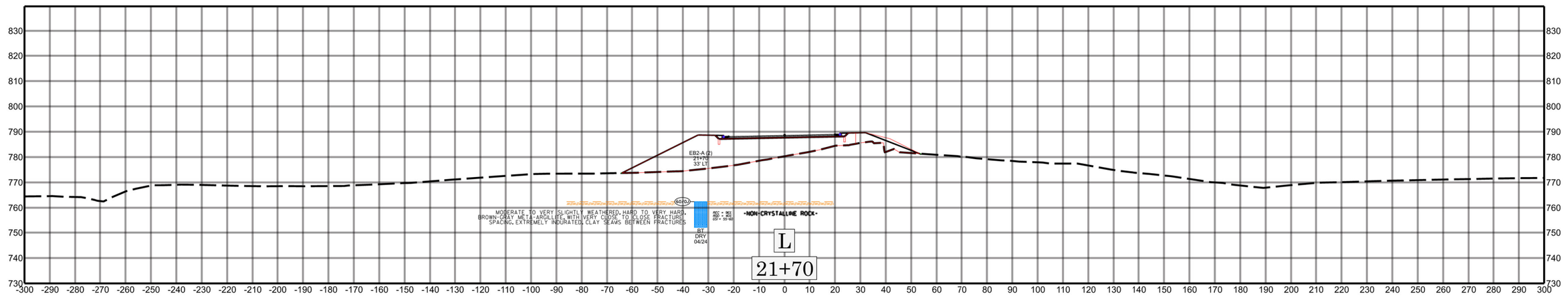

EB2-B
21+24
19' RT
-WEATHERED ROCK-
(META-ARGILLITE)
MODERATE TO VERY SLIGHTLY WEATHERED, HARD TO VERY HARD, GRAY-BROWN META-ARGILLITE, WITH VERY CLOSE TO CLOSE FRACTURE SPACING, EXTREMELY INDURATED, CLAY SEAMS BETWEEN FRACTURES
-NON-CRYSTALLINE ROCK-
BT
FIAD
05/24
L
21+24

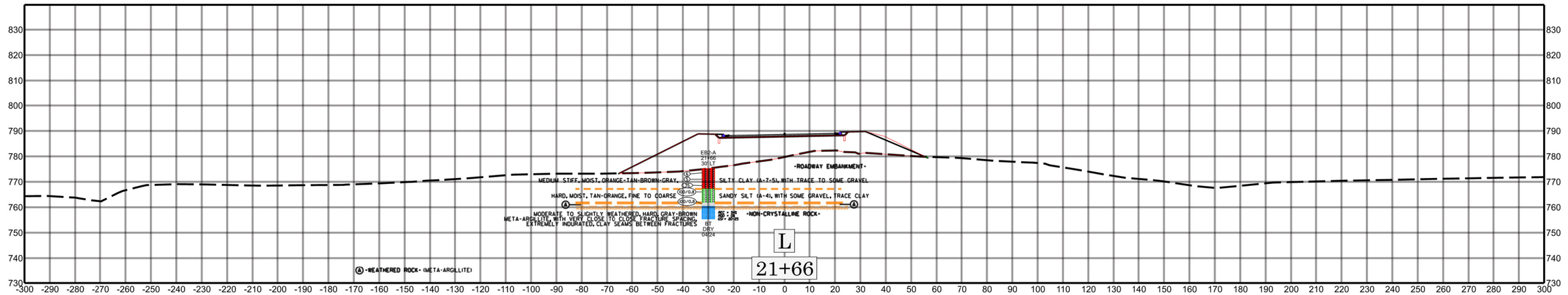

B1-B
20+84
22' RT
-WEATHERED ROCK-
(META-ARGILLITE)
SLIGHT TO VERY SLIGHTLY WEATHERED, HARD TO VERY HARD, GRAY META-ARGILLITE, WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, EXTREMELY INDURATED, CLAY SEAMS BETWEEN FRACTURES
-NON-CRYSTALLINE ROCK-
BT
CAVED
04/24
L
20+84


B1-A
20+80
19' LT
-WEATHERED ROCK-
(META-ARGILLITE)
A-NON-CRYSTALLINE ROCK-
A-NON-CRYSTALLINE ROCK-
VERY SLIGHTLY WEATHERED, VERY HARD, GRAY META-ARGILLITE, WITH VERY CLOSE TO MODERATELY CLOSE FRACTURE SPACING, EXTREMELY INDURATED
-NON-CRYSTALLINE ROCK-
BT
FIAD
05/24
A-NON-CRYSTALLINE ROCK-MODERATE TO SLIGHTLY WEATHERED, MEDIUM HARD TO HARD, BROWN META-ARGILLITE, WITH VERY CLOSE TO CLOSE FRACTURE SPACING, EXTREMELY INDURATED, CLAY SEAMS BETWEEN FRACTURES
L
20+80

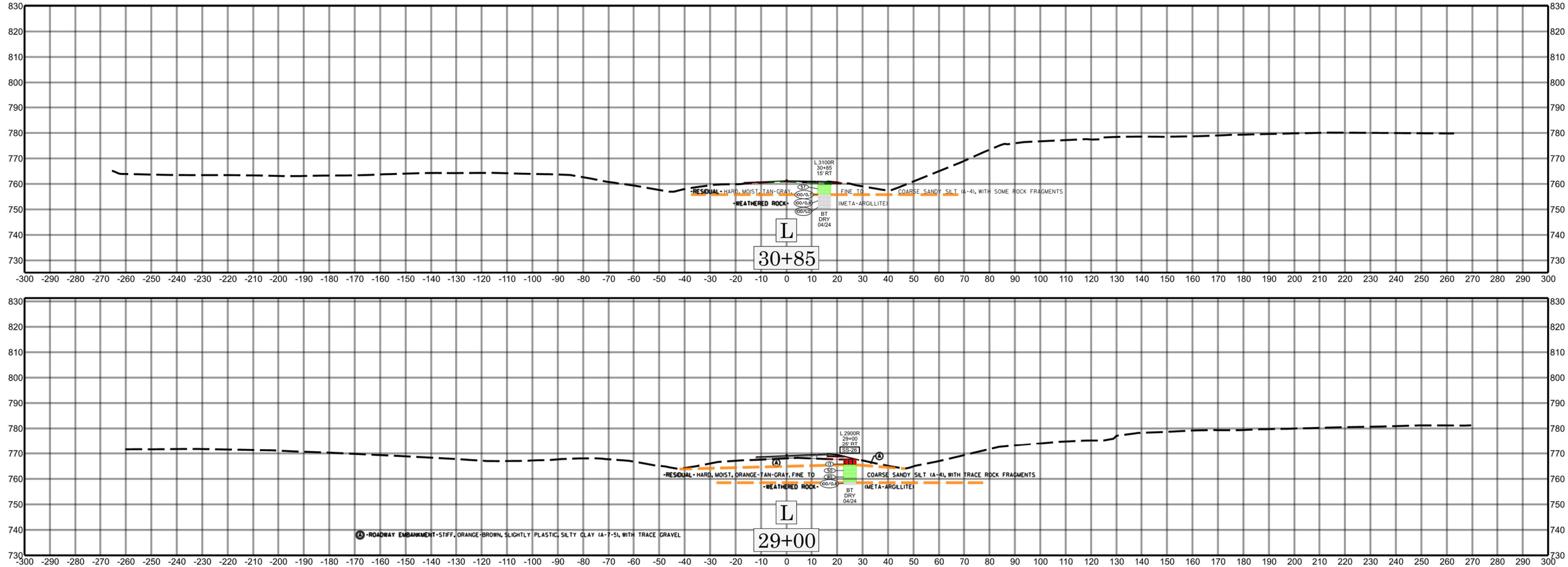
10/18/23


L 2250L
22+53
27' LT
BS-07
-ROADWAY EMBANKMENT-
MEDIUM STIFF TO VERY STIFF, MOIST, RED-ORANGE-TAN-GRAY CLAYEY SILT (A-5) AND FINE TO
-BLACK-BROWN, SLIGHTLY PLASTIC, SILTY CLAY (A-7-5), COARSE SANDY SILT (A-4), WITH TRACE GRAVEL
BT
DRY
04/24
L
22+53

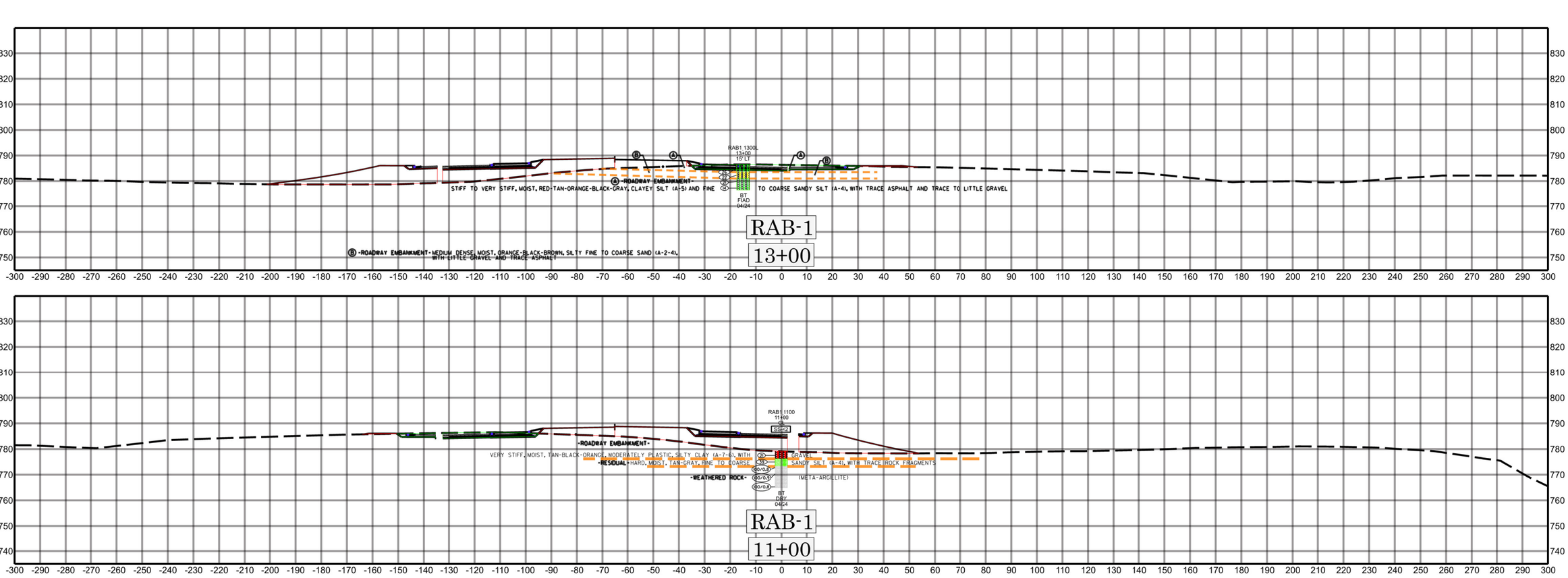

EB2-A (2)
21+70
33' LT
MODERATE TO VERY SLIGHTLY WEATHERED, HARD TO VERY HARD, BROWN-GRAY META-ARGILLITE, WITH VERY CLOSE TO CLOSE FRACTURE SPACING, EXTREMELY INDURATED, CLAY SEAMS BETWEEN FRACTURES
-NON-CRYSTALLINE ROCK-
BT
DRY
04/24
L
21+70


EB2-A
21+66
30' LT
-ROADWAY EMBANKMENT-
MEDIUM STIFF, MOIST, ORANGE-TAN-BROWN-GRAY, SILTY CLAY (A-7-5), WITH TRACE TO SOME GRAVEL
HARD, MOIST, TAN-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH SOME GRAVEL, TRACE CLAY
MODERATE TO SLIGHTLY WEATHERED, HARD, GRAY-BROWN META-ARGILLITE, WITH VERY CLOSE TO CLOSE FRACTURE SPACING, EXTREMELY INDURATED, CLAY SEAMS BETWEEN FRACTURES
-NON-CRYSTALLINE ROCK-
BT
DRY
04/24
L
21+66
-WEATHERED ROCK- (META-ARGILLITE)

10/18/23

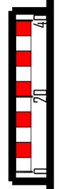

L 3100R
30+85
15' RT
ST
CO/0.5
CO/0.8
CO/0.8
BT
DRY
04/24
-RESIDUAL- HARD, MOIST, TAN-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH SOME ROCK FRAGMENTS
-WEATHERED ROCK- (META-ARGILLITE)
L
30+85
L 2900R
29+00
26' RT
SS-26
ST
CO
CO
CO/0.8
BT
DRY
04/24
-RESIDUAL- HARD, MOIST, ORANGE-TAN-GRAY, FINE TO COARSE SANDY SILT (A-4), WITH TRACE ROCK FRAGMENTS
-WEATHERED ROCK- (META-ARGILLITE)
A -ROADWAY EMBANKMENT- STIFF, ORANGE-BROWN, SLIGHTLY PLASTIC, SILTY CLAY (A-7-5), WITH TRACE GRAVEL
L
29+00
L 2700L
27+00
47' LT
SS-27
ST
CO
CS
SS
BT
DRY
04/24
A -ROADWAY EMBANKMENT-
-RESIDUAL- VERY STIFF TO HARD, MOIST, RED-BROWN-, ORANGE-TAN, SILTY CLAY (A-7-5) AND CLAYEY SILT (A-5)
A -ROADWAY EMBANKMENT- STIFF, MOIST, RED-ORANGE-TAN, HIGHLY PLASTIC, SILTY CLAY (A-7-5), WITH TRACE GRAVEL
L
27+00

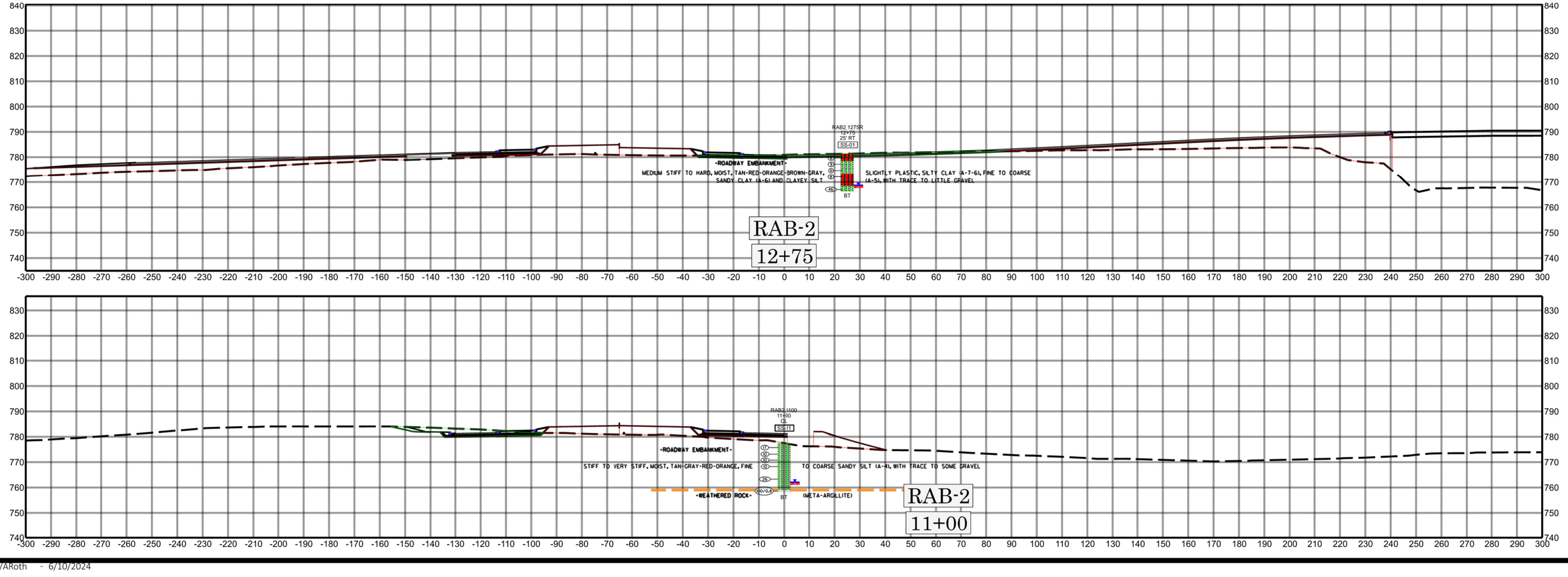
10/18/23



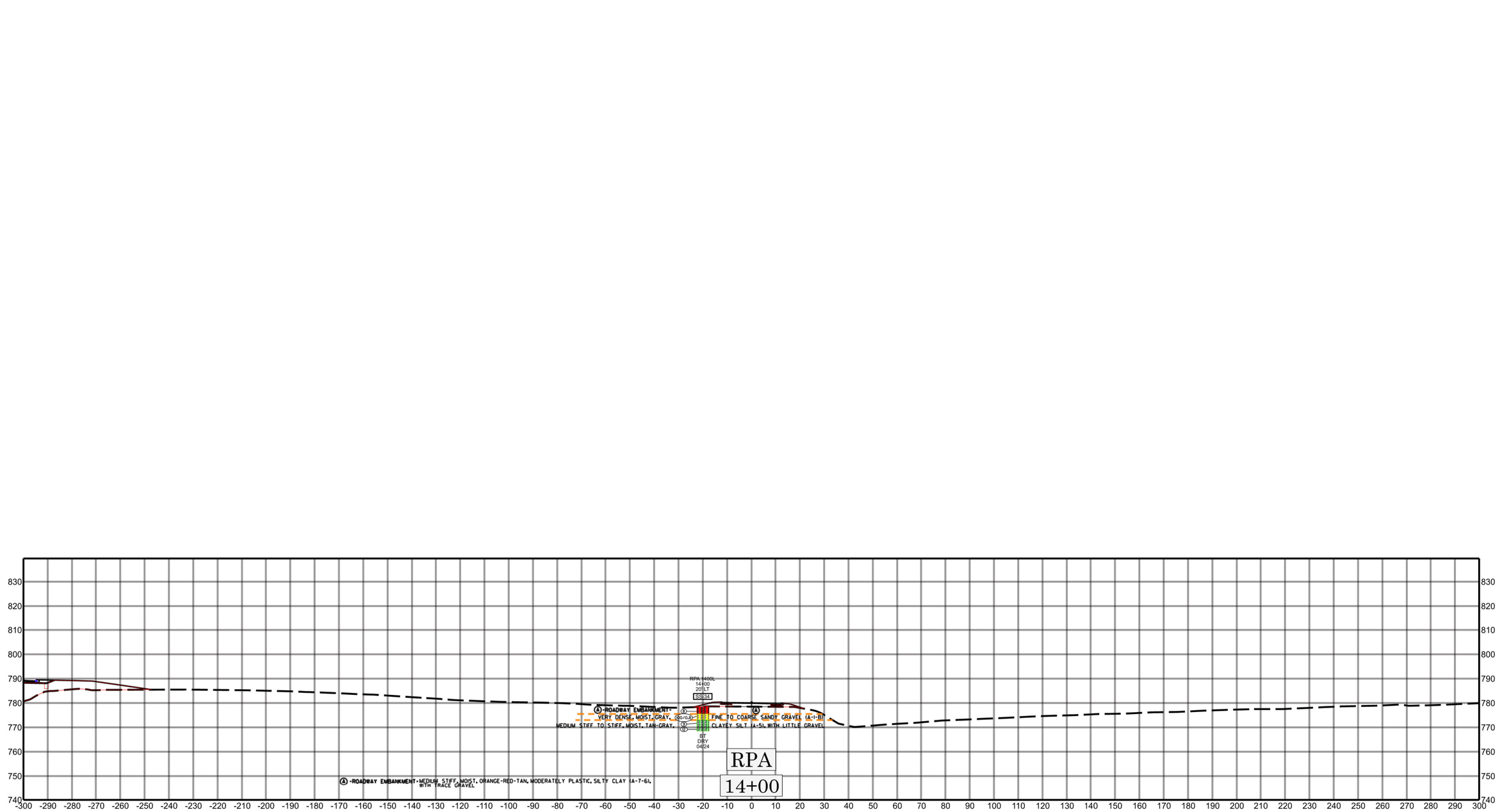
ECSLIMITED/ARoth - 6/10/2024

10/18/23


40
20
0

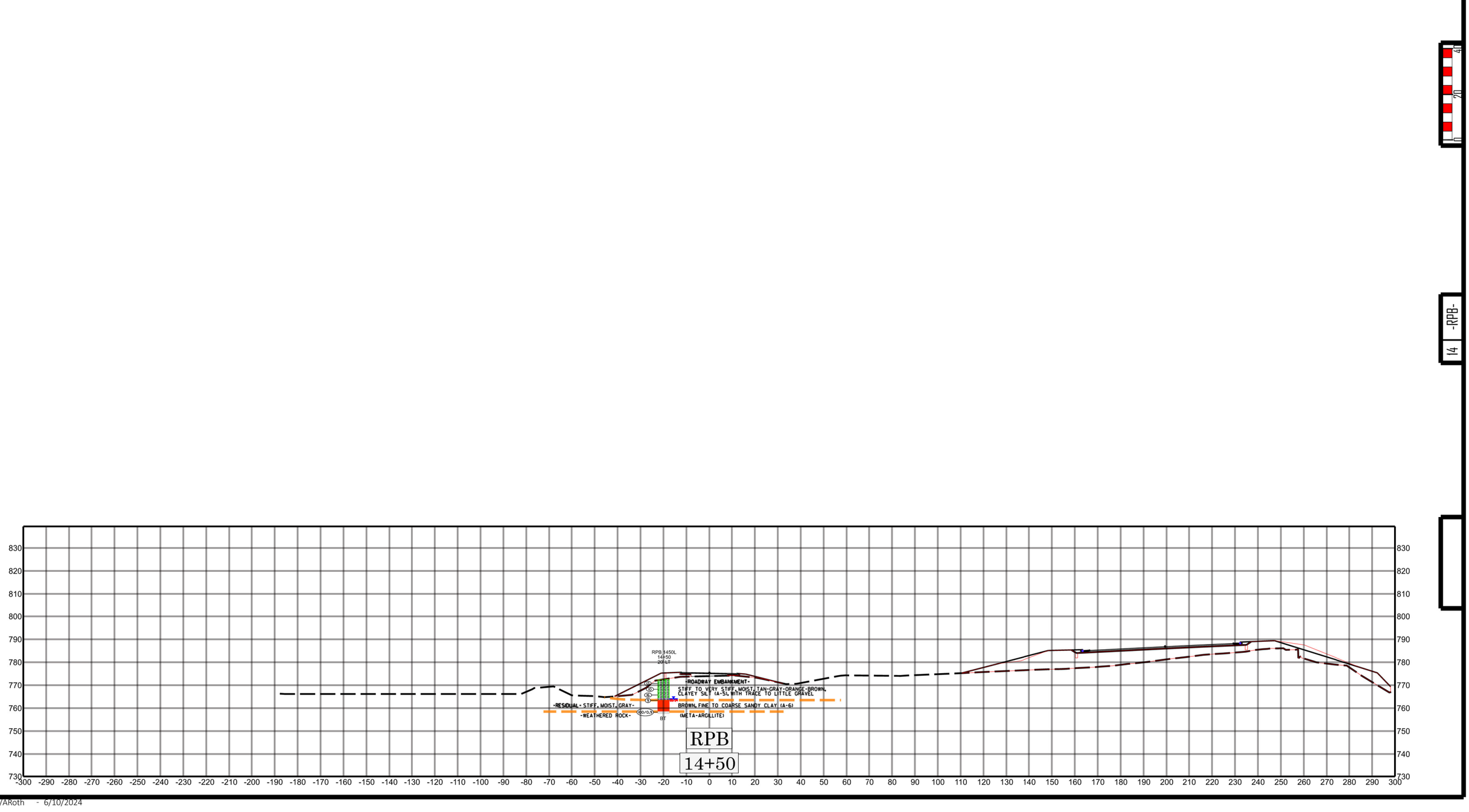

840
830
820
810
800
790
780
770
760
750
740
-300 -290 -280 -270 -260 -250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300
RAB2 1275R
12+75
25' RT
SS-01
-ROADWAY EMBANKMENT-
MEDIUM STIFF TO HARD, MOIST, TAN-RED-ORANGE-BROWN-GRAY, SANDY CLAY (A-6) AND CLAYEY SILT
SLIGHTLY PLASTIC, SILTY CLAY (A-7-6), FINE TO COARSE (A-5), WITH TRACE TO LITTLE GRAVEL
BT
RAB-2
12+75
RAB2 1100
11+00
CL
SS-11
-ROADWAY EMBANKMENT-
STIFF TO VERY STIFF, MOIST, TAN-GRAY-RED-ORANGE, FINE TO COARSE SANDY SILT (A-4), WITH TRACE TO SOME GRAVEL
-WEATHERED ROCK-
(META-ARGILLITE)
BT
RAB-2
11+00

10/18/23

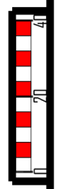


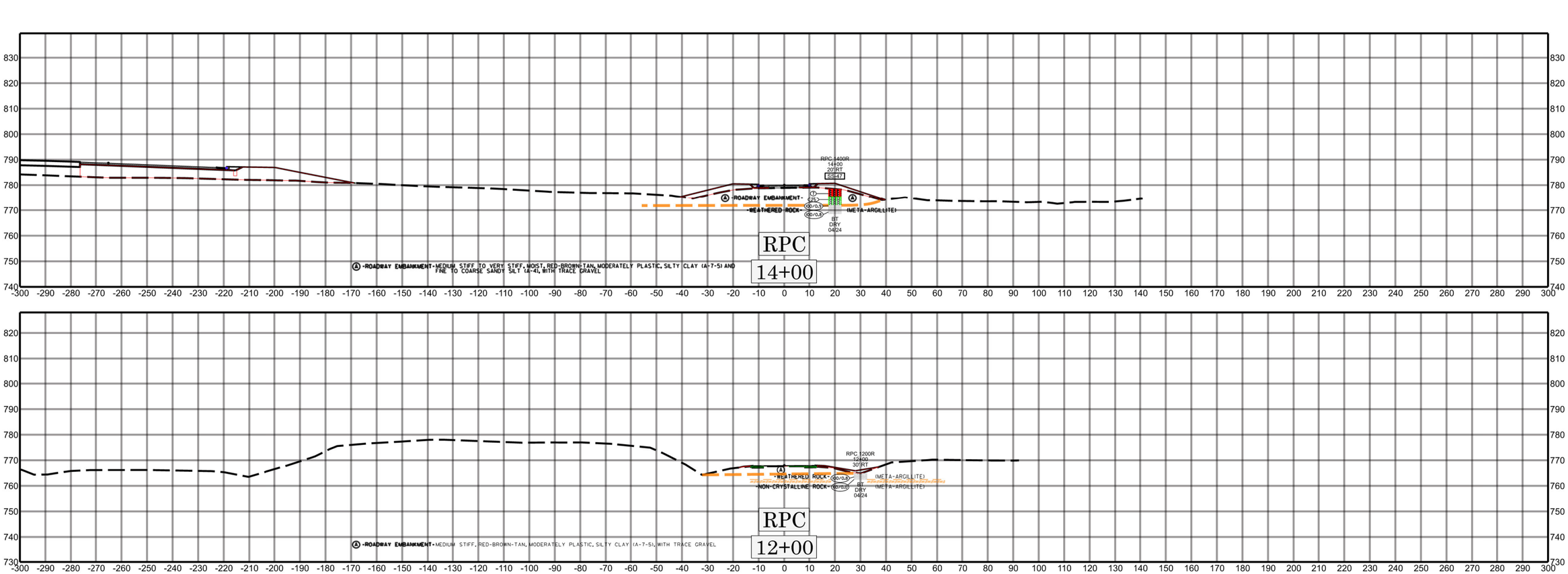
0 20 40

13 -RPA-

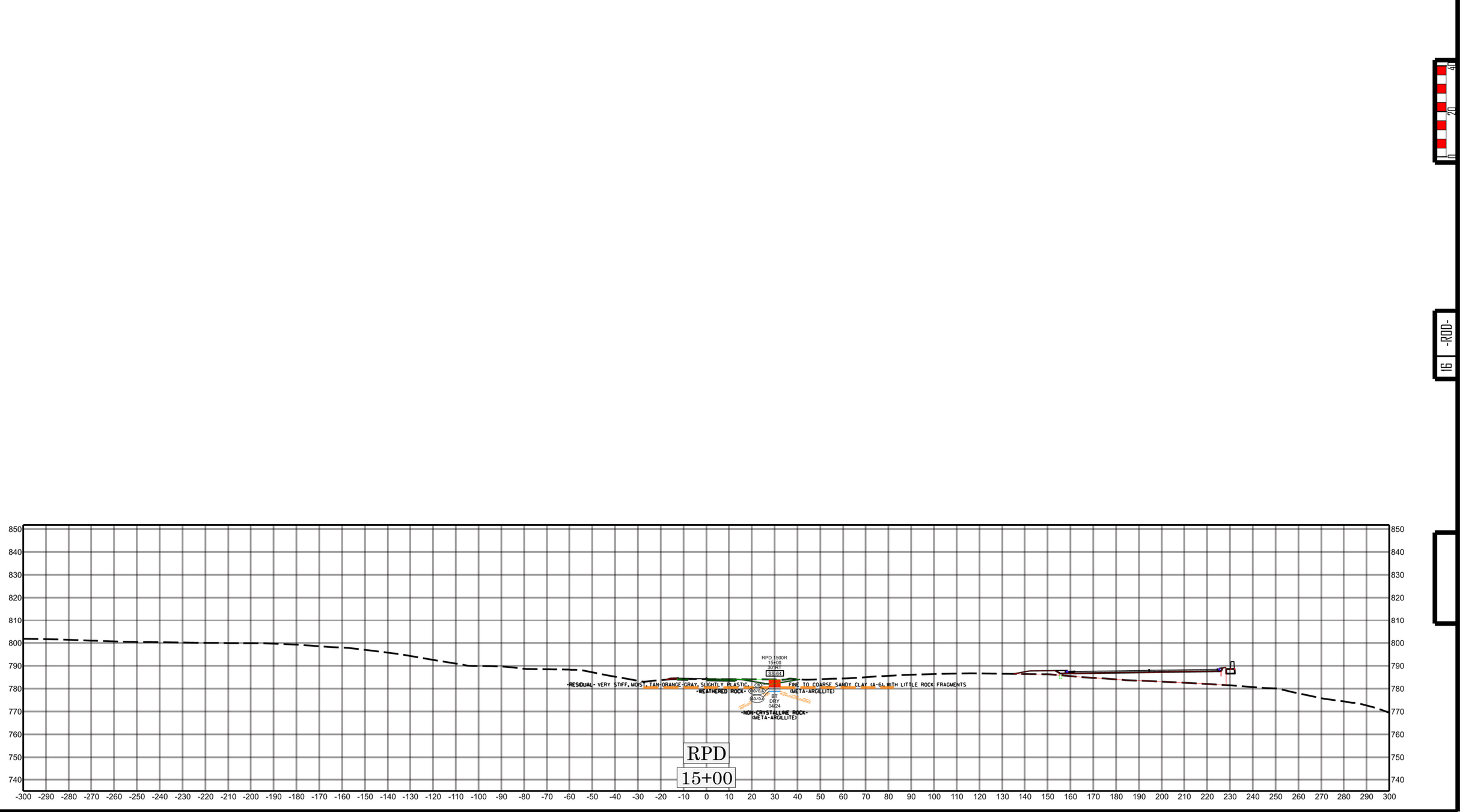

RPB 1450L
14+50
20ft LT
-ROADWAY EMBANKMENT-
STIFF TO VERY STIFF, MOIST, TAN-GRAY-ORANGE-BROWN, CLAYEY SIL (A-5), WITH TRACE TO LITTLE GRAVEL
-RESIDUAL- STIFF, MOIST, GRAY-
-WEATHERED ROCK-
BROWN, FINE TO COARSE SANDY CLAY (A-6)
(META-ARGILLITE)
BT
RPB
14+50
830 820 810 800 790 780 770 760 750 740 730
-300 -290 -280 -270 -260 -250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300

10/18/23





15 -RPC-


RPD 1500R
15+00
30 RT
SS-64
-RESIDUAL- VERY STIFF, MOIST, TAN-ORANGE-GRAY, SLIGHTLY PLASTIC
-WEATHERED ROCK-
FINE TO COARSE SANDY CLAY (A-6), WITH LITTLE ROCK FRAGMENTS
(META-ARGILLITE)
BIT
DRY
04/24
-NON-CRYSTALLINE ROCK-
(META-ARGILLITE)
RPD
15+00
850
840
830
820
810
800
790
780
770
760
750
740
-300 -290 -280 -270 -260 -250 -240 -230 -220 -210 -200 -190 -180 -170 -160 -150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300

PROJECT REFERENCE NO.	SHEET NO.
B–5777	17

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A

LABORATORY TEST RESULTS

SOIL TESTS FOR QUALITY

REFERENCE: B–5777

PROJECT: 45733

Prepared in the Office of:
ECS SOUTHEAST, LLP
1812 CENTER PARK DRIVE, SUITE D
CHARLOTTE, NC 28217
(704) 525-5152 [PHONE]
(704) 357-0023 [FAX]
NC REGISTERED
ENGINERING
FIRM # F-1078

PROJECT REFERENCE NO.	SHEET NO.
B-5777	18

SOIL TEST RESULTS

BORING NO.	SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
								C. SAND	F. SAND	SILT	CLAY	10	40	200		
L_1100R	SS-60	60' RT	11+00 -L-	1.0-2.5	A-7-6(16)	51	23	28.3	2.2	25.2	44.3	80.3	72.8	70.0	11.3	-
L_1300L	SS-56	40' LT	13+00 -L-	1.0-2.5	A-4(9)	35	9	10.7	1.5	53.5	34.3	97.0	90.1	88.1	14.8	-
L_1500L	SS-53	20' LT	15+00 -L-	3.5-5.0	A-4(10)	37	9	3.6	0.9	72.0	23.5	99.8	96.9	95.5	12.1	-
L_1900L	SS-38	35' LT	19+00 -L-	1.0-2.5	A-4(2)	26	5	13.8	12.1	57.1	17.0	96.7	88.8	77.9	9.9	-
L_2250L	SS-07	27' LT	22+53 -L-	3.5-5.0	A-7-5(18)	46	15	3.1	1.1	48.8	47.0	99.3	97.4	96.1	25.1	-
L_2700L	SS-22	6' LT	27+00 -L-	1.0-2.5	A-7-5(36)	61	30	0.9	1.5	40.4	57.2	100.0	99.3	97.6	33.9	-
L_2900R	SS-26	25' RT	29+00 -L-	1.0-2.5	A-7-5(15)	42	12	1.4	0.9	62.5	35.2	99.5	98.9	97.9	18.2	-
RAB1_1100	SS-42	CL	11+00 -RAB1-	1.0-2.5	A-7-6(8)	41	17	36.6	6.7	29.8	26.9	97.6	67.3	57.9	14.7	-
RAB2_1100	SS-11	CL	11+00 -RAB2-	1.0-2.5	A-4(1)	32	9	48.1	6.6	23.1	22.2	86.6	56.2	46.2	10.4	-
RAB2_1275R	SS-01	25' RT	12+75 -RAB2-	1.0-2.5	A-7-6(10)	41	12	18.0	4.5	38.0	39.5	100.0	84.6	78.1	22.0	-
RPA_1400L	SS-34	20' LT	13+00 -RPA-	1.0-2.5	A-7-6(17)	43	16	6.2	1.6	53.3	38.9	98.5	94.5	92.6	17.6	-
RPC_1400R	SS-47	20' RT	14+00 -RPC-	1.0-2.5	A-7-5(19)	46	16	2.2	1.1	37.6	59.1	99.7	98.1	97.1	42.1	-
RPD_1500R	SS-64	30' RT	15+00 -RPD-	1.0-2.5	A-6(11)	36	15	13.5	14.0	47.6	24.9	97.1	89.2	78.1	15.5	-

LAB TECHNICIAN: AMANDA SUTTLE, P.G. NCDOT CERTIFICATION NO. 112-09-1003