ID: B-5178

CONTRACT: C202880

NOTE: SEE SHEET 2A FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

STATE	STATE PROJECT REFERENCE NO.		SHEET NO.	TOTAL SHEETS
N.C.	B-5178	42549.1.1	1	21

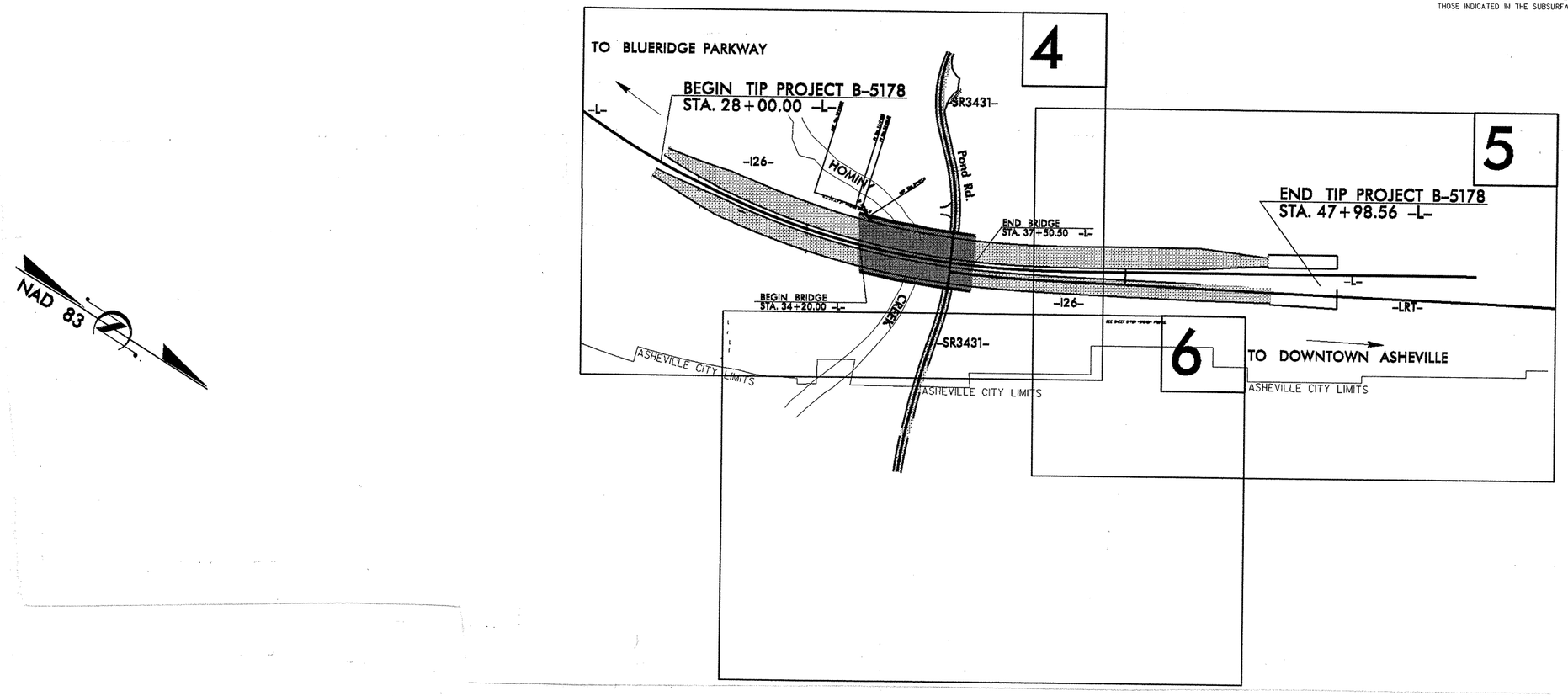
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
		P.E.
		R/W & UTIL.

PROJ. REFERENCE NO. 42549.1.1 B-5178 F.A. PROJ. BRIMS-0261(80)

COUNTY BUNCOMBE

PROJECT DESCRIPTION REPLACEMENT OF BRIDGES 235 AND 238 ON I-26 OVER SR 3431 (POND ROAD) AND HOMINY CREEK

INVENTORY



CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING, AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES, AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

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

PERSONNEL

JC KUHNE
MM HAGER
DO CHEEK
DC ELLIOT
C COFFEY
LE RIDDLE
DM MULLEN

INVESTIGATED BY JC KUHNE

CHECKED BY WD FRYE

SUBMITTED BY WD FRYE

DATE 9/6/2011

NORTH CAROLINA LICENSED SEAL 1878 GEOLOGIST JODY KUHNE

DRAWN BY: JC KUHNE JT WILLIAMS

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NOTE - 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.

PROJECT REFERENCE NO.	SHEET NO.
B-5178 42549.1.1	2 OF 21

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 TO BE THE 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 STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. 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
LIQUID LIMIT PLASTIC INDEX	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 A 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 0.50 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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
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
NONPLASTIC	0-5	VERY LOW
LOW PLASTICITY	6-15	SLIGHT
MED. PLASTICITY	16-25	MEDIUM
HIGH PLASTICITY	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.
UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED)
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LIQUID LIMIT LESS THAN 31
MODERATELY COMPRESSIBLE	LIQUID LIMIT EQUAL TO 31-50
HIGHLY COMPRESSIBLE	LIQUID LIMIT GREATER THAN 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
- SOUNDING ROD
- SPT CPT DPT DMT VST PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- SPT N-VALUE
- REF — SPT REFUSAL

SAMPLE DESIGNATIONS

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

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] MOBILE B-___
- [ ] BK-51
- [X] CME-45C
- [X] CME-550
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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_____
- [ ] -N_____
- [ ] -H_____

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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, YIELDS SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, YIELDS 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 FEET
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 THE 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, 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: NA

ELEVATION: FT.

NOTES:

REVISED 02/23/06

See Sheet 1-A For Index of Sheets

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

BUNCOMBE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5178	2A	21
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
42549.1.1	BRIMS-0261(80)1	PE	

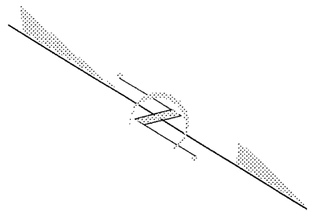
LOCATION: REPLACEMENT OF BRIDGES NO. 235 AND 238 ON I-26 OVER SR. 3431 (POND RD.) AND HOMINY CREEK

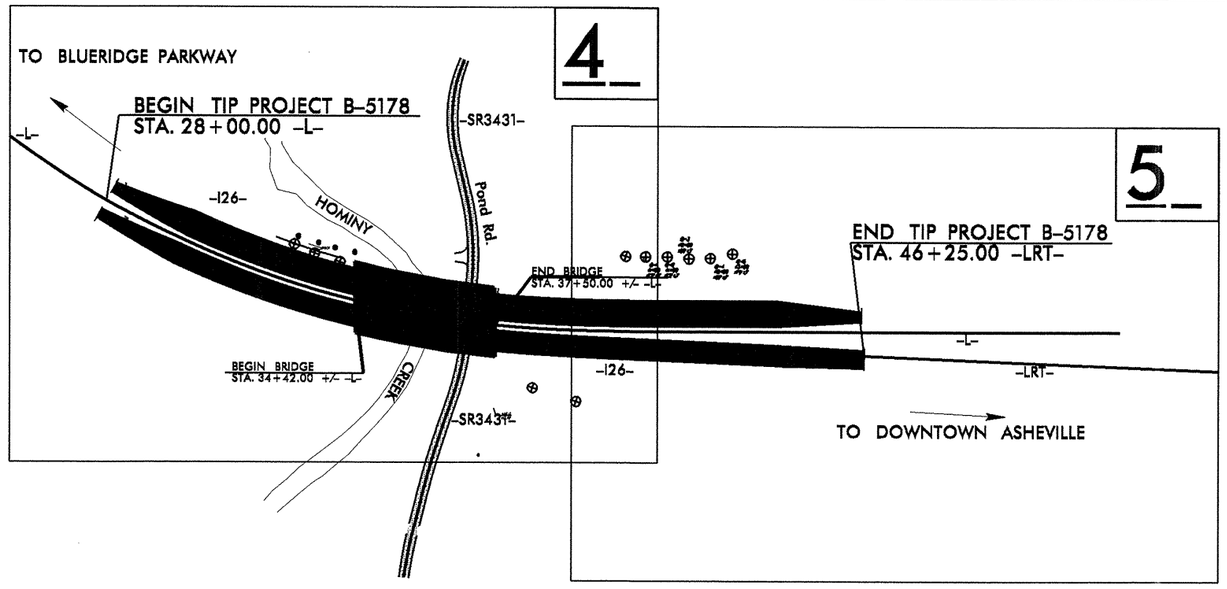
TYPE OF WORK: RESURFACING, PAVING, GRADING, DRAINAGE, STRUCTURE, STRUCTURE REMOVAL, GUARDRAIL, RETAINING WALL AND MEDIAN BARRIER

TIP PROJECT: B-5178

CONTRACT:

VICINITY MAP

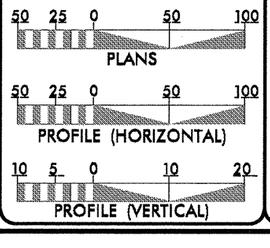




THIS IS A CONTROLLED ACCESS PROJECT

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

GRAPHIC SCALES



DESIGN DATA

ADT 2011 = 81700
ADT 2033 = 103600
DHV = 8 %
D = 55 %
T = 16 % *
V = 70 MPH
* TTST = 10 DUAL 6
FUNC CLASS = INTERSTATE
STANDARD TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-5178 = 0.288 MILE

LENGTH STRUCTURE TIP PROJECT B-5178 = 0.058 MILE

TOTAL LENGTH TIP PROJECT B-5178 = 0.346 MILE

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

2006 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: AUGUST 19, 2011

LETTING DATE: AUGUST 21, 2012

JIMMY GOODNIGHT, PE
PROJECT ENGINEER

TIM GOINS, PE
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA

STATE HIGHWAY DESIGN ENGINEER _____ P.E.

09/08/9

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jkunne AT GEA255445

COMPUTED BY: NNA DATE

CHECKED BY: TDG DATE

PROJECT NO.	SHEET NO.
B-5178	1 OF 1

EARTHWORK BALANCE SHEET

IN CUBIC YARDS

LOCATION	UNCLASSIFIED EXCAVATION	UNDERCUT EXCAVATION	UNSUITABLE EARTH EXCAVATION	SUITABLE EARTH EXCAVATION	TOTAL EMB'T	EARTH EMBANKMENT	ROCK EMB'T	EMB'T + % 15	BORROW	SELECT BORROW	SUITABLE WASTE	UNSUITABLE WASTE	TOTAL WASTE
-TEMP_ALN1-12+18.01 TO 15+88.61	942	0	0	942	717	717	0	825	0	0	117	0	117
-TEMP_ALN1-19+19.64 TO 22+93.74	20725	0	0	20725	12	12	0	14	0	0	20711	0	20711
-L- 28+00 TO 30+00 LT	349	0	0	349	236	236	0	271	0	0	78	0	78
-L- 30+50.00 TO 34+20.00 LT	1247	0	0	1247	140	140	0	161	0	0	1086	0	1086
-L- 37+50.50 to 41+00.00 LT	386	0	0	386	160	160	0	184	0	0	202	0	202
-L- 41+50.00 to 46+00.00 LT	5345	0	0	5345	352	352	0	405	0	0	4940	0	4940
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
WASTE IN LIEU OF BORROW	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTALS PHASE 1 -L-	28994	0	0	28994	1617	1617	0	1860	0	0	27134	0	27134
-TEMP_ALN2- 14+05.14 TO 19+57.36	154	0	0	154	794	794	0	913	759	0	0	0	0
-TEMP_ALN2- 23+02.73 TO 28+75.06	15	0	0	15	783	783	0	900	885	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
WASTE IN LIEU OF BORROW	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTALS PHASE 2	169	0	0	169	1577	1577	0	1813	1644	0	0	0	0
-L- 28+00 TO 34+00.00 RT	835	0	0	835	1238	1238	0	1424	589	0	0	0	0
-L- 37+50.50 TO 46+00.00 RT	20143	0	0	20143	22	22	0	25	0	0	20118	0	20118
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
WASTE IN LIEU OF BORROW	0	0	0	0	0	0	0	0	-589	0	-589	0	-589
SUBTOTAL PHASE 3 -L-	20978	0	0	20978	1260	1260	0	1449	0	0	19529	0	19529
-Temp_Aln2-14+05.14 TO 19+57.36(REMOVAL)	497	0	0	497	148	148	0	170	0	0	327	0	327
-Temp_Aln2- 23+02.73 TO 28+75.06(REMOVAL)	684	0	0	684	85	85	0	98	0	0	586	0	586
	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL PHASE 4	1181	0	0	1181	233	233	0	268	0	0	913	0	913
-SR3431- 10+00 TO 22+24.94	15783	0	0	15783	196	196	0	225	0	0	15558	0	15558
	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL PHASE 1 -SR3431-	15783	0	0	15783	196	196	0	225	0	0	15558	0	15558
PROJECT SUBTOTALS	67105	0	0	67105	4883	4883	0	5615	1644	0	63134	0	63134
LOSS DUE TO CLEAR. & GRUB	-200			-200					0		-200		-200
SHOULDER MATERIAL					1800	1800	0	2070	2070				
													0
PROJECT TOTALS	66905	0	0	66905	6683	6683	0	7685	3714	0	62934	0	62934
EST TO REPLACE TOPSOIL ON BORROW PIT									186				
GRAND TOTALS	66905	0							3900	0			
SAY	67000	0							3900	0			

PAVEMENT STRUCTURE VOLUME :	**4,630**	
DRAINAGE DITCH EXCAVATION :	130	
SHOULDER BORROW:	**0**	
SHALLOW UNDERCUT	**100**	(Contingency Item)
CLASS IV SUBGADE STABILIZATION	**100**	(Contingency Item)
LESS GRANULAR MAT'L	**100**	(Contingency Item)

EARTHWORK QUANTITIES ARE CALCULATED BY THE ROADWAY DESIGN UNIT. THESE EARTHWORK QUANTITIES ARE BASED IN PART ON SUBSURFACE DATA PROVIDED BY THE GEOTECHNICAL ENGINEERING UNIT.

693

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Michael F. Easley
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

Lyndo Tippett
SECRETARY

August 12, 2011

STATE PROJECT: 42549.1.1, B-5178

COUNTY: Buncombe

DESCRIPTION: Roadway and approaches, Br. Nos. 235 and 238 on I-26 over SR 3431 (Pond Road) and Hominy Creek

SUBJECT: Geotechnical Report – Inventory

PROJECT DESCRIPTION

The project consists of .29 miles of existing 4 lane widening along the existing I-26 alignment. A single deck eight lane bridge is proposed to replace the existing bridges. A geotechnical investigation was performed in July, 2011 utilizing a CME 550 ATV mounted drill. Standard Penetration Tests were performed at selected locations along the alignment for cut slopes and a new retaining wall. Representative soil samples were obtained for visual classification in the field.

SR 3431 (Pond Road) will also have the grade lowered to accommodate the new superelevation of the bridge.

The following survey line was investigated, as was the alignment of Pond Road:

Line	Stations
- L -	28+00 – 46+25
-SR 3431-	10+00 – 19+00

AREAS OF SPECIAL GEOTECHNICAL INTEREST

STRUCTURES

The existing bridge is proposed to be replaced with a single 8-lane deck. A Bridge Inventory will be submitted as a separate report.

POTENTIALLY UNSUITABLE SUBSURFACE CONDITIONS

Small areas of soft soils requiring reinforcement may be found in the alluvial soils along Pond Road and are reflected in contingency items for geotextile and select backfill in the Recommendations.

PHYSIOGRAPHY AND GEOLOGY

The Pond Road section of project is contained in the floodplain of Hominy Creek. Interstate 26 and the replacement bridge are approximately 50' above the stream elevation.
Rock is present at the surface as shown on the plansheets, particularly in the vicinity of the proposed retaining wall and around station 17+00 on Pond Road. Fresh rock on this project is quartz rich biotite gneiss of the Ashe Formation and is very durable.

SOIL PROPERTIES

Soils in cut areas of I-26 are generally dense to very dense silty sands with weathered rock seams. Rock will likely be encountered at the base of I-26 cut sections.
Cut slopes on Pond Road will be in loose embankment under the existing bridge and a combination of dense silty sand with weathered rock seams to rock going upstation from 15+00 to 18+00.

GROUNDWATER

Groundwater exists essentially in the alluvial deposits at the base flow level of Hominy Creek. Roadway borings along I-26 show relatively shallow water depths that are not expected to affect slope stability or require specialized drainage.

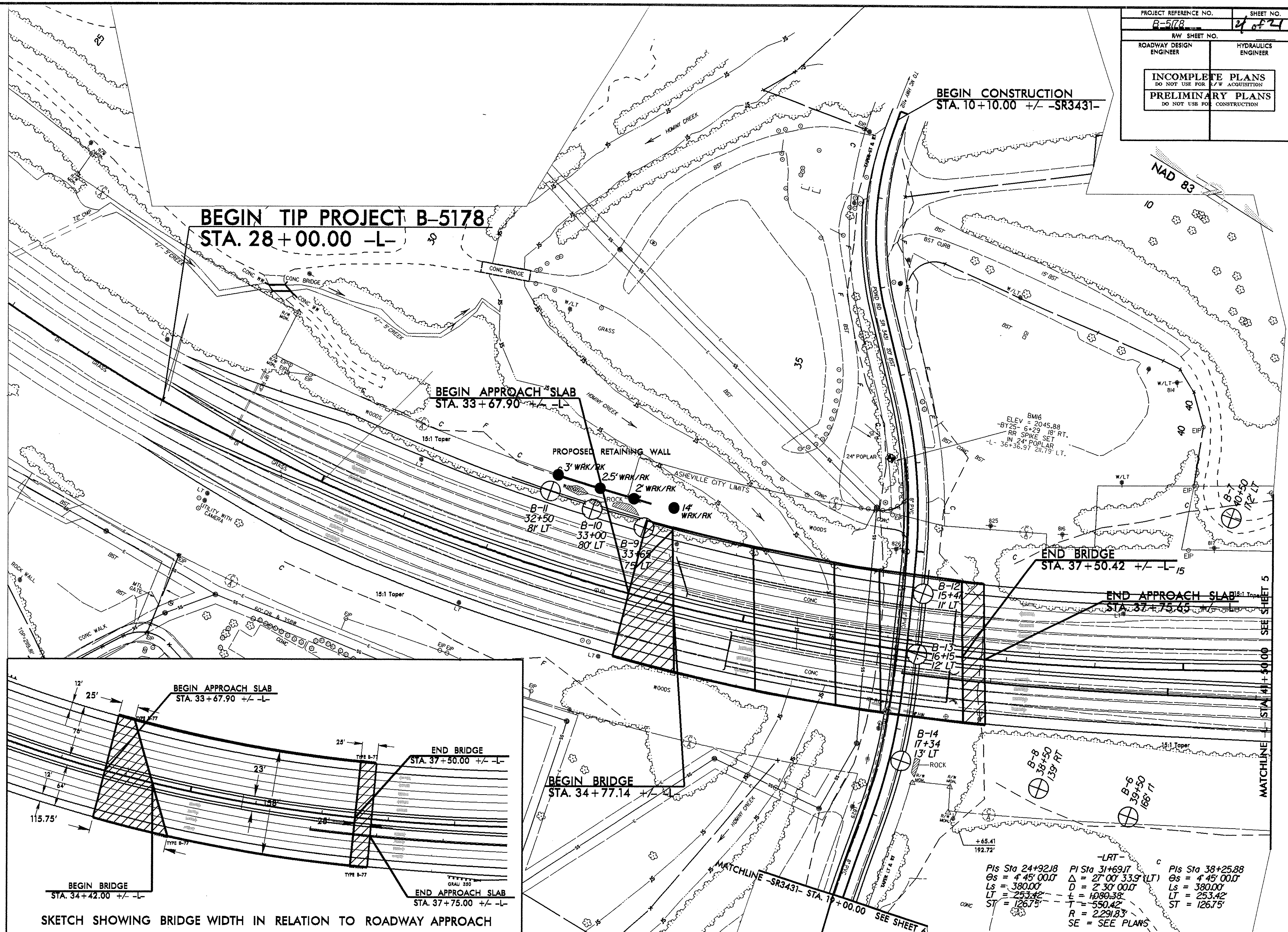
Respectfully submitted,

Jody C. Kuhne

PROJECT REFERENCE NO.	SHEET NO.
B-5178	2 of 21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



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PROJECT REFERENCE NO.	SHEET NO.
B-5178	5 of 21
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

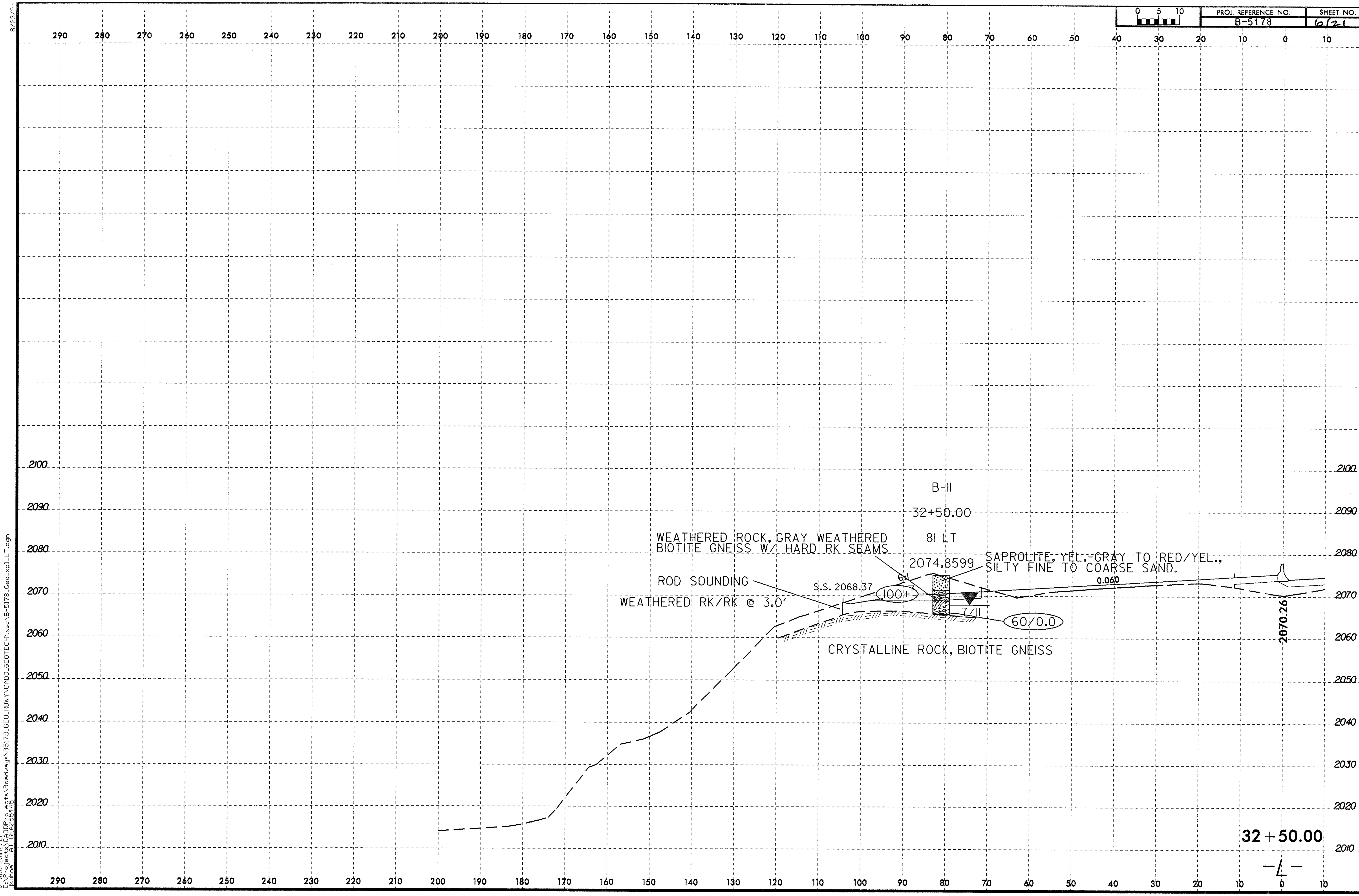
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

MATCHLINE –L– STA. 41+00.00 SEE SHEET 4

END TIP PROJECT B-5178
STA. 47+68.00 –LRT–

B-1 41+00 172' LT
B-2 41+50 172' LT
B-3 42+00 168' LT
B-4 42+50 169' LT
B-5 43+00 119' LT

I-26 EAST BOUND
I-26 WEST BOUND TO ASHEVILLE
JB w/Lab Lid
48" NW&ISBW
APPROX
N 31°33'47.0"W
N 29°05'20.2"W
BM#4
BL- STA 66+76.60
96.7' RIGHT
ELEV.=2054.96'
+84.39
EXIST R/W
200.39'
HOMINY CREEK
NAD 83
MTL CANOPY
15 MTL BLDG
ISFD
48" CONC
ROCK WALL
BST CONC
48" WD RAIL
25" RCP
21" RCP
TOP=2023.17
INV=2008.07
W/LT
GR



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kuhne AT GEA25545

B-10
33+00.00
80 LT
2070.6936

WEATHERED ROCK, BRN/GRAY/DK. GRAY, WEATHERED HORNBLENDE-BIOTITE GNEISS W/ HARD RK SEAMS

SAPROLITE, BRN. RES. SAPROLITE

0.060

60/0.0

100+

7/11

PROPOSED RETAINING WALL

ROD SOUNDING

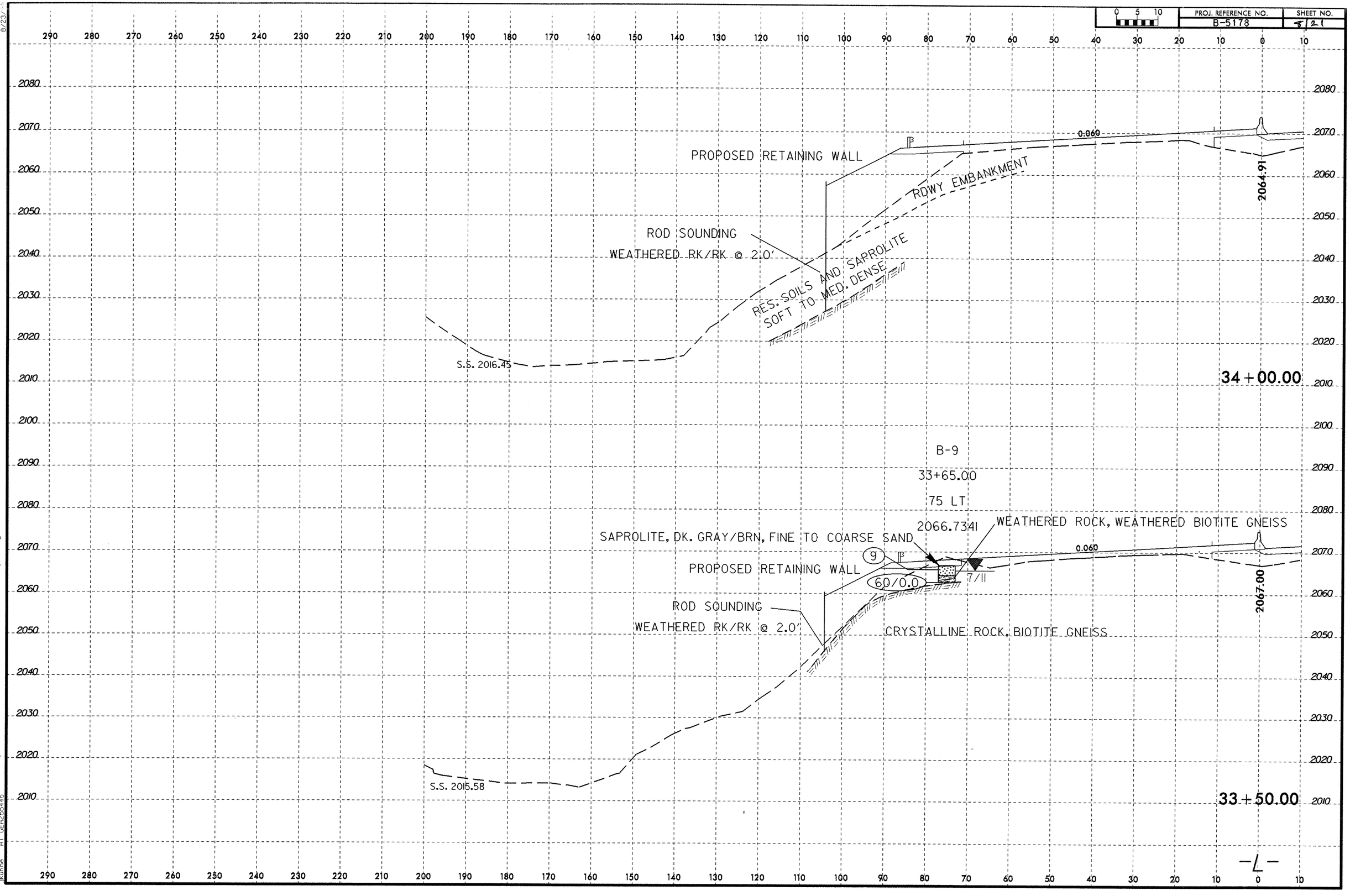
WEATHERED RK/RK @ 2.5'

CRYSTALLINE ROCK, BIOTITE GNEISS

2068.53

S.S. 2014.89

33+00.00



PROJ. REFERENCE NO. B-5178

SHEET NO. 912

B-11

32+50.00

81 LT

2074.8599

WEATHERED ROCK, GRAY WEATHERED BIOTITE GNEISS W/ HARD RK SEAMS

SAPROLITE, YEL.-GRAY TO RED/YEL., SILTY FINE TO COARSE SAND.

ROD SOUNDING

WEATHERED RK/RK @ 3.0'

S.S. 2068.37

100+

6:1

3

7/11

60/0.0

0.060

2070.26

CRYSTALLINE ROCK, BIOTITE GNEISS

32 + 50.00

—L—

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jkuhne
AT GEA255445

B-10
33+00.00
80 LT
2070.6936

WEATHERED ROCK, BRN/GRAY/DK. GRAY, WEATHERED HORNBLENDE-BIOTITE GNEISS W/ HARD RK SEAMS

SAPROLITE, BRN. RES. SAPROLITE

0.060

2068.53

60/0.0

100+

7/11

PROPOSED RETAINING WALL

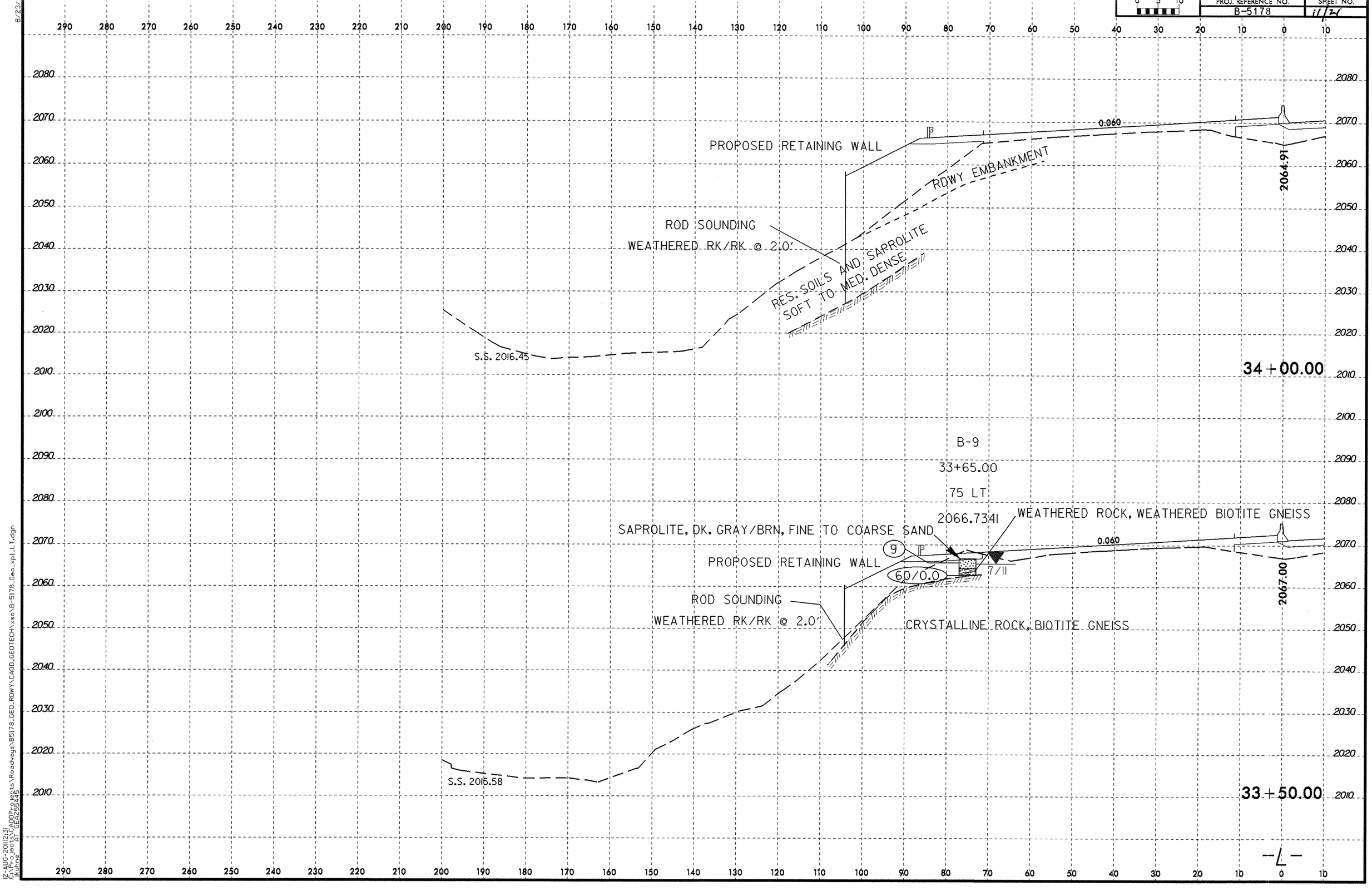
ROD SOUNDING

WEATHERED RK/RK @ 2.5'

CRYSTALLINE ROCK, BIOTITE GNEISS

S.S. 2014.89

33+00.00



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	B-5178	12/21

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

2100 2090 2080 2070 2060 2050 2040

S.S. 2085.98

SAPROLITE W/ WEATHERED ROCK SEAMS

MED. TO VERY DENSE

2:1

6:1

0.035

2057.40

2059.44

39+50.00

S.S. 2082.19

SAPROLITE W/ WEATHERED ROCK SEAMS

MED. TO VERY DENSE

6:1

0.043

2057.55

2059.95

39+00.00

S.S. 2072.66

SAPROLITE W/ WEATHERED ROCK SEAMS

MED. TO VERY DENSE

6:1

0.051

2057.70

2060.51

38+50.00

—L—

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

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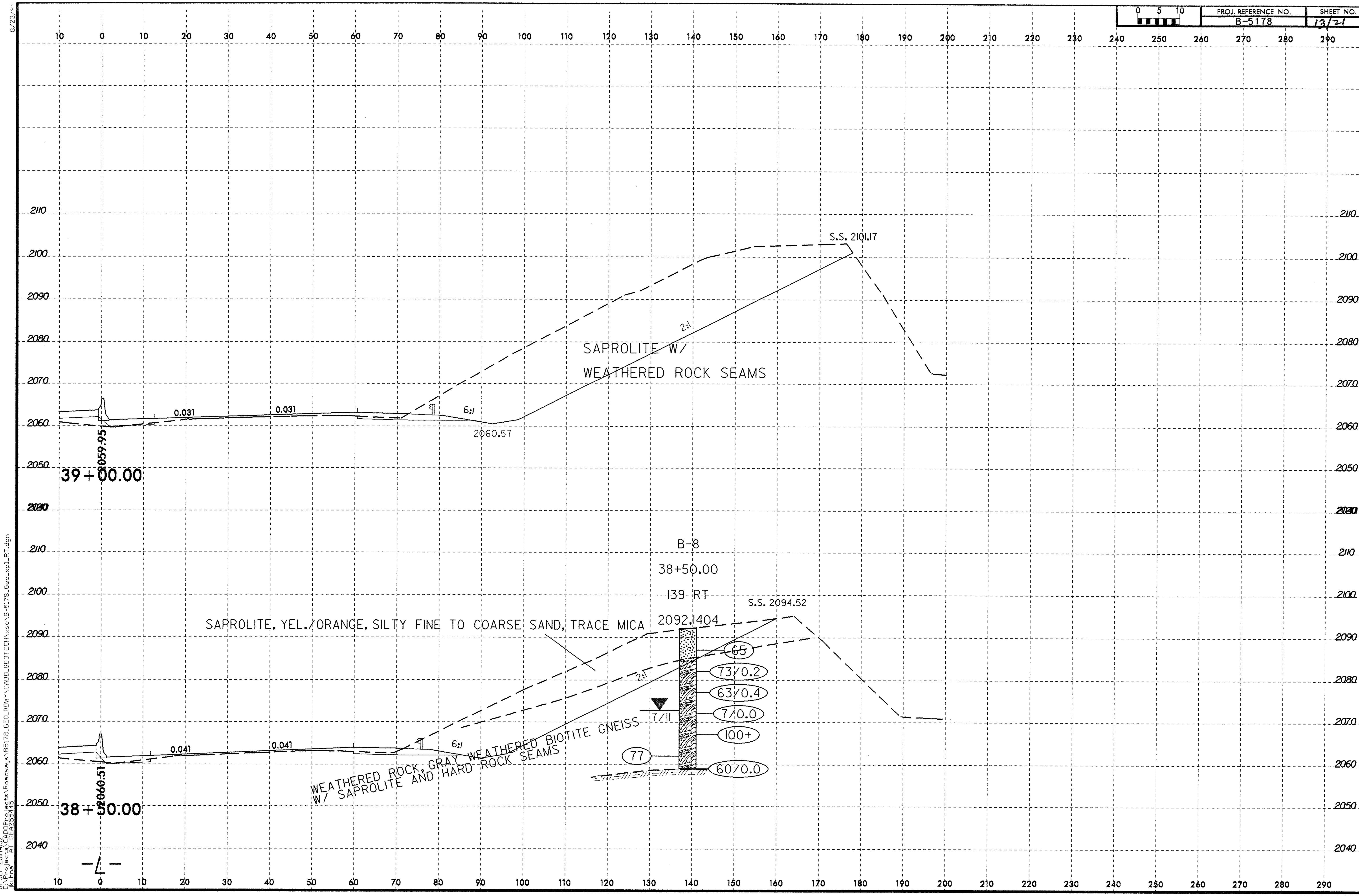

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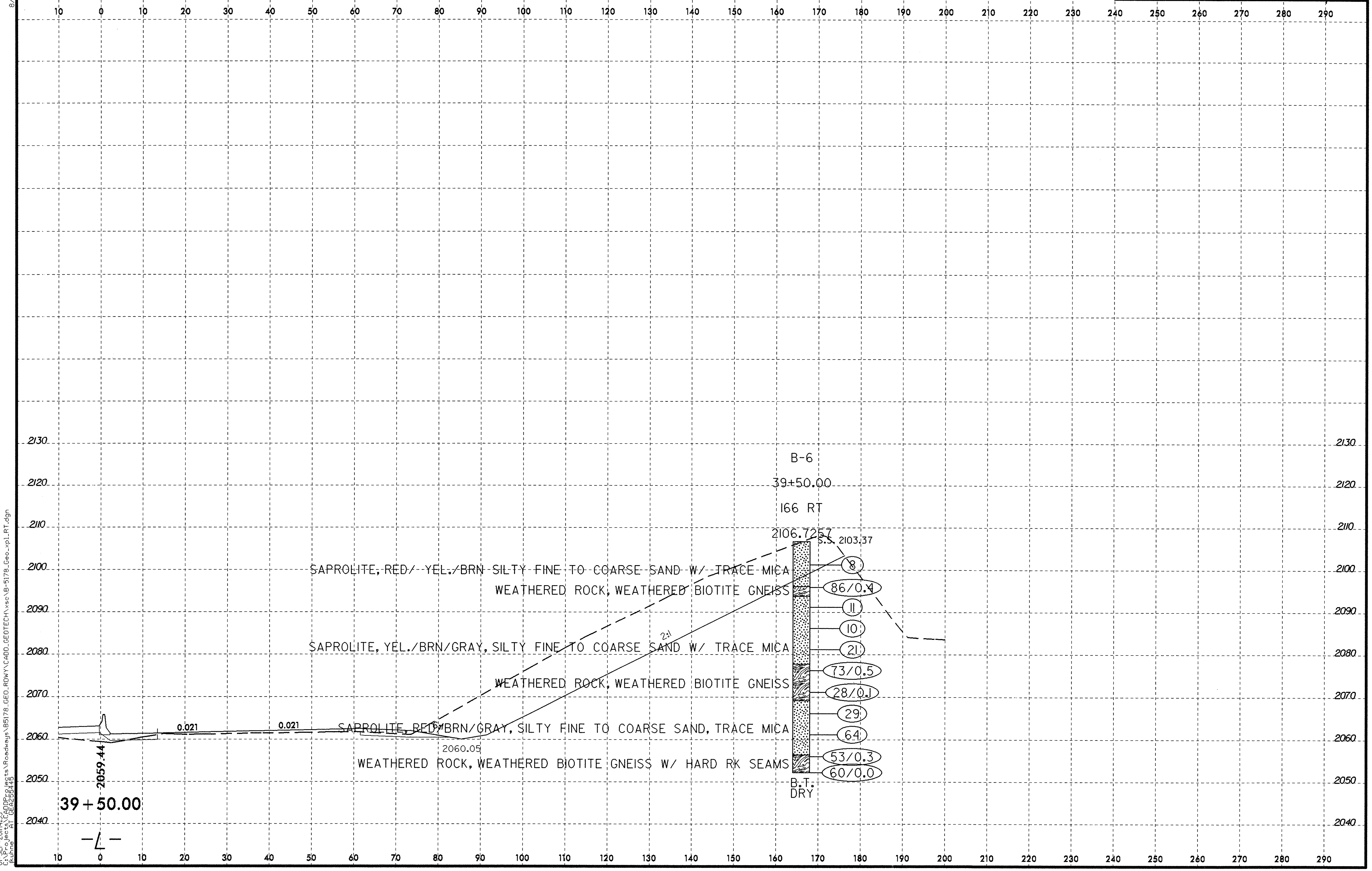
PROJ. REFERENCE NO. B-5178 | SHEET NO. 14/21



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Kuhne AT GEA255445

B-7
40+50.00
172 LT
S.S. 2095.05
2095.0295

SAPROLITE, YEL./RED/BRN, SILTY FINE TO COARSE SAND
CRYSTALLINE ROCK, BIOTITE GNEISS, HARD ROCK SEAM
SAPROLITE, SILTY FINE TO COARSE SAND
WEATHERED ROCK, WEATHERED BIOTITE GNEISS
SAPROLITE, SILTY FINE TO COARSE SAND

8
9
10
6/11
60/0.0
100+
60/0.0

2:1

SAPROLITE W/ WEATHERED AND HARD ROCK SEAMS

6:1
0.020
2057.10
2058.74
40+50.00

CRYSTALLINE ROCK, BIOTITE GNEISS

S.S. 2091.78

SAPROLITE W/ WEATHERED ROCK SEAMS
MED. TO VERY DENSE
2:1

6:1
0.027
2057.25
2058.93
40+00.00

B-2
41+50.00
172 LT
S.S. 2105.63
2106.3835

SAPROLITE, YEL./BRN./RED, SILTY FINE TO COARSE SAND, TRACE MICA
WEATHERED ROCK, GRAY WEATHERED BIOTITE GNEISS HARD ROCK SEAMS
SAPROLITE, WHITE, SILTY FINE TO COARSE SAND
WEATHERED ROCK, BLK/GRAY/BRN, FINE TO CARSE SAND W/ RK FRAGS
SAPROLITE, BLK/GRAY/BRN SITLY FINE TO COARSE SAND W/ MICA
WEATHERED ROCK, WEATHERED BIOTITE GNEISS W/ HARD ROCK SEAMS

9 7 100+ 100+ 14 20 100+ 26 23 60/0.0
6/11

SAPROLITE W/ WEATHERED ROCK SEAMS
2:1
6:1
0.020
2056.80
2058.00
41+50.00

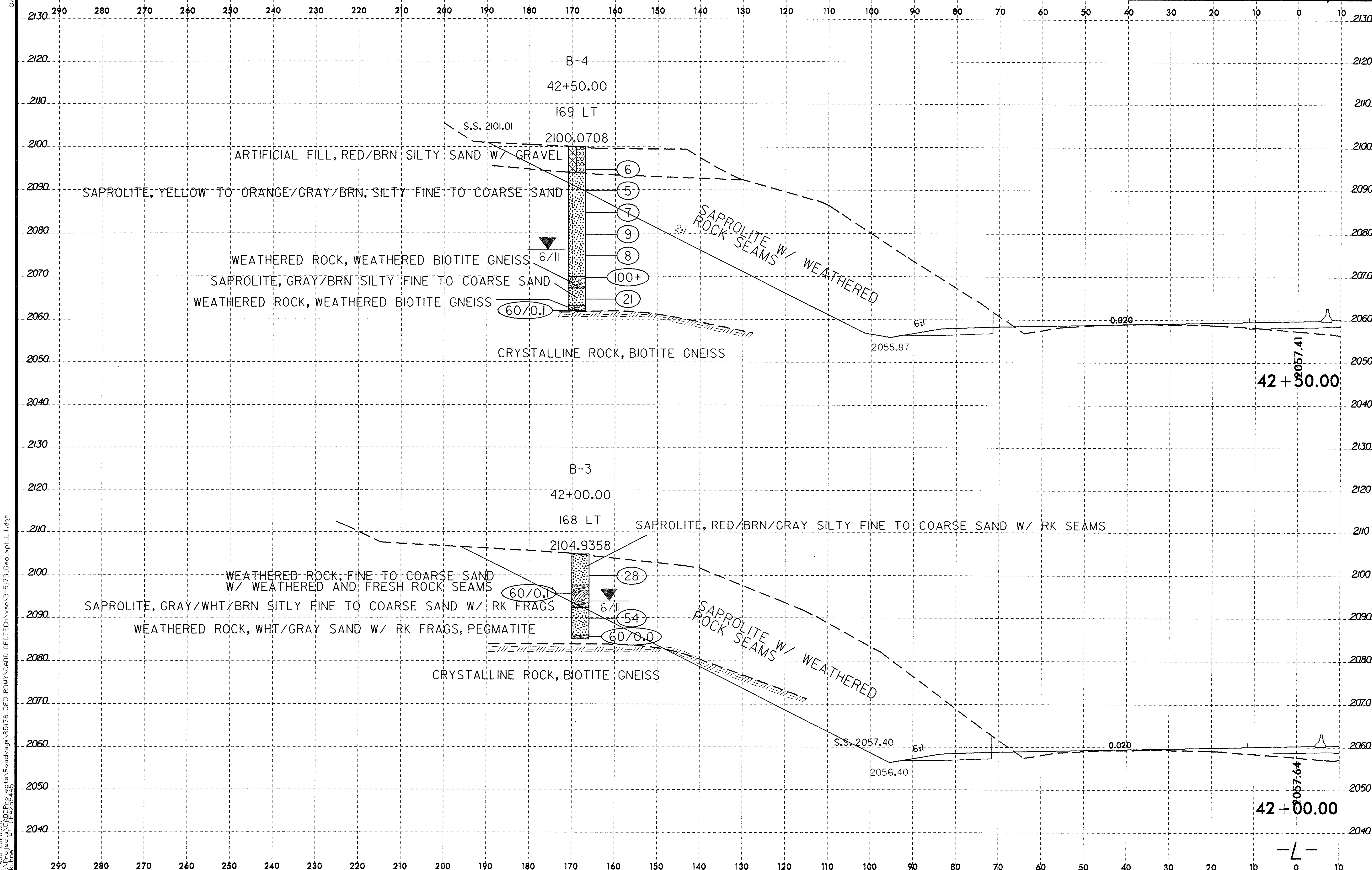
B-1
41+00.00
172 LT
S.S. 2103.52
2100.4268

SAPROLITE, YELLOW/TAN, SILTY FINE SAND, SOME MICA.
TRANSITIONS TO WHITE/GRAY SILTY, FINE TO COARSE SAND
WEATHERED ROCK, WEATHERED MIGMATITIC GNEISS
CRYSTALLINE ROCK, BIOTITE GNEISS

6 8 9 20 100+ 60/0.0
6/11

SAPROLITE
2:1
6:1
0.020
2056.95
2057.96
41+00.00

PROJ. REFERENCE NO.	SHEET NO.
B-5178	17/21



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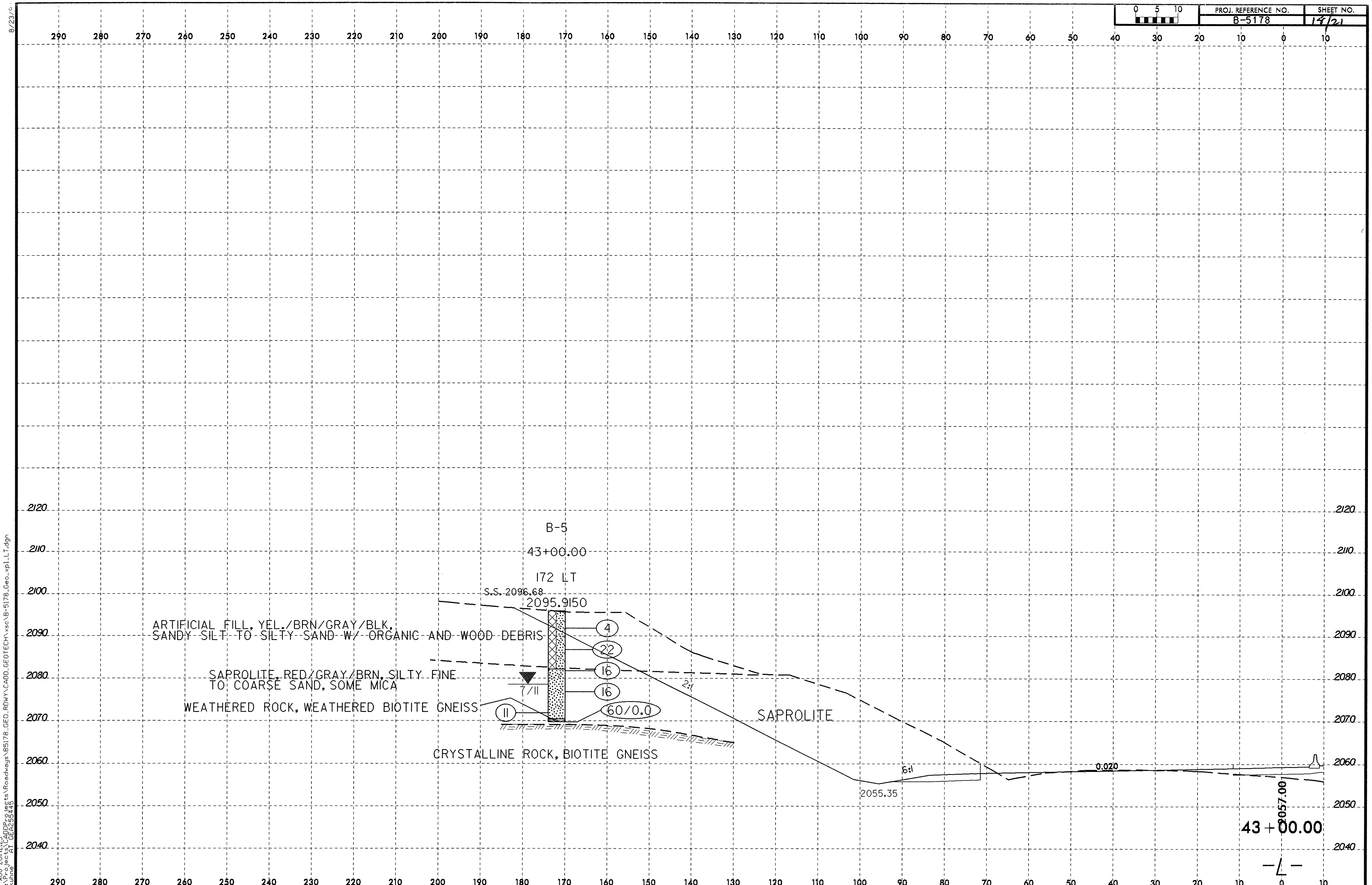
PROJ. REFERENCE NO.	SHEET NO.
B-5178	18/21



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jkuhne AT GEA255445

8/23/9-

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	B-5178	19/2

B-12

15+47 11" LT 1

ROADWAY EMBANKMENT, GRAY TO BRN., SILTY FINE TO COARSE SAND W/ GRAVEL

4

5

ALLUVIAL, BROWN SANDY SILT

100+

60/0.0

WEATHERED ROCK, RED/ORANGE SILTY COARSE SAND

15+50.00

15+40.00

-SR3431-

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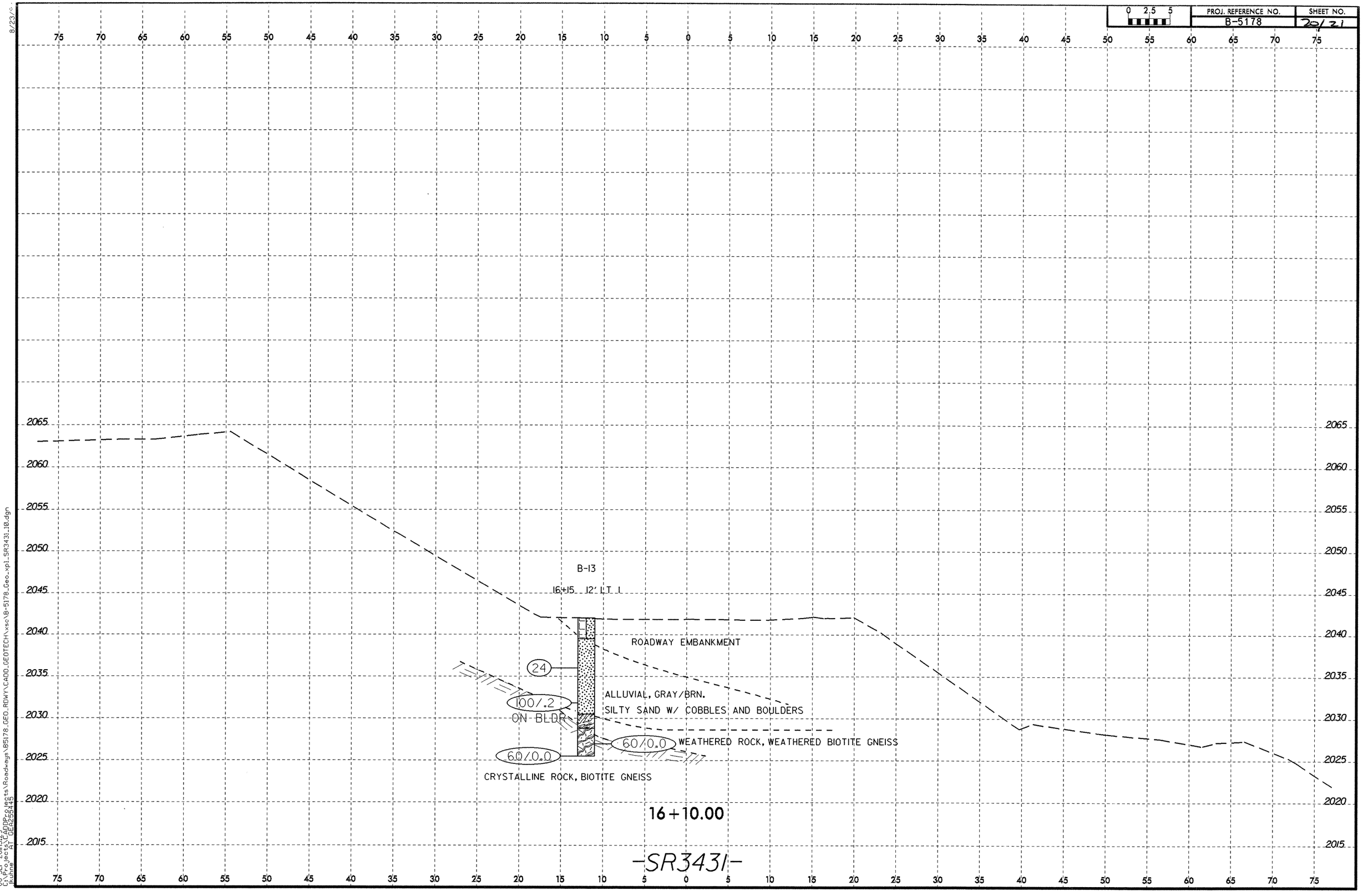

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75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75

2080
2075
2070
2065
2060
2055
2050
2045
2040
2035
2030
2025

B-14
17+34 12.5' LT 1

ROADWAY EMBANKMENT, SILTY SAND W/ COBBLES AND BOULDERS

60/0.0 100+

WEATHERED ROCK, GRAY/DK. GRAY, SEAMY WEATHERED AND CRYSTALLINE ROCK

CRYSTALLINE ROCK, CRYSTALLINE ROCK, BIOTITE GNEISS

17+30.00

-SR3431-