



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JOSH STEIN
GOVERNOR

DANIEL H. JOHNSON
SECRETARY

February 11, 2026

MEMORANDUM TO: Shihai Zhang, PE
State Pavement Design Engineer

Steven T. Smallwood, PE
State Roadway Design Engineer

ATTENTION: Nathan Adima, PE
Senior Project Manager

FROM: Cheryl A. Youngblood, LG, C.P.G
Contracts and Statewide Services Manager

STATE PROJECT: 50133.1.FS1 (I-5716)

COUNTY: Catawba

DESCRIPTION: I-40 and SR 1007 (Lenoir Rhyne Blvd) Interchange

SUBJECT: Pavement and Subgrade Investigation Report

The Geotechnical Engineering Unit has completed the evaluation of the pavement and subgrade investigation for this project and presents the following. There were no changes to the original graphics report and it will not be reissued.

The proposed work consists of widening sections of the I-40 and SR 1007 Interchange, realigning ramps, building concrete islands, and constructing a loop on new location.

The subgrade beneath the existing roadway consists of residual and roadway embankment soils. Predominant soil types are sandy silt (A-4), sandy clay (A-6) and silty clays (A-7-5, A-7-6). Some soils were observed to contain trace mica contents.

The project mainline is approximately 60 percent embankment. Anticipated borrow will likely consists of residual sandy silt and silty clay soils (A-4, A-7).

The length of this project is 0.800 miles.

Existing Pavement:

The existing pavement was observed to be in good condition. Surface pavement distress is primarily characterized by low to moderate severity longitudinal and transverse cracking and low severity fatigue cracking.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

A. Highly Plastic Clays:

Locations of clays with a PI of 26 or greater (16 in coastal soils)

Soils with a PI of 26 or greater were not encountered during this investigation.

B. Trapped Water within the Pavement:

Trapped water was not encountered during this investigation.

C. Soils with a High Moisture Content:

Locations of soils that were classified as wet to saturated

LINE	STATION AND OFFSET	MOISTURE CONTENT
-L-	26+00 WB ACCEL	20.6%

D. Groundwater:

Locations where groundwater was encountered.

Groundwater was not encountered during this investigation.

CAY/JBB



Signed by:

Jeffrey B. Barfield, Pg 02/16/2026

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PROJECT: 50133.1.FS1

REFERENCE: I-5716

SEE SHEET 3 FOR PLAN SHEET LAYOUT
AT TIME OF INVESTIGATION

CONTENTS

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>	<u>CROSS SECTIONS</u>
-L-	25+00-43+00	4-6	7-15
-RPA-	20+00-32+00	5-6	16-22
-LPA-	10+00-20+00	5	23-33
-RPB-	10+00-15+50	4-5	11-14
-RPC-	23+50-27+00	4-5	34-41

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
42	BORELOG

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY CATAWBA
PROJECT DESCRIPTION I-40 & SR 1007 (LENOIR RHYNE
BOULEVARD) INTERCHANGE IMPROVEMENTS

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5716	1	42

CAUTION NOTICE

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

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

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

- NOTES:
- 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.
 - 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

S. DAVIS

M. RENZA

M. ARNOLD

M. DURWAY

S. WOODS

INVESTIGATED BY F&R, INC.

DRAWN BY T.T. WALKER DS

CHECKED BY D. RACEY

SUBMITTED BY P. ALTON, P.E.

DATE JUNE 2019

SINCE



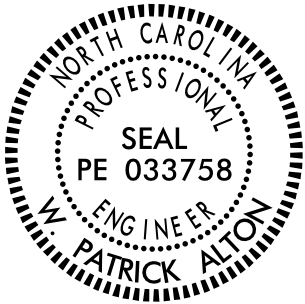
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DocuSigned by:
W. Patrick Alton 6/13/2019
A270EF78A5B5E449 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

DIVISION OF HIGHWAYS

GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

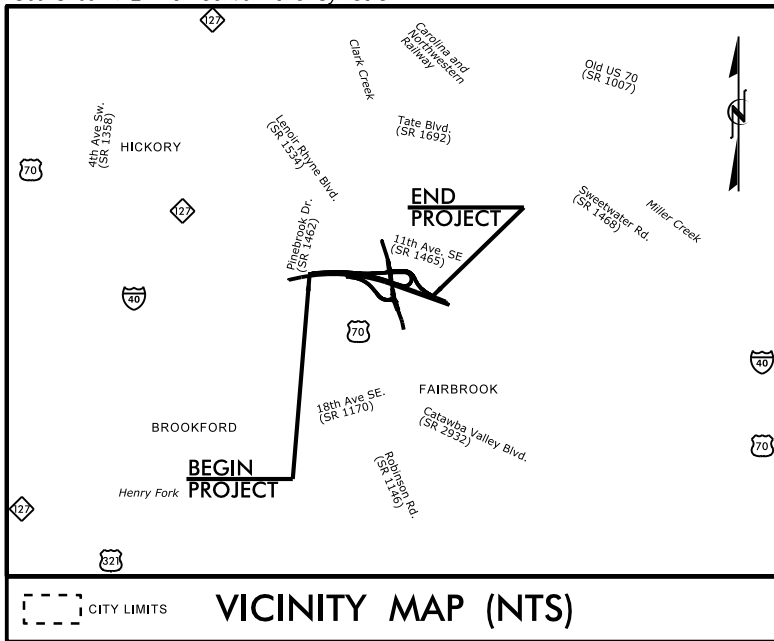
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6										WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.										HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC. ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (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.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRISTALLINE ROCK (CR)									
GENERAL CLASS.		GRANULAR MATERIALS (≤ 35% PASSING #200)					SILT-CLAY MATERIALS (> 35% PASSING #200)					ORGANIC MATERIALS					CRYSTALLINE ROCK (CR)		NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																				
GROUP CLASS.	A-1	A-1-b	A-3	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.																						
SYMBOL																																							
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX 10 MX	51 MN 10 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	35 MX 35 MX 35 MX	36 MN 36 MN 36 MN	36 MN 36 MN 36 MN					GRANULAR SOILS		SILT-CLAY SOILS		MUCK, PEAT																						
MATERIAL PASSING #40 LL PI	-		-		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																						
GROUP INDEX	0		0		0		4 MX		8 MX		12 MX		16 MX		NO MX		HIGHLY ORGANIC SOILS																						
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										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																			
PRIMARY SOIL TYPE		COMPACTNESS OR CONSISTENCY		RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)		RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)		ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION		DIP & DIP DIRECTION OF ROCK STRUCTURES		SLOPE INDICATOR INSTALLATION		CONE PENETROMETER TEST		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE																			
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)		VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE		< 4 4 TO 10 10 TO 30 30 TO 50 30 TO 50		N/A		SOIL SYMBOL		TEST BORING		AUGER BORING		CORE BORING		MONITORING WELL		PIEZOMETER INSTALLATION																					
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		INFERRED SOIL BOUNDARY		CORE BORING		SOUNDING ROD		TEST BORING WITH CORE		SPT N-VALUE																							
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ROCK HARDNESS																			
U.S. STD. SIEVE SIZE OPENING (MM)		4 4.76		10 2.00		40 0.42		60 0.25		200 0.075		270 0.053		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																			
BOULDER (BLDR.)		COBBLE (COB.)		GRAVEL (GR.)		COARSE SAND (CSE. SD.)		FINE SAND (F. SD.)		SILT (SL.)		CLAY (CL.)		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																			
GRAIN SIZE		305 12		75 3		2.0		0.25		0.05		0.005		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																			
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										ROCK HARDNESS																			
SOIL MOISTURE SCALE (ATTERBERG LIMITS)		FIELD MOISTURE DESCRIPTION		GUIDE FOR FIELD MOISTURE DESCRIPTION		AR - AUGER REFUSAL		MED. - MEDIUM		VST - VANE SHEAR TEST		WEA. - WEATHERED		UNIT WEIGHT		DRY UNIT WEIGHT		SAMPLE ABBREVIATIONS		S - BULK																			
CPT - CONE PENETRATION TEST		CSE. - COARSE		PMT - PRESSUREMETER TEST		DPT - DILATOMETER TEST		SAP. - SAPROLITIC		SD. - SAND, SANDY		SL. - SILT, SILTY		SLI. - SLIGHTLY		TCR - TRICONE REFUSAL		W - MOISTURE CONTENT		V - VERY																			
F - FINE		FOSS. - FOSSILIFEROUS		FRAC. - FRACTURED, FRACTURES		FRAGS. - FRAGMENTS		HL. - HIGHLY		TUNG. - CARBIDE INSERTS		CASING		W/ ADVANCER		TRICONE		TUNG. - CARB.		CORE BIT																			
EQUIPMENT USED ON SUBJECT PROJECT										EQUIPMENT USED ON SUBJECT PROJECT										EQUIPMENT USED ON SUBJECT PROJECT																			
DRILL UNITS:		ADVANCING TOOLS:		HAMMER TYPE:		CORE SIZE:		HAND TOOLS:		POST HOLE DIGGER		HAND AUGER		SOUNDING ROD		VANE SHEAR TEST		CORE SIZE:		HAND TOOLS:																			
CME-45C		CLAY BITS		AUTOMATIC		-B		POST HOLE DIGGER		HAND AUGER		SOUNDING ROD		VANE SHEAR TEST		CORE SIZE:		HAND TOOLS:		POST HOLE DIGGER																			
CME-55		6" CONTINUOUS FLIGHT AUGER		MANUAL		-H		HAND AUGER		SOUNDING ROD		VANE SHEAR TEST		CORE SIZE:		HAND TOOLS:		POST HOLE DIGGER		HAND AUGER																			
CME-550		8" HOLLOW AUGERS																																					
CME-550		HARD FACED FINGER BITS																																					
VANE SHEAR TEST		TUNG. - CARBIDE INSERTS																																					
PORTABLE HOIST		CASING																																					
		TRICONE																																					
		TRICONE																																					
		CORE BIT																																					
INDURATION										INDURATION										INDURATION																			
TERM		SPACING		THICKNESS		TERM		THICKNESS		TERM		THICKNESS		TERM		THICKNESS		TERM		THICKNESS																			
VERY WIDE		MORE THAN 10 FEET		4 FEET		VERY THICKLY BEDDED		4 FEET		VERY THICKLY BEDDED		4 FEET		VERY THICKLY BEDDED		4 FEET		VERY THICKLY BEDDED		4 FEET																			
WIDE		3 TO 10 FEET		1.5 - 4 FEET		THICKLY BEDDED		1.5 - 4 FEET		THICKLY BEDDED		1.5 - 4 FEET		THICKLY BEDDED		1.5 - 4 FEET		THICKLY BEDDED		1.5 - 4 FEET																			
MODERATELY CLOSE		1 TO 3 FEET		0.16 - 1.5 FEET		THINLY BEDDED		0.16 - 1.5 FEET		THINLY BEDDED		0.16 - 1.5 FEET		THINLY BEDDED		0.16 - 1.5 FEET		THINLY BEDDED		0.16 - 1.5 FEET																			
CLOSE		0.16 TO 1 FOOT		0.03 - 0.16 FEET		VERY THINLY BEDDED		0.03 - 0.16 FEET		VERY THINLY BEDDED		0.03 - 0.16 FEET		VERY THINLY BEDDED		0.03 - 0.16 FEET		VERY THINLY BEDDED		0.03 - 0.16 FEET																			
VERY CLOSE		LESS THAN 0.16 FEET		< 0.008 FEET		THICKLY LAMINATED		< 0.008 FEET		THICKLY LAMINATED		< 0.008 FEET		THICKLY LAMINATED		< 0.008 FEET		THICKLY LAMINATED		< 0.008 FEET																			
FRIABLE										FRIABLE										FRIABLE																			
MODERATELY INDURATED										MODERATELY INDURATED										MODERATELY INDURATED																			
INDURATED										INDURATED										INDURATED																			
EXTREMELY INDURATED										EXTREMELY INDURATED										EXTREMELY INDURATED																			
BENCH MARK: BM# 9: N: 722151.8590, E: 1313479.6680										BENCH MARK: BM# 9: N: 722151.8590, E: 1313479.6680										BENCH MARK: BM# 9: N: 722151.8590, E: 1313479.6680																			
TBM1 BY1-18: N: 723075.6320, E: 1313328.2020										TBM1 BY1-18: N: 723075.6320, E: 1313328.2020										TBM1 BY1-18: N: 723075.6320, E: 1313328.2020																			
BM# 9 ELEVATION: 1080.69 FEET										BM# 9 ELEVATION: 1080.69 FEET										BM# 9 ELEVATION: 1080.69 FEET																			
TBM1 BY1-18 ELEVATION: 1096.72 FEET										TBM1 BY1-18 ELEVATION: 1096.72 FEET										TBM1 BY1-18 ELEVATION: 1096.72 FEET																			
NOTES:										NOTES:										NOTES:																			
SRT= SOUNDING ROD TERMINATED										SRT= SOUNDING ROD TERMINATED										SRT= SOUNDING ROD TERMINATED																			
FIAD= FILLED IMMEDIATELY AFTER DRILLING										FIAD= FILLED IMMEDIATELY AFTER DRILLING										FIAD= FILLED IMMEDIATELY AFTER DRILLING																			
ALL BORING ELEVATIONS EXCEPT B-II THROUGH B-20 AND B-25 THROUGH B-32 OBTAINED FROM .TIN FILE RECEIVED FROM AMT ON DATE 04/26/2019										ALL BORING ELEVATIONS EXCEPT B-II THROUGH B-20 AND B-25 THROUGH B-32 OBTAINED FROM .TIN FILE RECEIVED FROM AMT ON DATE 04/26/2019										ALL BORING ELEVATIONS EXCEPT B-II THROUGH B-20 AND B-25 THROUGH B-32 OBTAINED FROM .TIN FILE RECEIVED FROM AMT ON DATE 04/26/2019																			

TIP PROJECT: I-5716

CONTRACT:

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



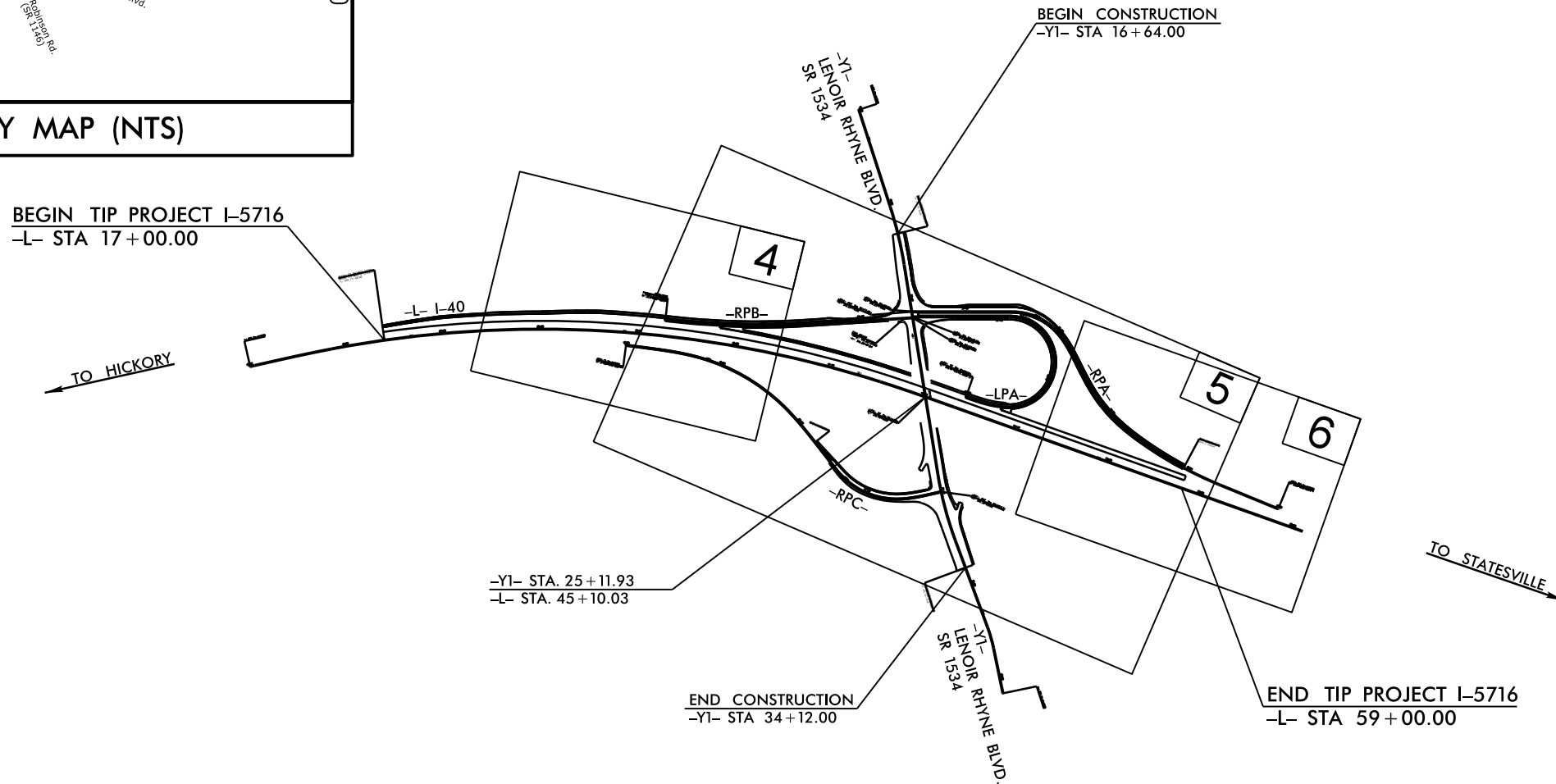
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CATAWBA COUNTY

LOCATION: I-40 AND SR 1007 (LENOIR RHYNE BOULEVARD) INTERCHANGE

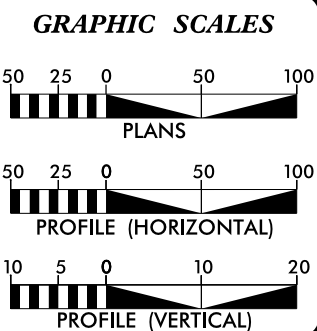
TYPE OF WORK: DRAINAGE, GRADING, PAVING & RETAINING WALLS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-5716	3	42
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
50133.1.FS1	NHPP-040-2(166)131	PE	



- NOTES:
- CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD ____
 - THIS IS A CONTROL OF ACCESS PROJECT

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



DESIGN DATA	
ADT 2020 =	69049
ADT 2040 =	77200
K =	9 %
D =	55 %
T =	10 % *
V =	70 MPH
* TTST =	7% DUAL=3%
TIER =	STATEWIDE
FUNC CLASS =	INTERSTATE

PROJECT LENGTH	
LENGTH ROADWAY TIP PROJECT I-5716 =	0.800 MI.
LENGTH STRUCTURE TIP PROJECT I-5716 =	0.000 MI.
TOTAL LENGTH TIP PROJECT I-5716 =	0.800 MI.

AMT NCBELS LICENSE # F-1049	
Prepared for the North Carolina Department of Transportation in the Office of: A. MORTON THOMAS AND ASSOCIATES, INC. CONSULTING ENGINEERS 8511 FALLS OF NEUSE ROAD, SUITE 100, RALEIGH, NC 27609 (919) 855-0900 FAX (919) 855-5067 EMAIL: AMT1@AMTENGINEERING.COM	
2018 STANDARD SPECIFICATIONS	
RIGHT OF WAY DATE: JUNE 21, 2019	NICK RAMIREZ, PE PROJECT ENGINEER
LETTING DATE: AUGUST 18, 2020	JAMES CROUSE, PE PROJECT DESIGN ENGINEER
	KEVIN E. MOORE, PE NCDOT CONTACT

HYDRAULICS ENGINEER	
SIGNATURE: _____	P.E.
ROADWAY DESIGN ENGINEER	
SIGNATURE: _____	P.E.





June 5, 2019

State Project No.: 50133.1.FS1
TIP No.: I-5716
Project ID: 31860
County: Catawba
Description: I-40 and SR 1007 (Lenoir Rhyne Boulevard) Interchange Improvements

SUBJECT: Geotechnical Report – Inventory

Project Description

This project primarily involves improvements to the interchange of I-40 (-L-) and Lenoir Rhyne Boulevard (-Y1-) in Hickory, Catawba County, North Carolina. As shown on plan sheets initially received on 7/9/18, the project consisted of: the realignment of Ramp A; the addition of Loop A; outside widening of westbound I-40 up to Ramp B to accommodate the acceleration lane from Loop A; and slight realignment and widening of Ramp C to accommodate a second right turn lane. The project also included the construction of two (2) retaining walls. This subsurface investigation was performed based on the plans provided on 7/9/18, with additional subsurface investigation performed for retaining wall 1 on -RPA- from station 27+00 to 31+29.31, right, and retaining wall 2 on -RPC- from station 23+00 to 26+00, right.

Based on revised plans received on 4/26/19, the interchange design was revised. The revision includes a re-design of Ramp A and Loop A, which eliminates the need for retaining wall 1 and requires less widening of westbound I-40 up to Ramp B, and widening to the inside shoulder of Ramp C which eliminates the need for retaining wall 2. This report is based on these most-recent plans.

The majority of the project generally remains within existing right-of-way, with the exception of Ramp A and Loop A, which extend onto commercial property.

The geotechnical field investigation was performed in July 2018. During this time period, a total of 31 Standard Penetration Test (SPT) borings and one auger boring were advanced with an ATV-mounted CME-55 drill rig with an automatic hammer. Additionally, 3 sounding rods were performed in May 2019 to aid in determining the potential presence of rock along Ramp A where subsurface information was needed based on the revised plans. Representative soil samples were collected from the split spoon for visual classification in the field and for analysis by F&R's testing laboratory.

The following alignments were investigated:

<u>Alignment</u>	<u>Station (±)</u>
-L-	25+00 to 43+00, left
-RPA-	20+00 to 32+00
-LPA-	10+00 to 20+00
-RPB-	10+00 to 15+50
-RPC-	23+50 to 27+00, right

Areas of Special Geotechnical Interest

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

<u>Alignment</u>	<u>Station (±)</u>
-L-	32+25 to 34+25, left
-RPA-	15+50 to 24+25
-LPA-	14+75 to 16+25

- 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:

<u>Alignment</u>	<u>Station (±)</u>
-L-	30+75 to 34+75, left
-LPA-	22+25 to 22+75, right

- 3) Soft, Loose and/or Wet Soils: The following areas contain relatively soft or loose (clay $N \leq 5$, sand $N \leq 7$) and/or wet, near-surface soils that have the potential to cause subgrade problems during construction:

<u>Alignment</u>	<u>Station (±)</u>
-LPA-	16+75 to 21+25
-RPC-	24+00 to 24+50, right

- 4) 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:

<u>Alignment</u>	<u>Station (±)</u>
-L-	36+25 to 36+75, left
-LPA-	10+50 to 11+00, left
-LPA-	19+25 to 20+25, right

5) Cohesive Soils: The following areas contain deeper deposits of relatively soft cohesive soils (AASHTO A-5, A-6 & A-7 soils) that have the potential to cause embankment instability or long-term settlement problems:

<u>Alignment</u>	<u>Station (±)</u>
-L-	36+25 to 36+75, left
-LPA-	20+00 to 22+75, right

6) Groundwater: The following area exhibited groundwater within three feet of existing grade, which has the potential to cause subgrade problems during construction:

<u>Alignment</u>	<u>Station (±)</u>
-LPA-	16+75 to 17+25, left

7) Artificial Fill: The following locations contain artificial fill. These soils have the potential to be highly variable, which could cause subgrade problems during construction if undetected pockets of organics, debris, or soft/loose/wet soils are present.

<u>Alignment</u>	<u>Station (±)</u>
-RPA-	22+50 to 25+30, right
-RPA-	29+85 to 31+75, right
-LPA-	15+75 to 17+50
-LPA-	21+50 to 23+50, right
-RPC-	24+75 to 25+00, right

Physiography and Geology

The proposed interchange improvements will require expanding the existing ramps to accommodate additional lanes, and adding an entrance loop onto westbound I-40, which will require additional right-of-way from undeveloped commercial properties The construction along the -L- centerline will typically match existing roadway grades.

The project is located near the western edge of the Piedmont Physiographic Province of North Carolina within the Inner Piedmont Belt. More-specifically, it is located in an area mapped as Biotite Gneiss and Schist (CZbg). Typical weathered and crystalline rock samples recovered from our borings primarily exhibit the characteristics of Gneiss. Soils weathered from the parent rock generally consist of sandy silts and silty sands. 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 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 encountered within the area of this project have been divided into four categories: artificial fill, roadway embankment, alluvial soils, and residual soils.

Artificial Fill: Artificial fill (AF) was encountered at the surface of 5 borings and was related to different features: B-8 to concrete drainage backfill, B-17 through B-19 to a parking lot on commercial property, and B-27 to an overhead power line access road. Additionally, asphalt fragments were observed on the ground surface near B-35 which is likely indicative of an apparent stockpile associated with a nearby asphalt paving company. Borings B-17 through B-19 encountered asphalt and ABC at the surface with a combined thickness of approximately 5 to 6 inches. The AF extended to depths ranging from about 1 to 32 feet, with most extending to about 2 feet or less in depth. The deepest areas of AF were related to the stockpile right of Ramp A and Loop A, and were estimated based on topographic features. The sampled artificial fill was typically described as moist, medium dense silty SAND (A-2-4), and medium stiff to stiff sandy SILT (A-4). A majority of the samples contained trace organic matter and gravel.

Roadway Embankment: Roadway embankment (RE) soils were encountered at the surface of 8 borings. The RE extended to depths ranging from about 2 to 17 feet. The fill was typically described as moist, medium dense, silty SAND (A-2-4), and moist, medium stiff to stiff, sandy SILT (A-4). A majority of the samples contained trace organic matter, gravel and mica. Possible boulders were encountered in boring B-2 at -L- station 26+97, left, and may also be encountered in other unexplored areas of the project.

Alluvial Soil: Alluvial soils were encountered in 4 borings along Ramp A. The alluvial soils were typically encountered at the ground surface. The alluvium extended to depths ranging from about 2 to 12 feet, with an average depth of about 5 feet. The alluvium was variable and typically described as moist to wet, very loose, silty and clayey SAND (A-2-4 & A-2-6), and soft to medium stiff, sandy CLAY (A-6). A majority of the soil samples contained 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 16 borings, below artificial fill at 5 borings, below alluvial soils at 3 borings, and below roadway embankment at 5 borings. No residual soils were encountered in 2 borings, and these borings were terminated in roadway embankment. The residual soils were variable and typically described as moist, loose to medium dense, silty SAND (A-2-4), medium stiff to very stiff, sandy SILT (A-4), and stiff to very stiff, silty and sandy CLAY (A-6 & A-7). Most of the samples contained varying amounts of mica, organic matter, manganese deposits, and rock fragments.

Rock Properties

Weathered Rock (WR) was encountered in 8 borings. Of these 8 borings, 3 of the borings were terminated in WR, and 5 terminated in Crystalline Rock (CR). WR was encountered at depths ranging from about 2 to 19 feet and elevations ranging from about 1,049 to 1,090 feet.

Crystalline Rock (CR) was encountered in 10 borings as indicated by auger and SPT refusal. CR was also assumed to be encountered in 2 of the 3 sounding rods as suggested by driving refusal. All of these 10 borings were terminated in CR. Five of the 10 borings encountered WR before being terminated, while the five remaining borings transitioned directly from residual soil to CR. The WR layers above the CR varied in thickness from about 2 to 5.5 feet. The CR was encountered at depths ranging from about 6 to 25 feet and elevations ranging from about 1,045 to 1,081 feet. The rock typically consisted of Biotite Gneiss. 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 these borings.

Groundwater Properties

Generally, groundwater measurements were attempted in a majority of the borings immediately upon their completion and after a stabilization period of approximately 24 hours. Immediately upon completion, groundwater was encountered in 5 borings at depths ranging from 1.1 to 23.1 feet, and elevations ranging from about 1,065.5 to 1,048.2 feet. Four (4) borings were then backfilled immediately upon their completion. Stabilized groundwater was encountered in 6 borings at depths ranging from 3 to 19.5 feet, and elevations ranging from 1,052.3 to 1,062.0 feet. Groundwater was not encountered in the remaining borings. The recovered soil samples were generally described as moist above the groundwater level and wet or saturated 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:

W. Patrick Alton, P.E.
Transportation Services Manager

DocuSigned by:

Derrick Racey
Geotechnical Project Manager

Appendix A

Bulk Samples

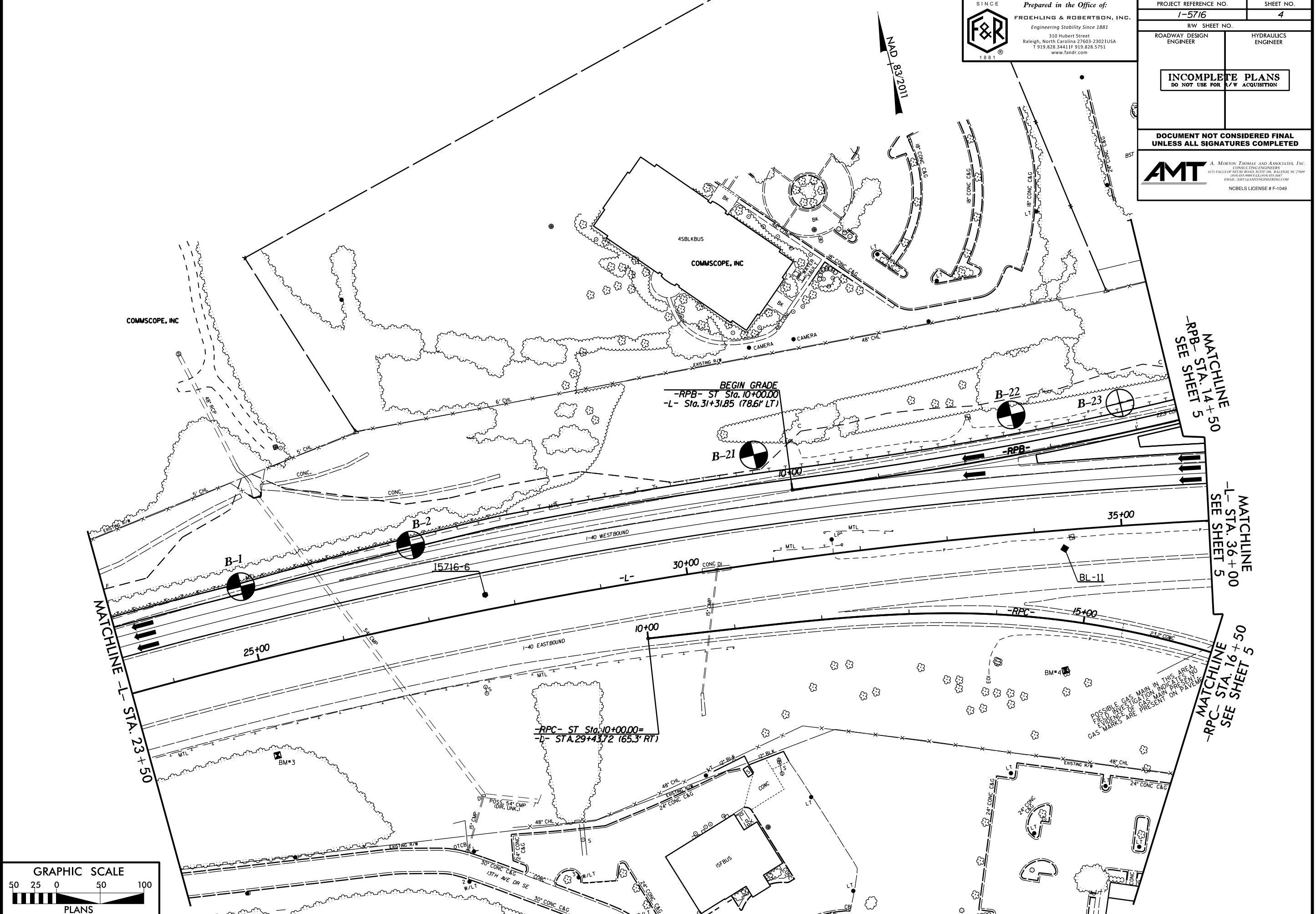
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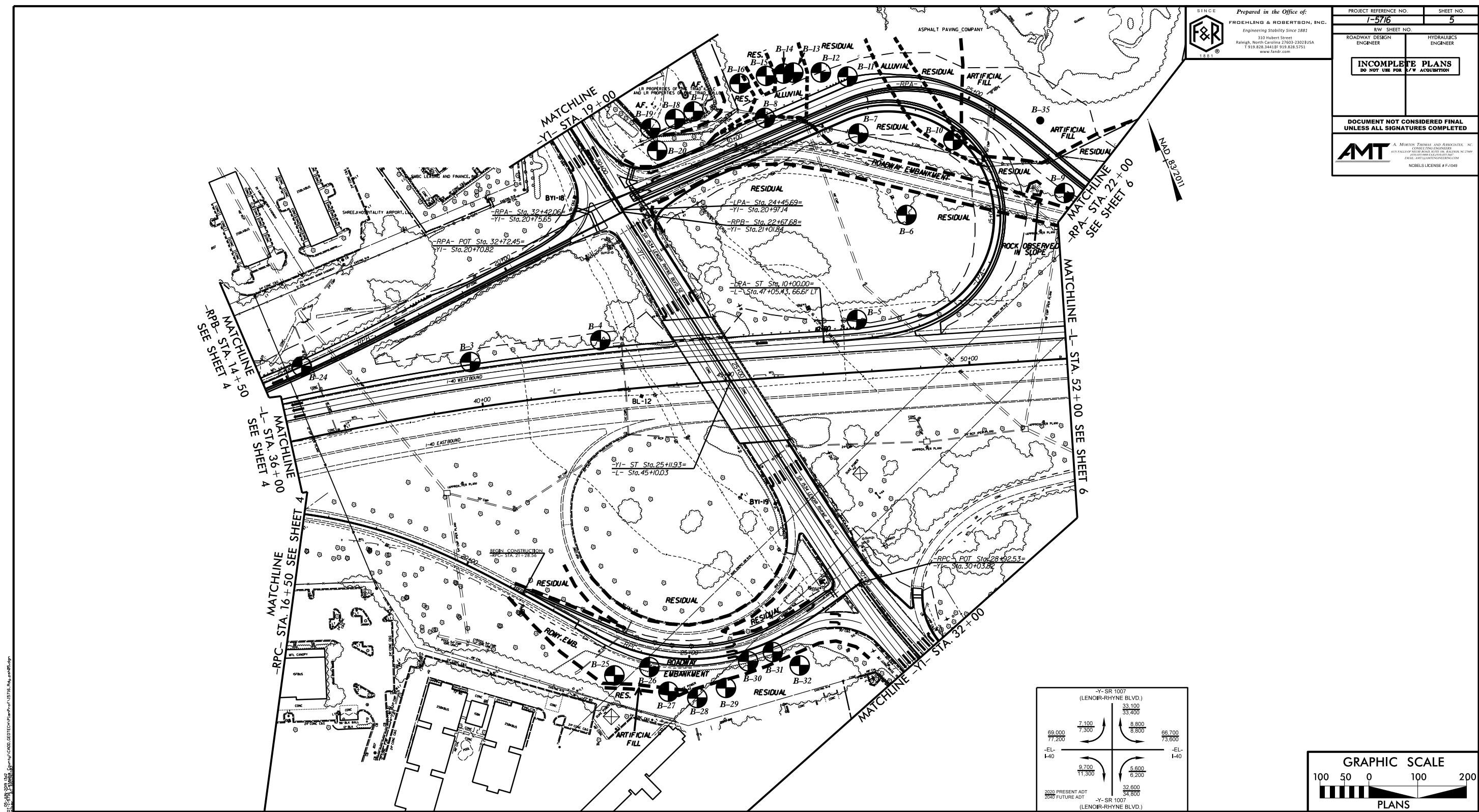
Undisturbed Samples

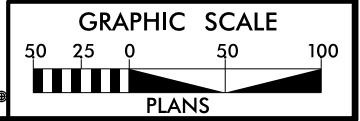
Undisturbed Shelby tube samples were not requested to be collected as part of this investigation.

8/17/99

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280

260

240

220

200

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160

140

120

100

80

60



PROJ. REFERENCE NO.
I-5716

SHEET NO.
7

- Ⓐ **Roadway Embankment:** Medium Dense, Moist, Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Gravel and Clay
- Ⓑ **Roadway Embankment:** Medium Stiff to Stiff, Moist, Red-Gray-Brown, Fine Sandy SILT (A-4) with Trace Mica, Gravel, and Manganese Deposits

1110

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

1110

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

Ground Surface

2:1

Dense, Moist, (39)

B-1

Ⓐ

Ⓑ

BT
DRY

Gray-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Little Rock Fragments

Roadway Embankment:

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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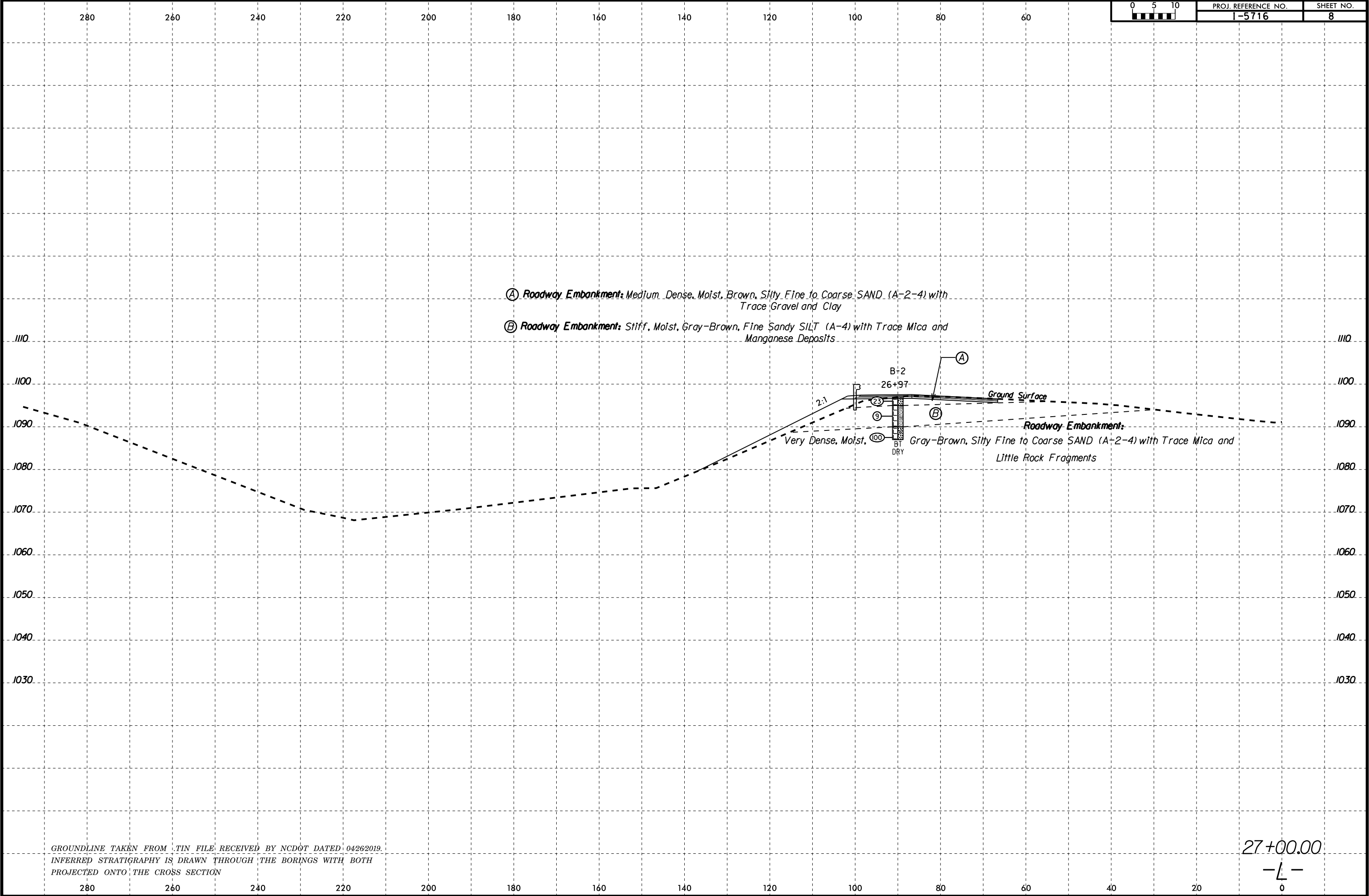
20

25+00.00

-L-

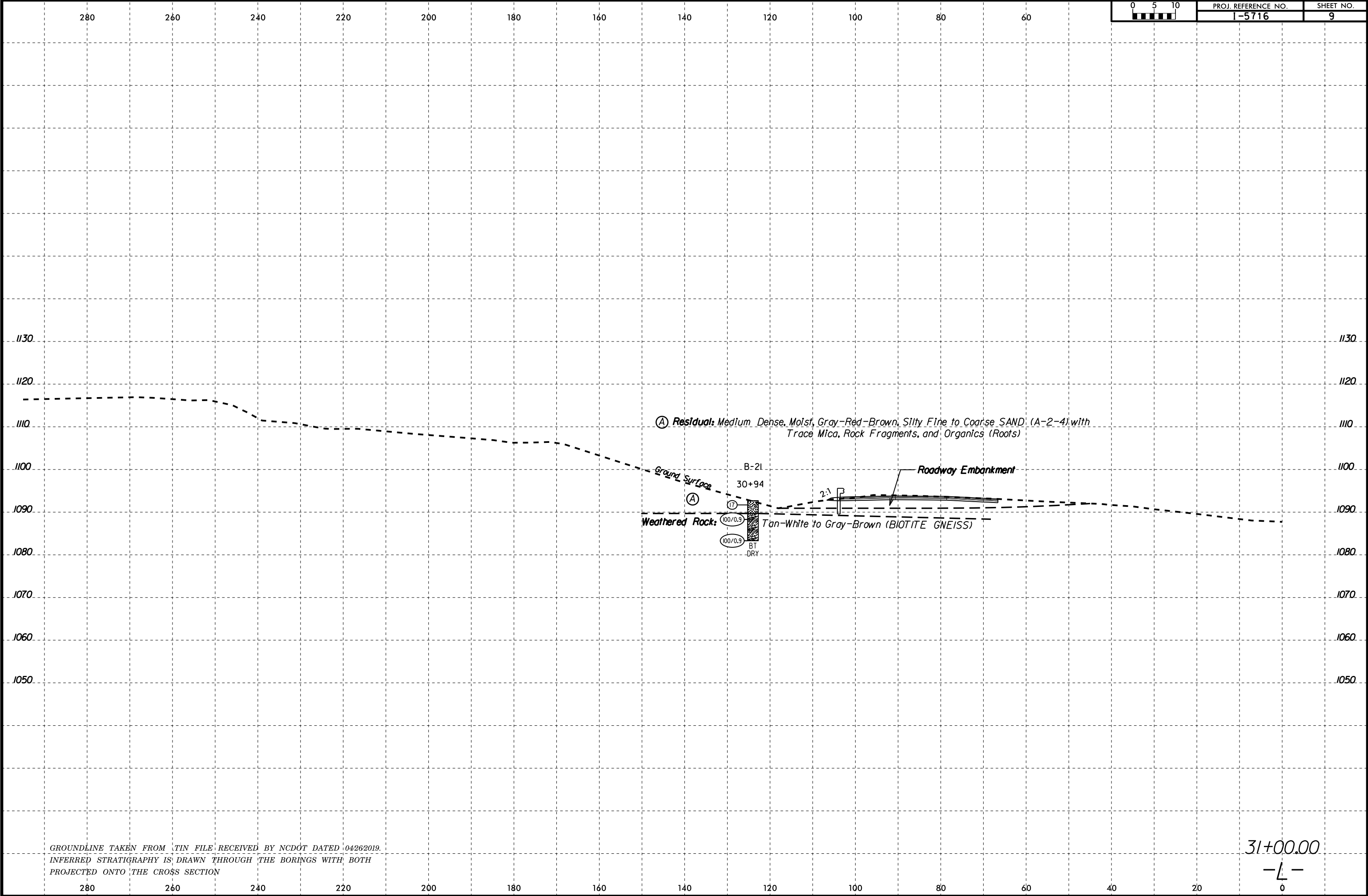
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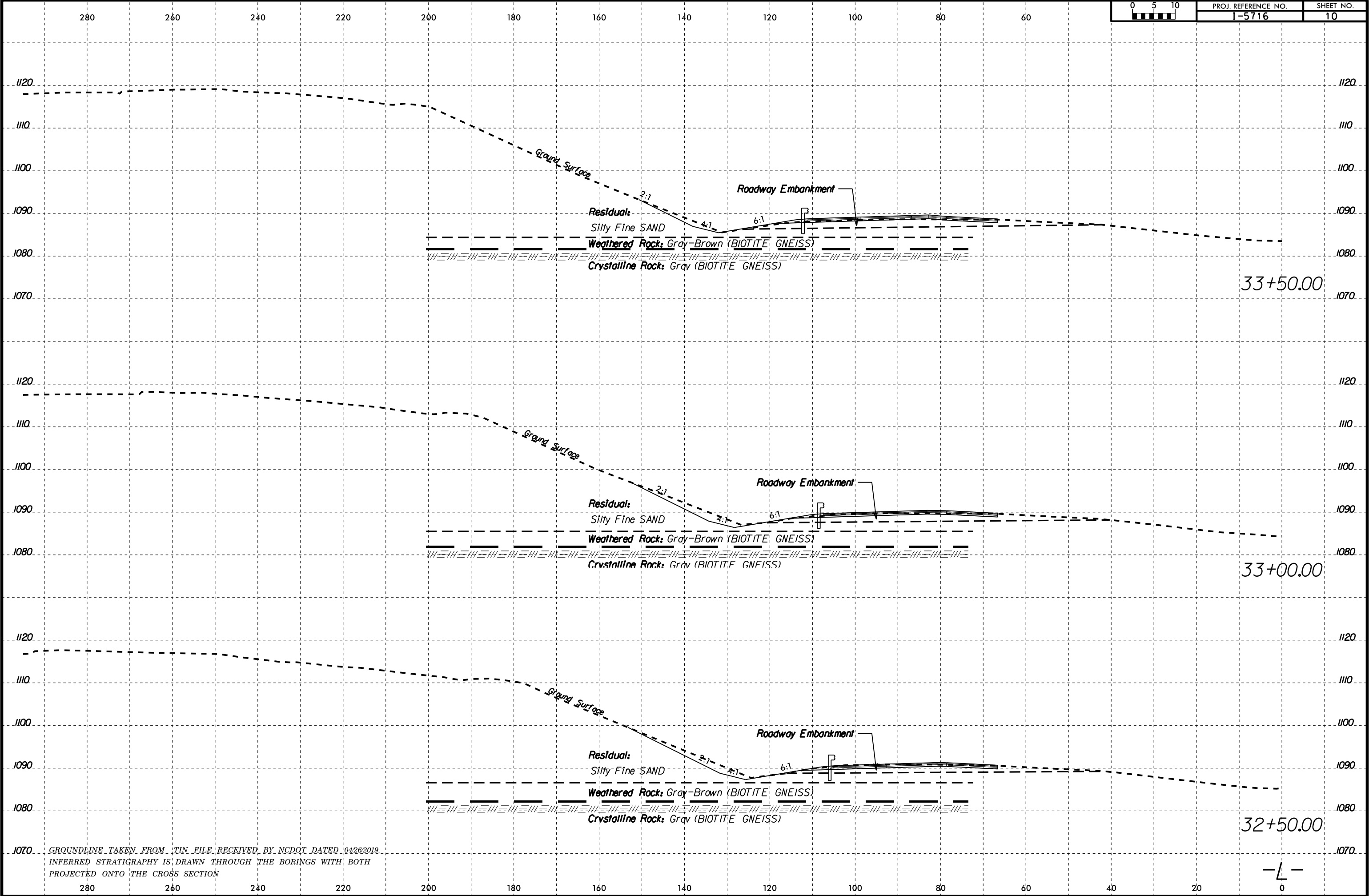


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31+00.00
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PROJ. REFERENCE NO.
I-5716

SHEET NO.
11

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-111	136' LT	33+85	0.1- 1.5	A-2-4(1)	NP	NP	16.7	63.0	10.1	10.2	84.8	80.0	24.5	20.6	-

Ⓐ **Residual:** Loose, Moist, Silty Fine SAND (A-2-4) with Trace Clay, Mica, Organics (Roots) and Rock Fragments, Little Coarse Sand

-RPB-
STA. 12+72.46

Roadway Embankment

SS-III

B-22

33+85

Ⓐ

Weathered Rock:

Crystalline Rock:

Gray-Brown (BIOTITE GNEISS)

Gray (BIOTITE GNEISS)

Ground Surface

2:1

4:1

6:1

9

100/0.3

REF DRY

60/0.0

34+00.00

-L-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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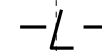
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PROJ. REFERENCE NO.
I-5716

SHEET NO.
13

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-108	146' LT	36+53	3.5-5.0	A-7-5(13)	55	20	17.5	20.6	6.5	55.4	98.8	88.9	64.1	24.5	-

- (A) Roadway Embankment: Medium Dense, Moist, Gray-Red-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Gravel, Mica, and Organics, ABC Stone from 0.9'-2.0'
- (B) Roadway Embankment: Medium Stiff, Moist, Red-Brown, Fine to Coarse Sandy Silty CLAY (A-7-5) with Trace Mica and Organics

1100

1090

1080

1070

1060

1050

1040

1030

1020

1100

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1080

1070

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1050

1040

1030

1020

(A)

SS-108

B-24

36+53

-RPB-
STA. 15+25.54

(B)

(7)

(5)

(6)

(9)

BT
DRY

Residual:

Medium Stiff, Moist, Red-Brown,

Loose, Moist, Red-Brown, Clayey Silty

Fine Sandy Silty CLAY (A-6) with Trace Mica

Fine to Coarse SAND (A-2-4) with Trace Mica and Rock Fragments

6:1

7.8:1

Ground Surface

36+50.00

-L-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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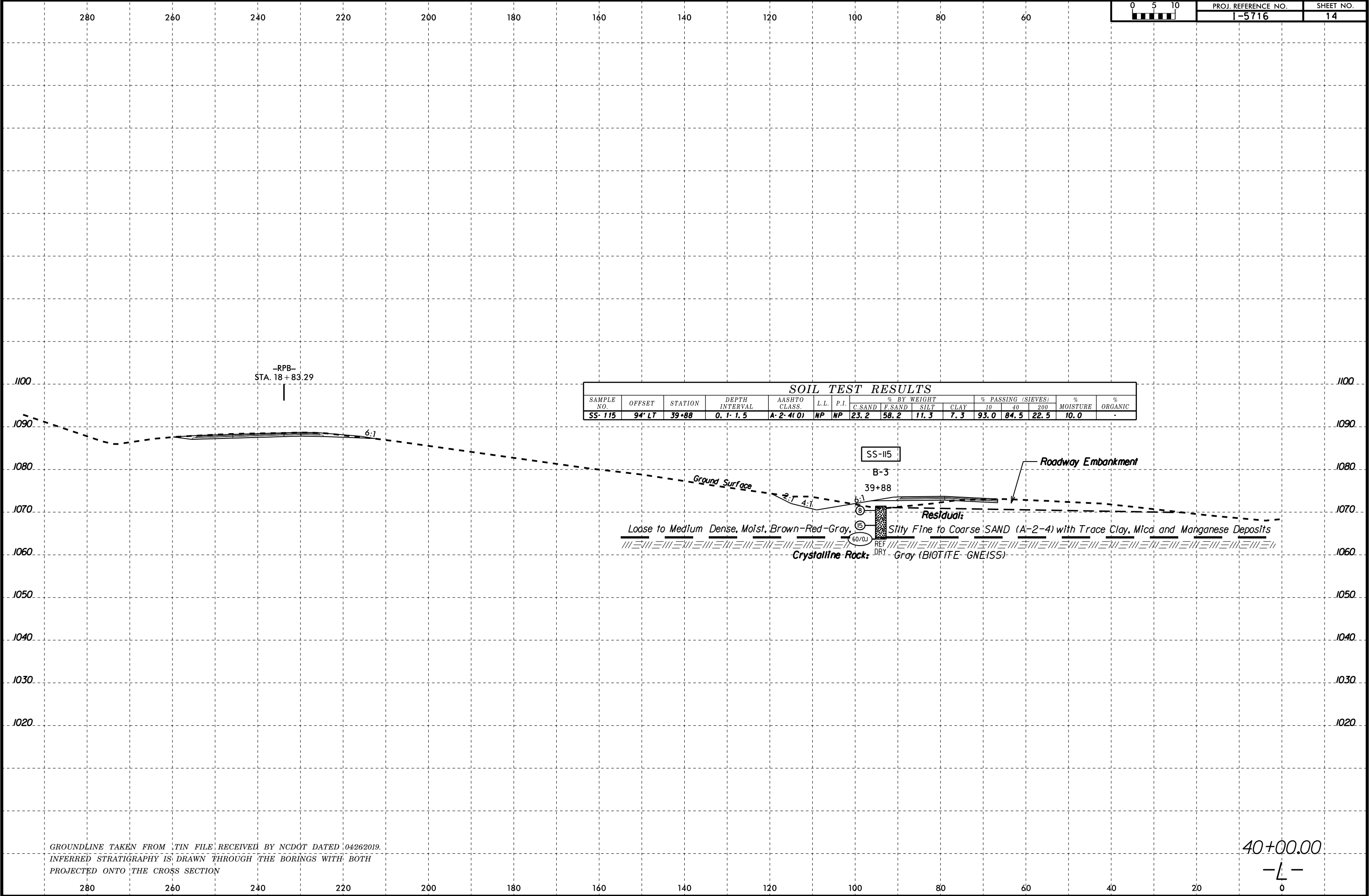
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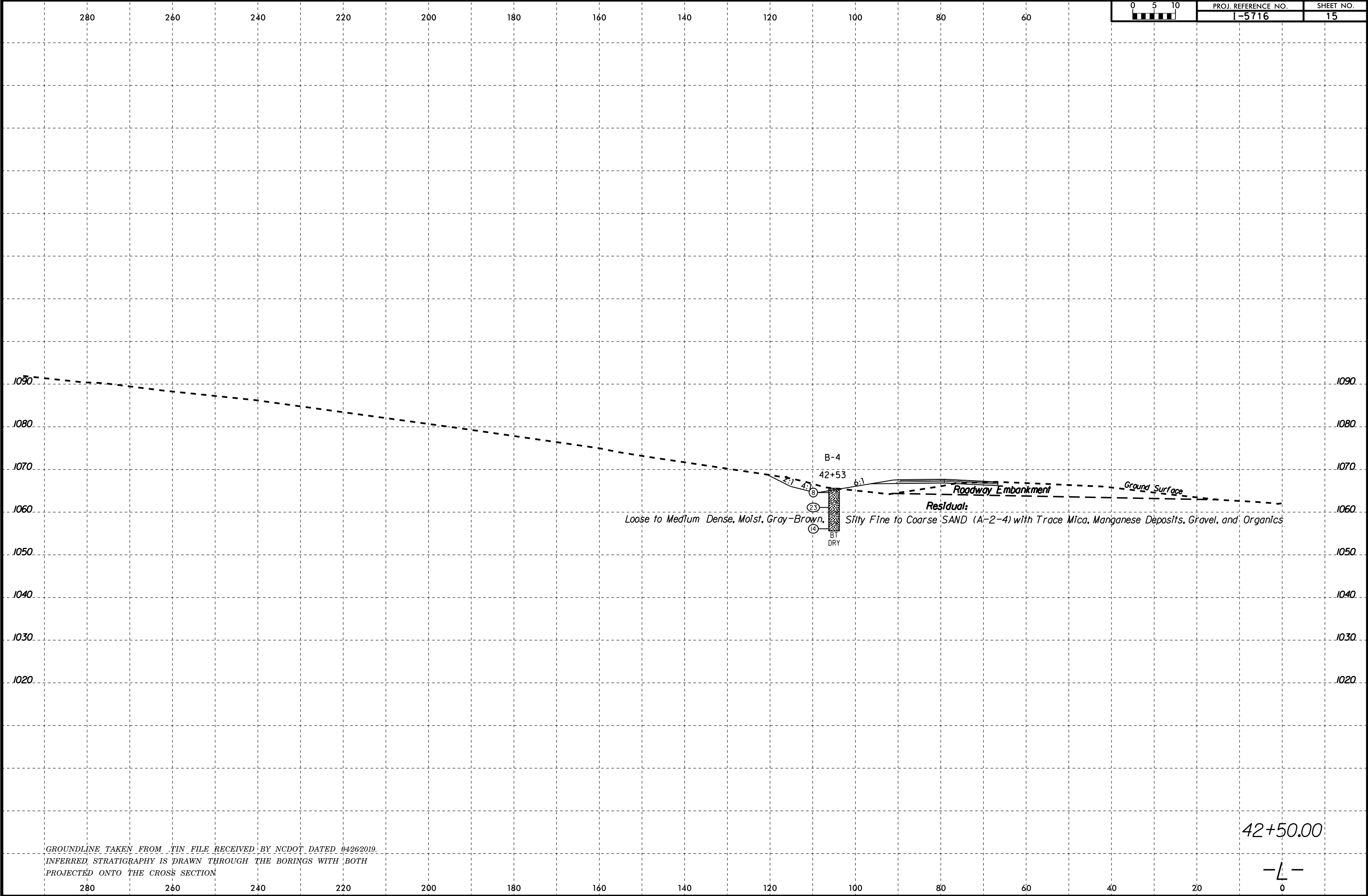
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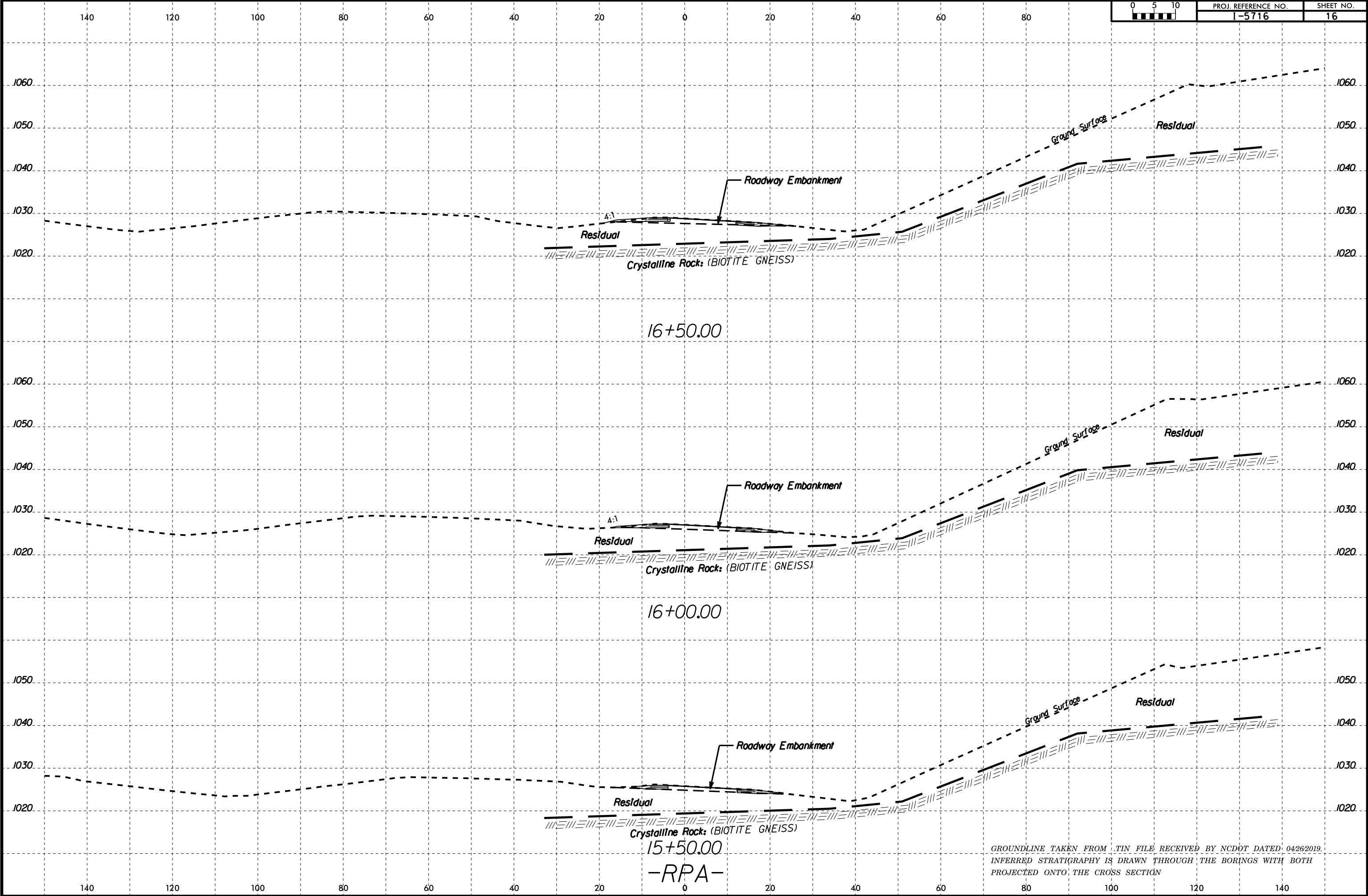
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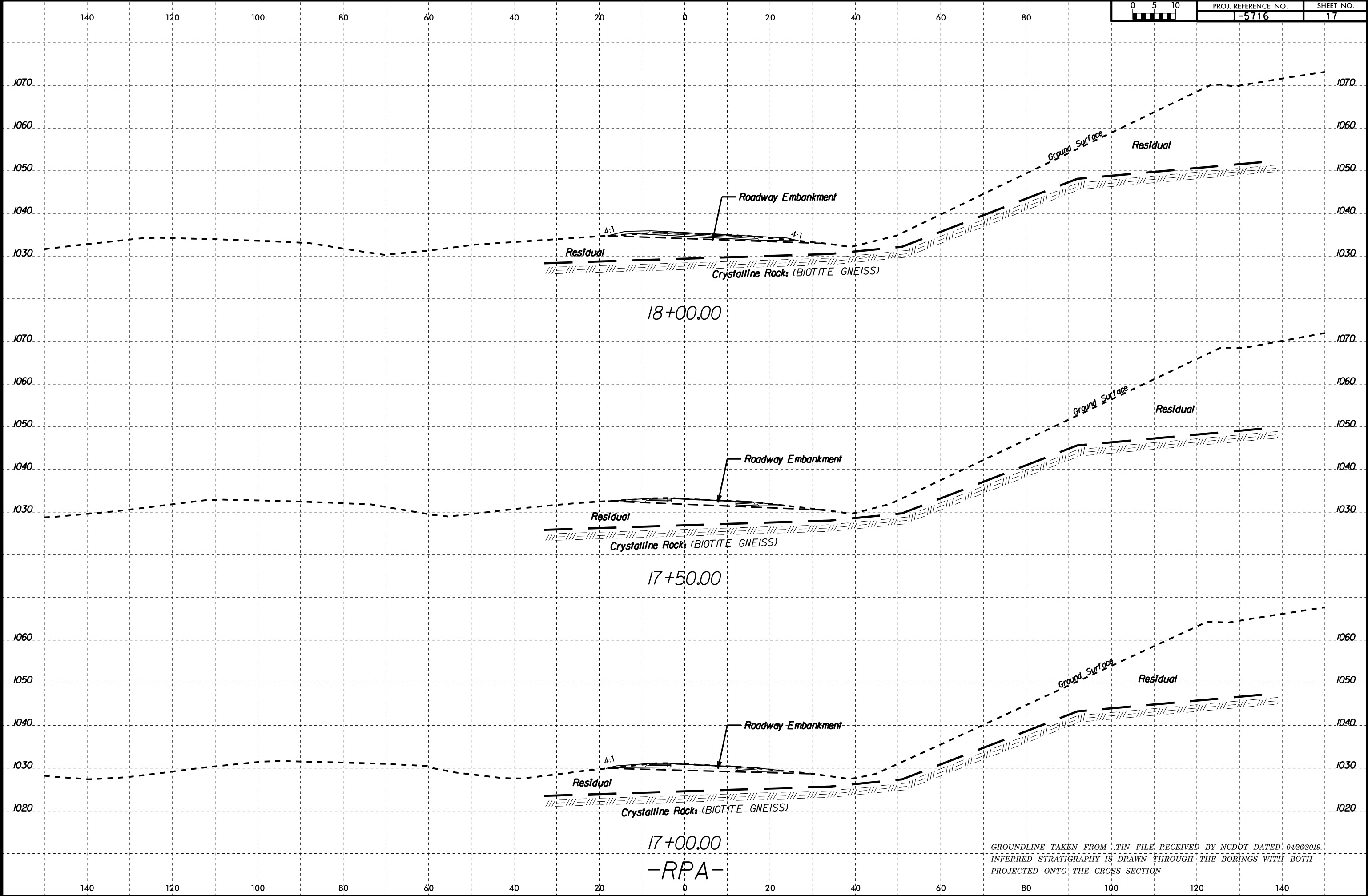
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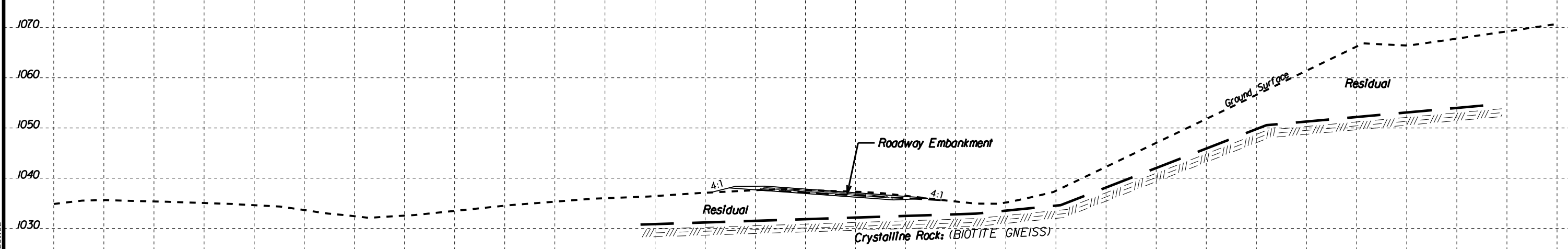
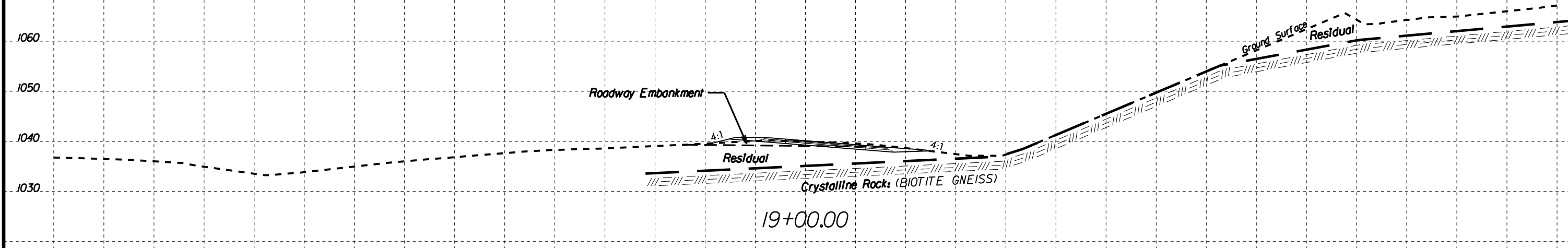
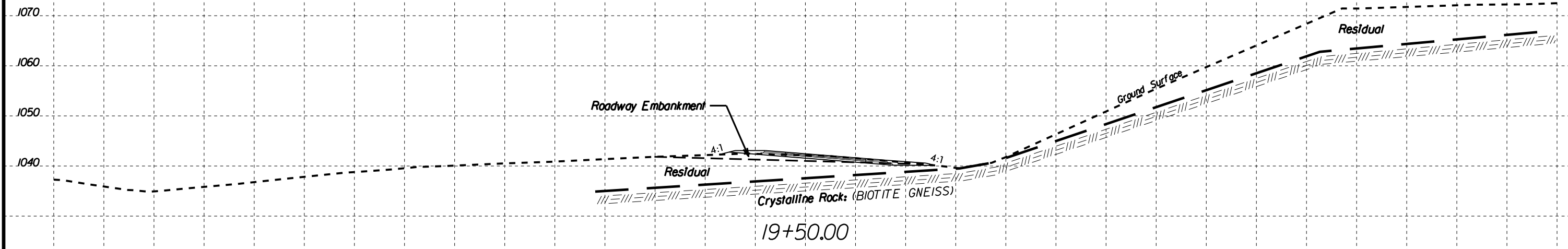
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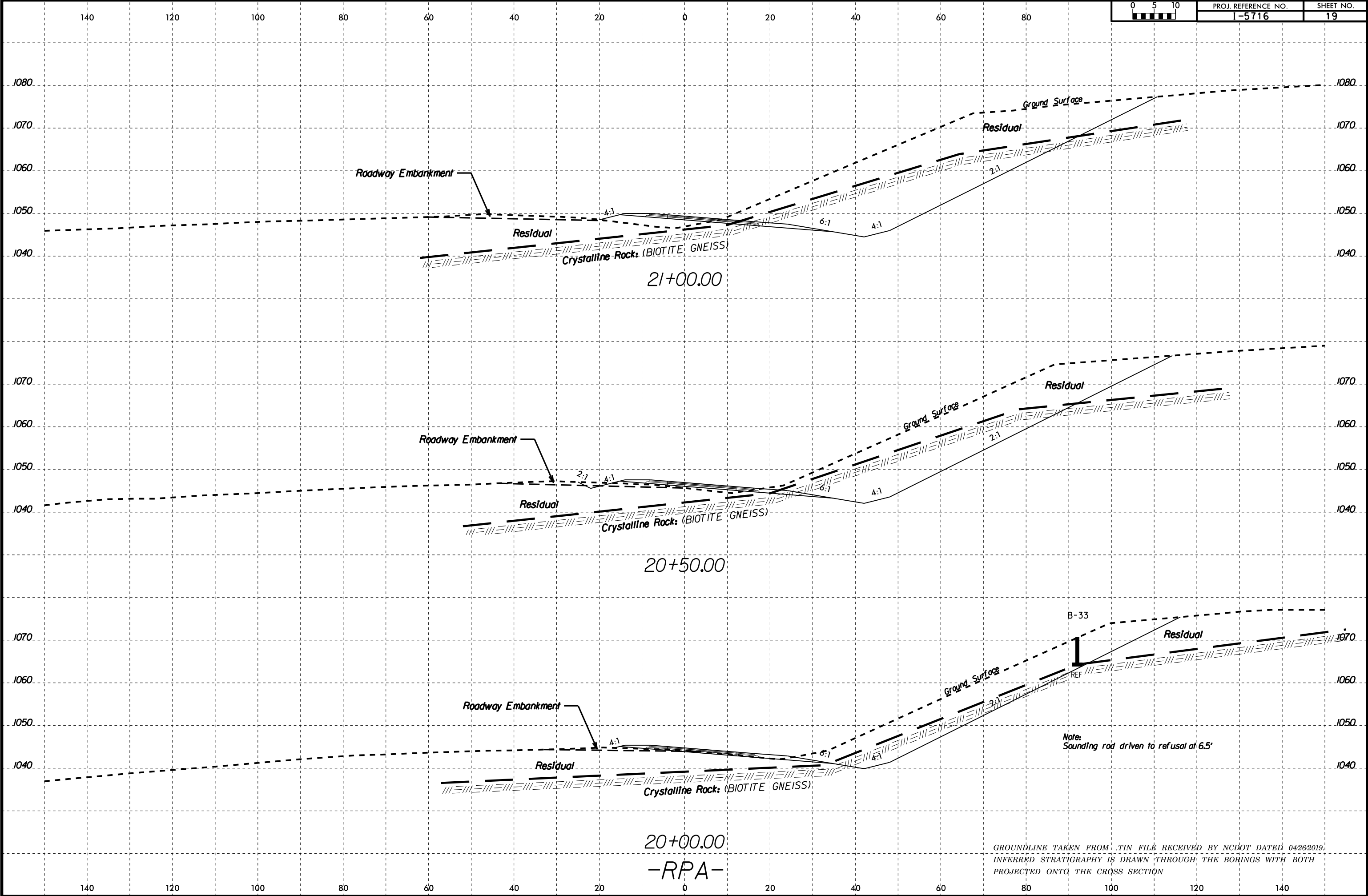
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PROJECTED ONTO THE CROSS SECTION

6/23/16

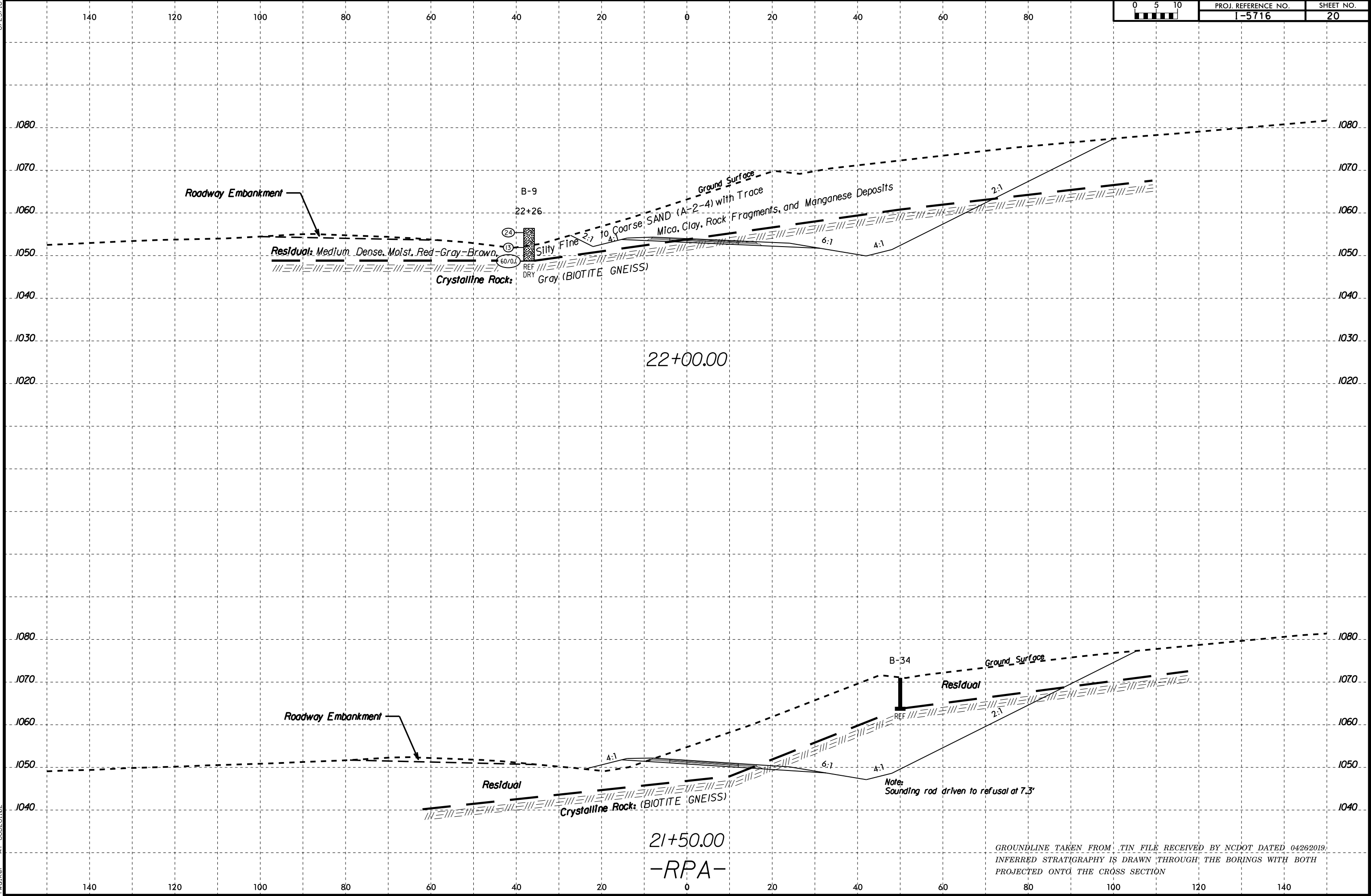
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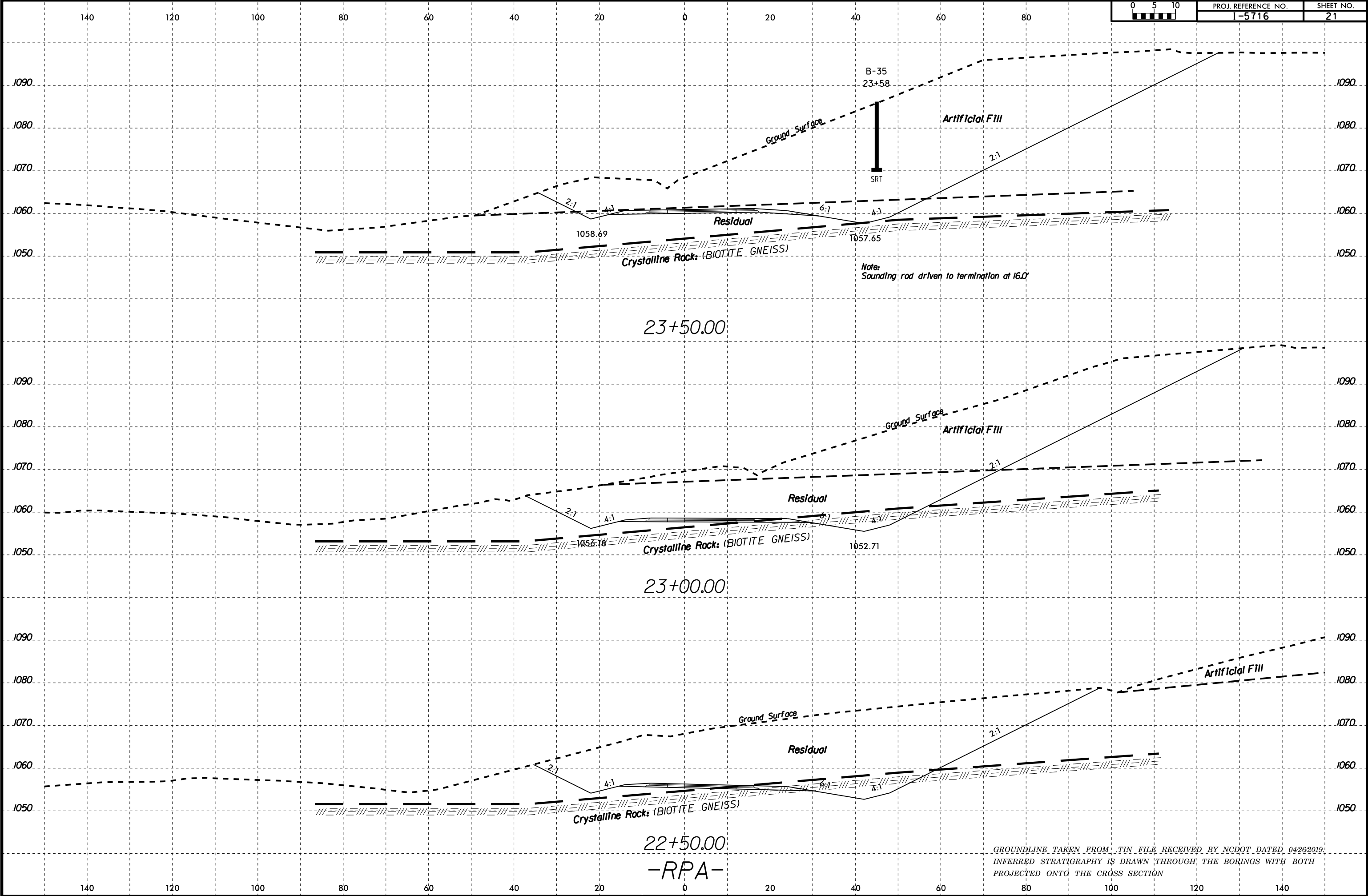
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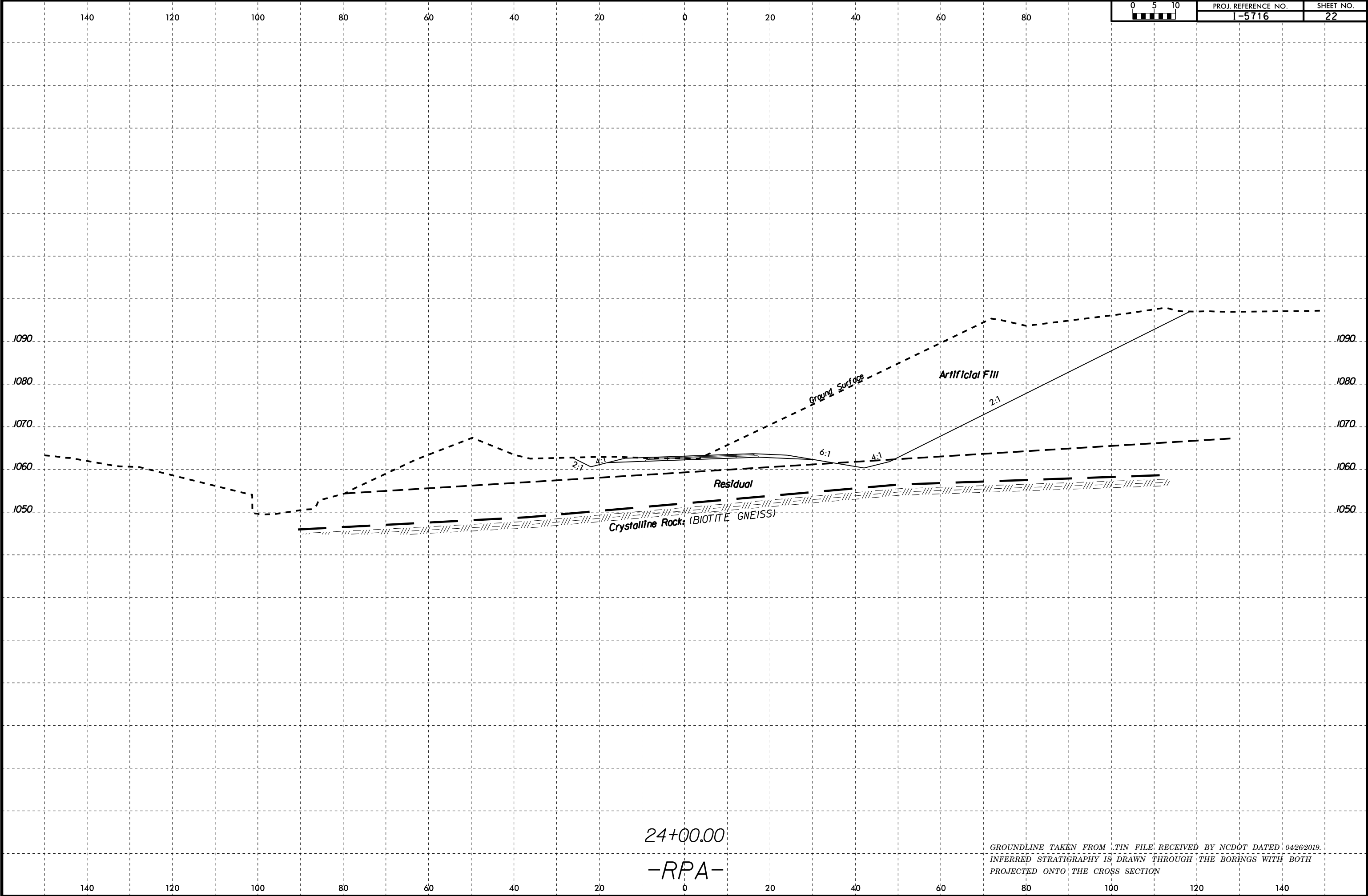
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180

160

140

120

100

80

60

40

20

0

20

40



PROJ. REFERENCE NO.
I-5716

SHEET NO.
23

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- 117	40' LT	10+72	1.0- 1.5	A- 7- 5(8)	49	13	14.3	25.8	13.3	46.6	95.6	88.0	61.9	18.4	-
SS- 118	40' LT	10+72	3.5- 5.0	A- 4(0)	34	3	20.8	36.7	14.4	28.1	71.6	63.4	35.6	20.3	-

(A) Roadway Embankment: Medium Dense, Moist, Red-Brown, Silty Fine SAND (A-2-4) with Trace Organics and Gravel

(B) Residual: Stiff, Moist, Red-Brown, Fine to Coarse Sandy Silty CLAY (A-7-5) with Trace Mica and Rock Fragments

SS-117
SS-118

B+5

10+72

14

14

5

10

BT

DRY

Medium Stiff to Stiff, Moist to Wet, and Fine Sandy Clayey SILT (A-5) with Trace Rock Fragments, Trace Mica to Micaceous
Loose to Medium Dense, Moist, Gray, Silty Fine to Coarse SAND (A-2-4) with Trace Mica, Clay, and Rock Fragments

Ground Surface

Roadway Embankment

10+50.00

-LPA-

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

180

160

140

120

100

80

60

40

20

0

20

40

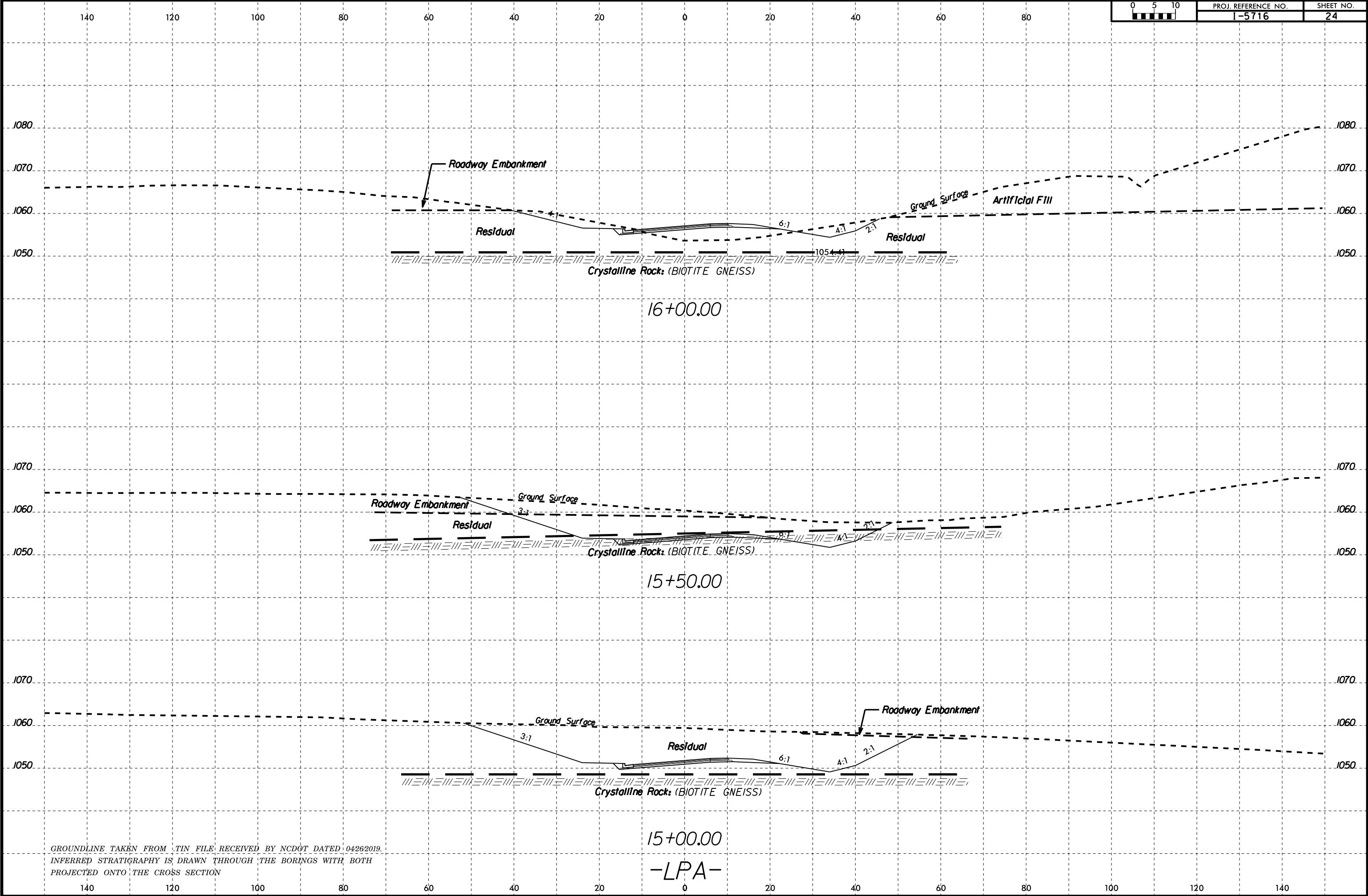
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80

100

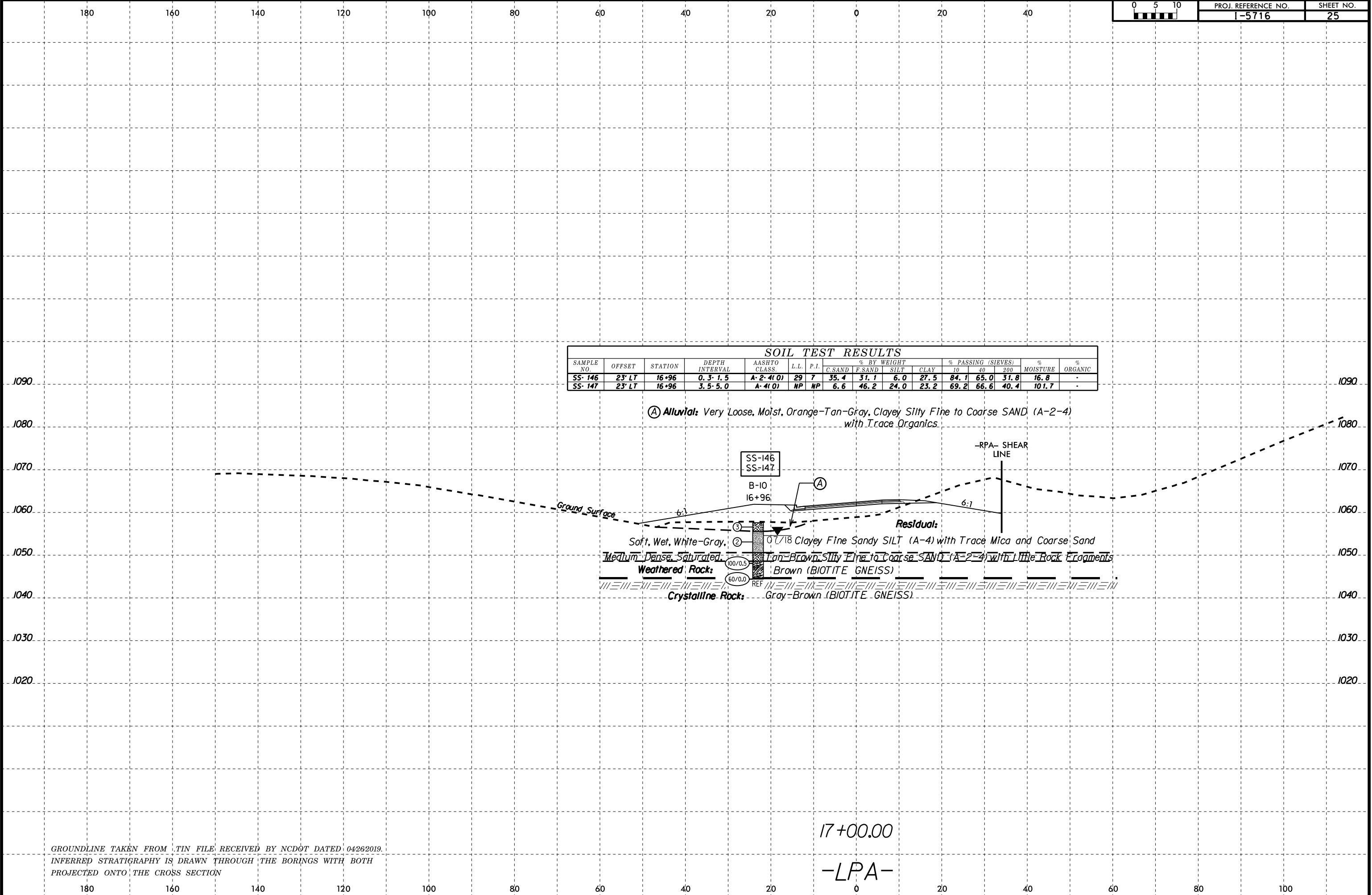
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6/23/16

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140

120

100

80

60

40

20

0

20

40

60

80



PROJ. REFERENCE NO.
I-5716

SHEET NO.
26

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-128	70' RT	19+22	8.5- 10.0	A-2-4(0)	NP	NP	19.3	60.1	6.3	14.3	84.6	79.2	23.0	24.8	-

1090

1080

1070

1060

1050

1040

1030

1020

1010

1090

1080

1070

1060

1050

1040

1030

1020

1010

-RPA-
STA. 27+16.32

SS-128

B-II

19+22

Ground Surface

Residual:

Loose to Medium Dense, Wet to Moist, Red-Orange-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Organics (0.0-1.5%), Mica, and Manganese Deposits, Little Clay

4:1

4

2

10

B-I

DRY

6:1

4:1

2:1

19+00.00

-LPA-

140

120

100

80

60

40

20

0

20

40

60

80

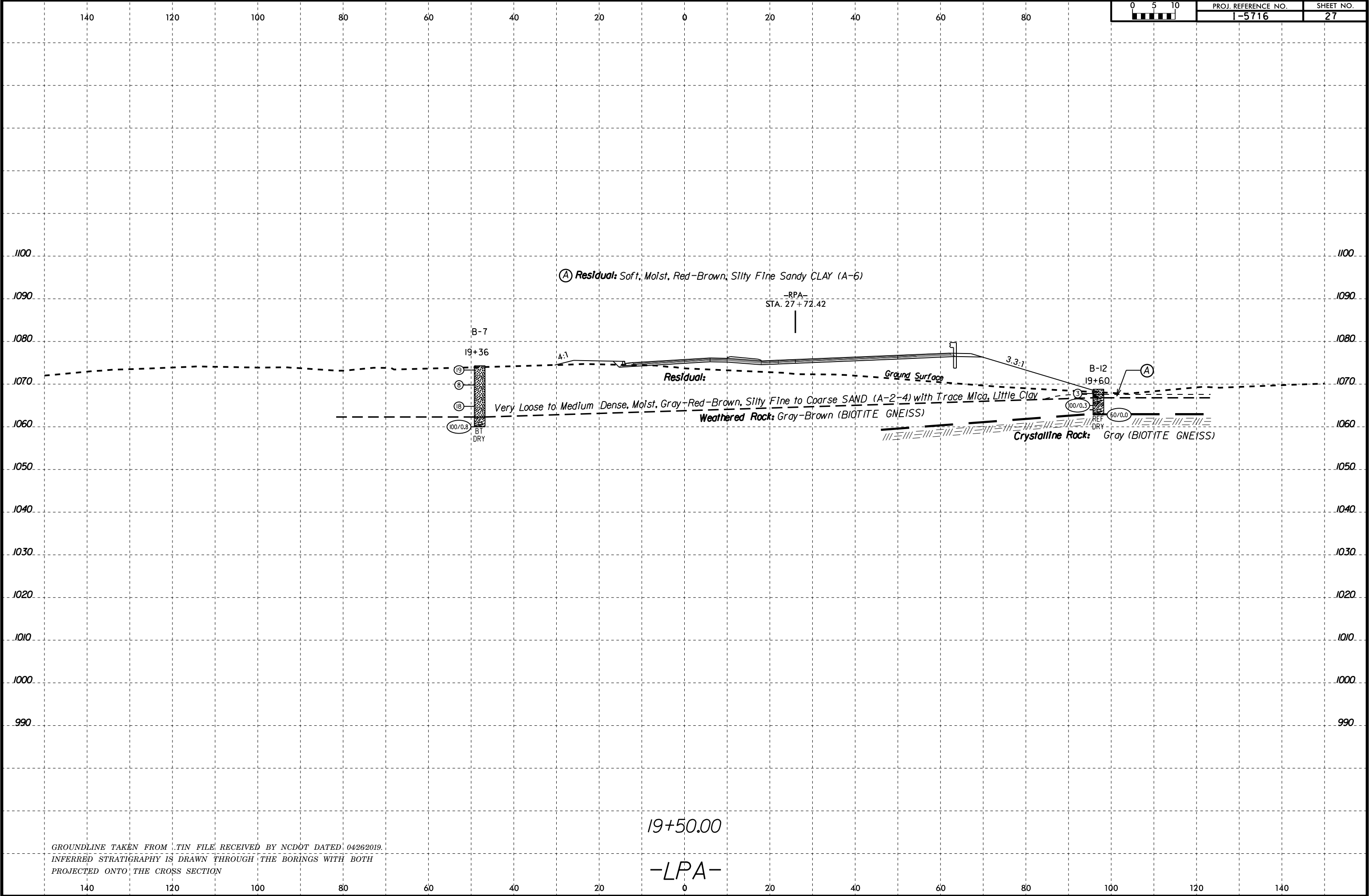
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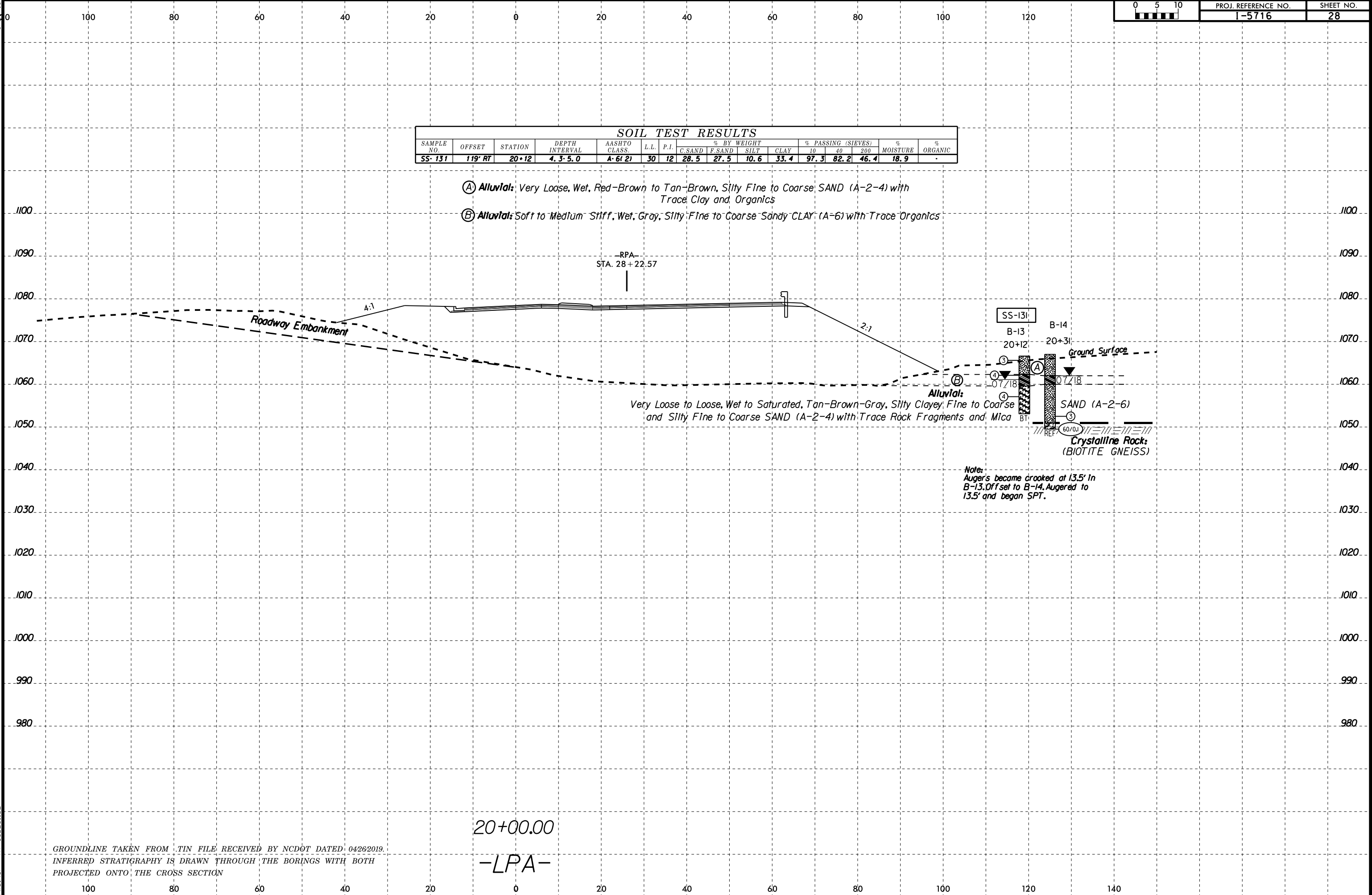
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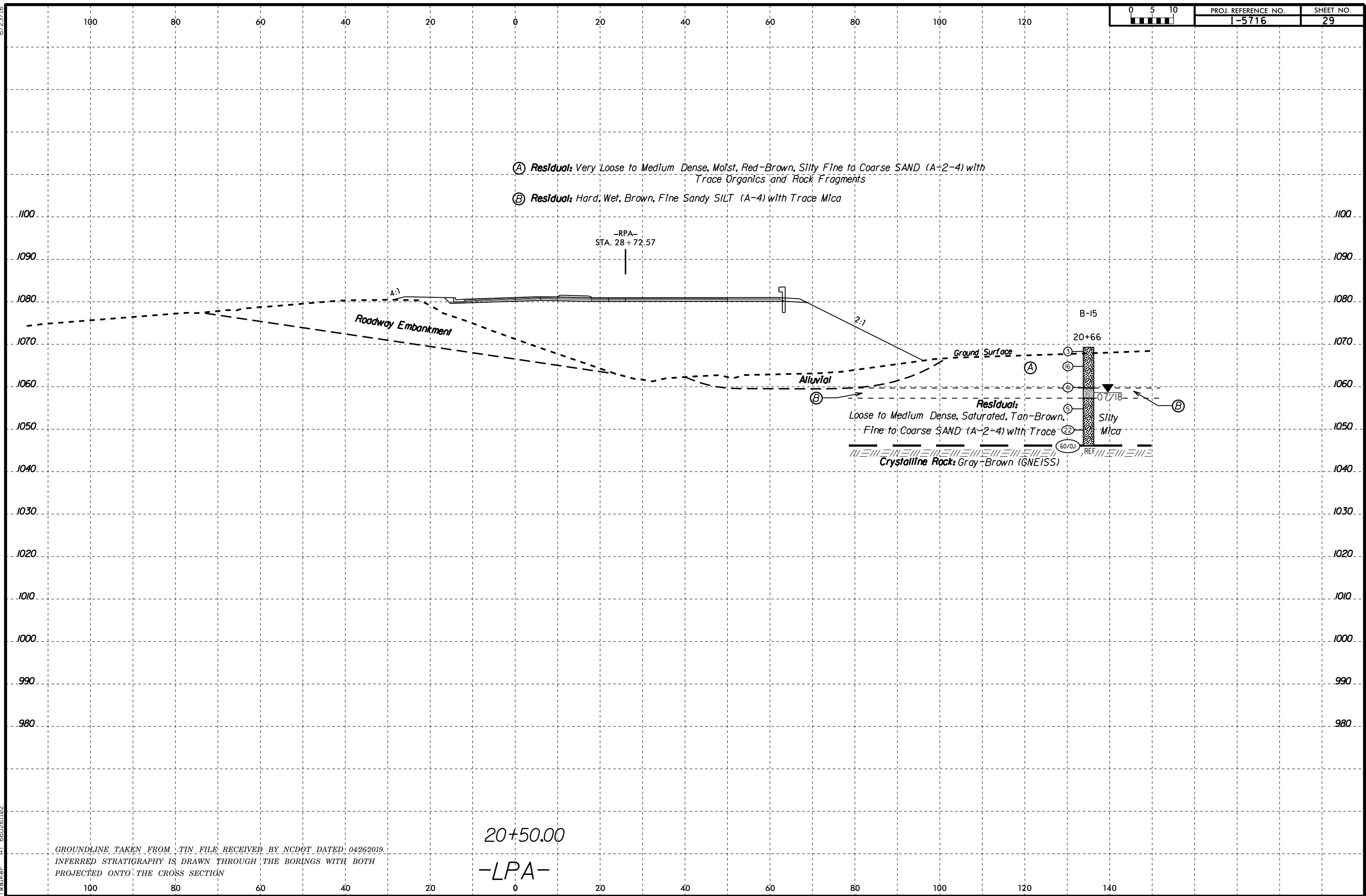
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Walker-A 66026102

140

120

100

80

60

40

20

0

20

40

60

80



PROJ. REFERENCE NO.
I-5716

SHEET NO.
30

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT			CLAY	% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT		10	40	200		
SS-135	142' RT	21+22	8.5-10.0	A-2-4(0)	34	9	41.2	25.2	4.1	29.5	96.1	71.9	35.0	23.2	-
SS-136	58' RT	21+02	0.2-1.5	A-4(1)	29	8	20.6	36.5	11.6	31.3	98.2	89.0	46.9	18.7	-
SS-137	58' RT	21+02	8.5-10.0	A-4(0)	26	7	31.2	34.1	8.6	26.1	93.2	77.5	36.3	22.1	-

- (A) **Artificial Fill:** Soft, Moist, Red-Brown, Clayey Fine to Coarse Sandy SILT (A-4) with Trace Organics
- (B) **Alluvial:** Soft, Wet, Tan-Gray, Clayey Fine to Coarse Sandy SILT (A-4) with Trace Organics
- (C) **Residual:** Loose to Medium, Dense, Wet, Red-Orange-Brown, Clayey Silty Fine to Coarse SAND (A-2-4) with Trace Organics (0.0-1.5%), Trace Mica, and Trace to Little Rock Fragments
- (D) **Weathered Rock:** Gray-Brown (BIOTITE GNEISS)

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

1000

990

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

1000

990

A-1

Roadway Embankment

-RPA-
STA. 29+22.57

Ground Surface

Residual:

Medium Stiff, Wet, White-Tan-Orange,
Fine Sandy SILT (A-4) with Trace Mica
and Rock Fragments

SS-136
SS-137

B-8
21+02

07/18

60/0.0

Crystalline Rock: Gray (BIOTITE GNEISS)

SS-135

B-16
21+22

07/18

60/0.0

100/0.8

100/0.4

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

21+00.00

-LPA-

140

120

100

80

60

40

20

0

20

40

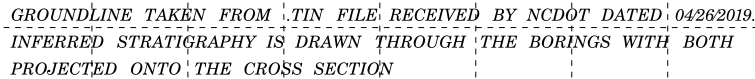
60

80

100

120

140



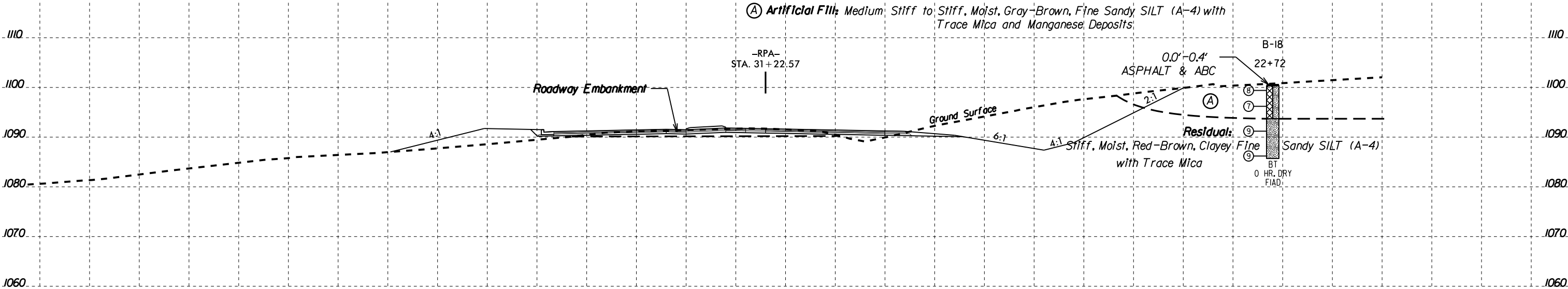
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120 100 80 60 40 20 0 20 40 60 80 100 120



PROJ. REFERENCE NO.	SHEET NO.
I-5716	32



23+00.00

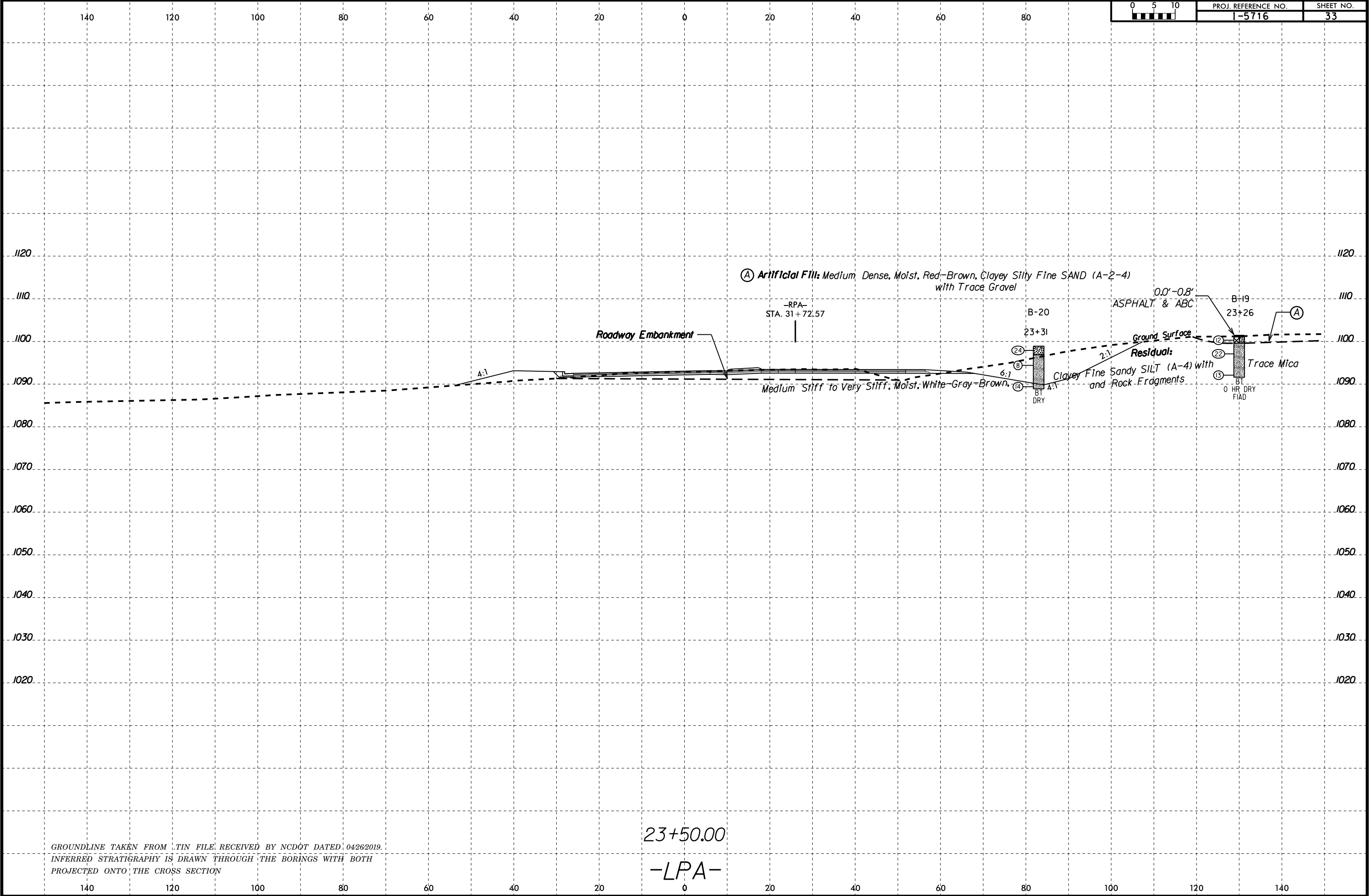
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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

120 100 80 60 40 20 0 20 40 60 80 100 120 140 160

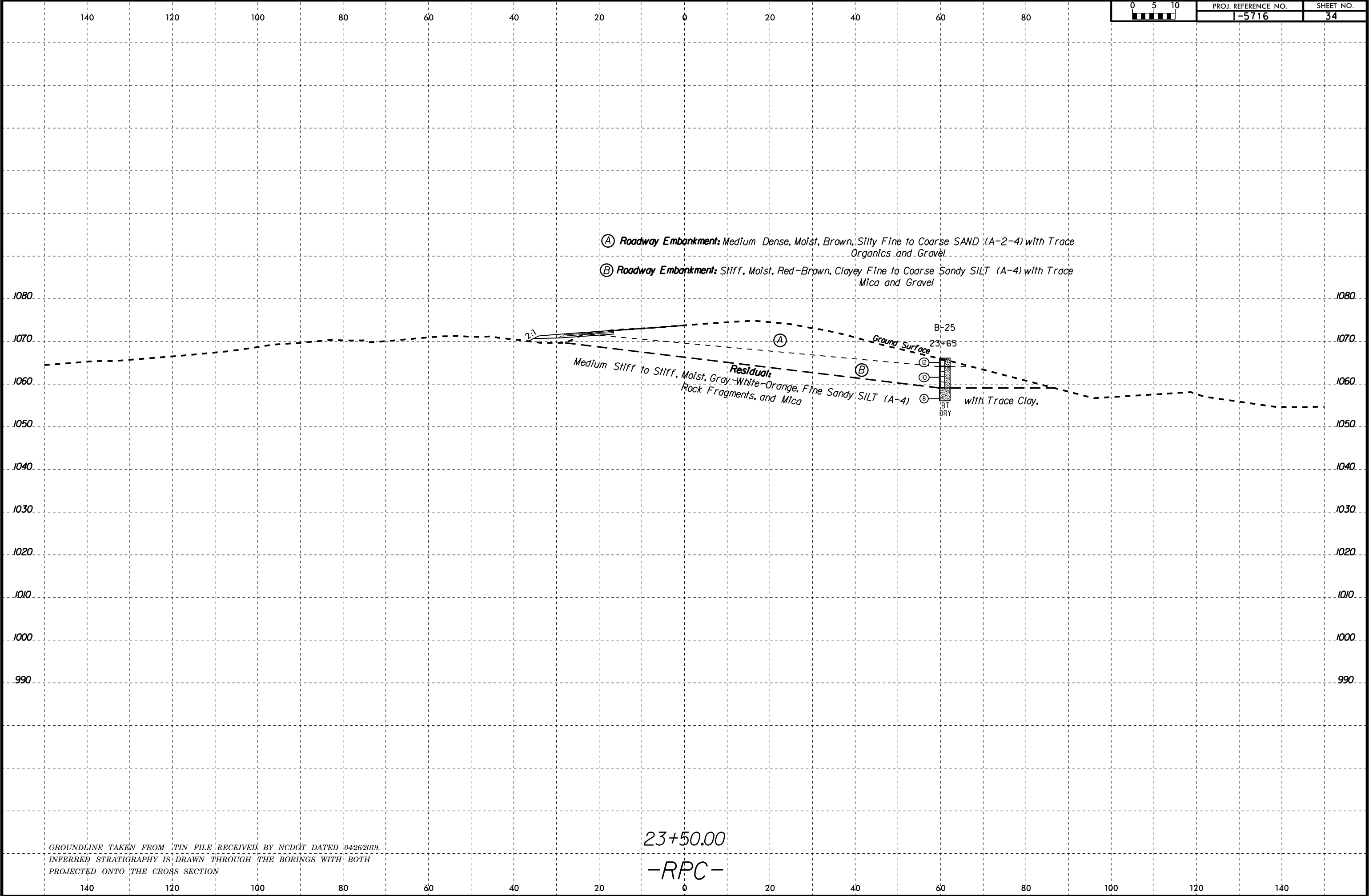
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Walker-A 66026102



PROJ. REFERENCE NO.	SHEET NO.
I-5716	34

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

23+50.00
-RPC-

6/23/16

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Walker-A1 66026102

140

120

100

80

60

40

20

0

20

40

60

80



PROJ. REFERENCE NO.
I-5716

SHEET NO.
35

1120

1110

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

1000

1120

1110

1100

1090

1080

1070

1060

1050

1040

1030

1020

1010

1000

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-3	24+23	25' RT	8.5- 10.0	A-7-5(10)	53	16	14.4	22.0	16.6	47.0	88.5	80.9	60.5	19.2	-

Ⓐ **Roadway Embankment:** Loose, Moist, Orange-Brown, Silty Fine SAND (A-2-4) with Trace Organics and Mica

Ⓑ **Roadway Embankment:** Medium Stiff, Moist, Brown, Fine Sandy SILT (A-4) with Trace Mica

SS-3

B-26

24+23

Ⓐ

Ⓑ

Roadway Embankment

Stiff, Moist, Red-Brown, Fine to Coarse Sandy CLAY (A-7)
Residual: Stiff, Moist, Brown-Pink, Fine Sandy

7

6

14

13

9

BT

DRY

Ground Surface

with Trace Gravel

SILT (A-4) with Trace Mica

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

24+00.00
-RPC-

140

120

100

80

60

40

20

0

20

40

60

80

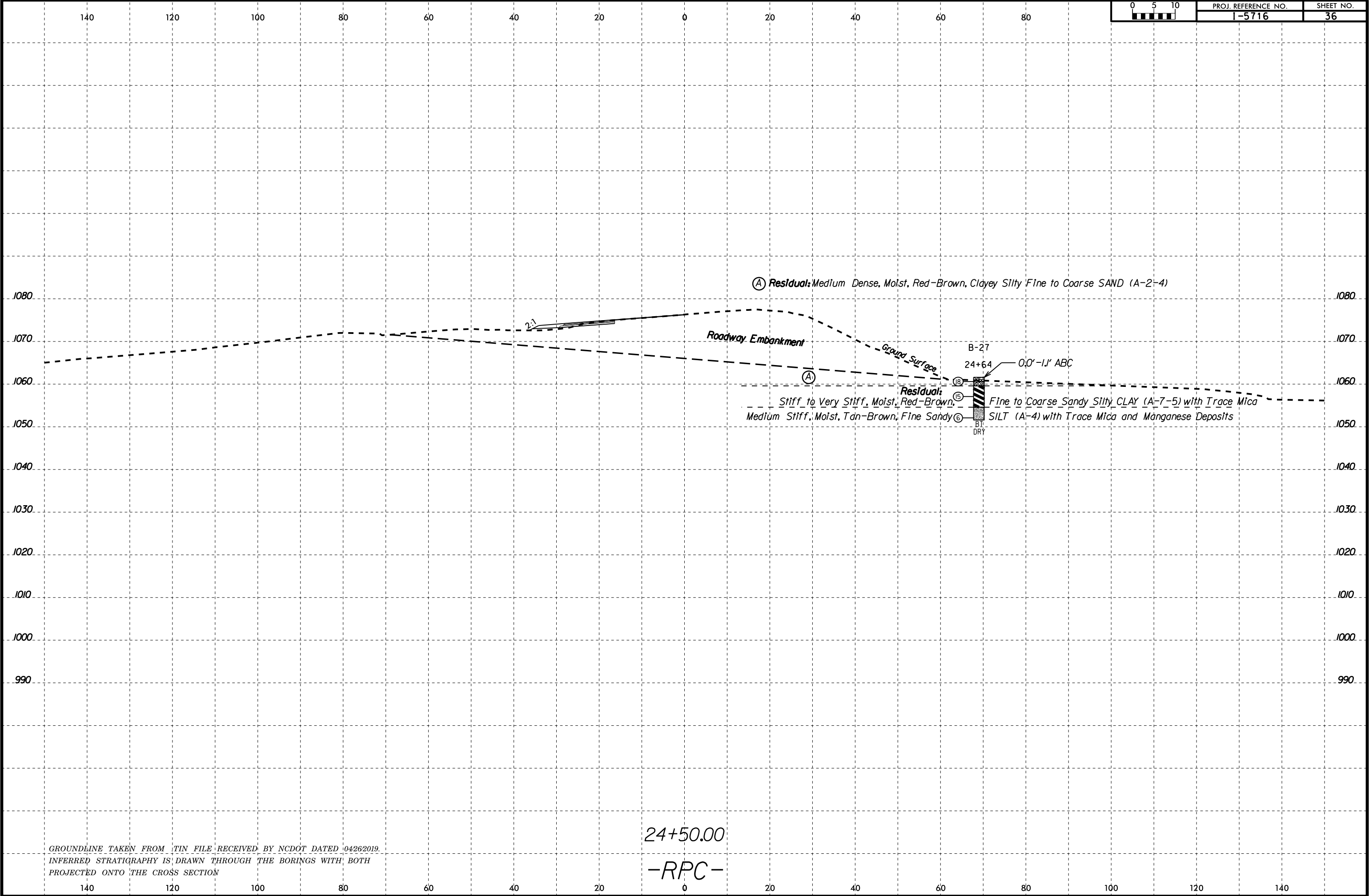
100

120

140

6/23/16

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Walker-A 66026102

140

120

100

80

60

40

20

0

20

40

60

80



PROJ. REFERENCE NO.
I-5716

SHEET NO.
37

1080

1070

1060

1050

1040

1030

1020

1010

1000

990

1080

1070

1060

1050

1040

1030

1020

1010

1000

990

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-101	80' RT	25+14	3.5-5.0	A-7-5(10)	75	22	8.5	15.2	16.2	60.1	99.9	94.3	80.6	35.6	-

EXIST.

Roadway Embankment

SS-101

B-28

25+14

Residual:

Ground Surface

Loose to Medium Dense, Moist, Red-Brown, Clayey Silty (10) Fine to Coarse SAND (A-2-4) with Trace Organics
Stiff, Moist, Red-Brown, Fine to Coarse Sandy (14) Silty CLAY (A-7-5) with Trace Mica
Medium Stiff, Moist, Red-Orange-Brown, Fine Sandy (6) SILT (A-4) with Trace Mica and Manganese Deposits

BT
DRY

25+00.00

-RPC-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04/26/2019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

140

120

100

80

60

40

20

0

20

40

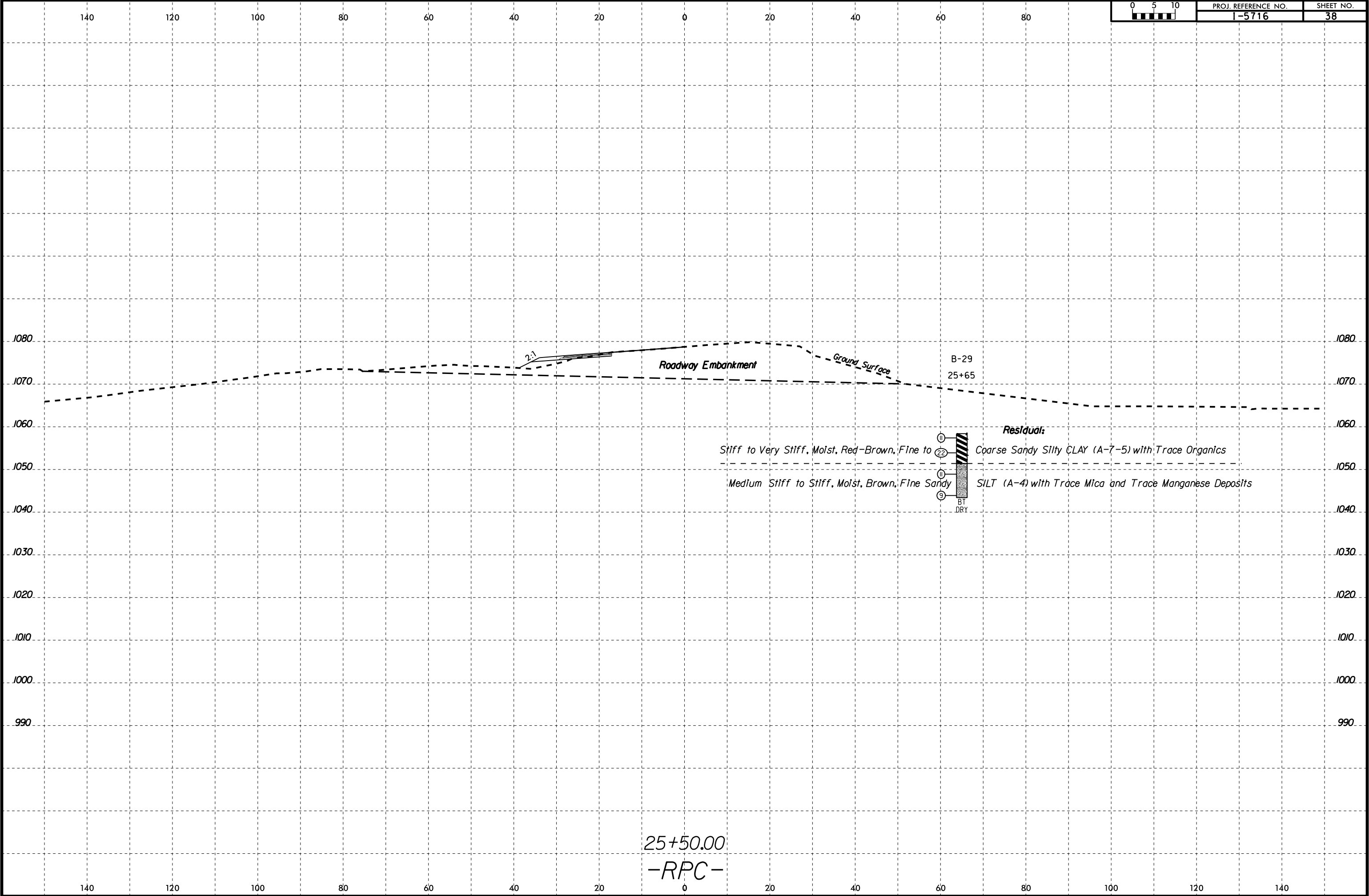
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80

100

120

140

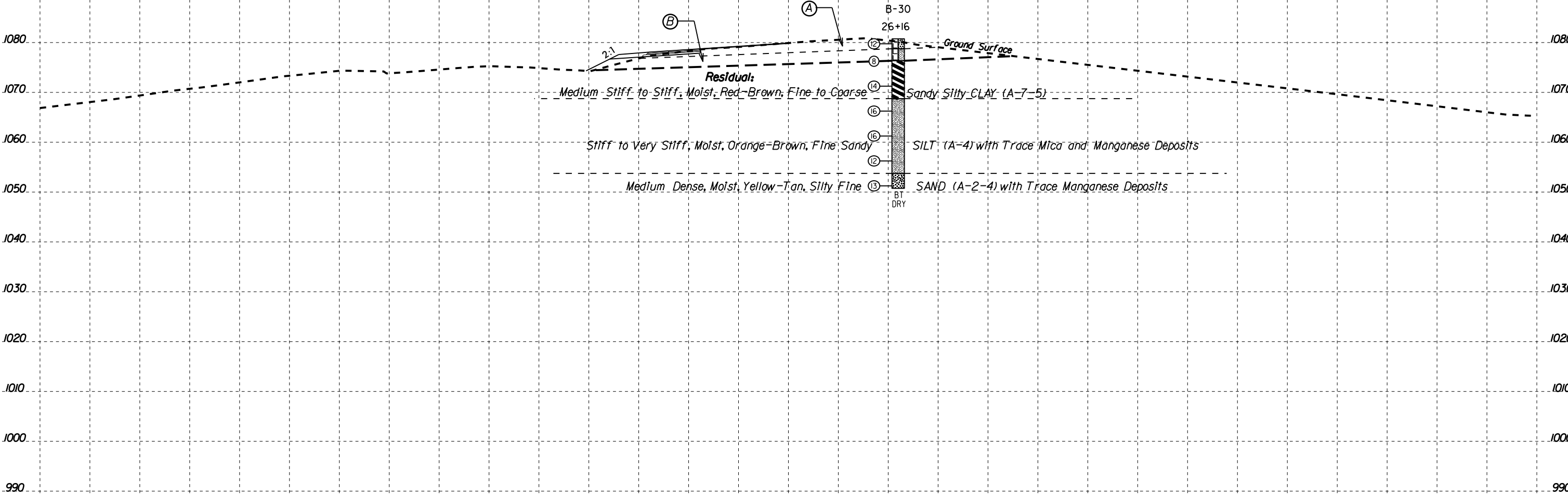


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Walker-A 66026102

Ⓐ **Roadway Embankment:** Medium Dense, Moist, Gray-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica, Gravel, and Organics

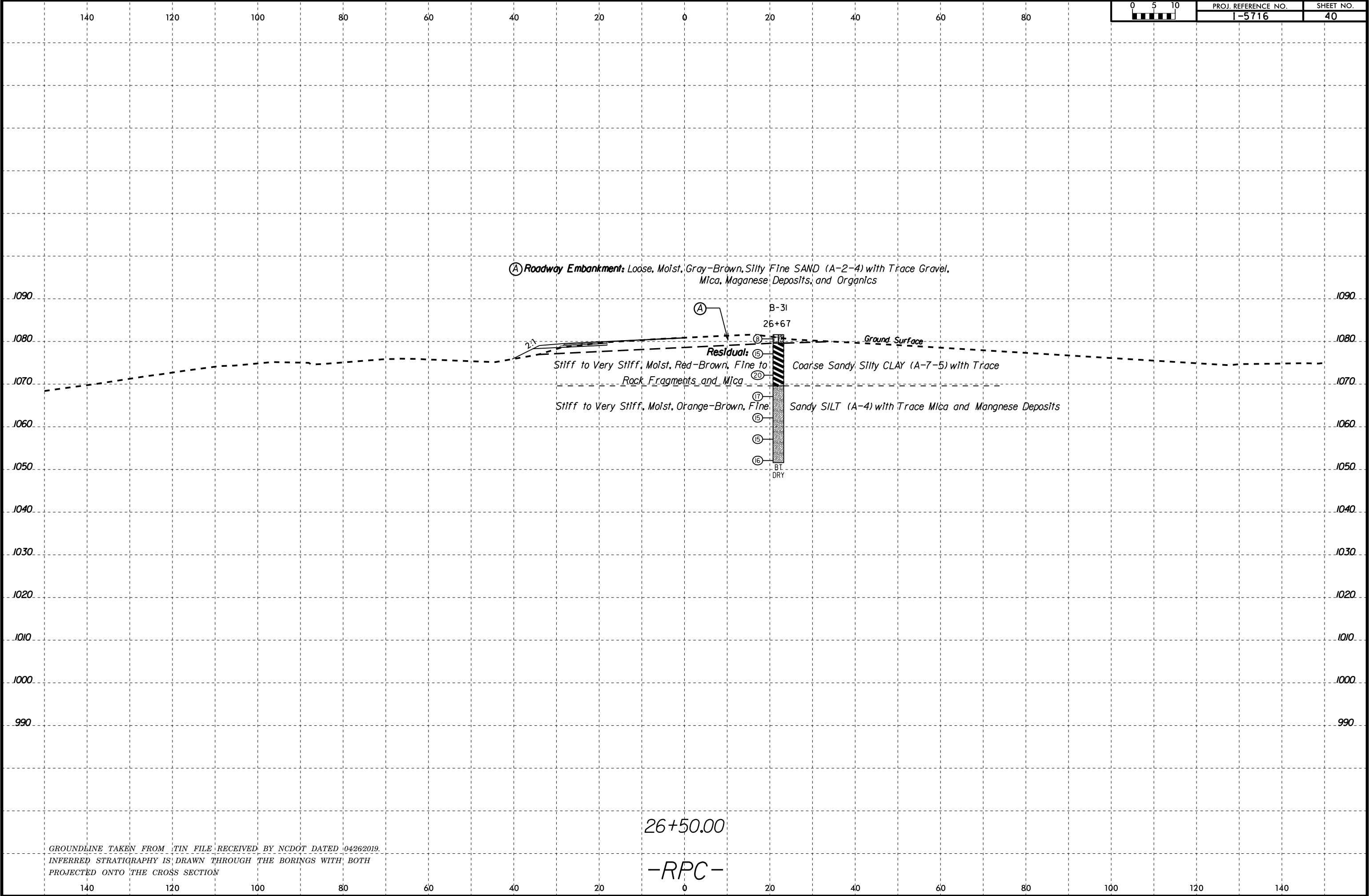
Ⓑ **Roadway Embankment:** Medium Stiff to Stiff, Moist, Brown, Fine Sandy SILT (A-4) with Trace Mica



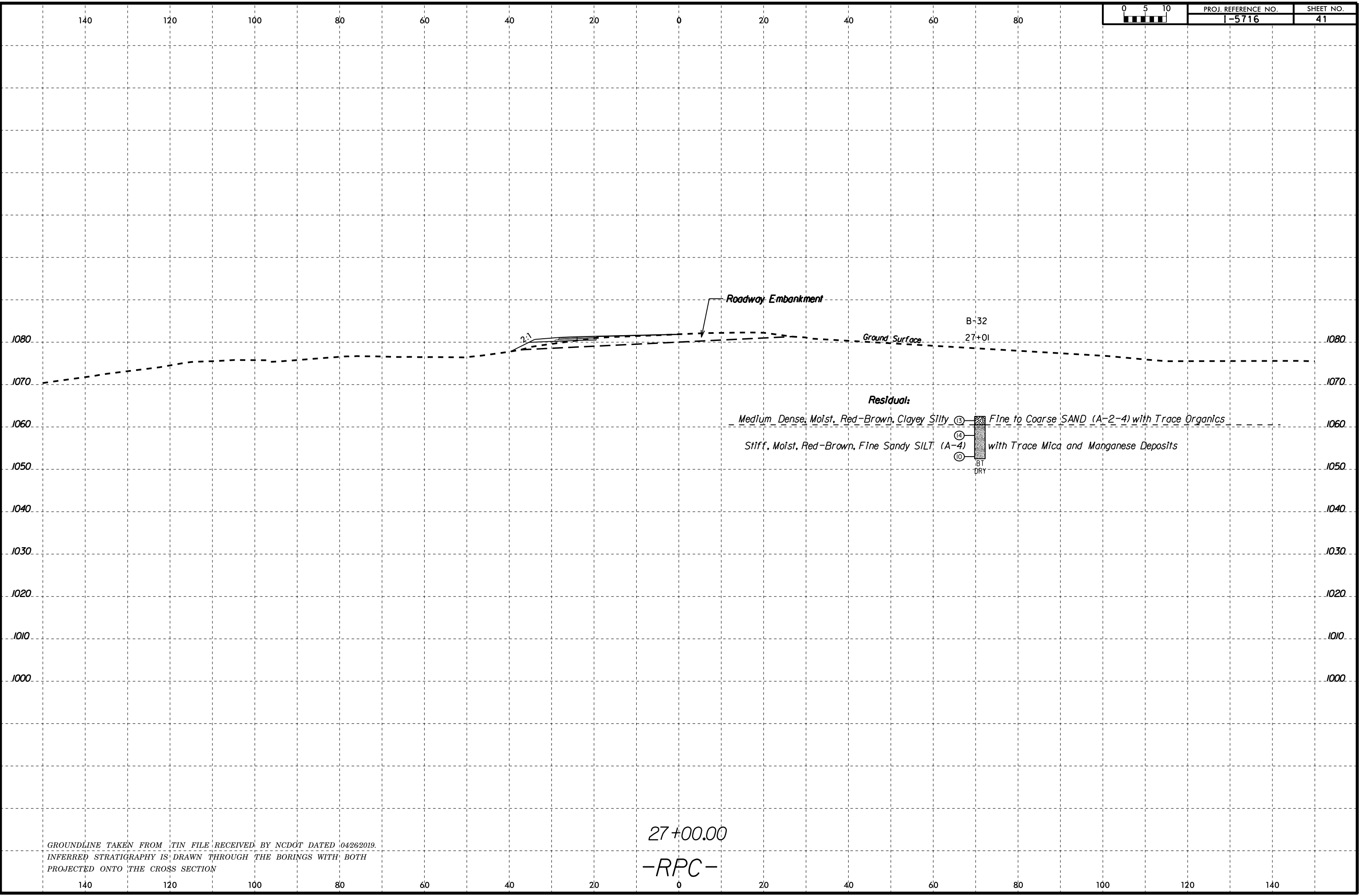
26+00.00
-RPC-

6/23/16

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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY NCDOT DATED 04262019.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

WBS 50133.1.FS1			TIP I-5716			COUNTY CATAWBA			GEOLOGIST M. Arnold						
SITE DESCRIPTION I-40 & SR 1007 (Lenoir Rhyne Boulevard) Interchange Improvements									GROUND WTR (ft)						
BORING NO. B-6			STATION 15+25			OFFSET 192 ft LT			ALIGNMENT -LPA-			0 HR. Dry			
COLLAR ELEV. 1,063.4 ft			TOTAL DEPTH 8.9 ft			NORTHING 722,773			EASTING 1,313,937			24 HR. Dry			
DRILL RIG/HAMMER EFF./DATE F&R2175 CME-55 82% 02/20/2018						DRILL METHOD H.S. Augers			HAMMER TYPE Automatic						
DRILLER S. Davis			START DATE 07/24/18			COMP. DATE 07/24/18			SURFACE WATER DEPTH N/A						
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
1065															
	1,063.4	0.0	4	5	7	12						M		1,063.4	GROUND SURFACE 0.0
1060	1,059.9	3.5	14	23	26			49				M		Red-Gray-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Clay and Mica, Trace to Little Rock Fragments	
														1,056.9	6.5
1055	1,054.9	8.5												WEATHERED ROCK	
	1,054.5	8.9	100/0.3											Gray (BIOTITE GNEISS)	8.8
			60/0.0											CRYSTALLINE ROCK	8.9
														Gray (BIOTITE GNEISS)	
														Boring Terminated with Standard Penetration Test Refusal at Elevation 1,054.5 ft in CRYSTALLINE ROCK (BIOTITE GNEISS)	
														Notes:	
														1. Surficial Organic Soil=0.0'-0.2'	
														2. Auger Refusal at 8.9'	

NCDOT BORE DOUBLE I-5716_GEO_BH_RDWY.GPJ NC DOT GDT 05/19