REFERENCE: B-5818

PROJECT: 45771

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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-L-	14+50 TO 40+50	4-9	10-23

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *ANSON*

PROJECT DESCRIPTION *BRIDGE NO. 11 ON NC 109 OVER DEADFALL CREEK*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5818	1	23

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.

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DATE *NOVEMBER 2019*

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12/3/2019

SIGNATURE DATE

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PROJECT REFERENCE NO.	SHEET NO.
B-5818	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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 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	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, CPT, 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 2.25" I.D. HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

CORE SIZE:
- [ ] -B _____ [ ] -H _____
- [X] -N Q3

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: BORINGS EBI-A, EBI-B, BI-A, BI-B, B2-A, B2-B, EB2-A, EB2-B:
TBM -BL4- 27' LT. -L- STA. 28+56, N: 394,113.9610, E: 1,641,571.7970
ELEVATION: 275.77 FEET

NOTES:

ALL BORING ELEVATIONS EXCEPT THOSE LISTED ABOVE OBTAINED FROM .TIN FILE RECEIVED FROM NCDOT ON 09/09/2019

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
B-5818	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

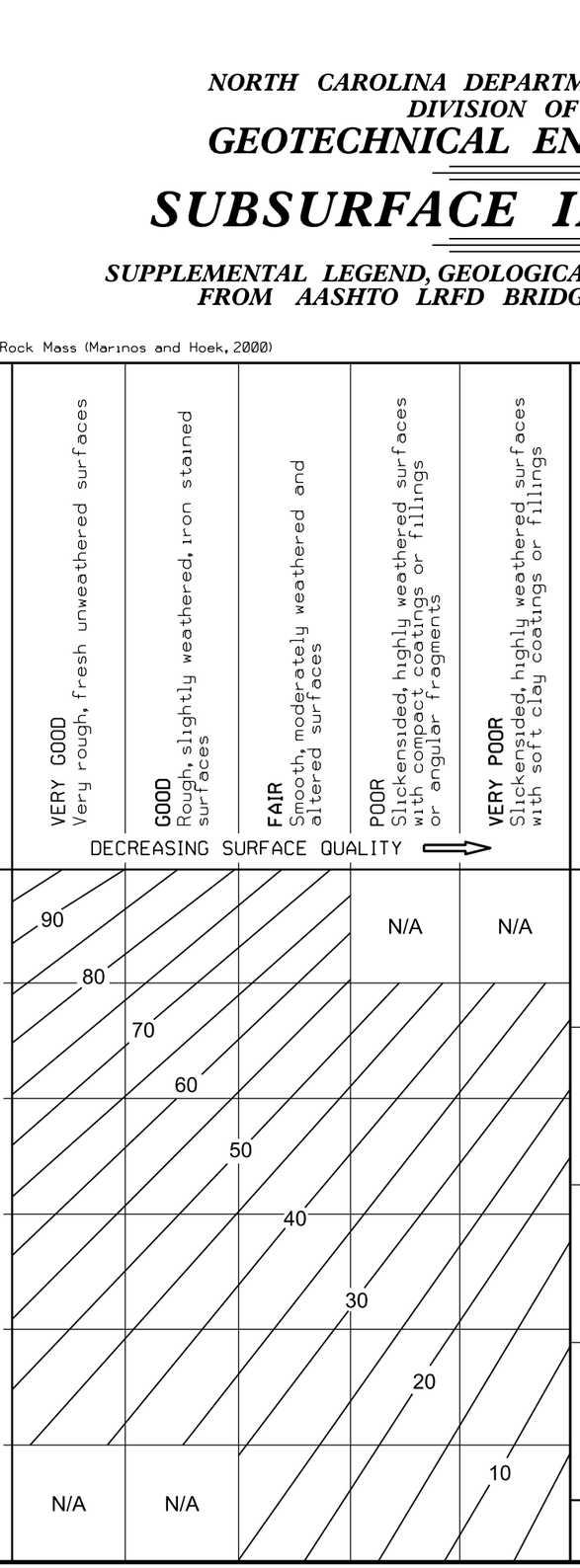
AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

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

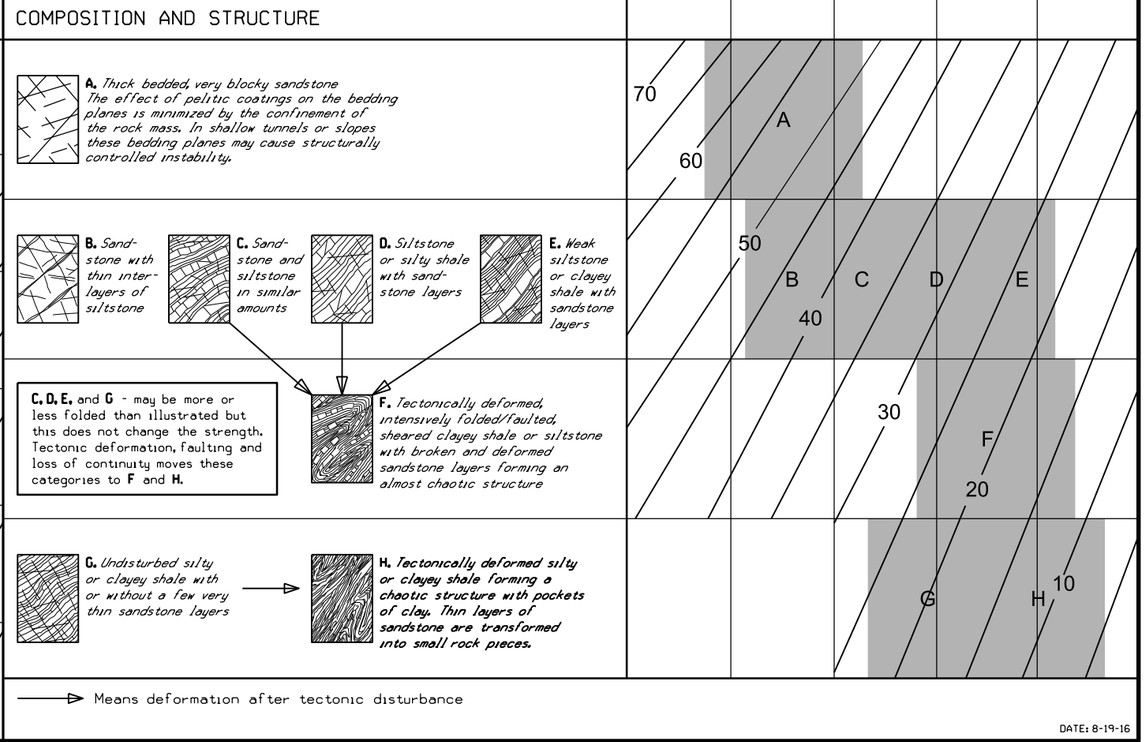


AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

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

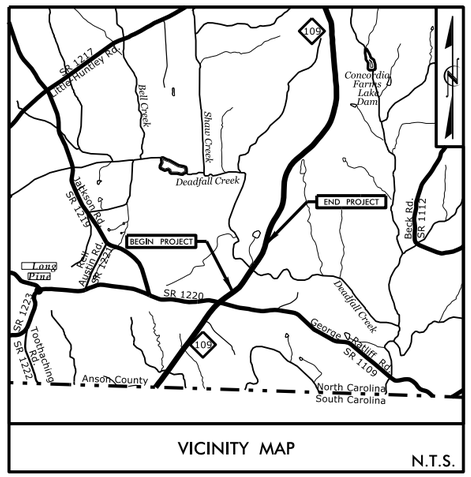


DATE: 8-19-16

TIP PROJECT: B–5818

CONTRACT:

See Sheet 1A For Index of Sheets
See Sheet 1B For Standard Symbology Sheet



VICINITY MAP N.T.S.

PRELIMINARY PLANS

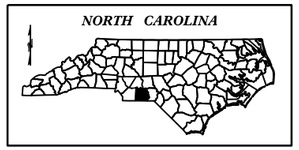
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

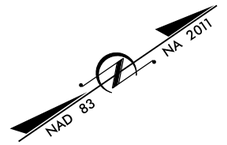
ANSON COUNTY

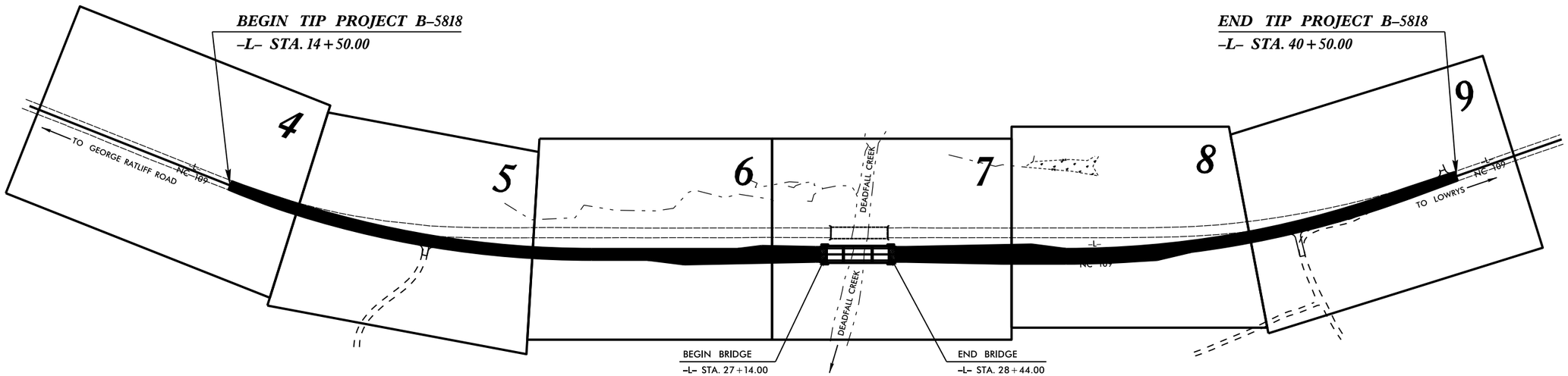
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B–5818	3	23

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
45771.1.1		P.E.

LOCATION: BRIDGE #011 OVER DEADFALL CREEK ON NC 109
TYPE OF WORK: GRADING, DRAINAGE, PAVING & STRUCTURE







THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES.
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD __.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 20 10 0 20 40
PROFILE (HORIZONTAL): 20 10 0 20 40
PROFILE (VERTICAL): 4 2 0 4 8

DESIGN DATA

ADT 2018 = 1,320
ADT 2043 = 2,640
K = 9%
D = 60%
T = 22%*
V = 55 MPH
FUNC. CLASSIFICATION: MAJOR COLLECTOR
* (TTST 15% + DUALS 7%)
REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT B–5818 = 0.467 MILES
LENGTH OF STRUCTURE TIP PROJECT B–5818 = 0.025 MILES
TOTAL LENGTH OF TIP PROJECT B–5818 = 0.492 MILES

NCDOT CONTACT: KEITH PASCHAL, PE
Structure Management Unit

PLANS PREPARED FOR THE NCDOT BY:
STV 100 Years
STV Engineers, Inc.
900 West Trade St., Suite 715
Charlotte, NC 28202
NC License Number F-0991

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: NOVEMBER 22, 2019

LETTING DATE: NOVEMBER 18, 2020

NIKKI T. HONEYCUTT, PE
PROJECT ENGINEER

MAAMOON K. ABDELAZIZ
PROJECT DESIGNER

HYDRAULICS ENGINEER
P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER
P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

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DRacey AT 66D26IN09

FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603-2302 I USA
T 919.828.3441 I F 919.828.5751
NC Engineering License # F-0266

November 26, 2019

State Project No.: 45771.1.1
TIP No.: B-5818
Project ID: 35915
County: Anson
Description: Bridge No. 11 on NC 109 over Deadfall Creek

SUBJECT: Geotechnical Report – Inventory

Project Description

This project primarily involves replacing existing Bridge 11 on NC 109 (-L-) over Deadfall Creek in Peachland, Anson County, North Carolina. The proposed bridge will be located about 40 feet east of the existing bridge, which will necessitate a realignment of the existing road. The existing roadway consists of one northbound and one southbound lane. The new alignment primarily extends through wooded and undeveloped property.

As shown on plan sheets received on 9/10/19, the project consists of the realignment on NC 109 (-L-) from station 14+50, which is approximately 1,250 lf south of the proposed bridge, and ends at station 40+50, which is approximately 1,200 lf north of the proposed bridge – a distance of 2,600 lf (0.49 miles).

The typical proposed section for the project will include one northbound and one southbound lane. More-specifically, the typical section will incorporate 12-foot lanes, and 8-foot grassed shoulders. The proposed bridge will consist of a 2-lane, single-span bridge over Deadfall Creek. The bridge will be approximately 130 feet in length.

The boring locations were selected by F&R based on the plans dated 9/10/19, and the geotechnical field investigation was performed in September 2019. A total of 27 Standard Penetration Test (SPT) borings were advanced with an ATV-mounted CME-55 drill rig with an automatic hammer. Representative soil samples were collected from the split spoon for visual classification in the field and for analysis by F&R's testing laboratory.

Generally the following alignment was investigated, the limits of which were determined by the attached plan sheets. The bridge inventory report is being issued under separate cover:

Alignment	Station (±)
-L-	14+50 to 40+50

Areas of Special Geotechnical Interest

1) Non-Crystalline Rock: The following area was found to contain non-crystalline rock above or within six feet of the proposed grade and will likely require ripping or blasting for removal:

Alignment	Station (±)
-L-	20+25 to 21+25
-L-	21+75 to 25+75

2) Weathered Rock: The following areas were found to contain weathered rock above or within six feet of the proposed grade and have a potential to require ripping or blasting for removal:

Alignment	Station (±)
-L-	17+25 to 22+25
-L-	22+75 to 25+75
-L-	35+25 to 37+25

3) Cohesive Soils: The following areas contain cohesive soils (AASHTO A-5, A-6 & A-7 soils) at existing subgrade in fill areas or at/near proposed subgrade that have the potential to cause subgrade problems during construction:

Alignment	Station (±)
-L-	15+25 to 15+75
-L-	25+75 to 26+25
-L-	30+25 to 32+75
-L-	34+25 to 38+75

Physiography and Geology

The proposed roadway will consist of one northbound and one southbound lane. The new alignment primarily extends through wooded and undeveloped property. At the beginning of the project at -L- station 14+50, the roadway elevation (EL) starts at EL ±328 feet and gradually descends to EL ±296 feet at about -L- station 22+00. From this point the roadway elevation ascends to EL ±308 feet at about -L- station 25+00, and then descends again to EL ±261 feet at about -L- station 28+00. From this point the remainder of the existing roadway grade gradually ascends to the highest elevation of the project, EL ±311 at -L- station 40+50, the end of the project. The lowest elevation of the project is the Deadfall Creek bed at about -L- station 27+80, estimated at about EL ±254.

The surface water across the project is generally drained by Deadfall Creek. A small, unnamed drainage feature runs along the west side of the existing road in a north/south direction, left of about -L- station 20+50 to Deadfall Creek. Another similar drainage feature runs from Deadfall Creek to about -L- station

33+00. A small wetland feature is shown on the provided plan sheet 8 on the west side of the existing road from about -L- station 31+50 to 33+50; however, this is located beyond the project construction limits.

The project is located in the Piedmont Physiographic Province of North Carolina within the Carolina Slate Belt. More-specifically, it is located in an area mapped as metamudstone and meta-argillite ($CZmd_1$). Typical weathered rock samples recovered from our borings primarily exhibit the characteristics of meta-argillite. Soils weathered from the parent rock generally consist of sandy and clayey silts, along with some silty and sandy clays. The in-situ soils are the residual product of in-place chemical weathering of rock that was similar to the rock presently underlying the site.

Soils Properties

The subsurface conditions discussed below and those shown on the attached drawings represent an estimate of the subsurface conditions based on interpretation of the boring data using normally-accepted geotechnical engineering judgments. The transitions between different soil strata are usually less distinct than those shown on the boring logs and cross sections. Sometimes the relatively small sample obtained in the field is insufficient to definitively describe the origin of the subsurface material. Although individual soil test borings are representative of the subsurface conditions at the boring locations on the dates shown, they are not necessarily indicative of subsurface conditions at other locations or at other times.

Soils within the area of this project have been divided into three categories: roadway embankment, alluvial soils, and residual soils.

Roadway Embankment: Roadway embankment (RE) soils were encountered at the surface in boring EB2-A. The RE extended to a depth of about 2 feet. The fill was described as moist, medium dense, clayey SAND (A-2-6) with little gravel.

Alluvial Soil: Alluvial soils were encountered in 4 borings. The alluvial soils were encountered at the ground surface in borings B2-A, B2-B, and EB2-B, and beneath RE in boring EB2-A. The alluvial soils extended to depths up to 12 feet with an average depth of about 10 feet. The alluvial soil types were typically described as moist to wet, loose to medium dense, silty and clayey SAND (A-2-4 & A-2-6) with trace organic matter.

Residual Soil: A majority of the soils encountered on this project were residual soils. Residual soils were encountered at the surface of 25 borings. No residual soils were encountered in borings B2-A and B2-B. The residual soils were variable and typically described as moist, stiff to hard, sandy SILT (A-4), and silty and sandy CLAY (A-6 & A-7). A majority of the samples contained varying amounts of rock fragments.

Rock Properties

Weathered Rock (WR) was encountered in 20 borings. Of these 20 borings, 6 of the borings terminated in WR, and 14 terminated in or on Non-Crystalline Rock (NCR). Boring L1750R encountered an intermediate layer of WR before re-encountering WR to boring termination. The intermediate zone of WR was about 5 feet thick. Excluding the intermediate zone of WR, the WR was encountered at depths ranging from about 2 to 17 feet and elevations ranging from about 248 to 313 feet.

NCR was encountered in 20 borings as indicated by SPT refusal and typically auger refusal. Borings L1550R and L1750R encountered an intermediate layer of NCR before encountering weathered rock to termination below this layer. The intermediate zones of NCR were about 3.5 to 5 feet thick. The remaining 18 borings were terminated in or on NCR. Of these 18 borings, 1 transitioned from alluvial soils to NCR, 3 transitioned directly from residual soils to NCR, and 14 encountered WR before being terminated. The NCR was encountered at depths ranging from about 7 to 21 feet, or elevations ranging from about 242 to 306 feet. The rock typically consisted of meta-argillite. Refusal is a designation applied to any material that cannot be penetrated by the soil auger, and is typically caused by encountering boulders, hard rock lenses/ledges or bedrock. The nature of the materials causing refusal was not explored in the majority of these borings, but is anticipated to represent the NCR level.

Rock coring was performed in borings B1-A, B1-B, B2-A, and B2-B after encountering auger refusal. The coring extended to depths of 34.5, 32.8, 27.7, and 31.6 feet, respectively, after SPT refusal was achieved. The rock generally consisted of very slightly to completely weathered, hard to very soft, meta-argillite. The strata recovery and RQD are indicated on the cross sections. Strata recovery ranged from 25% to 100%, and strata RQD ranged from 0% to 94%.

Groundwater Properties

Generally, groundwater measurements were attempted in a majority of the 27 borings along the project immediately upon their completion and after a stabilization period of approximately 24 hours. Three borings were backfilled immediately upon their completion. Groundwater was not encountered in any of the borings immediately upon completion. Stabilized groundwater was encountered in 8 borings at depths ranging from 4 to 14 feet, and elevations ranging from about 252 to 260 feet. Groundwater was not encountered in the remaining 16 borings. The recovered soil samples were generally described as moist above the groundwater level and wet below the groundwater level. It should be noted that the groundwater levels fluctuate depending upon seasonal factors such as precipitation and temperature. As such, soil moisture and groundwater conditions at other times may vary or be different from those described in this report.

We appreciate the opportunity to work with you on this project. Please contact us if you have any questions regarding this report or if we may be of further service.

Sincerely,
FROEHLING & ROBERTSON, INC.

DocuSigned by:
Derick Racey
1C9DED1446894D7...
Derick Racey
Geotechnical Project Manager

DocuSigned by:
Patrick Alton
A270EF78A6DF442...
W. Patrick Alton, P.E.
Transportation Services Manager

Appendix A

Bulk Samples

The following bulk sample was obtained and transported to our laboratory for testing to determine the engineering properties of the soil:

Sample No.	Boring No.	Line	Station	Offset	Depth (ft)	Test(s) Performed
CBR-1	L2450R1	-L-	24+50	5’ Rt.	2.0-5.0	Standard Proctor, CBR

Undisturbed Samples

Undisturbed Shelby tube samples were not collected as part of this investigation.

PROJECT REFERENCE NO.	SHEET NO.
B-5818	4
R/W SHEET NO.	

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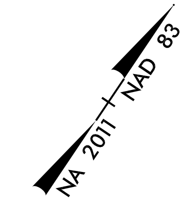

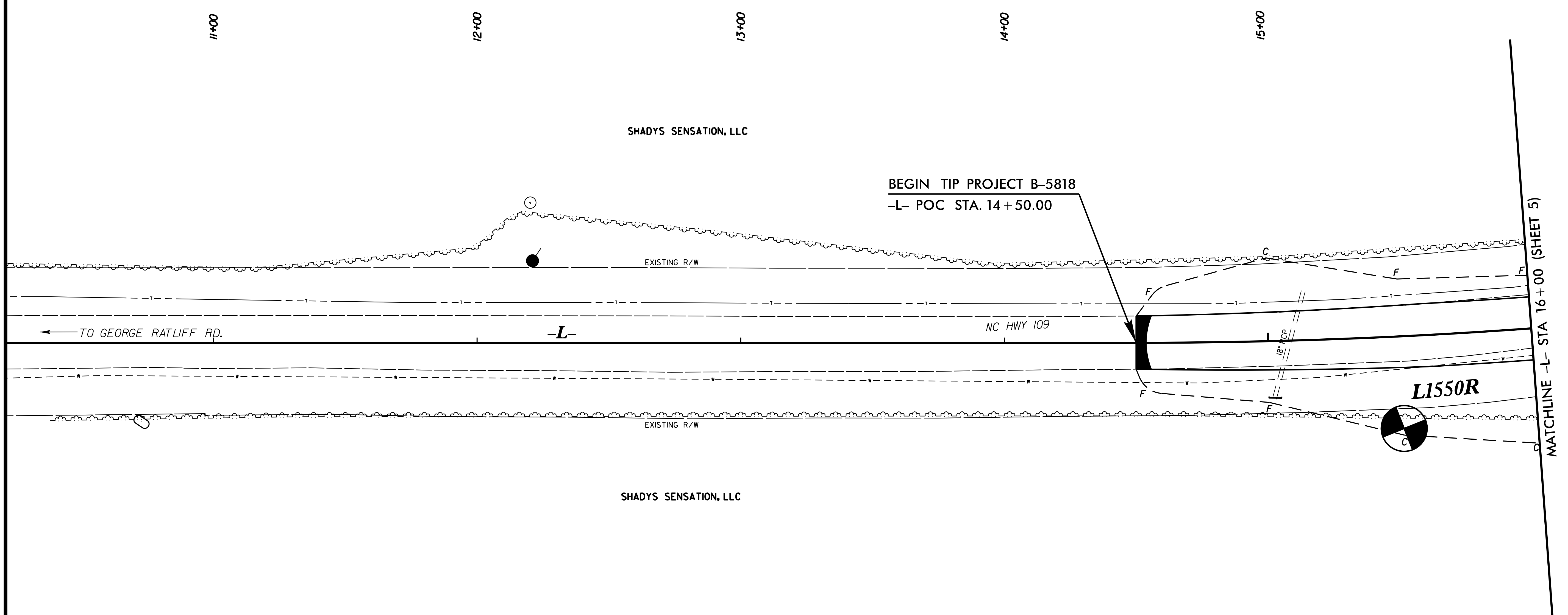

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NA 2011 + NAD 83

17+00 18+00 19+00 20+00

SHADYS SENSATION, LLC

EXISTING R/W

NC HWY 109

36" RCP

15" CMP

-L- STA 16+00 (SHEET 4)

-L- STA 21+00 (SHEET 6)

MATCHLINE -L- STA 16+00

MATCHLINE -L- STA 21+00

L1750R

L1950R

L2050R

SHADYS SENSATION, LLC

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PLANS

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R/W SHEET NO.	
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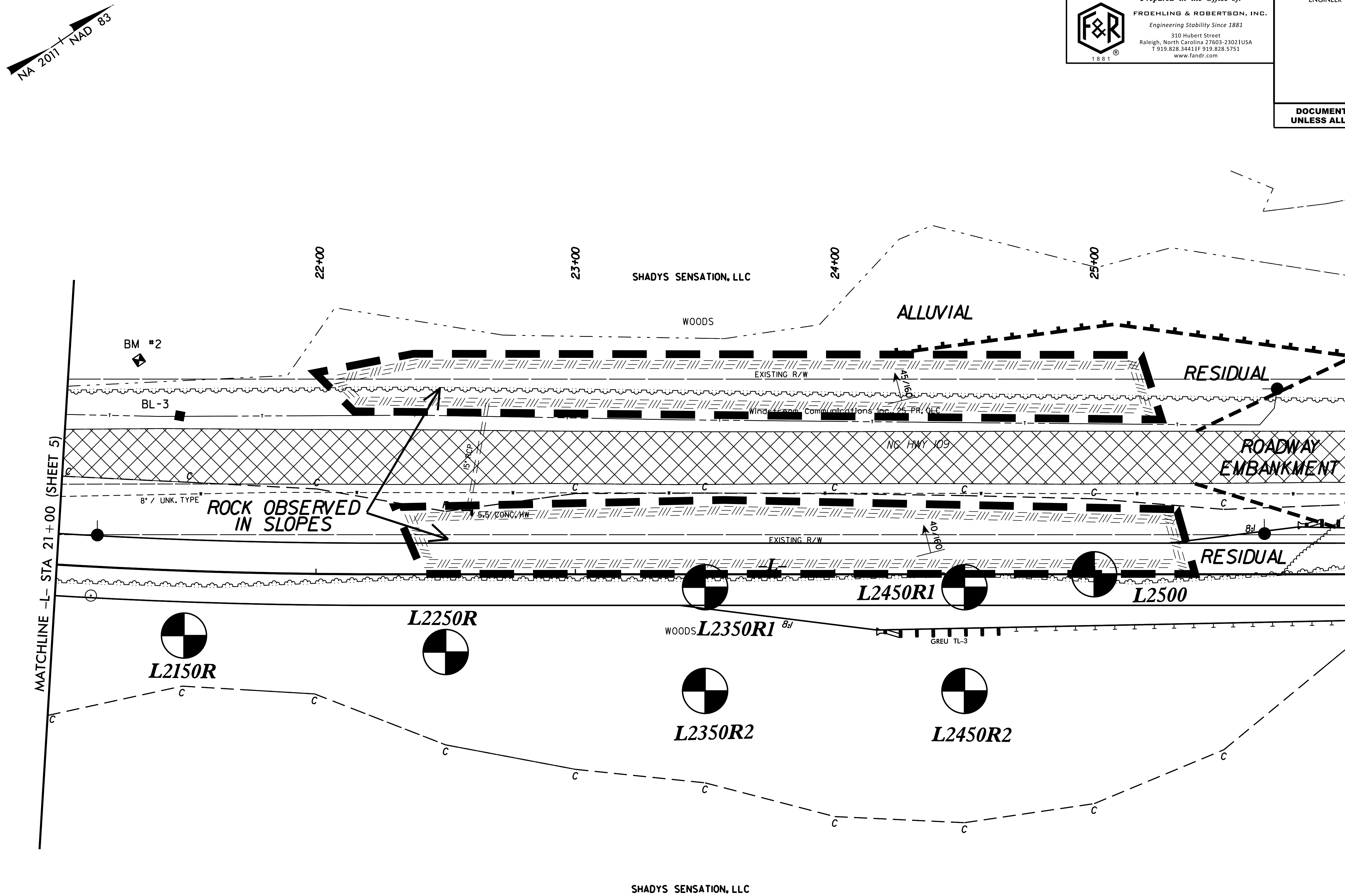

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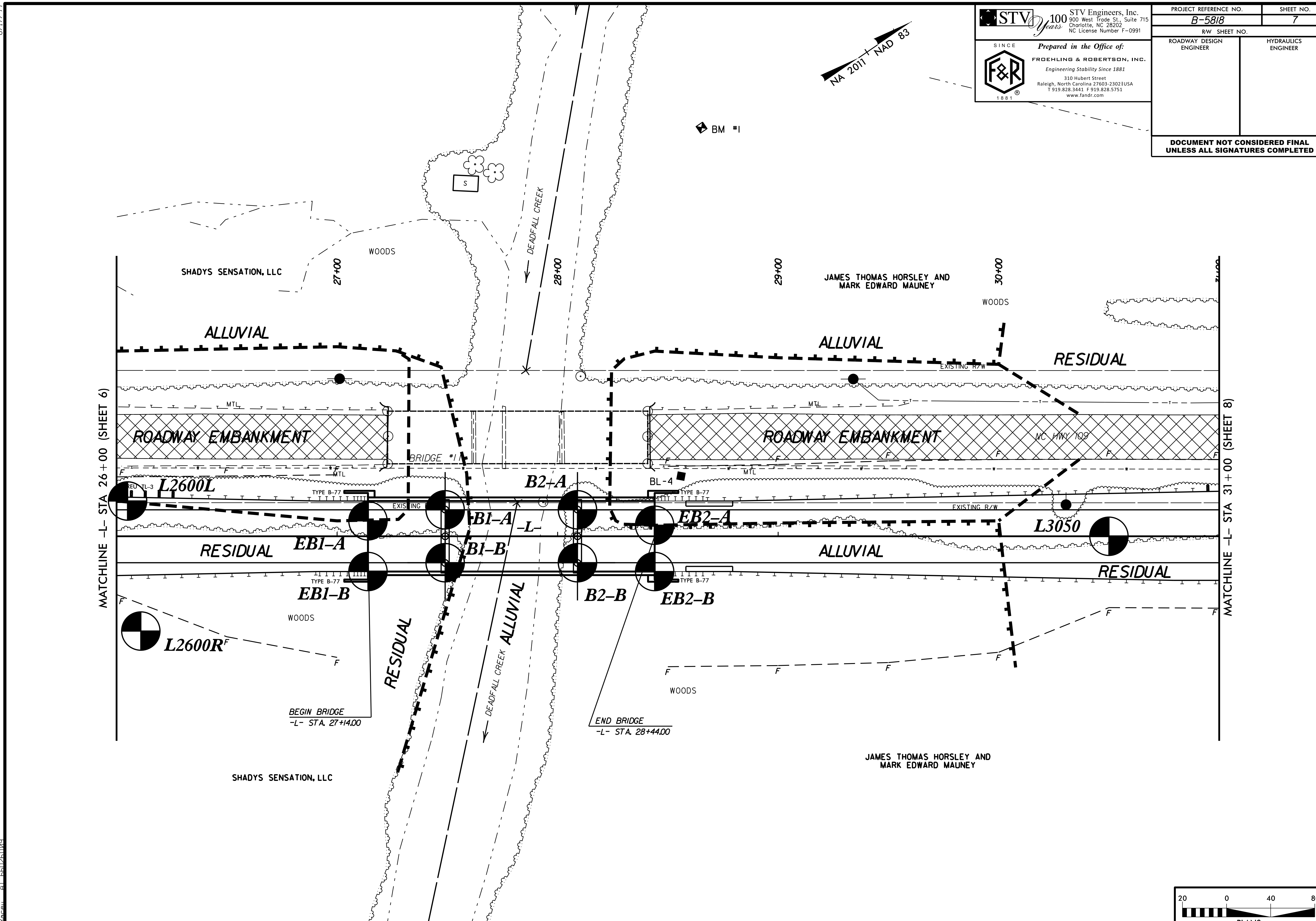

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B-5818
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NA 2011 NAD 83
BM #1
DEADFALL CREEK
SHADYS SENSATION, LLC
WOODS
JAMES THOMAS HORSLEY AND MARK EDWARD MAUNEY
27+00
28+00
29+00
30+00
ALLUVIAL
RESIDUAL
ROADWAY EMBANKMENT
NC HWY 109
BRIDGE #1
EXISTING R/W
MTL
L2600L
L2600R
L3050
EB1-A
EB1-B
B1-A
B1-B
B2-A
B2-B
EB2-A
EB2-B
BL-4
TYPE B-77
-L-
MATCHLINE -L- STA 26+00 (SHEET 6)
MATCHLINE -L- STA 31+00 (SHEET 8)
BEGIN BRIDGE
-L- STA. 27+14.00
END BRIDGE
-L- STA. 28+44.00
PLANS
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WLB

JAMES THOMAS HORSLEY AND MARK EDWARD MAUNEY

WOODS

32+00 33+00 34+00 35+00

EXISTING R/W

MATCHLINE –L– STA 31+00 (SHEET 7)

MATCHLINE –L– STA 36+00 (SHEET 9)

NC HWY 109

4" CONC. HW
GREU TL-3

8" V UNK. TYPE

BL-5

EXISTING R/W

–L–

L3600R

L3450R

L3250R

GREU TL-3

JAMES THOMAS HORSLEY AND MARK EDWARD MAUNEY

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PROJECT REFERENCE NO.	SHEET NO.
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R/W SHEET NO.	

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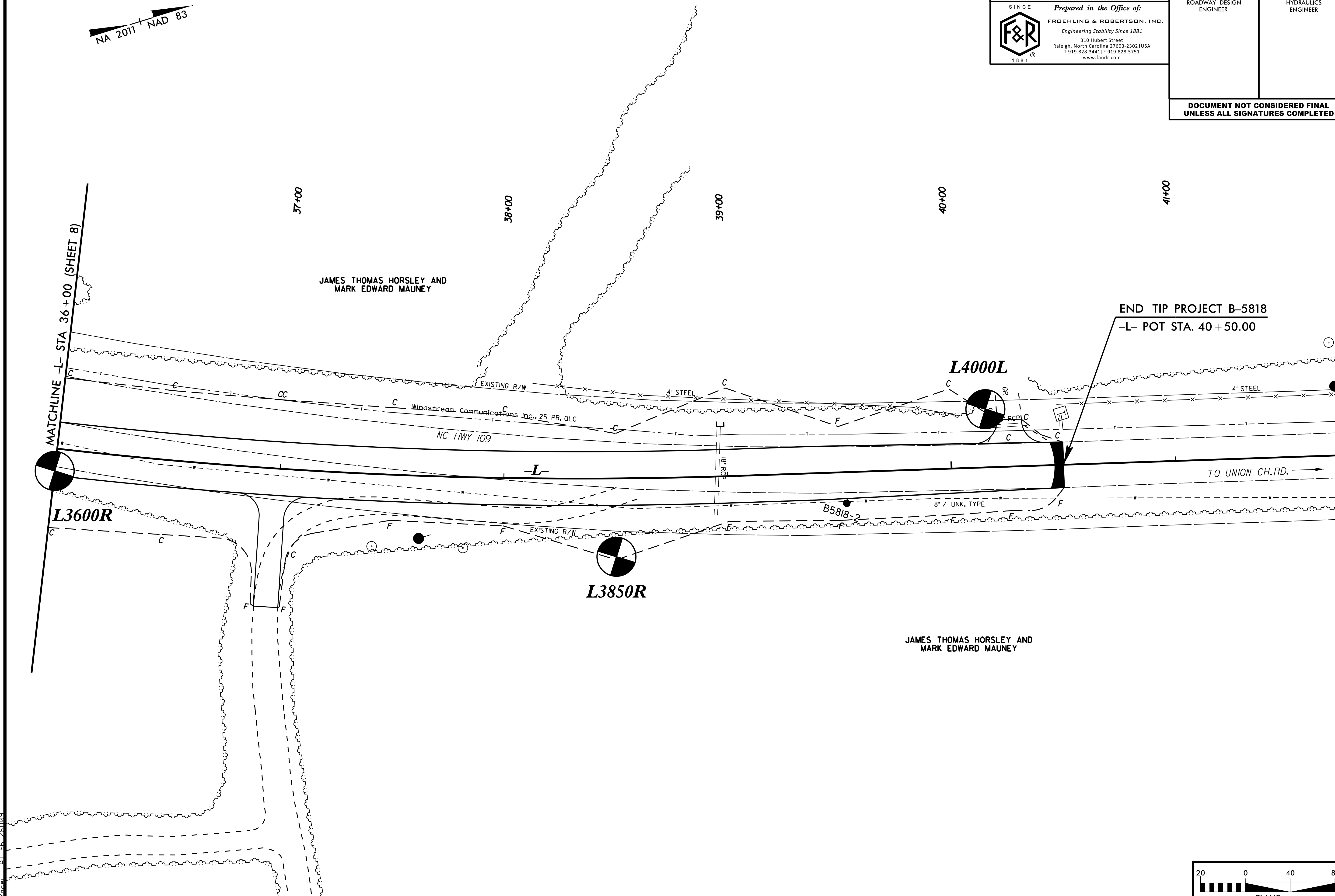

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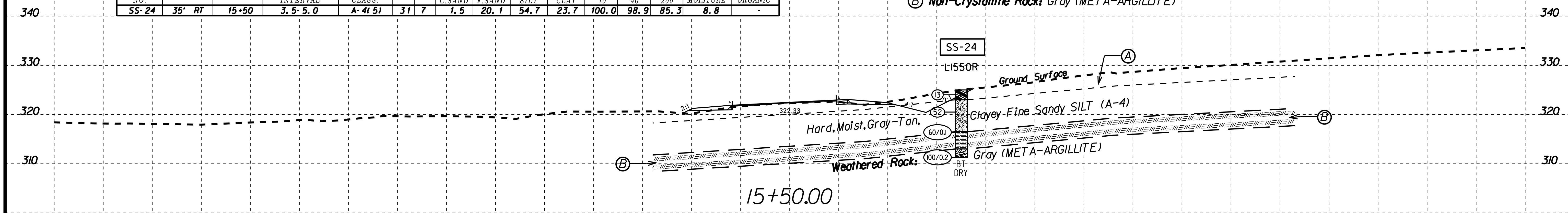
B-5818	10

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	% BY WEIGHT F.SAND	% BY WEIGHT SILT	% BY WEIGHT CLAY	% PASSING (SIEVES) 10	% PASSING (SIEVES) 40	% PASSING (SIEVES) 200	% MOISTURE	% ORGANIC
SS-24	35' RT	15+50	3.5-5.0	A-4(5)	31	7	1.5	20.1	54.7	23.7	100.0	98.9	85.3	8.8	-

Ⓐ **Residual:** Stiff, Moist, Tan-Red, Silty Fine Sandy CLAY (A-6) with Trace Organics

Ⓑ **Non-Crystalline Rock:** Gray (META-ARGILLITE)



GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

-L-

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15-NOV-2019 10:25
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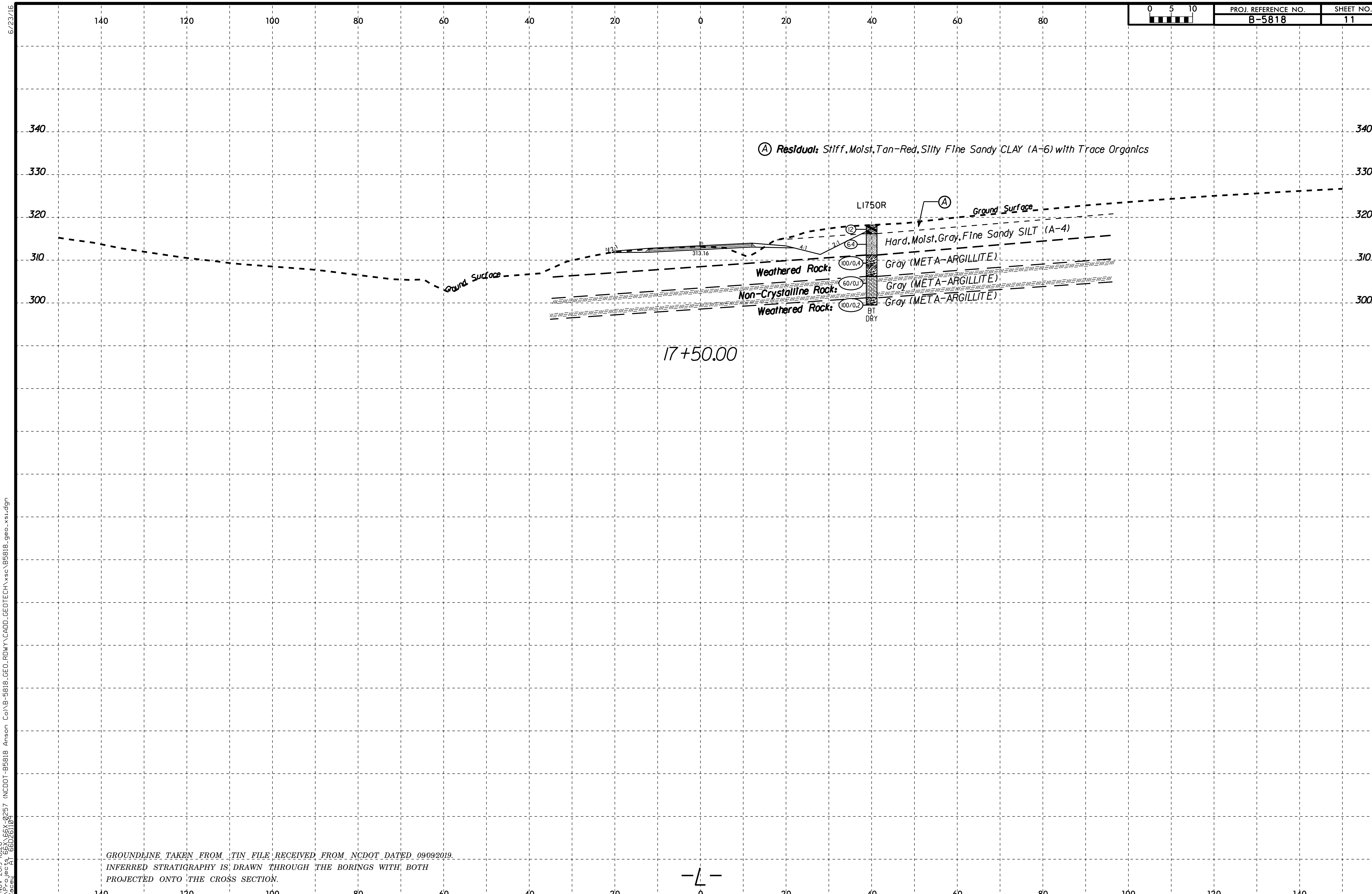
PROJ. REFERENCE NO. B-5818

SHEET NO. 11



GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

6/23/16

15-NOV-2019 10:26
F:\Projects 66X\66X-0257 (NCDOT-B5818 Anson Co)\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xsi.dgn

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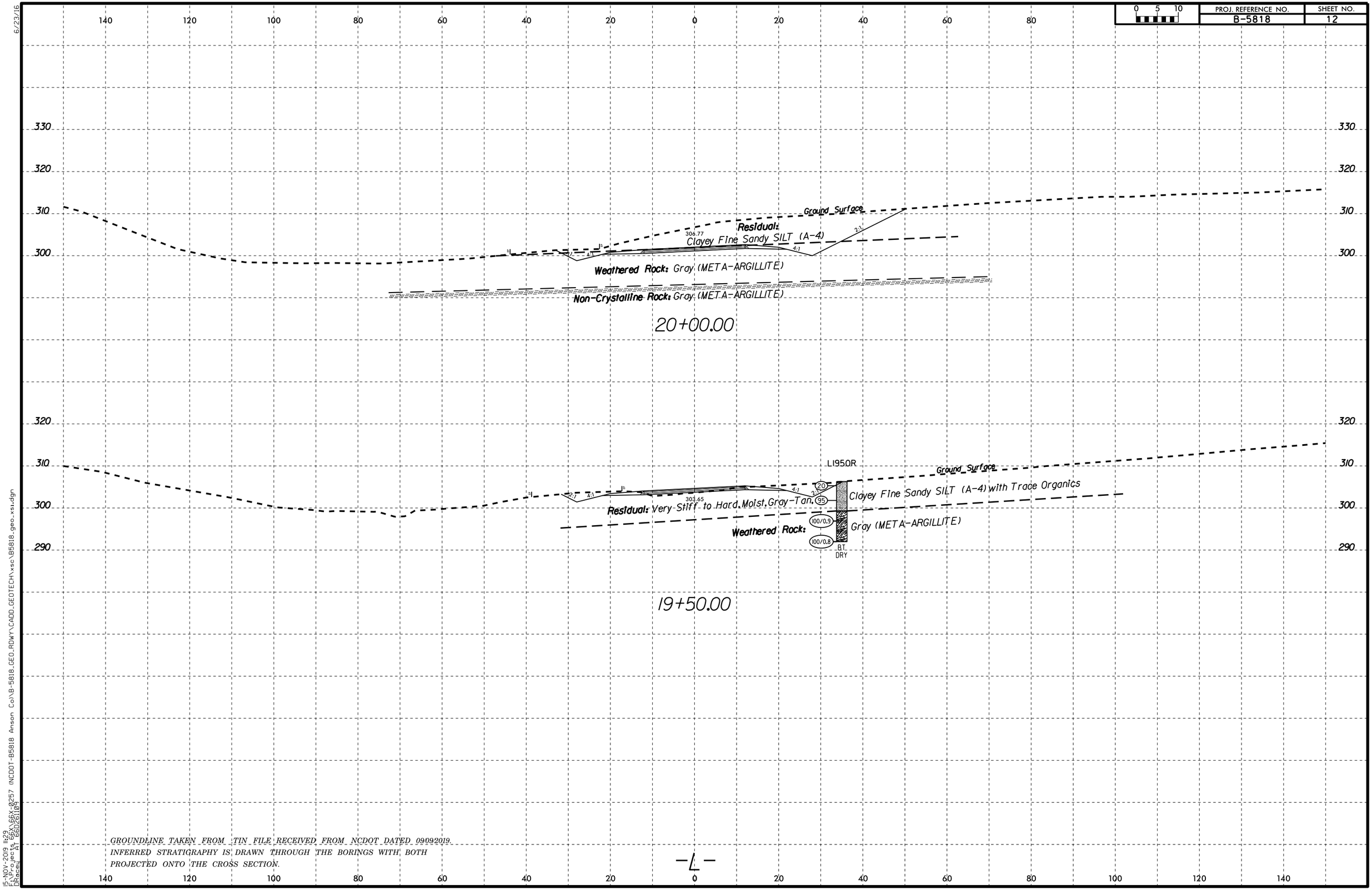
	B-5818	12



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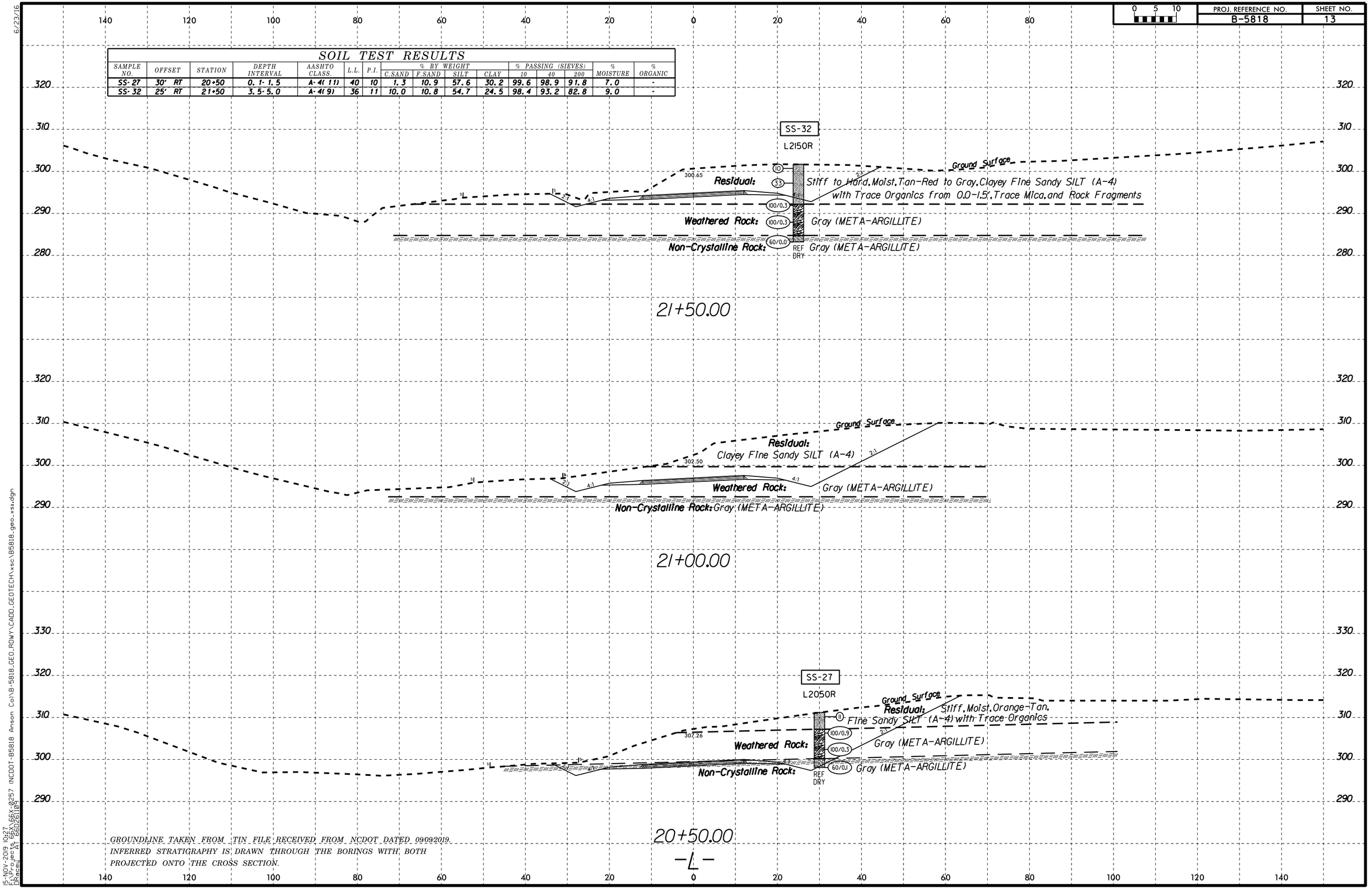
DRacey
AT 66D2611109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	13

0 5 10

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-27	30' RT	20+50	0.1-1.5	A-4(11)	40	10	1.3	10.9	57.6	30.2	99.6	98.9	91.8	7.0	-
SS-32	25' RT	21+50	3.5-5.0	A-4(9)	36	11	10.0	10.8	54.7	24.5	98.4	93.2	82.8	9.0	-



GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

15-NOV-2019 10:27
P:\NCDOT-B5818 Anson Co\B-5818.GEO.RDWY\CADD_GEOTECH\xsc\B5818_geo_xs1.dgn
DRacel_geo_A1 660261109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	14

0 5 10

140 120 100 80 60 40 20 0 20 40 60 80

330 320 310 300 290 280

Ground Surface

298.87 **Residual:** Clayey Fine Sandy SILT (A-4)

Weathered Rock: Gray (META-ARGILLITE)

Non-Crystalline Rock: Gray (META-ARGILLITE)

1:1 2:1 4:1

23+00.00

L2250R

Ground Surface

297.87 **Residual:** Stiff to Hard, Moist, Tan-Red-Gray, Clayey Fine Sandy SILT (A-4)

(14) (97) with Trace Organics from 0.0-1.5', Trace Rock Fragments

Non-Crystalline Rock: (60/0.1) Gray (META-ARGILLITE)

(60/0.1)

REF DRY

22+50.00

Ground Surface

295.81 **Residual:** Clayey Fine Sandy SILT (A-4)

Weathered Rock: Gray (META-ARGILLITE)

Non-Crystalline Rock: Gray (META-ARGILLITE)

22+00.00

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT DATED 09092019.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

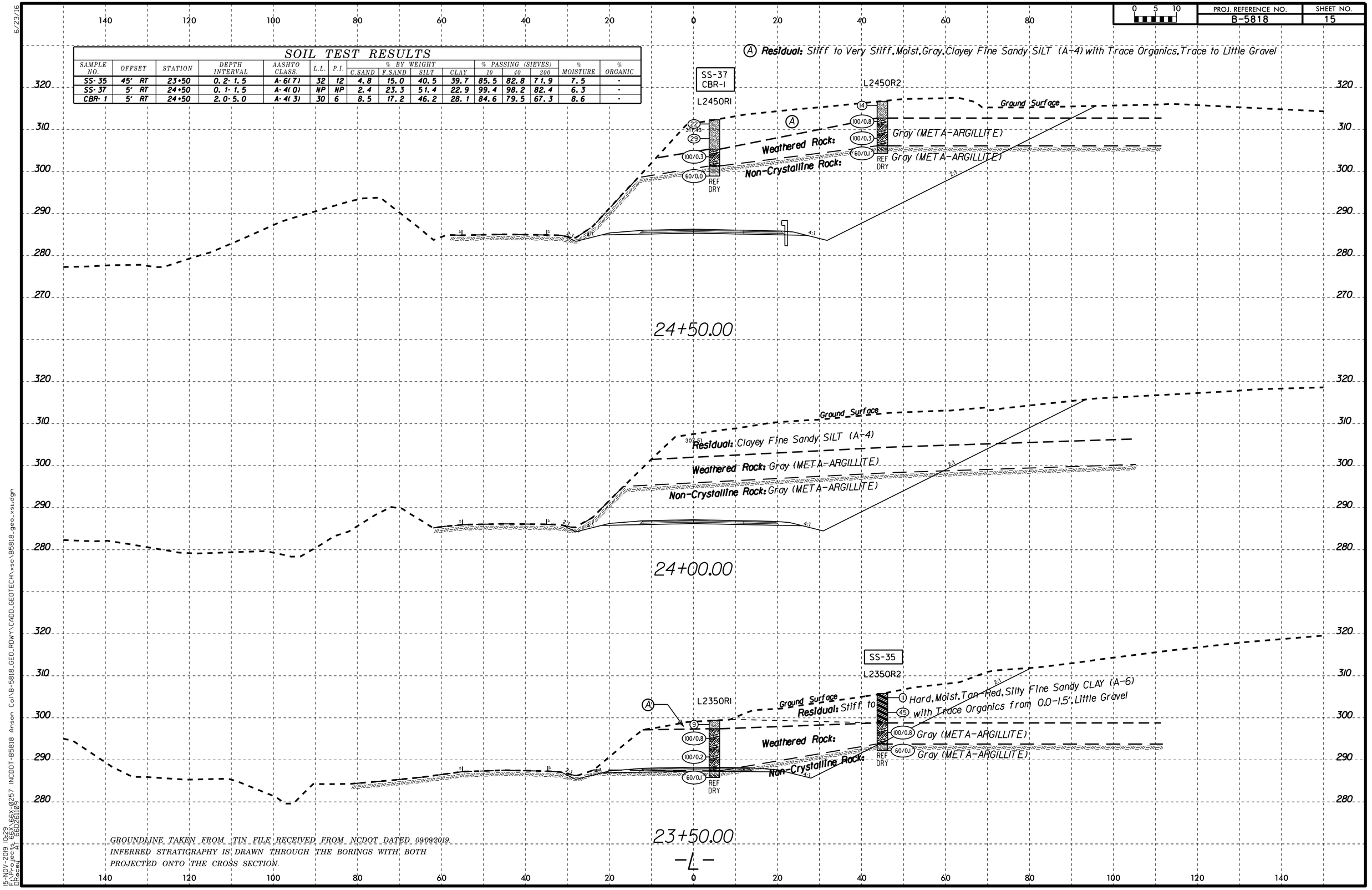
-L-

PROJ. REFERENCE NO.	SHEET NO.
B-5818	15

0 5 10

SOIL TEST RESULTS

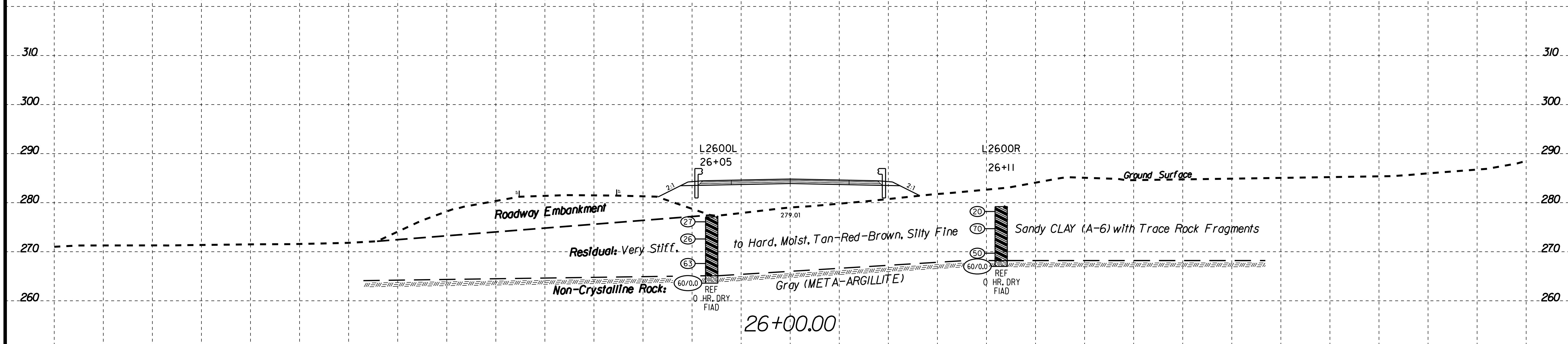
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-35	45' RT	23+50	0.2-1.5	A-6(7)	32	12	4.8	15.0	40.5	39.7	85.5	82.8	71.9	7.5	-
SS-37	5' RT	24+50	0.1-1.5	A-4(0)	NP	NP	2.4	23.3	51.4	22.9	99.4	98.2	82.4	6.3	-
CBR-1	5' RT	24+50	2.0-5.0	A-4(3)	30	6	8.5	17.2	46.2	28.1	84.6	79.5	67.3	8.6	-

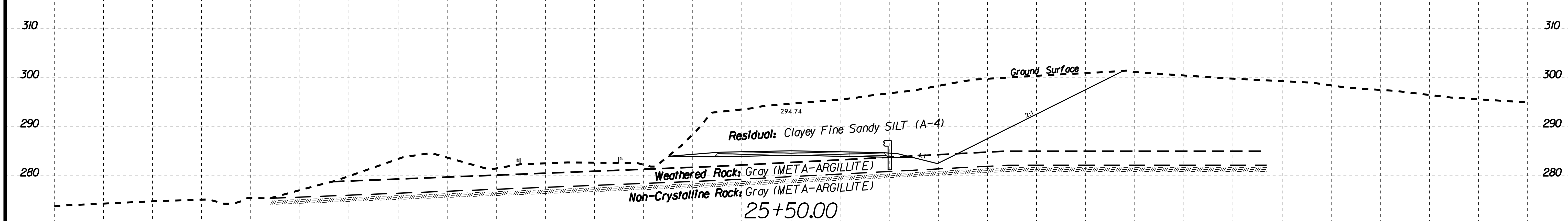


GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

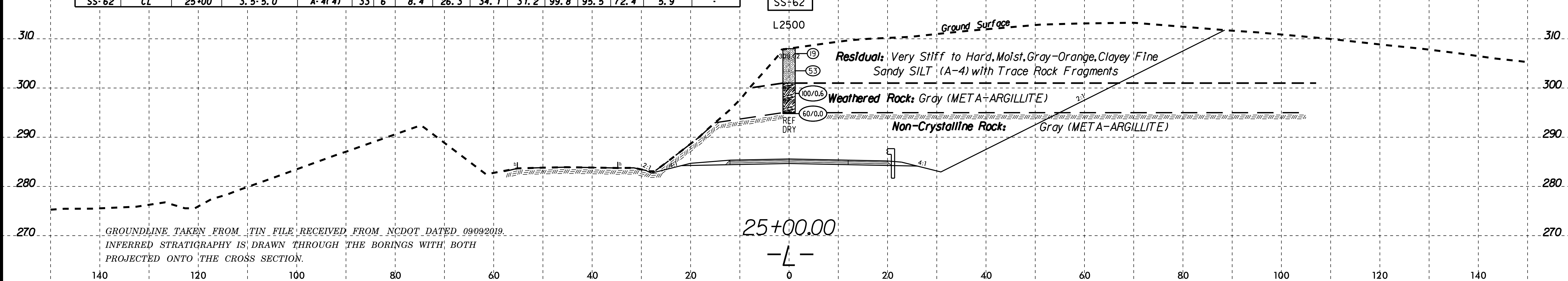
15-NOV-2019 10:23
V:\Projects\6633-0257 (NCDOT-B5818 Anson Co)\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xs1.dgn
DRacey AT 6602611109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	16





SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-62	CL	25+00	3.5-5.0	A-4(4)	33	6	8.4	26.3	34.1	31.2	99.8	95.5	72.4	5.9	-



GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

6/23/16
15-NOV-2019 10:29 F:\Projects_66X\66X-0257 (NCDOT-B5818 Anson Co)\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xsi.dgn DRacey AT 66026110

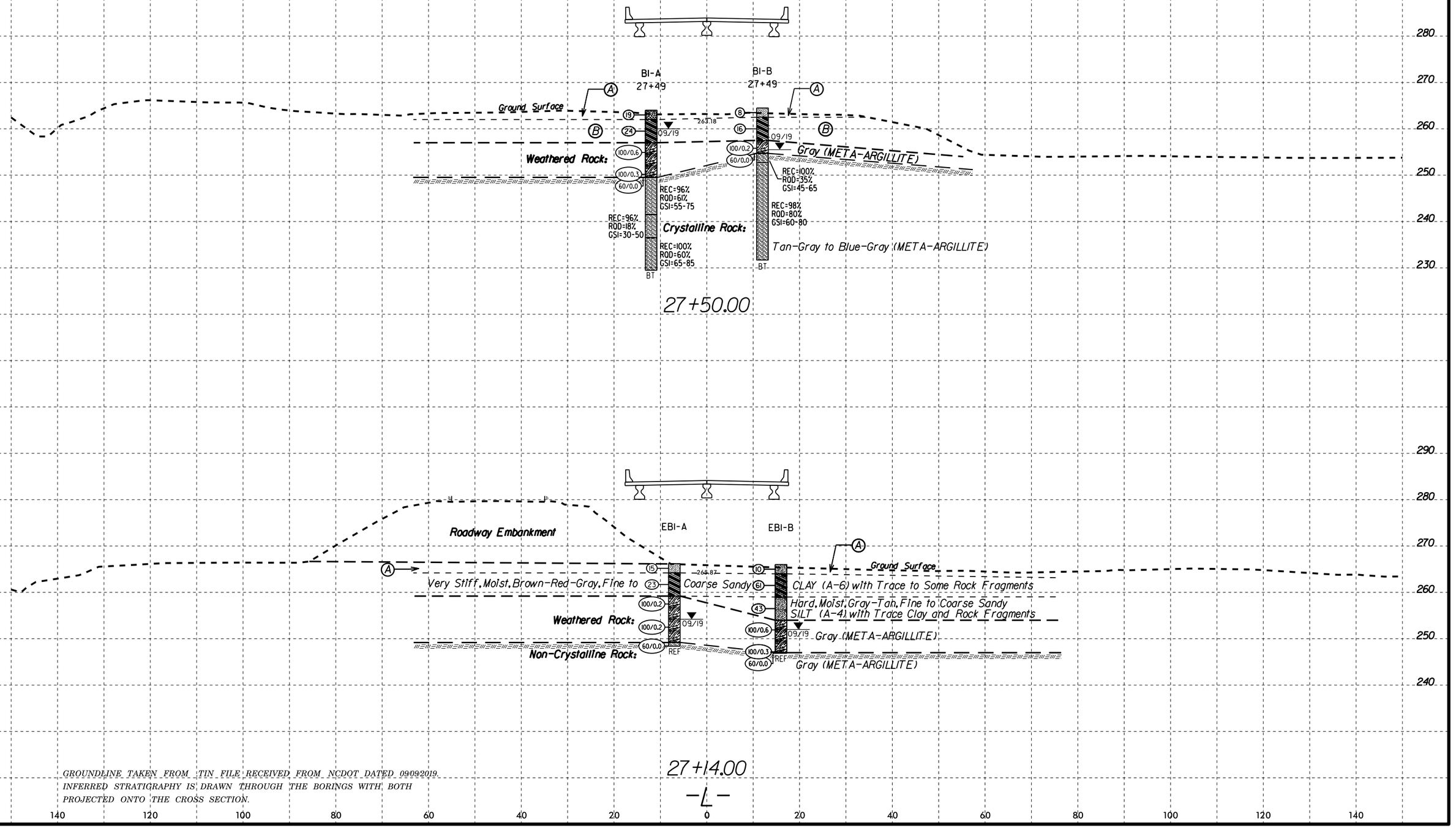
PROJ. REFERENCE NO.	SHEET NO.
B-5818	17

0 5 10

NOTE: See Structure Inventory Report for more details about bridge borings

Ⓐ **Residual:** Medium Stiff to Very Stiff, Moist, Tan-Orange-Brown, Fine Sandy SILT (A-4) with Trace Organics and Clay, Trace to Some Rock Fragments

Ⓑ **Residual:** Very Stiff, Moist, Orange-Brown, Fine Sandy Silty CLAY (A-6) with Trace Rock Fragments



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED FROM NCDOT DATED 09092019

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

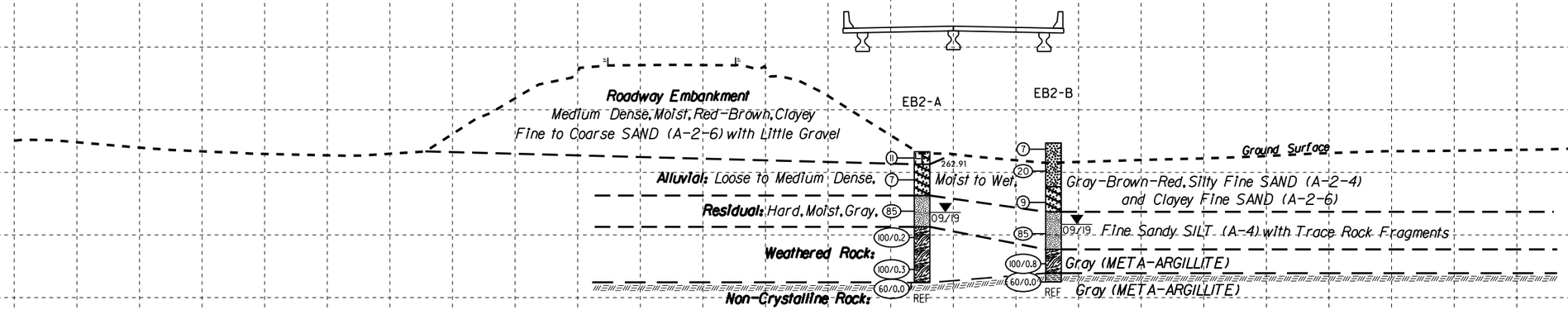
25-NOV-2019 14:28
DRacey
Project: 66X66X-0257 (NCDOT-B5818 Anson Co\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xs1.dgn
A1 6602611109

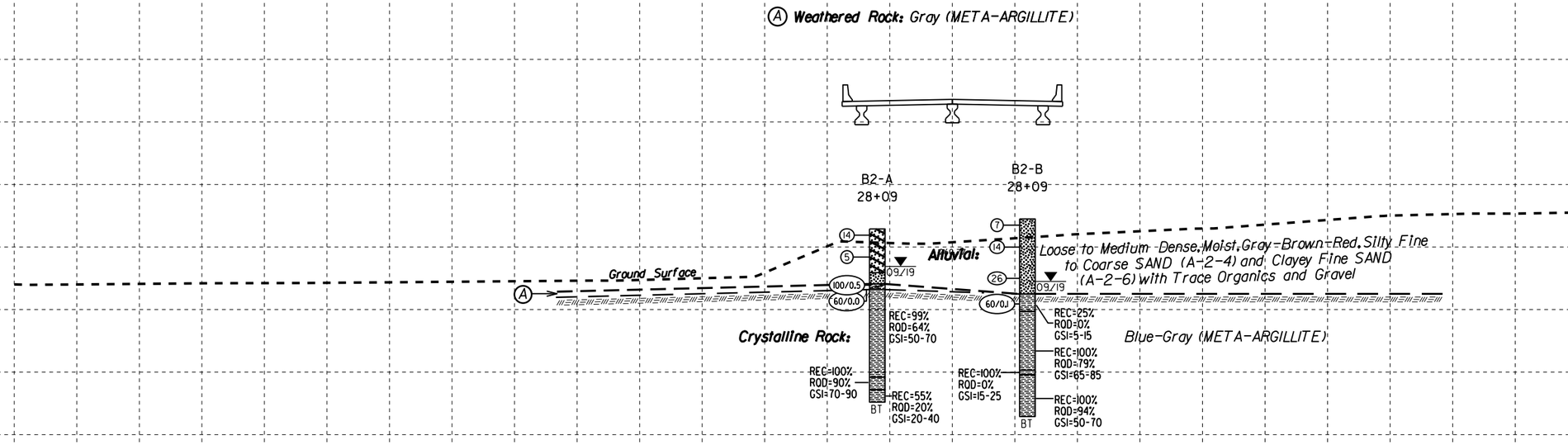
PROJ. REFERENCE NO.	SHEET NO.
B-5818	18

0 5 10

140 120 100 80 60 40 20 0 20 40 60 80

NOTE: See Structure Inventory Report for more details about bridge borings





GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

25-NOV-2019 11:29
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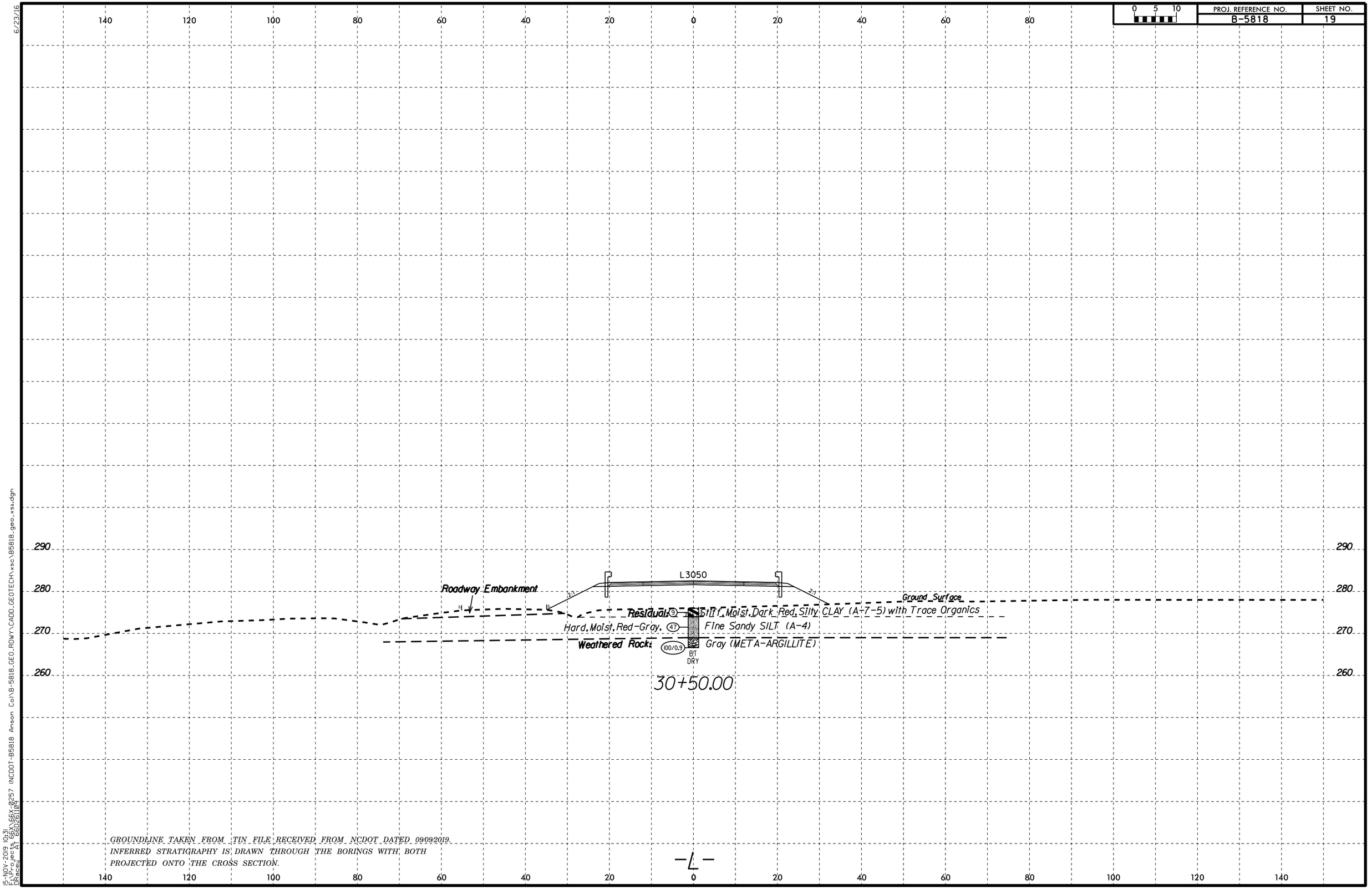
DRacey_AT_66D261109

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-5818	19



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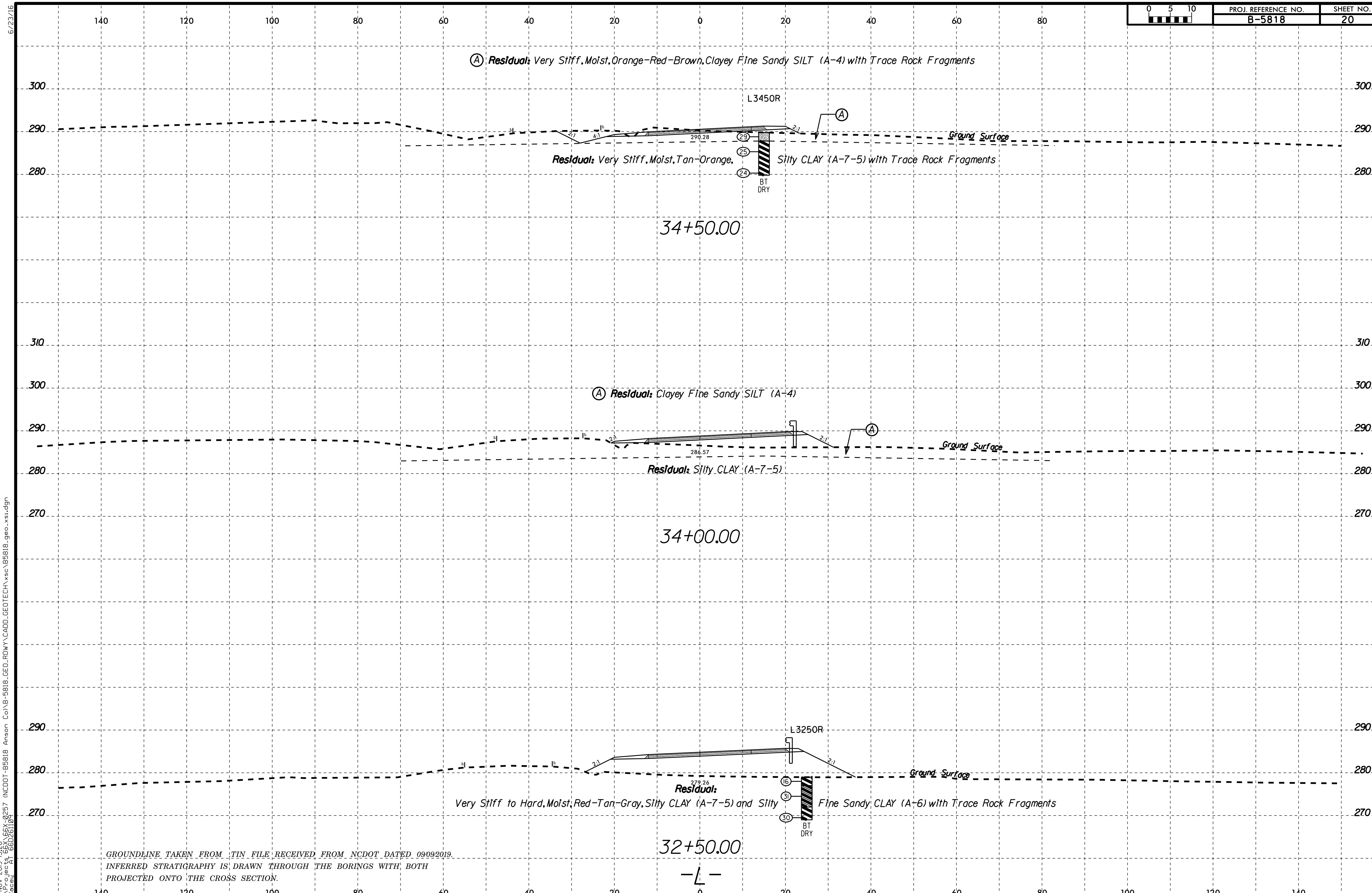
DRacey_A1 66D261109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	20



6/23/16

15-NOV-2019 15:26
F:\Projects 66\X66X-0257 (NCDOT-B5818 Anson Co)\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xsi.dgn

6/23/16

PROJ. REFERENCE NO.	SHEET NO.
B-5818	21

0 5 10

140 120 100 80 60 40 20 0 20 40 60 80

310
300
290
280

298.55

Residual: Silty CLAY (A-7-5)

Weathered Rock: META-ARGILLITE

Ground Surface

36+50.00

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-10	10' RT	36+00	3.5-5.0	A-7-5(19)	46	16	3.1	8.6	55.6	32.7	100.0	97.9	92.7	13.5	-

310
300
290
280

SS-10

L3600R

298.51

12
2.7
100/0.7
100/0.5

BIT
DRY

Residual: Stiff to Very Stiff, Moist, Red-Gray-Brown, Silty CLAY (A-7-5) with Trace Organics and Rock Fragments

Weathered Rock: Gray (META-ARGILLITE)

Ground Surface

36+00.00

310
300
290
280

298.33

Residual: Silty CLAY (A-7-5)

Weathered Rock: META-ARGILLITE

Ground Surface

35+50.00

GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.

INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

15-NOV-2019 11:21
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DRacer at 66D2661109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	22

0 5 10

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-5	35' RT	38+50	0.1-1.5	A-4(3)	25	7	6.6	15.2	47.1	31.1	97.2	93.6	80.5	6.4	-
SS-6	35' RT	38+50	3.5-5.0	A-7-5(23)	51	21	1.8	6.8	46.2	45.2	99.2	98.2	93.6	16.4	-

Ⓐ **Residual:** Stiff, Moist, Tan-Orange, Clayey Fine Sandy SILT (A-4) with Trace Rock Fragments and Organics

SS-5
SS-6

L3850R — Ⓐ

310
300
290

305.81

10
19
66
100/0.7 BT DRY

Ground Surface

Residual: Very Stiff, Moist, Red-Tan, Silty CLAY (A-7-5) with Trace Rock Fragments

Hard, Moist, Tan-Gray, Fine Sandy SILT (A-4) with Trace Organics

Weathered Rock: Gray (META-ARGILLITE)

38+50.00

310
300
290

304.18

Ground Surface

Residual: Silty CLAY (A-7-5)

Fine Sandy SILT (A-4)

Weathered Rock: META-ARGILLITE

38+00.00

310
300
290

302.24

Ground Surface

Residual: Silty CLAY (A-7-5)

Fine Sandy SILT (A-4)

Weathered Rock: META-ARGILLITE

37+50.00

310
300
290

300.06

Ground Surface

Residual: Silty CLAY (A-7-5)

Fine Sandy SILT (A-4)

Weathered Rock: META-ARGILLITE

37+00.00

—L—

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

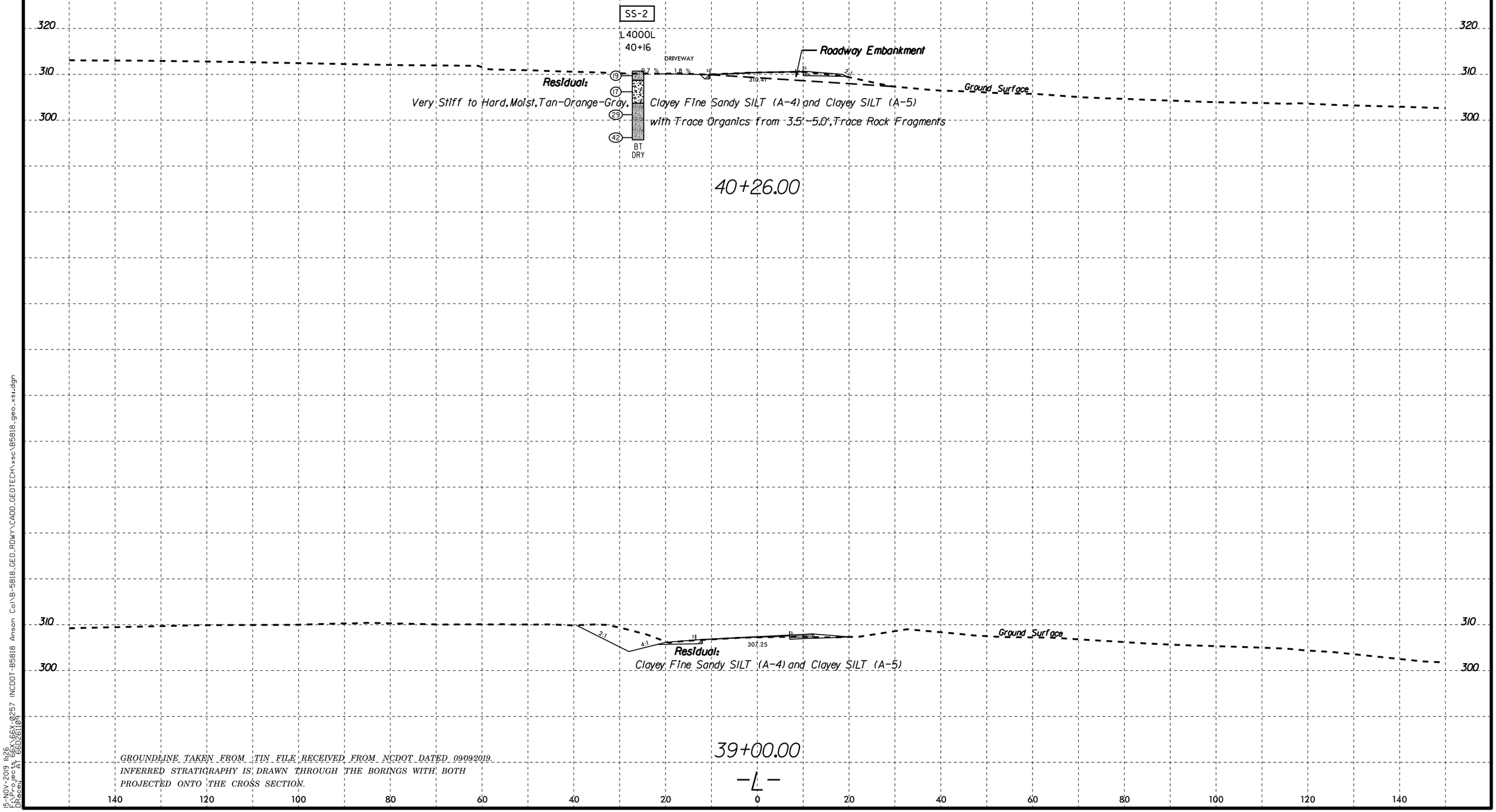
15-NOV-2019 11:22
E:\NCDOT\B5818 Anson Co\B-5818_GEO_RDWY\CADD_GEOTECH\xsc\B5818_geo_xs1.dgn
DRacey_A1 66D261109

PROJ. REFERENCE NO.	SHEET NO.
B-5818	23

0 5 10

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C.SAND	F.SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-2	26' LT	40+16	3.5-5.0	A-5(11)	41	9	3.1	7.3	56.5	33.1	100.0	98.3	92.6	21.0	-



GROUNDLINE TAKEN FROM TIN FILE RECEIVED FROM NCDOT DATED 09092019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

15-NOV-2019 11:26
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DRacey_AT_66D261109