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REFERENCE: I-4700A

PROJECT: 34232

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN	CROSS SECTION
-NBLI-	885+00 to 996+90.85	4-12	15-66
-SBLI-	885+00 to 996+99.52	4-12	67-103
-L2-	997+00 to 1055+00	12-14	104-III

	SHEET
BORELOGS	112-116
LAB SUMMARY	117

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-26 FROM NEAR NC 280
(EXIT 40) TO NEAR NC 146 (EXIT 37)

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4700A	1	117

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 (ON-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.

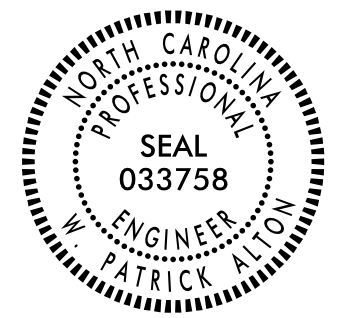
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- THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR 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.

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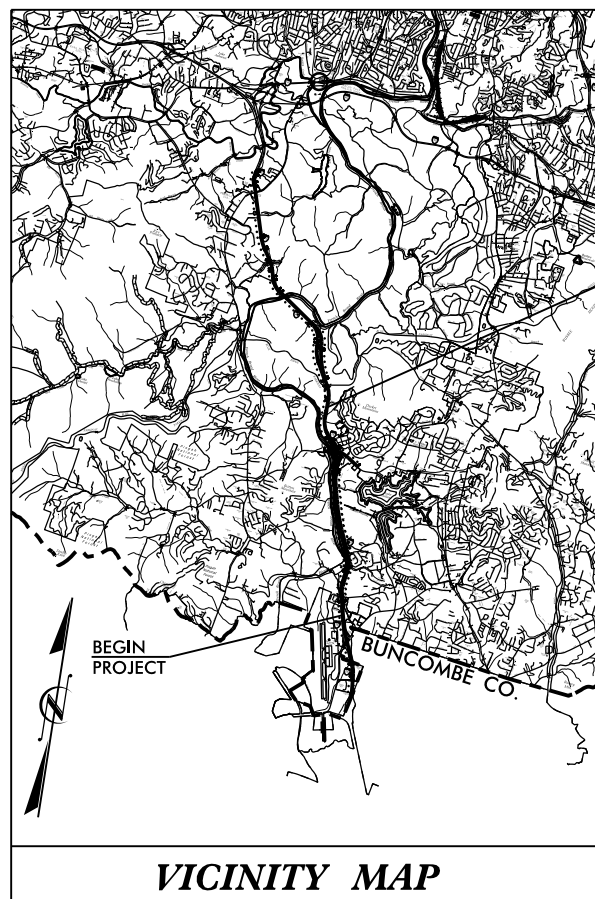
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
 DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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: 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 YIELD 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.	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 INTRODUCED 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 IN 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 (SROQ) - 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 THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	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.	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER HIGHLY ORGANIC SOILS MUCK, PEAT
MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	COMPRESSION SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	PERCENTAGE OF MATERIAL	
	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP		
	MISCELLANEOUS SYMBOLS		
	RECOMMENDATION SYMBOLS		
	ABBREVIATIONS		
	EQUIPMENT USED ON SUBJECT PROJECT		
TEXTURE OR GRAIN SIZE		ROCK HARDNESS	
U.S. STD. SIEVE SIZE OPENING (MM)	4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053	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 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 GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	SOIL MOISTURE - CORRELATION OF TERMS
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	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 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 GROOVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.	SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE
	PLASTICITY	INDURATION	
	COLOR		
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN, GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.			

7/24/2017

TIP PROJECT: I-4700A



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

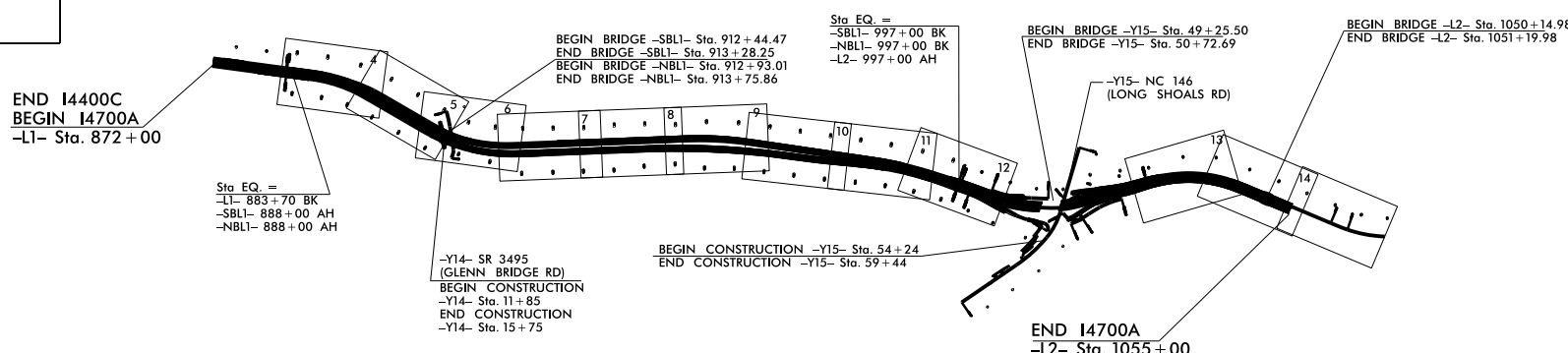
BUNCOMBE COUNTY

LOCATION: I-26 FROM NEAR NC 280 (EXIT 40) TO NEAR NC 146 (EXIT 37)

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

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-4700A	3	117
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	

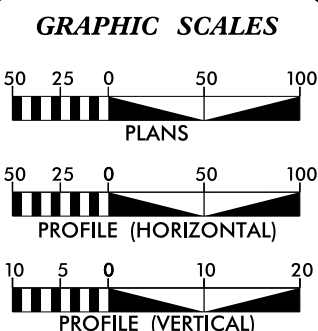
(9-29-2017 SUBMITTAL- 25% I-4700A/B ONLY)



- NOTE:
- CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.
 - THIS PROJECT IS PARTIALLY WITHIN THE MUNICIPAL BOUNDARIES OF THE CITY OF ASHEVILLE AND CITY OF HENDERSONVILLE.
 - THIS IS A CONTROLLED- ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.

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

CONTRACT:



DESIGN DATA

ADT 2011	=72,000
ADT 2040	=117,900
DHV	=11,790
D	=55%
T	=10% *
V	= 65-70 MPH
* TTST	= 4% DUAL 6%
FUNC CLASS	=
INTERSTATE	
STATEWIDE TIER	

PROJECT LENGTH

TOTAL LENGTH OF ROADWAY TIP PROJECT I-4400C1-4700A1-4700B	= 10.998 MI
TOTAL LENGTH OF STRUCTURES OF TIP PROJECT I-4400C1-4700A1-4700B	= 0.211 MI
TOTAL LENGTH OF TIP PROJECT I-4400C1-4700A1-4700B	= 11.209 MI

NOTE: LENGTHS WERE CALCULATED USING THE NBL ALIGNMENT

Prepared in the Office of:

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Raleigh, North Carolina 27609
NC License No. C-1554

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: June 2018

LETTING DATE: June 2019

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PROJECT ENGINEER

ERIN TYNDALL, P.E.
PROJECT DESIGN ENGINEER

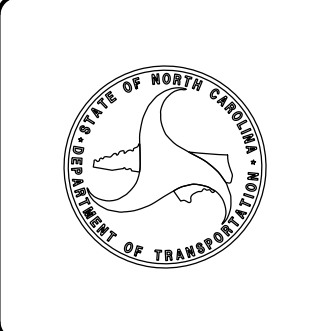
WANDA AUSTIN
NCDOT CONTACT

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



7/24/2017 5:40:00 PM RDY_TSH.dgn 3:11 PM



September 5, 2018

State Project No.: 36030.1.FS4
 TIP No.: I-4700A
 F.A. Number: N/A
 County: Buncombe
 Description: I-26 from near NC 280 (Exit 40) to near NC 146 (Exit 37)

SUBJECT: Geotechnical Report – Inventory

Project Description

This project primarily involves the widening of approximately 3.5 miles of existing I-26 (-L1-, -NBL1-, -SBL1-, and -L2-) in Arden, Buncombe County, North Carolina. The project begins at -L1- station 872+00, which is located about 3500 feet upstation of the intersection of I-26 with NC 280 (Airport Road, Exit 40). At station 883+70, the -L1- alignment divides into -NBL1- and -SBL1- alignments. At -NBL1- station 996+90.85 and -SBL1- station 996+99.52 equality, the alignment becomes -L2- station 997+00. The project ends at -L2- station 1055+00, which is approximately 3500 feet upstation of the intersection of I-26 with NC 146 (Exit 37). The majority of the widening generally remains within existing right-of-way along I-26. The typical section consists of two eastbound and two westbound lanes separated by a grass median. There is one major interchange in this section at Long Shoals Road (-Y15-). The French Broad River is generally located about 500 feet west of the proposed widening and runs approximately parallel to the existing interstate. The Duke Energy Asheville Plant is located east-northeast of the proposed widening from about station -NBL1- 945+00 to 985+00.

The typical section for the project will include four eastbound and four westbound lanes separated by a grass median or a concrete barrier. More-specifically, the typical section will incorporate 12-foot lanes, 10- to 14-foot outside shoulders, and a variable-width (up to 26-foot) median. The mainlines of the proposed widening of I-26 will cross over Glenn Bridge Road (-Y14-) and two separate private gravel service roads. The project also includes the construction, replacement, or modification of four (4) bridges and three (3) retaining walls. The locations shown below represent areas where additional subsurface investigation was performed in anticipation of the listed structures:

Retaining wall on -SBL1- from approximate station 886+00 to 891+50, left;
 Bridge on -NBL1- over -Y14- from -NBL1- station 912+93.01 to 913+75.86;
 Bridge on -SBL1- over -Y14- from -SBL1- station 912+47.52 to 913+30.52;
 Retaining wall on -NBL1- from approximate station 917+50 to 923+50, right;

Retaining wall on -NBL1- from approximate station 959+50 to 981+00, right;
 Bridge on -L2- over a private gravel service road from station 1050+14.48 to 1051+19.48.

The geotechnical field investigation was performed between July and September 2017, and March 2018. During these time periods, a total of 98 Standard Penetration Test (SPT) borings were advanced with ATV- and track-mounted CME-55 and CME-550 drill rigs with automatic hammers. In addition, two (2) hand auger borings and thirteen (13) hand auger borings with sounding rods were completed due to restrictive drill rig access in those areas. The boring locations were selected by NCDOT. Representative soil samples were collected from the split spoon or hand auger cuttings 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>
-NBL1-	887+00 to 996+90.85
-SBL1-	887+00 to 996+99.52
-L2-	997+00 to 1052+00

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>
-NBL1-	944+75 to 949+25
-NBL1-	960+75 to 969+25
-NBL1-	978+75 to 979+25, right
-NBL1-	991+25 to 996+90.85, right
-L2-	997+00 to 998+25, right
-SBL1-	946+25 to 947+75, right
-SBL1-	963+75 to 971+25, right

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>
-NBL1-	892+25 to 892+75, right
-NBL1-	944+25 to 947+75
-NBL1-	960+75 to 964+25, right
-NBL1-	968+25 to 969+25, right

-NBL1- 978+75 to 979+25
 -NBL1- 991+75 to 996+75, right
 -SBL1- 970+75 to 971+25, right

-SBL1- 888+75 to 892+00, left
 -SBL1- 913+25 to 913+75

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

<u>Alignment</u>	<u>Station (±)</u>
-NBL1-	919+00 to 919+50
-NBL1-	976+25 to 976+75, right
-SBL1-	888+75 to 891+25, left
-SBL1-	911+00 to 911+75
-SBL1-	931+25 to 985+00, left

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>
-NBL1-	887+50 to 888+50, right
-NBL1-	915+00 to 924+50, right
-NBL1-	947+50 to 962+25, right
-NBL1-	975+00 to 976+75, right
-NBL1-	983+25 to 983+75, right
-SBL1-	887+50 to 891+50, left
-SBL1-	911+25 to 913+75, left
-SBL1-	931+25 to 943+75, left
-SBL1-	953+25 to 953+75, left
-SBL1-	959+00 to 960+00, left
-SBL1-	963+00 to 966+25, left
-SBL1-	968+75 to 982+75, left
-L2-	1049+75 to 1052+00

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>
-NBL1-	912+50 to 914+00

6) Groundwater: The following areas exhibited groundwater within six feet of the proposed grade:

<u>Alignment</u>	<u>Station (±)</u>
-SBL1-	931+25 to 931+75
-SBL1-	953+25 to 953+75, left

The following areas exhibited groundwater within three feet of existing grade, which have the potential to cause subgrade problems during construction:

<u>Alignment</u>	<u>Station (±)</u>
-SBL1-	931+25 to 931+75
-SBL1-	947+25 to 948+00, left
-SBL1-	953+00 to 959+75, left
-SBL1-	971+50 to 983+50, 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>
-NBL1-	892+00 to 895+50, right
-NBL1-	982+70 to 983+40
-L2-	1050+40 to 1050+88

8) Organic Soils: The following location was found to contain organic-laden soils (greater than 4% organic and 4 inches in thickness), which have the potential to cause subgrade problems during construction, embankment instability, or long-term settlement problems. Organic content tests were performed on 1 sample, and the result was 63.9% organic content:

<u>Alignment</u>	<u>Station (±)</u>	<u>Association</u>
-SBL1-	937+25 to 941+50, left	Muck

Physiography and Geology

The proposed road widening will accommodate additional lanes in the eastbound and westbound directions. The widening will generally remain within existing right-of-way. The existing centerline elevations of the proposed widening gradually ascend and descend throughout the project. At the beginning of the project at -L1- station 872+00, the roadway elevation (EL) starts at EL ±2,155 feet and gradually descends to EL ±2,111

feet at about -NBL1- and -SBL1- station 884+00. From there, the existing roadway stays fairly flat in elevation on both -NBL1- and -SBL1- until reaching about -NBL1- station 900+00. The existing roadway then gradually descends until reaching EL $\pm 2,052$ feet at about -SBL1- station 941+00 and EL $\pm 2,048$ feet at about -NBL1- station 953+00. At this point the existing roadway becomes bifurcated with independent roadway grades varying as much as 25 feet difference in elevation between the northbound and southbound lanes, from about station equality -NBL1- 944+00 and -SBL1- 943+67 to about station 980+00 (-NBL1- and -SBL1-). From there, the existing roadways ascend until reaching EL $\pm 2,096$ feet at about -NBL1- station 967+00 and EL $\pm 2,073$ feet at about -SBL1- station 969+00. For the rest of the project the existing roadway elevation ascends and descends from as low as EL $\pm 2,052$ feet at -L2- station 1033+00 to as high as EL $\pm 2,098$ feet at the end of the project at -L2- station 1055+00.

The surface water across the project is generally drained by many small unnamed tributaries of the French Broad River. The French Broad River is located about 1 mile west of the proposed widening near the beginning of the project, and then runs approximately parallel within 300 to 500 feet of the existing interstate from about station -SBL1- 920+00 to the end of the project. Numerous small tributaries run in an approximate southeast-to-northwest or east-to-west direction and are able to cross beneath the existing roadway via various sizes of existing corrugated metal pipes throughout the project. Lake Julian, a reservoir for the Duke Energy Asheville Plant, is located east-northeast of the proposed widening and drains to the French Broad River via an open channel from the spillway to a culvert beneath I-26 at about -NBL- station 983+50 and -SBL- station 983+75.

The project is located in the Blue Ridge Physiographic Province of North Carolina. More-specifically, it is located in an area mapped as muscovite-biotite gneiss (Zatm). Typical weathered rock samples recovered from our borings primarily exhibit the characteristics of biotite 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 profile. 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 4 borings. The AF extended to depths ranging from 0 to 13.5 feet. The artificial fill was typically described as moist, soft to stiff, sandy SILT (A-4) and silty CLAY (A-7). A majority of the samples contained trace organic matter, mica, and gravel. Although

boulders were not encountered in borings containing artificial fill, they may be encountered in other unexplored areas of the project.

Roadway Embankment: Roadway embankment (RE) soils were encountered at the surface of 47 borings. The RE extended to depths ranging from 0 to 42 feet, with most about 7 feet or less in depth. The fill was typically described as moist to wet, very soft to very stiff, sandy and clayey SILT (A-4 & A-5) and soft to very stiff, sandy and silty CLAY (A-7). A majority of the samples contained trace organic matter, mica, and gravel. Boulders were encountered in boring B-92 and may be encountered in other unexplored areas of the project.

Alluvial Soil: Alluvial soils were encountered in 24 borings. The alluvial soils were typically encountered below artificial fill and roadway embankment, and in some locations at the ground surface where they were associated with the French Broad River floodplain and varying-sized drainage systems crossing the alignment. The alluvial soils extended to depths ranging from 0 to 19.1 feet with an average depth of about 5.5 feet. The alluvial soil types were variable and typically described as wet to saturated, loose to medium dense, silty SAND (A-1-b & A-2-4), moist to saturated, very soft to soft, sandy and clayey SILT (A-4 & A-5), and moist to saturated, very soft to stiff, sandy and silty CLAY (A-6 & A-7). A majority of the soil samples contained trace organic matter, mica, and gravel, although 2 borings (B-51 & B-53) encountered organic-laden soils (greater than 4% organic and 4 inches in thickness). Organic content tests were performed on 1 sample, and the result was 63.9% organic content.

Residual Soil: A majority of the soils encountered on this project were residual soils. Residual soils were encountered at the surface of 49 borings, below artificial fill at 6 borings, below alluvial soils at 9 borings, and below roadway embankment at 29 borings. No residual soils were encountered in 24 borings, and these borings were terminated in artificial fill, roadway embankment, alluvial soils, or weathered or crystalline rock. A majority of the borings that did not include residual soils were hand auger/sounding rod borings. The residual soils were variable and typically described as moist to wet, loose to dense, silty SAND (A-2-4), soft to very stiff, sandy and clayey SILT (A-4 & A-5), and sandy and silty CLAY (A-6 & A-7). A majority of the samples contained varying amounts of mica, manganese, and rock fragments.

Rock Properties

Weathered Rock (WR) was encountered in 33 borings. Of these 33 borings, 10 terminated in WR, and 23 terminated in or on Crystalline Rock (CR). Six of the borings encountered intermediate layers of WR before re-encountering soils below these layers. All of these six borings re-encountered WR and/or CR at boring termination. These intermediate zones of WR ranged in thickness from about 2.5 to 10 feet. Excluding the intermediate zones of WR, the WR was encountered at depths ranging from about 4 to 72 feet and elevations ranging from about 1,997 to 2,151 feet.

CR was encountered in 48 borings as indicated by auger and SPT refusal. All of the 48 borings were terminated in or on CR. Of these 48 borings, 3 transitioned directly from roadway embankment soils to CR, 4 transitioned directly from alluvial soils to CR, 19 transitioned directly from residual soils to CR, and 22 encountered WR before being terminated in or on CR. One boring (B-95) encountered an intermediate layer

of CR before re-encountering soils below this layer. The WR layers above the CR varied in thickness from 0.7 to 26.3 feet. The CR was encountered at depths ranging from about 2 to 75 feet, or elevations ranging from about 1996 to 2124 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, but is anticipated to represent the bedrock level.

Groundwater Properties

Generally, groundwater measurements were attempted in a majority of the borings along the project immediately upon their completion and after a stabilization period of approximately 24 hours. Immediately upon completion, groundwater was encountered in 30 borings at depths ranging from the ground surface to 51.4 feet, and elevations ranging from about 2023.4 to 2062.9 feet. Groundwater measurements were not attempted in the 15 hand auger borings, and eighteen borings were backfilled immediately upon their completion. Stabilized groundwater was encountered in 31 borings at depths ranging from 0.9 to 47.5 feet, and elevations ranging from 2023.3 to 2076.0 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.

Geotechnical Descriptive Analysis of the Project

For descriptive purposes, the project has been divided into three segments. The division of the segments is primarily based on the centerline topography of the proposed roadway.

Segment 1: -L1- Station 872+00 to 883+70, -NBL1- Station 883+70 to 944+00, -SBL1- Station 883+70 to 943+67 (±):

Segment 1 of the project generally consists of widening existing I-26 approximately 3500 feet upstation from NC 280 (Airport Road, Exit 40) to just northwest of Mahogany Road, with no impacts on residential properties. The project begins at an existing elevation (EL) of ±2,155 feet at -L1- station 872+00, which is the maximum elevation in this segment. The lowest elevation of this segment exists at -SBL1- station 983+50 at EL ±2,049 feet, which is about at the Lake Julian drainage feature crossing.

This segment requires maximum fills up to about 25 feet as measured on the right side of the road, and occurs at about -SBL1- station 907+00. Fills in this segment range from sliver fills to 25 feet, with an average fill requirement of about 7 feet. Other locations where significant fill depths are required include: -SBL1- station 905+00 (21' fill) and 915+00 (20' fill). The subgrade within the areas of proposed fills is anticipated to consist of mainly soft to very stiff roadway embankment silts (A-4 & A-5) and clays (A-6 & A-7), very loose to medium dense roadway embankment sands (A-1-b, A-2-4 & A-2-6), and soft to very stiff residual clays (A-7).

This segment requires mainly sliver cuts and cuts of 4 feet or less. There is a 7 foot cut at -NBL1- station 933+00 leading up to the maximum cut of the section which is about 11 feet as measured on the right side of the road at -NBL1- station 935+00. The unclassified excavation to be encountered in the cuts is anticipated to consist of mainly soft to hard residual silts and clays (A-4, A-5 & A-7) and loose to very dense residual sands (A-2-4). However, weathered and crystalline rock may also be encountered in proposed cuts right of the -NBL1- alignment at about station 892+25 to 892+75.

Segment 2: -NBL1- Station 944+00 to 985+00, -SBL1- Station 943+67 to 985+00 (±):

Segment 2 of the project generally consists of widening existing I-26 from just northwest of Mahogany Road to a private gravel access road that crosses beneath I-26. This segment has no impacts on residential and commercial properties. The existing northbound and southbound lanes are bifurcated through this segment and were constructed with independent roadway grades varying as much as 25 feet difference in elevation from about station equality -NBL1- 944+00 and -SBL1- 943+67 to about station 980+00 (-NBL1- and -SBL1-). The minimum elevation of -NBL1- of segment 2 is EL ±2,048 feet, and the maximum elevation is EL ±2,073 feet. The minimum elevation of -SBL1- of segment 2 is EL ±2,059 feet, and the maximum elevation is EL ±2,096 feet.

This segment requires maximum fills up to about 20 feet as measured on the right side of the road, which occurs at -NBL1- station 983+00. Fills in this segment range from sliver fills to 20 feet, with the average fill requirement of about 8 feet. Other locations where significant fill depths are required include: -NBL1- station 953+00 requiring a 14-foot fill, -NBL1- station 955+00 requiring a 13-foot fill, and -SBL1- station 957+00 to 959+00 requiring an 8-foot fill. The subgrade within the areas of proposed fills is anticipated to consist of mainly very soft to stiff roadway embankment silts (A-4 & A-5) and clays (A-7), very soft to soft alluvial silts (A-4 & A-5) and clays (A-6), soft to very stiff residual silts (A-4 & A-5) and clays (A-6), and soft to very stiff artificial fill silts (A-4).

This segment requires maximum cuts of about 12 feet on the left and right sides of the road at -NBL1- and -SBL1- station 963+00. Cuts in this segment range from sliver cuts to 12 feet, with an average cut depth of about 7 feet. Other locations where significant cut depths are required include -NBL1- and -SBL1- station 957+00 to 971+00, with 7- to 10-foot cuts. The unclassified excavation to be encountered in the cuts is anticipated to consist of mainly residual silts, clays, and sands along with some roadway embankment silts and clays. The subgrade within the areas of proposed cuts is anticipated to consist mainly of soft to very stiff roadway embankment silts (A-4) and clays (A-7), soft to stiff artificial fill silts (A-4), loose to very dense residual sands (A-1-a, A-2-4 & A-2-5), and soft to hard residual silts (A-4 & A-5). Weathered and crystalline rock are also anticipated to be encountered in proposed cuts in this segment in the following areas: about -NBL1- station 944+25 to 949+25, 960+75 to 969+25, and 978+75 to 979+25; about -SBL1- station 946+25 to 947+75 right, and 963+75 to 971+25, right.

Segment 3: -NBL1- Station 985+00 to 996+90.85, -SBL1- Station 985+00 to 996+99.52, -L2- Station 997+00 to 1055+00 (±):

Segment 3 of the project generally consists of widening existing I-26 approximately from a private gravel access road that crosses beneath I-26 to the end of the project just north of dual bridges over a private gravel service road. This segment has no impacts on residential properties and few to no impacts on commercial properties. Segment 3 begins at an existing elevation (EL) of ±2,064 feet and ends at existing EL ±2,097 feet. The ground surface elevations gradually ascend and descend from the beginning of the segment to about -L2- station 1033+00, where it then ascends to its maximum EL ±2,097 feet at the end of the project.

This segment requires maximum fills up to about 16 feet as measured on the left side of the road, which occurs at about -L2- station 1023+00. Fills in this segment range from sliver fills to 16 feet, with the average fill requirement of about 9 feet. Other locations where maximum fill depths are required include: -SBL1- station 985+00 and -L2- station 999+00, where 12-foot fills are required, and -L2- stations 1031+00 to 1055+00 where 9- to 16-foot fills are required. The subgrade within the areas of proposed fills is anticipated to consist of mainly soft to very stiff roadway embankment silts (A-4 & A-5) and clays (A-7) and residual silts (A-4 & A-5).

This segment requires maximum cuts of about 14 feet as measured on the right side of the road, and occurs at -L2- station 1033+00. Cuts in this segment range from sliver cuts to 14 feet, with an average cut depth of about 8 feet. Other locations where maximum cut depths are required include: -L2- stations 1037+00 and 1043+00, with both requiring 9-foot cuts, and -L2- station 1039+00 which requires an 11-foot cut. The unclassified excavation to be encountered in the cuts is anticipated to consist of mainly of residual silts and sands. The subgrade within the areas of proposed cuts is anticipated to consist mainly of stiff residual clays (A-6) and medium dense to dense sands (A-2-4). Weathered and crystalline rock are also anticipated to be encountered in proposed cuts in this segment in the following areas: about -L2- station 997+00 to 998+25, right; and about -NBL1- station 991+25 to 996+90.85, right.

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:

 Patrick Alton, P.E.
 Transportation Services Manager

DocuSigned by:

 Derick Racey
 Geotechnical Project Manager

Appendix A

Bulk Samples

The following bulk samples were 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	B-76	-NBL1-	946+71	203' Rt.	2.5-10.0'	Standard Proctor, CBR
CBR-2	B-19	-NBL1-	895+66	124' Rt.	5.0-15.0'	Standard Proctor, CBR

Undisturbed Samples

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

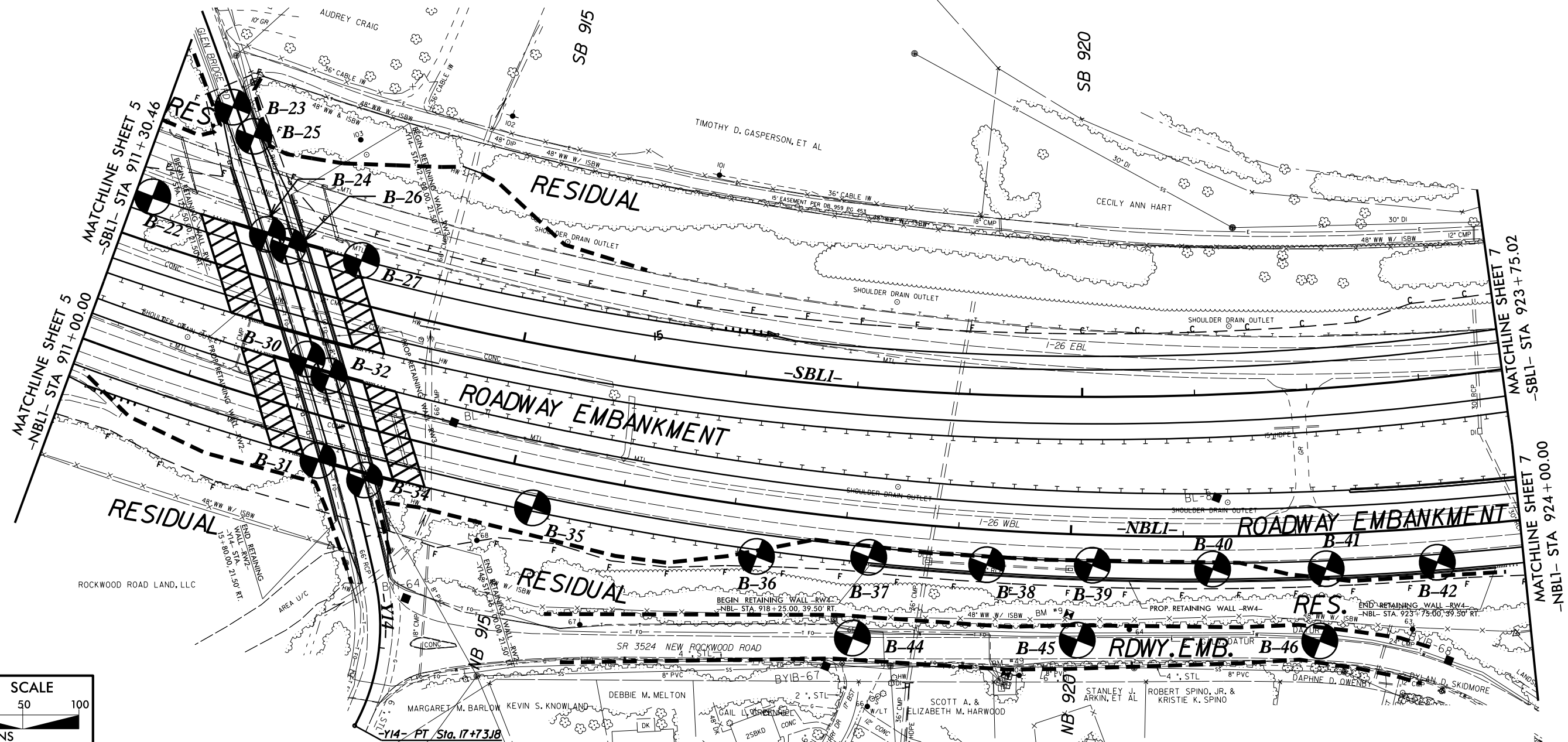
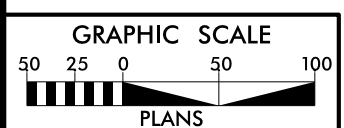
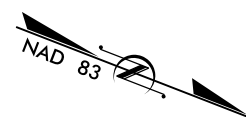
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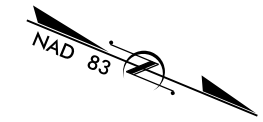


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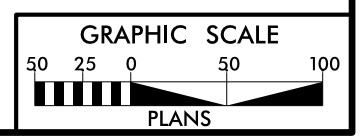
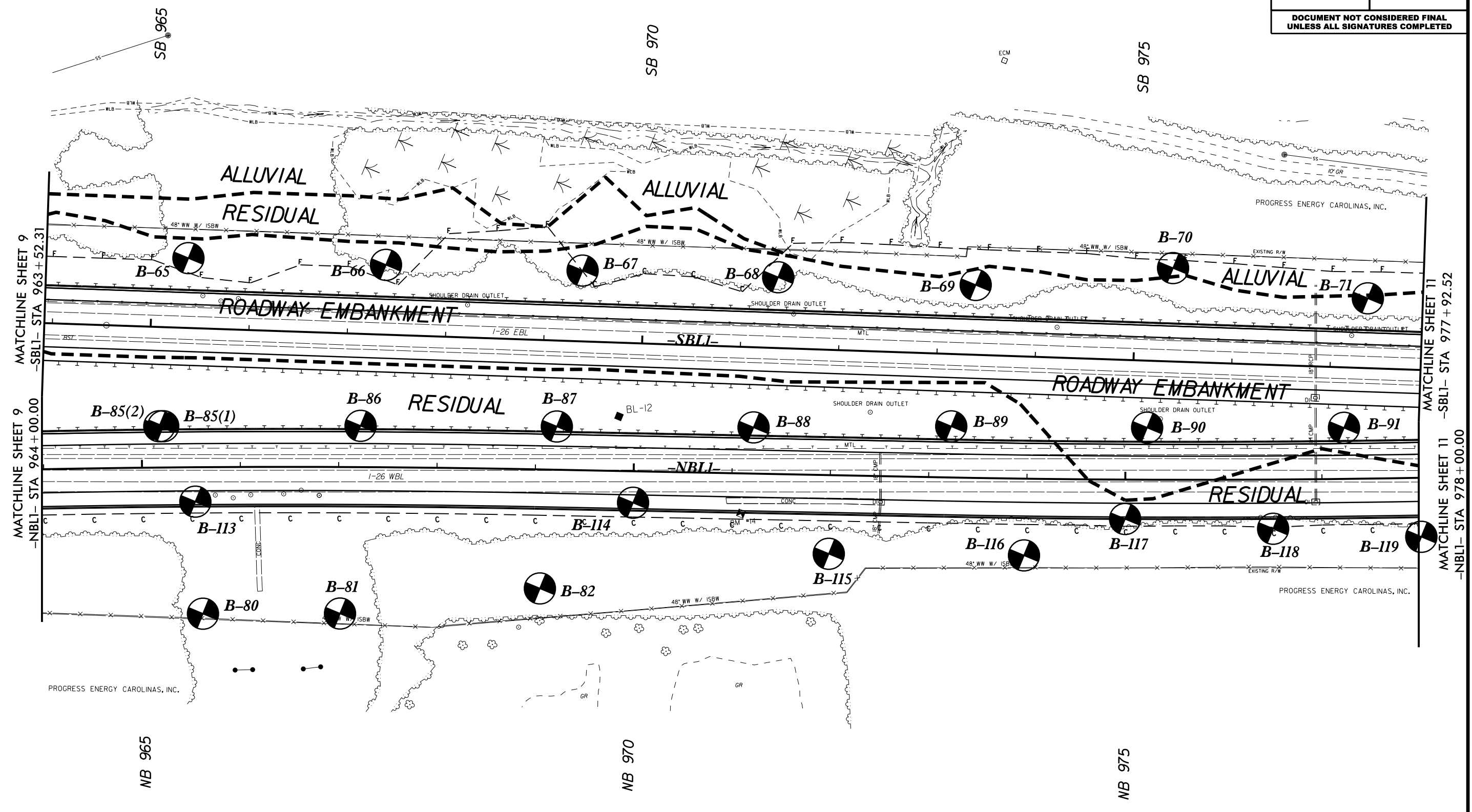
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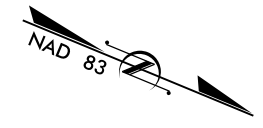
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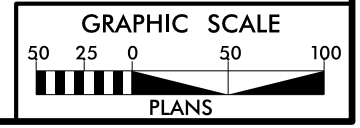
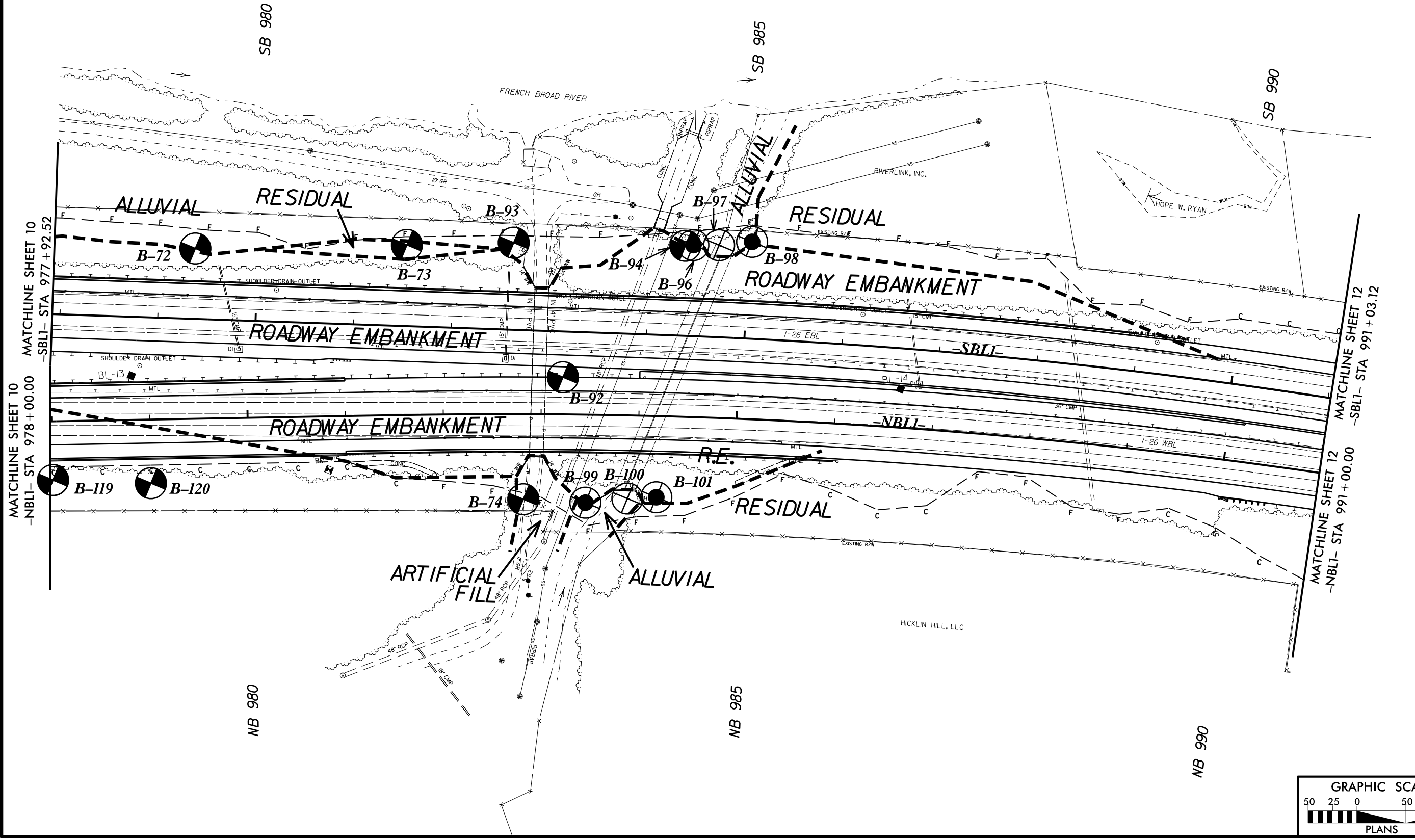
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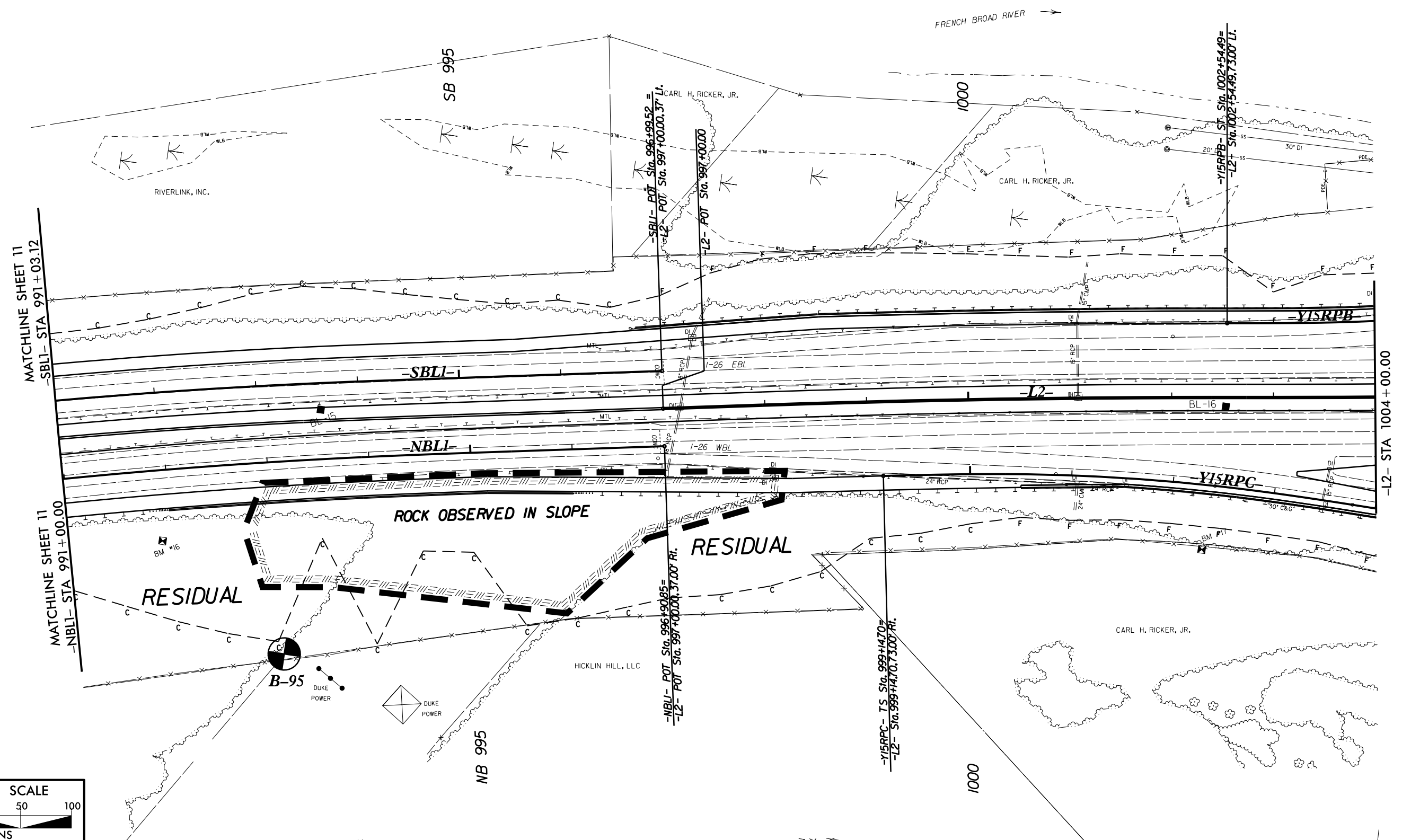
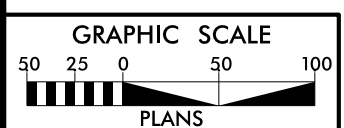
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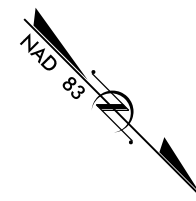
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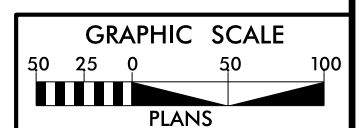
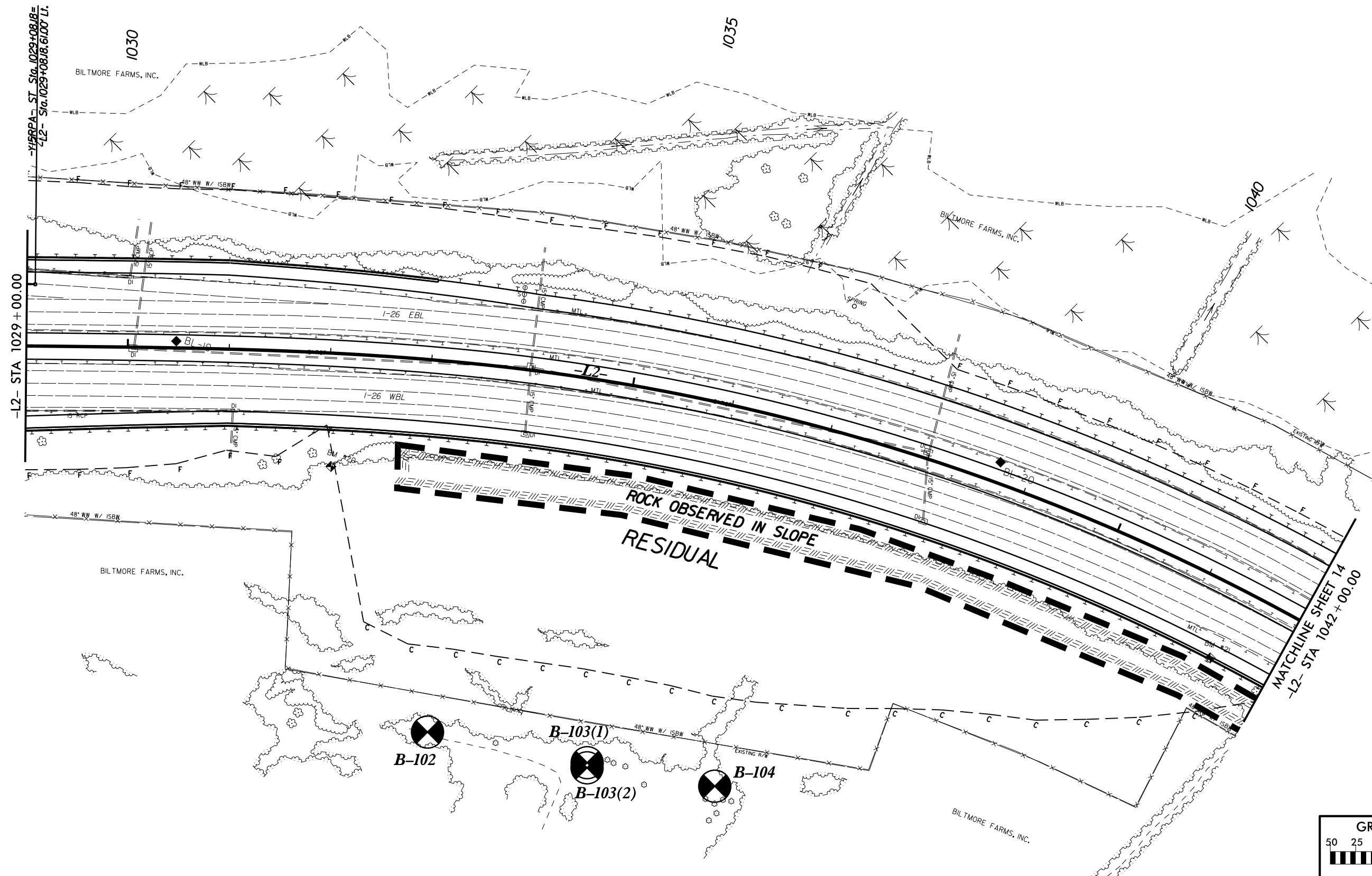
HNTB SINCE 1881
 Prepared in the Office of:
F&R FROEHLING & ROBERTSON, INC.
 Engineering Stability Since 1881
 310 Hubert Street
 Raleigh, North Carolina 27603-2302 USA
 T 919.828.3441 F 919.828.5751
 www.fandr.com

PROJECT REFERENCE NO. 1-4700A	SHEET NO. 13
RW SHEET NO. ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
INCOMPLETE PLANS DO NOT USE FOR A/W ACQUISITION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



REVISIONS

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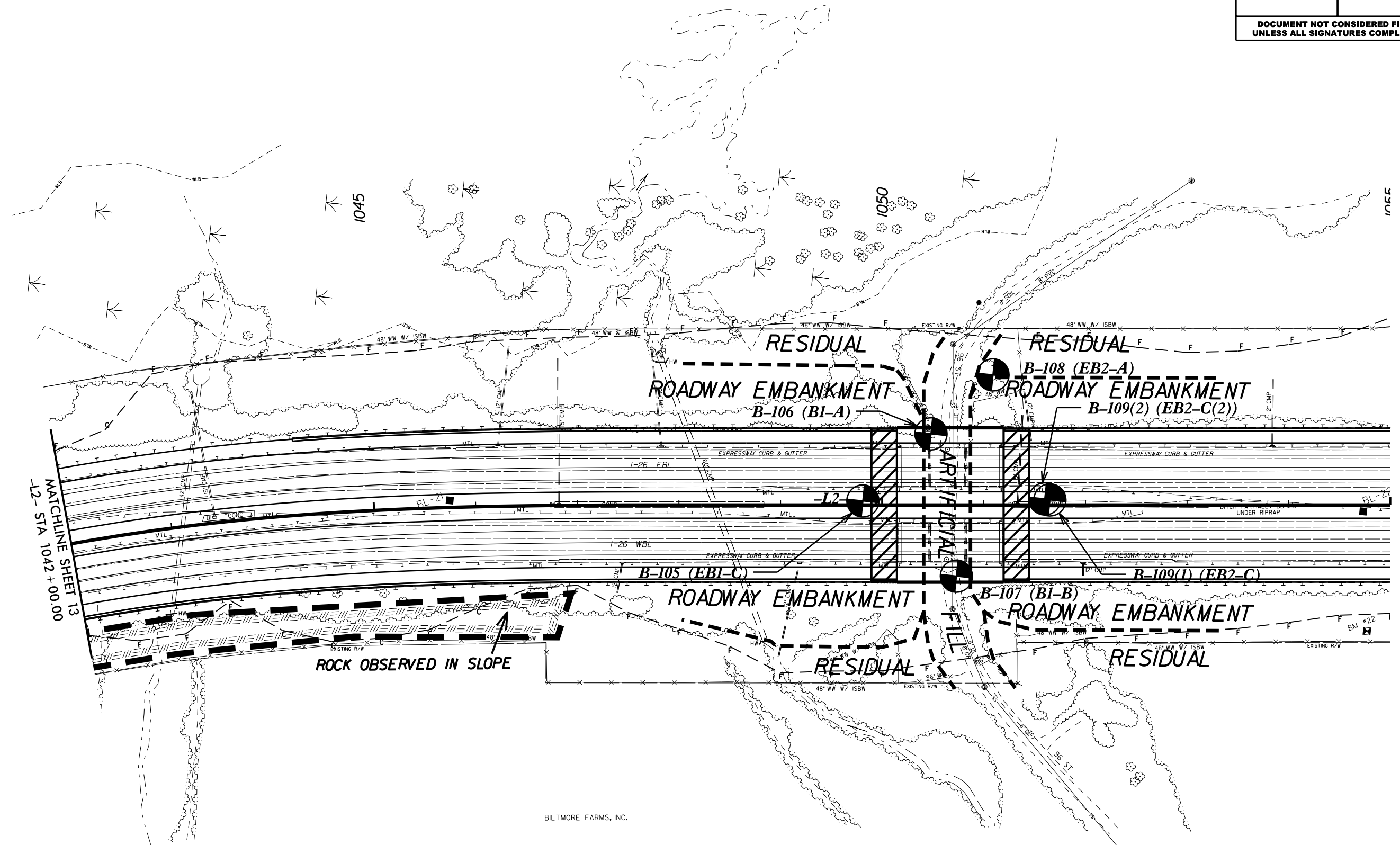
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REVISIONS



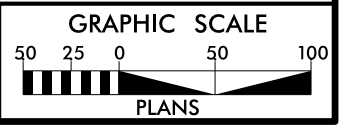
HNTB SINCE 1881
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PROJECT REFERENCE NO.	SHEET NO.
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RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

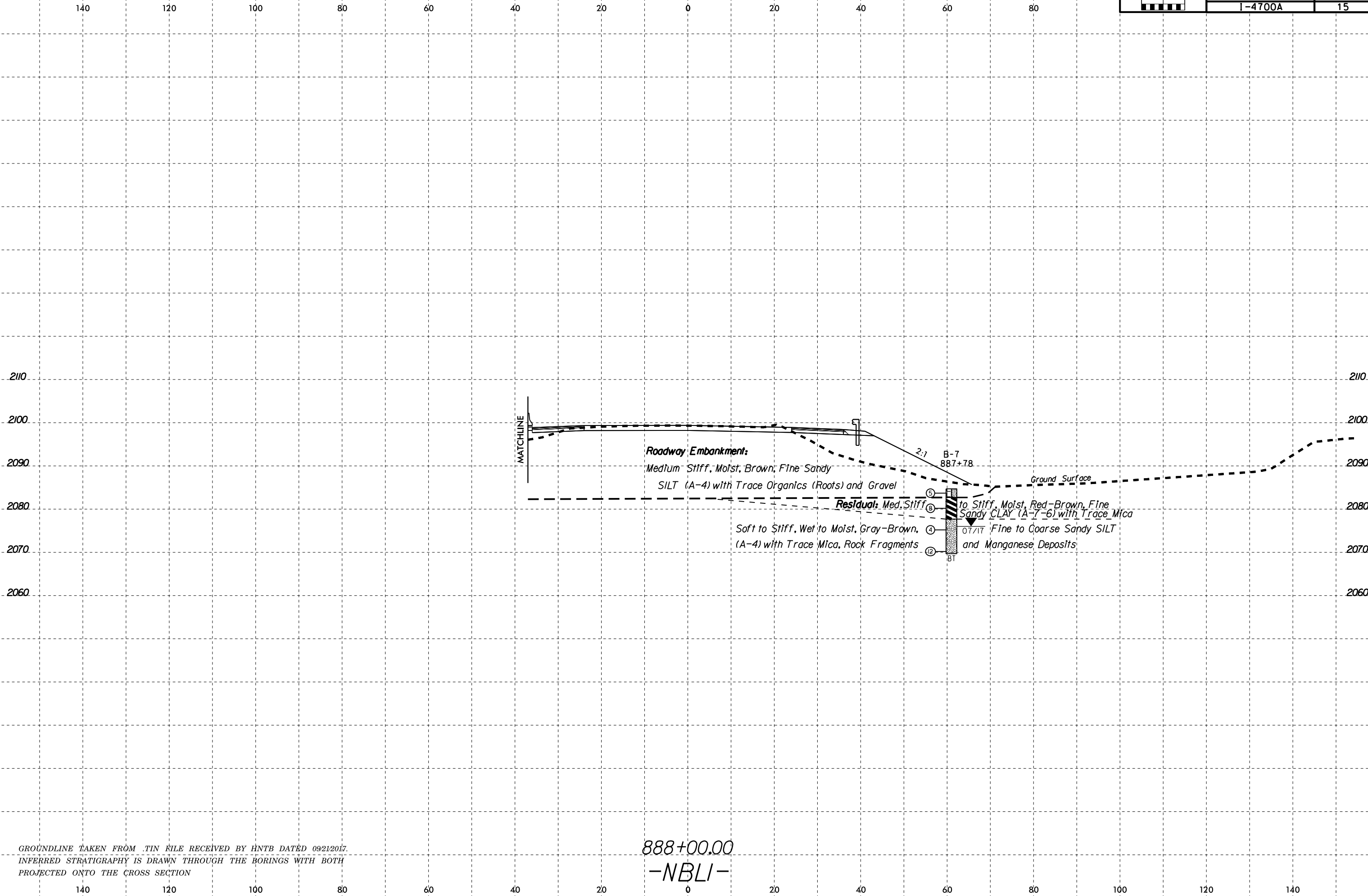


MATCHLINE SHEET 13
 -12- STA 1042 + 00.00

BILTMORE FARMS, INC.



6/23/16



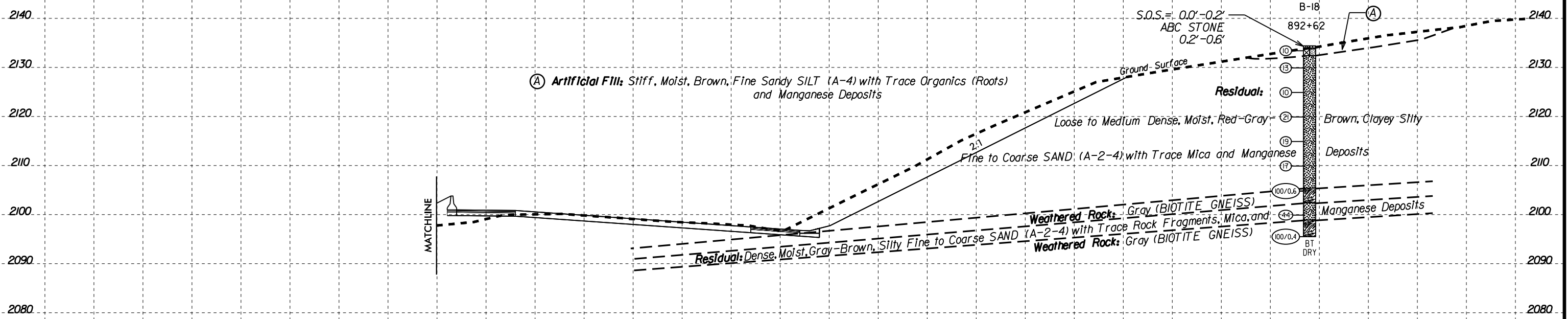
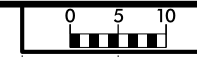
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GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09212017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

888+00.00
-NBLI-

6/23/16

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



(A) Artificial Fill: Stiff, Moist, Brown, Fine Sandy SILT (A-4) with Trace Organics (Roots) and Manganese Deposits

S.O.S. = 0.0'-0.2' ABC STONE 0.2'-0.6'

Residual:

Loose to Medium Dense, Moist, Red-Gray

Brown, Clayey Silty Deposits

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

Weathered Rock: Gray (BIOTITE GNEISS)

Weathered Rock: Gray (BIOTITE GNEISS)

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

Manganese Deposits

BT DRY

MATCHLINE

892+50.00

-NBLI-

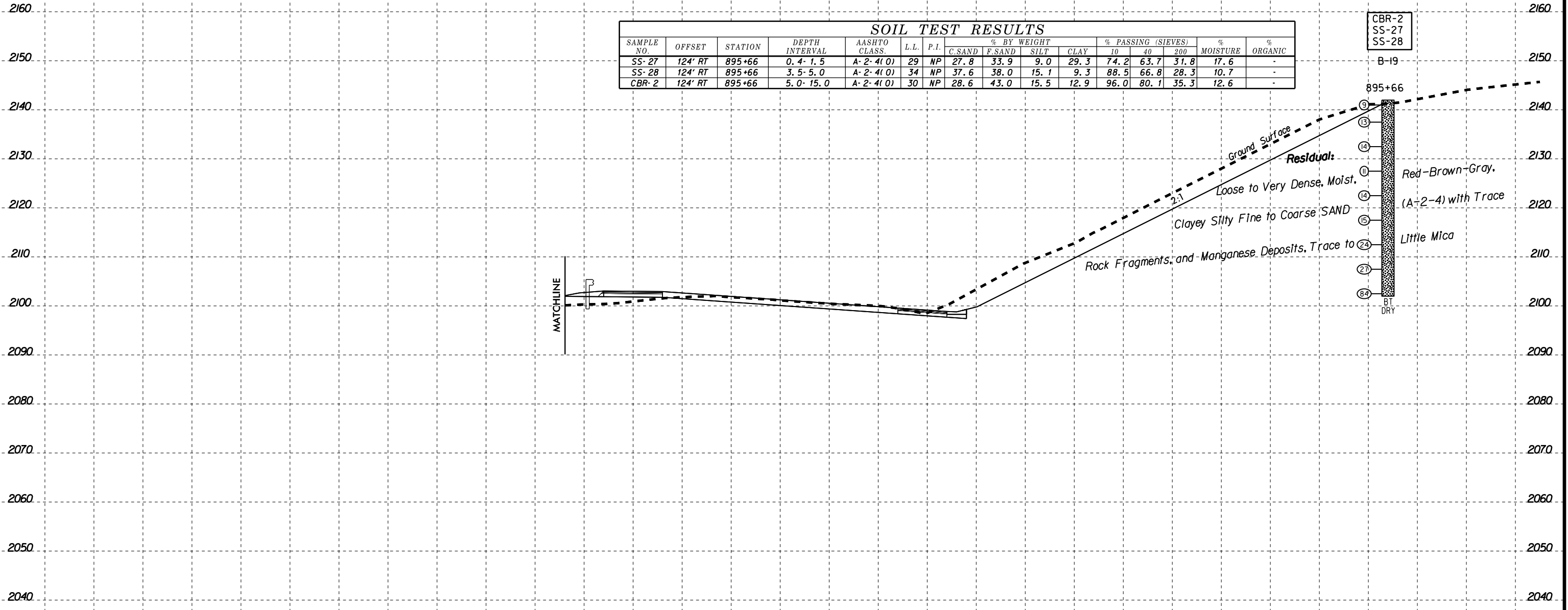
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-27	124' RT	895+66	0.4-1.5	A-2-4(0)	29	NP	27.8	33.9	9.0	29.3	74.2	63.7	31.8	17.6	-
SS-28	124' RT	895+66	3.5-5.0	A-2-4(0)	34	NP	37.6	38.0	15.1	9.3	88.5	66.8	28.3	10.7	-
CBR-2	124' RT	895+66	5.0-15.0	A-2-4(0)	30	NP	28.6	43.0	15.5	12.9	96.0	80.1	35.3	12.6	-

CBR-2
SS-27
SS-28

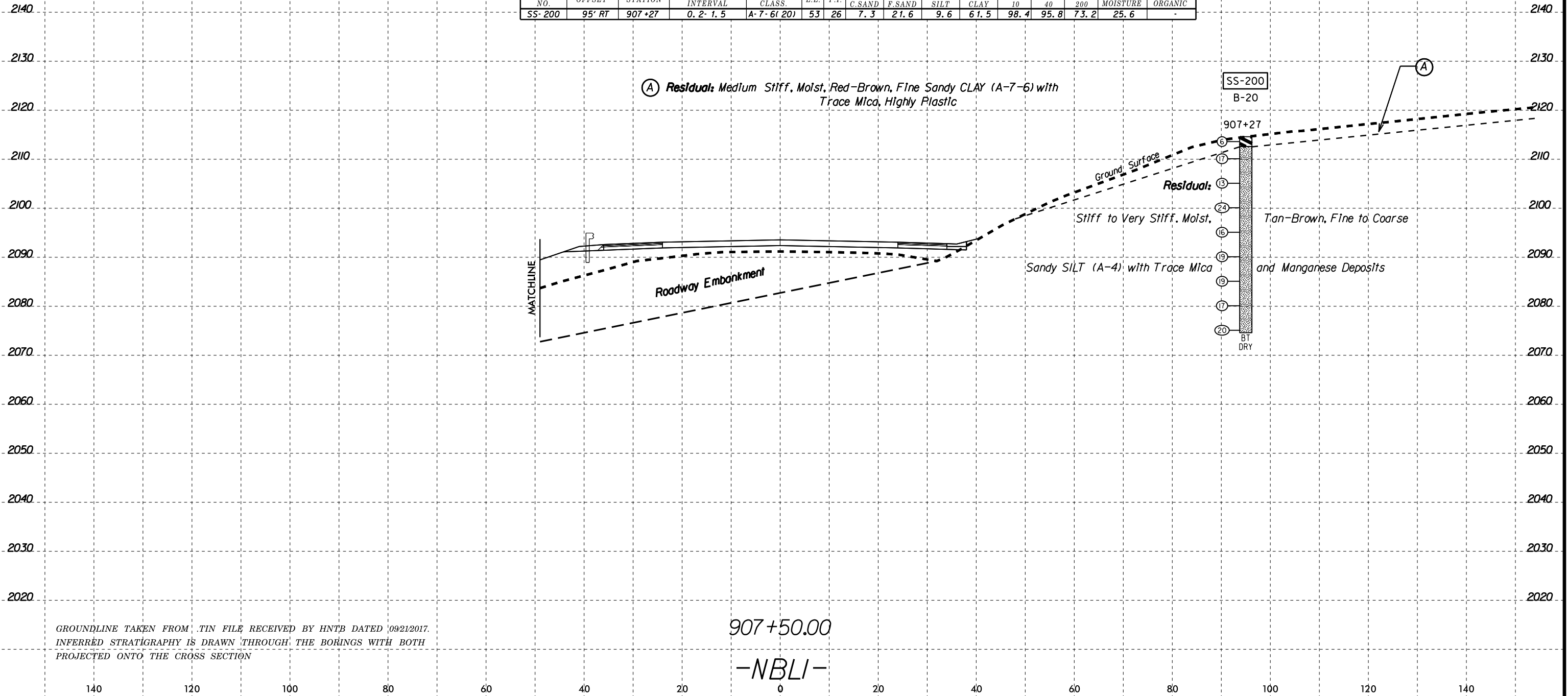


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PROJECTED ONTO THE CROSS SECTION

895+50.00
-NBLI-

6/23/16
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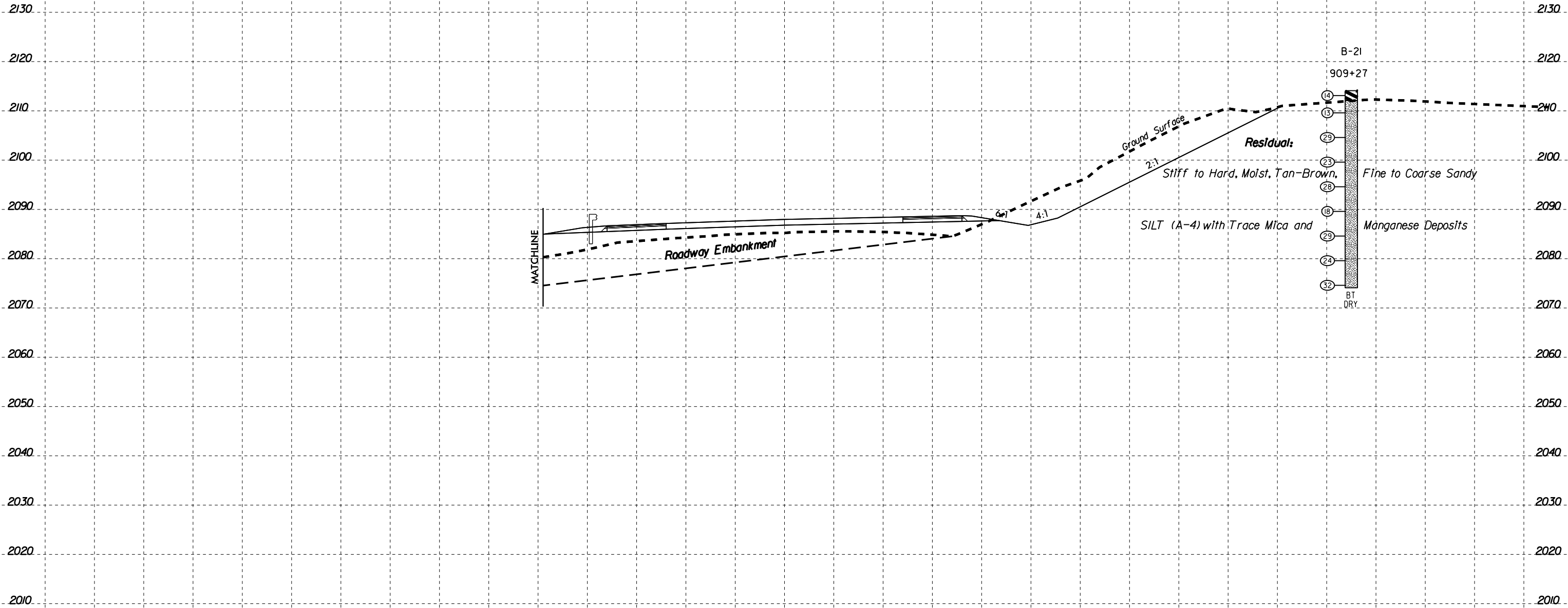
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-200	95' RT	907+27	0.2-1.5	A-7-6(20)	53	26	7.3	21.6	9.6	61.5	98.4	95.8	73.2	25.6	-



GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
 INFERRRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

907+50.00
 -NBLI-

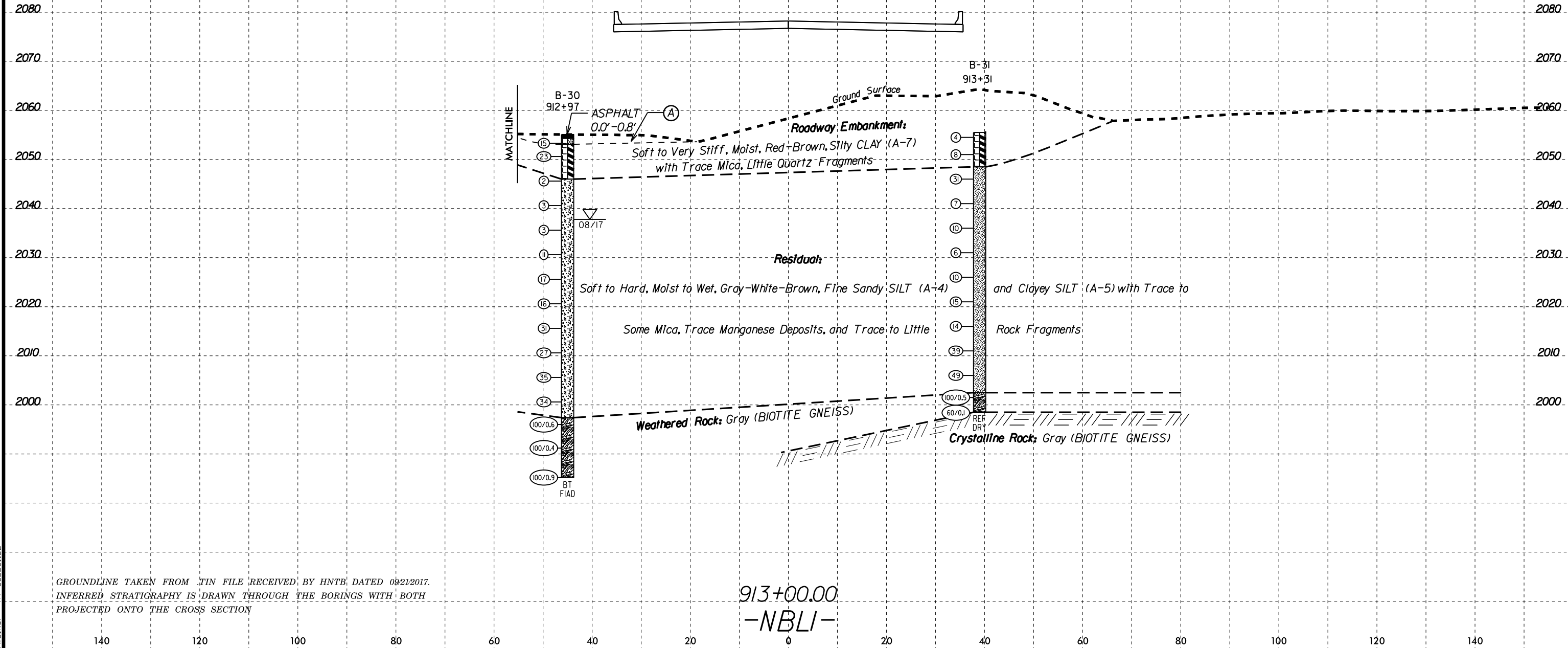
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6/23/16
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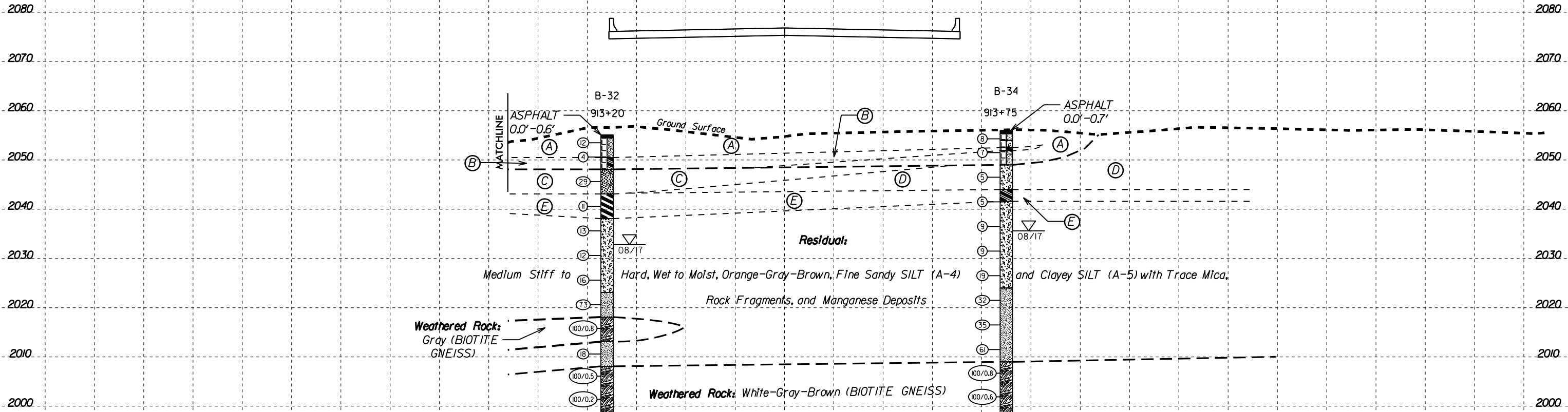
(A) **Roadway Embankment:** Medium Dense, Moist, Brown, Silty Fine to Coarse SAND (A-2-4)



GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB, DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
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913+00.00
-NBL1-

- (A) **Roadway Embankment:** Soft to Stiff, Moist, Red-Gray-Brown, Fine Sandy SILT (A-4) and Clayey SILT (A-5) with Trace Organics (Wood Fragments), Gravel, and Mica
- (B) **Roadway Embankment:** Soft to Medium Stiff, Moist, Black-Red-Brown, Silty CLAY (A-6, A-7) with Trace Gravel and Mica
- (C) **Residual:** Medium Dense, Wet, Tan-Gray-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Clay and Mica, Some Gravel
- (D) **Residual:** Medium Stiff, Wet, Red-Brown-Gray, Fine to Coarse Sandy Clayey SILT (A-5) with Trace Gravel and Mica
- (E) **Residual:** Medium Stiff to Stiff, Saturated, Orange-Brown and Gray, Silty CLAY (A-6, A-7) with Trace Rock Fragments, Micaceous

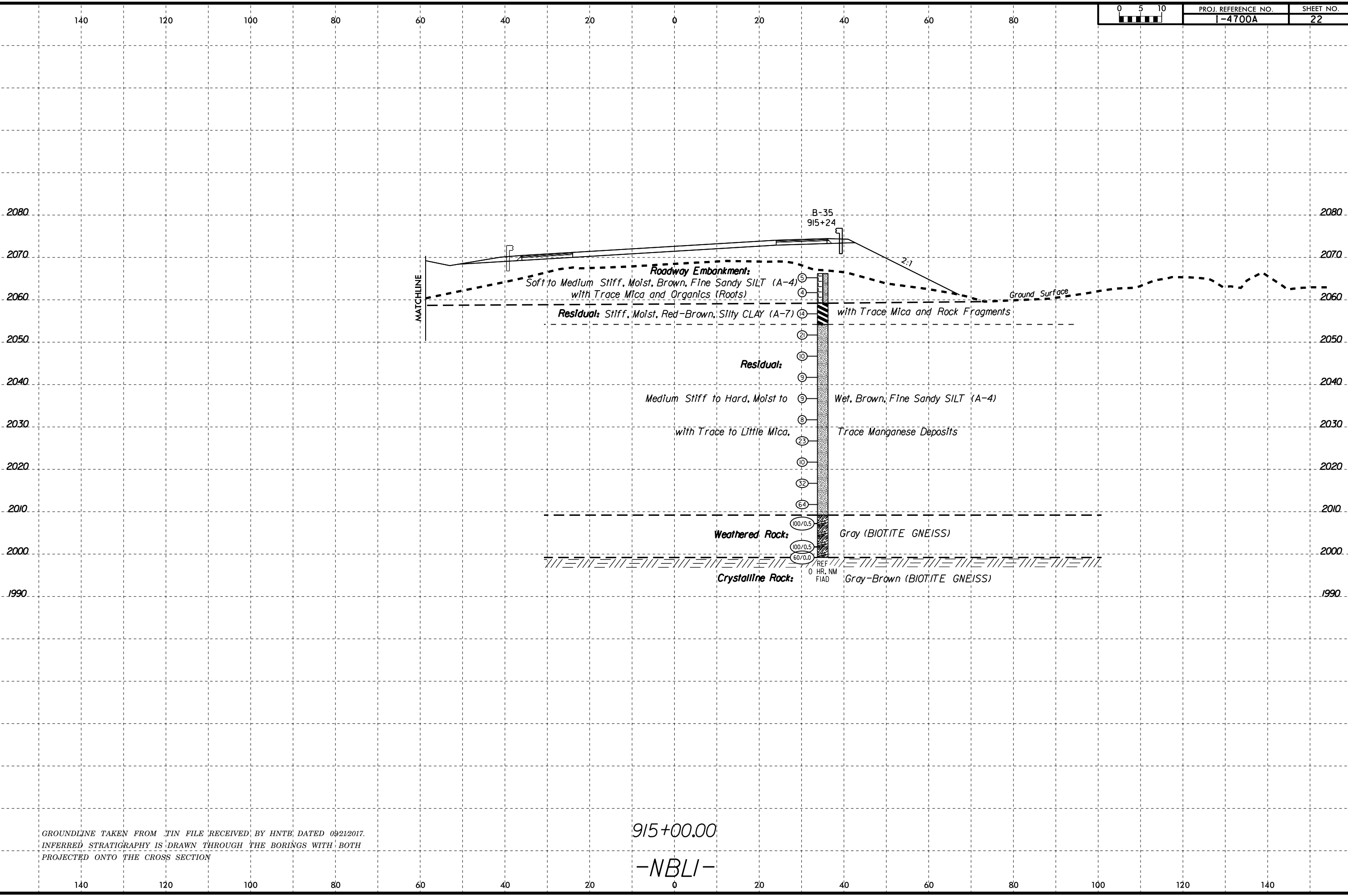


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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

913+50.00
-NBLI-

6/23/16



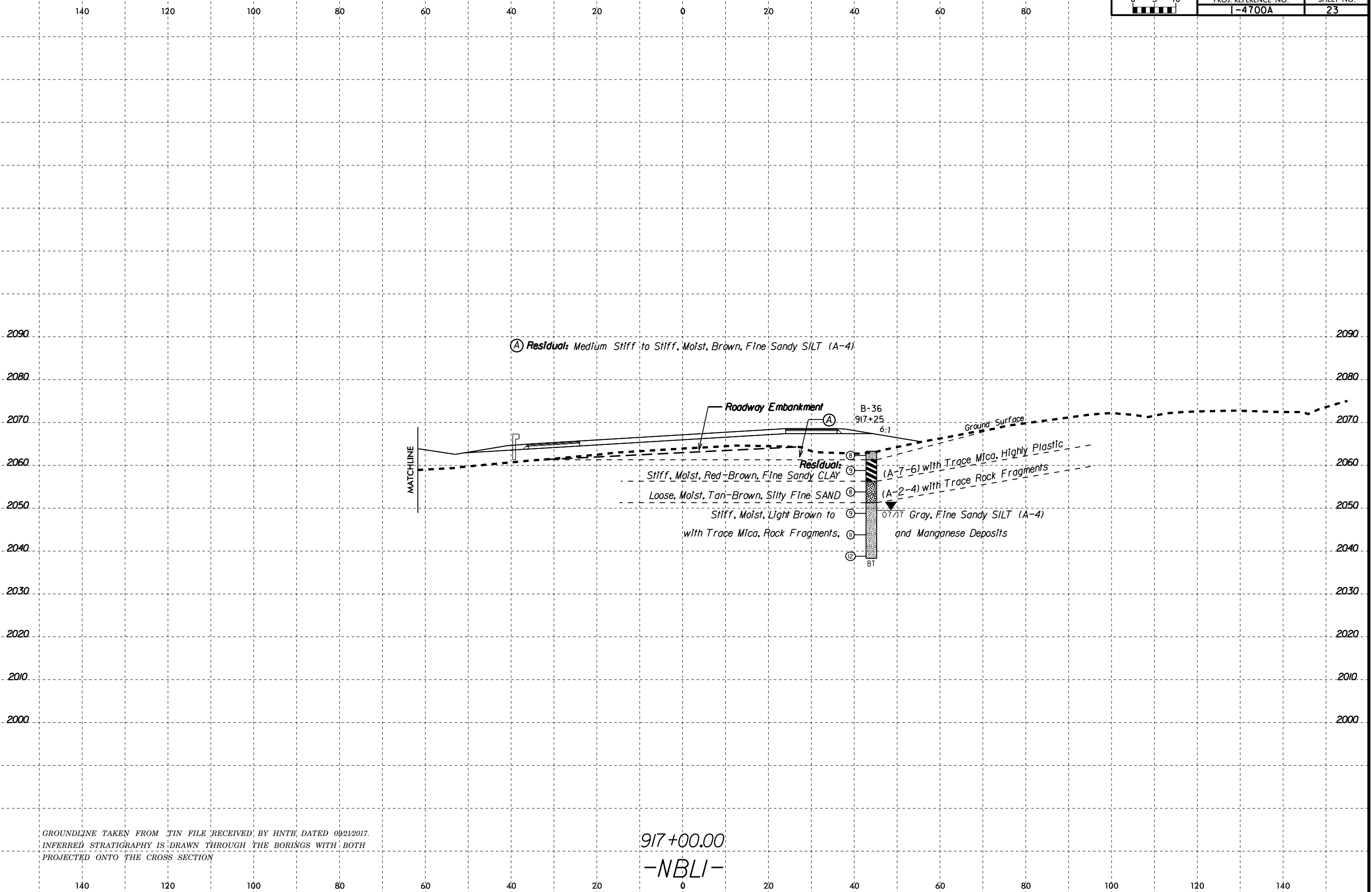
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 Walker

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB, DATED 09/21/2017.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

915+00.00

-NBLI-

6/23/16



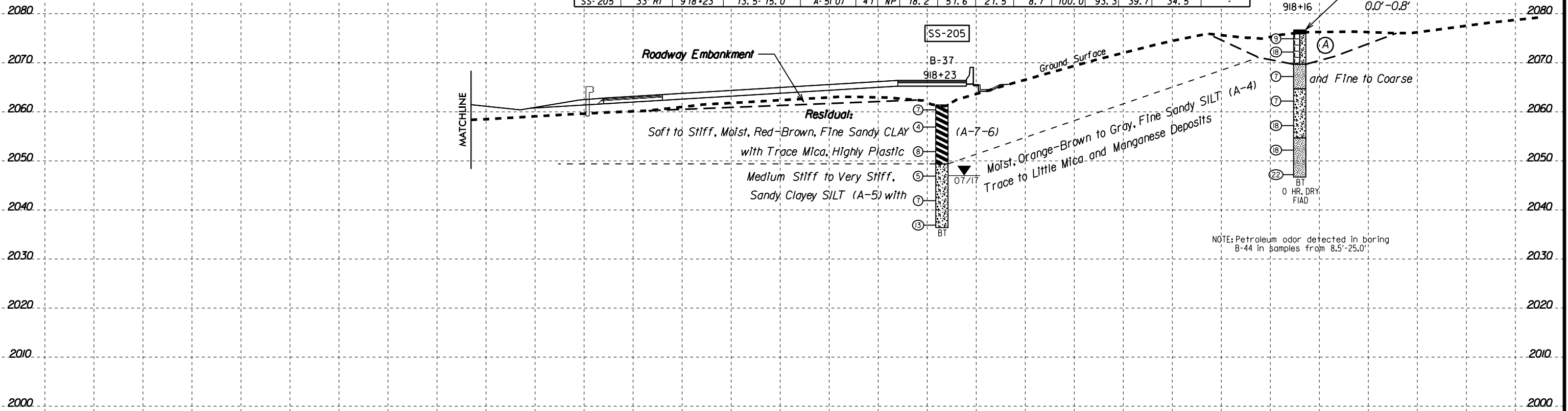
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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB, DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

917+00.00
-NBLI-

(A) Roadway Embankment: Stiff to Very Stiff, Moist, Red, Fine Sandy Clayey SILT (A-5) with Trace Mica

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-205	33' RT	918+23	13.5-15.0	A-5(0)	41	NP	18.2	51.6	21.5	8.7	100.0	93.3	39.7	34.5	-



MATCHLINE

Roadway Embankment

Residual:

Soft to Stiff, Moist, Red-Brown, Fine Sandy CLAY with Trace Mica, Highly Plastic

Medium Stiff to Very Stiff, Sandy, Clayey SILT (A-5) with

Moist, Orange-Brown to Gray, Fine Sandy SILT (A-4) Trace to Little Mica and Manganese Deposits

B-44 918+16

ASPHALT 0.0'-0.8'

(A) and Fine to Coarse

BT 0 HR. DRY FIAD

NOTE: Petroleum odor detected in boring B-44 in samples from 8.5'-25.0'

918+00.00
-NBLI-

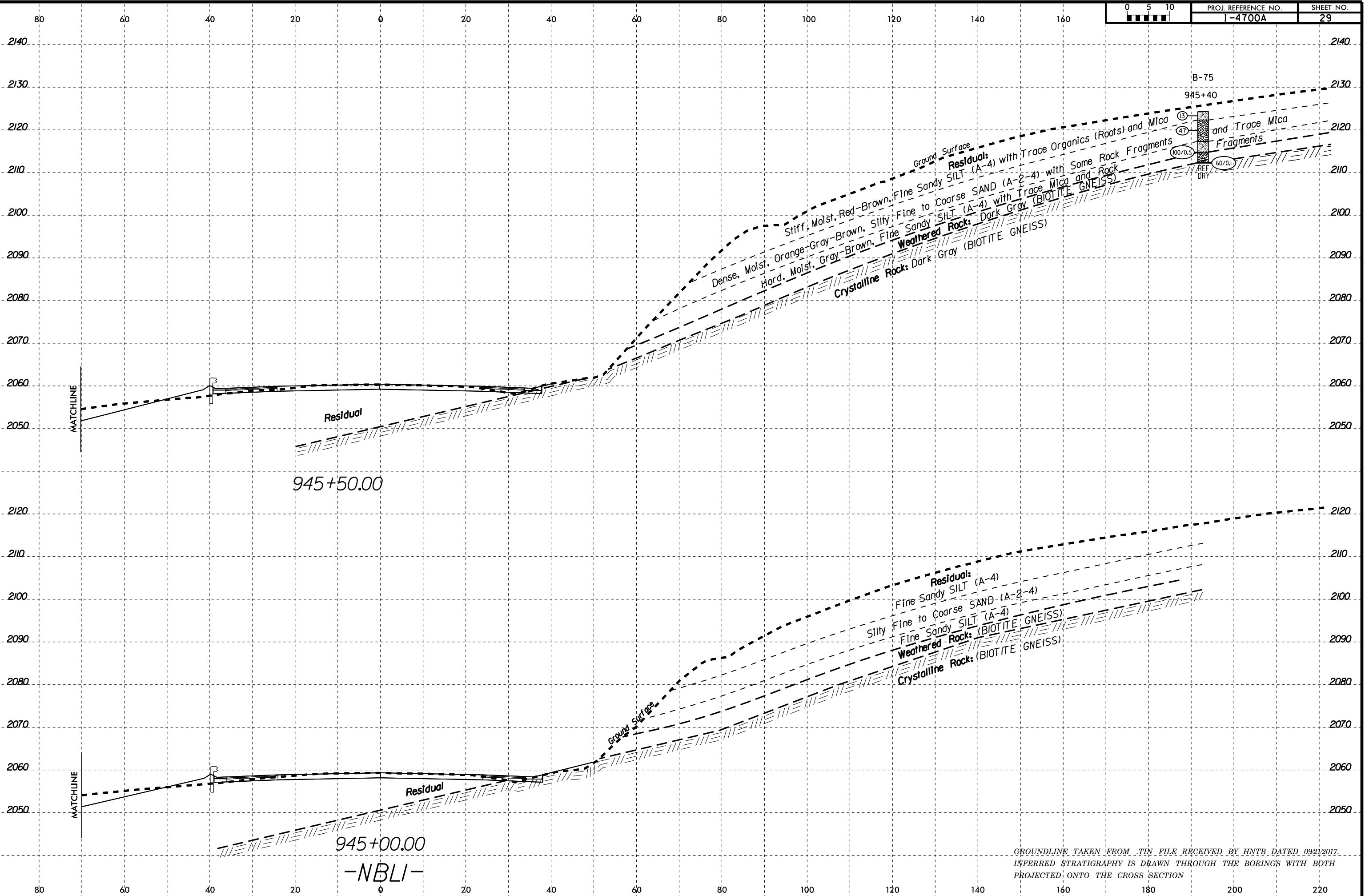
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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
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Walker

6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	29



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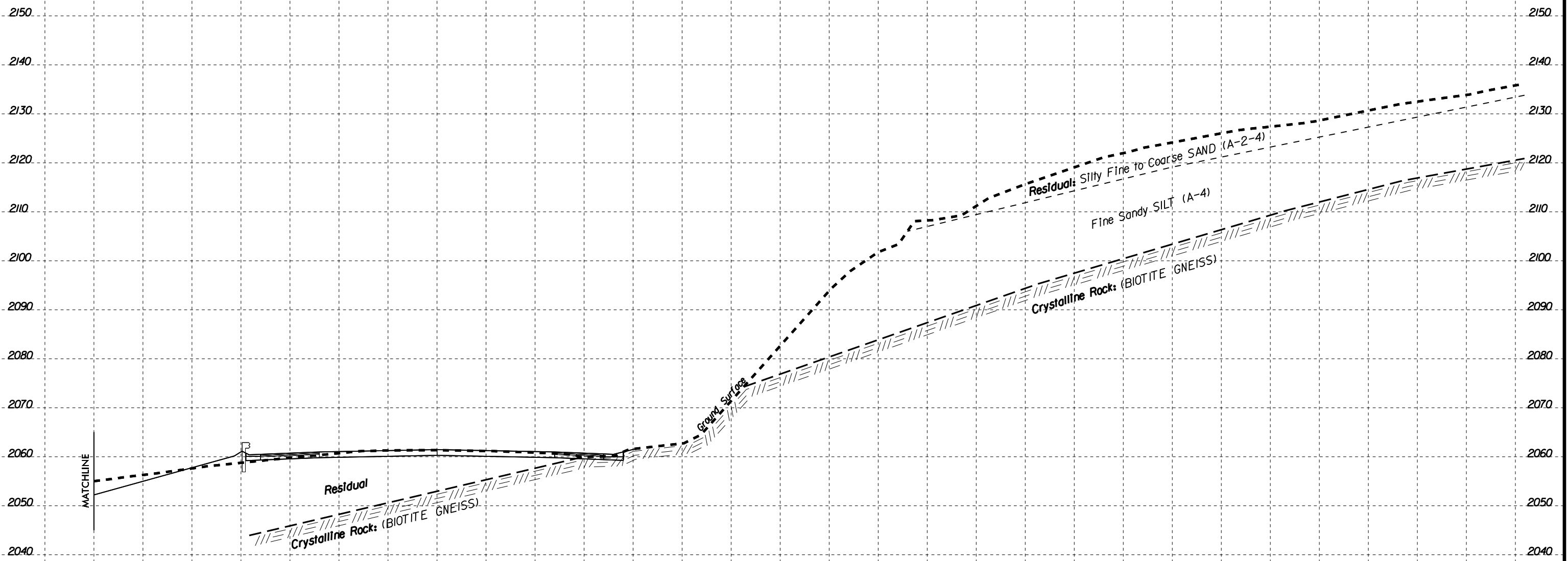
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6/23/16
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946+00.00

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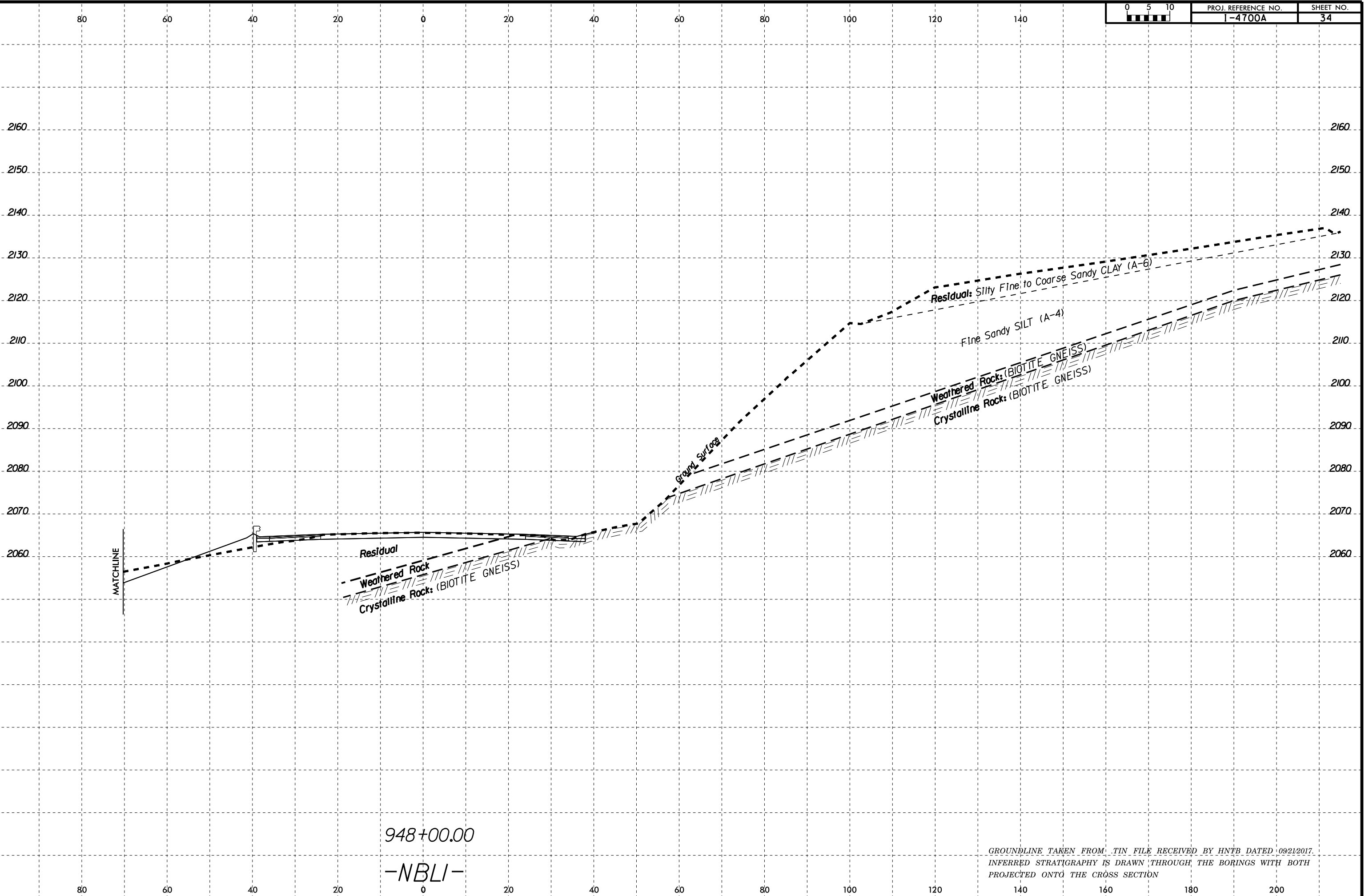
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6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	34



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948+00.00
-NBLI-

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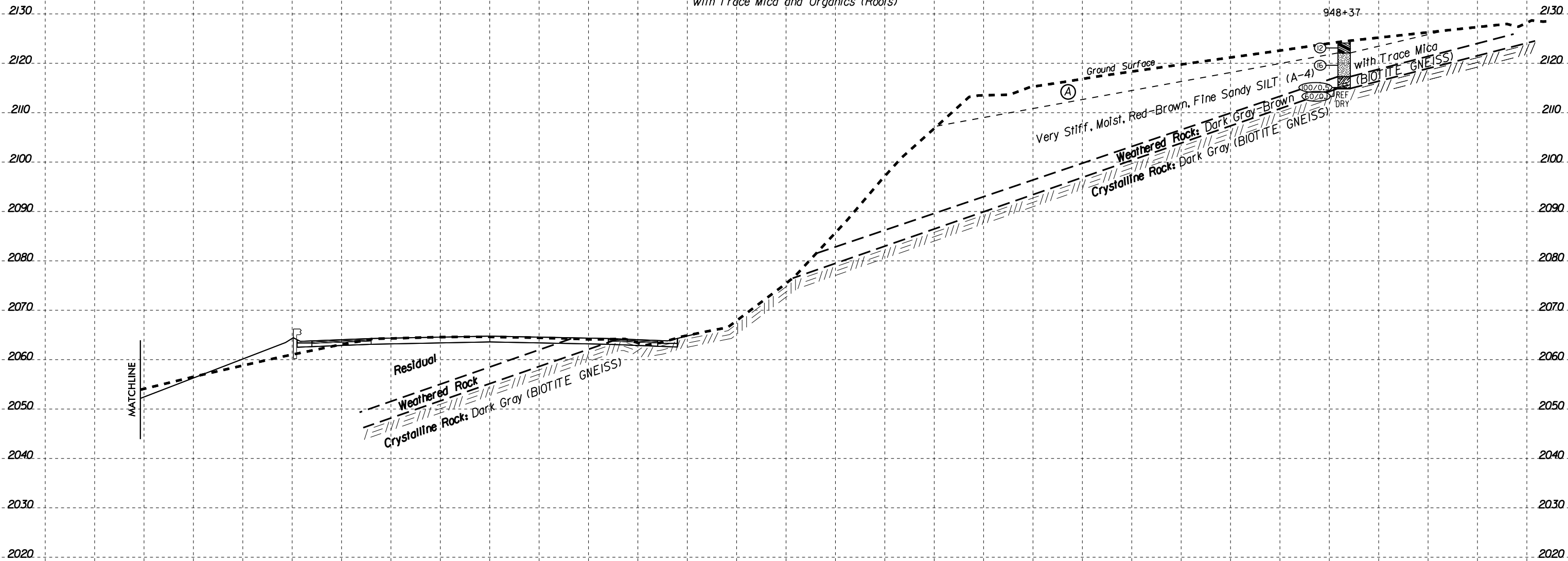
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							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-69	17.3' RT	948+37	0.0 - 1.5	A-6(6)	34	14	18.9	26.7	12.3	42.1	100.0	91.9	58.3	15.4	-

(A) **Residual:** Stiff, Moist, Red-Brown, Silty Fine to Coarse Sandy CLAY (A-6) with Trace Mica and Organics (Roots)

SS-69

B-77
948+37



Residual
Weathered Rock
Crystalline Rock: Dark Gray (BIOTITE GNEISS)

Ground Surface
Very Stiff, Moist, Red-Brown, Fine Sandy SILT (A-4)
Weathered Rock: Dark Gray-Brown (BIOTITE GNEISS)
Crystalline Rock: Dark Gray (BIOTITE GNEISS)

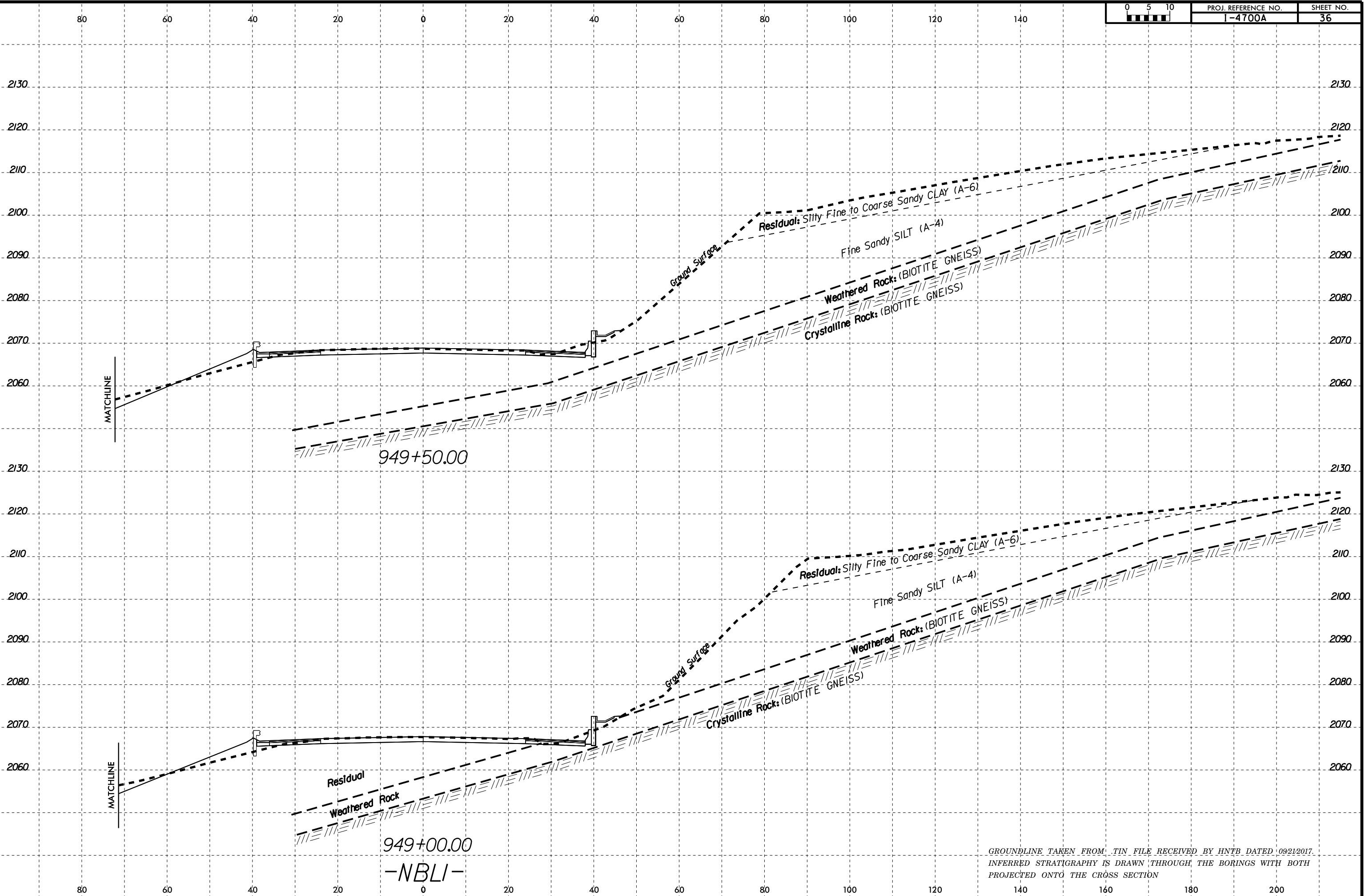
with Trace Mica
(BIOTITE GNEISS)

948+50.00
-NBLI-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
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Walker

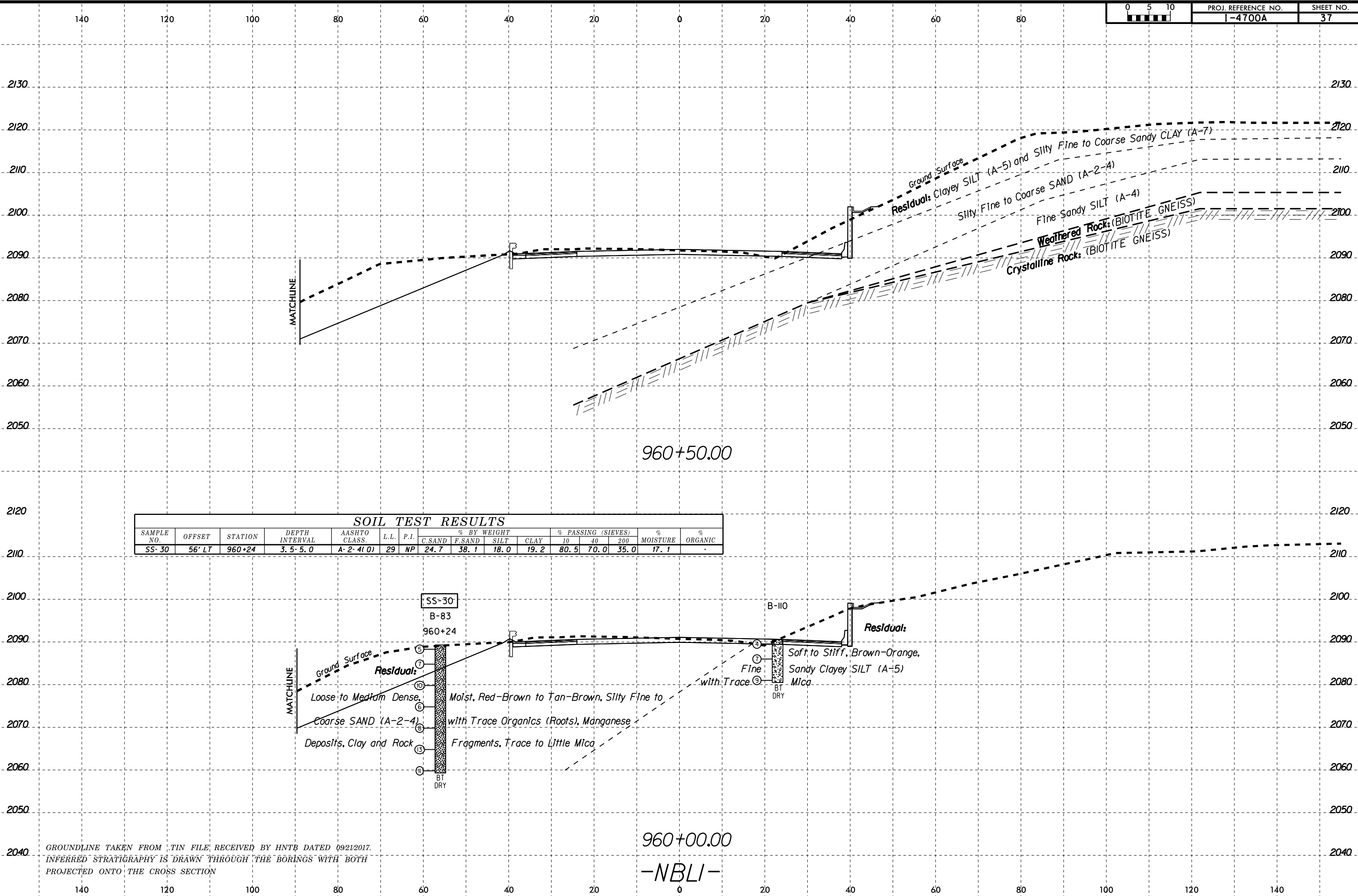
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 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
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6/23/16



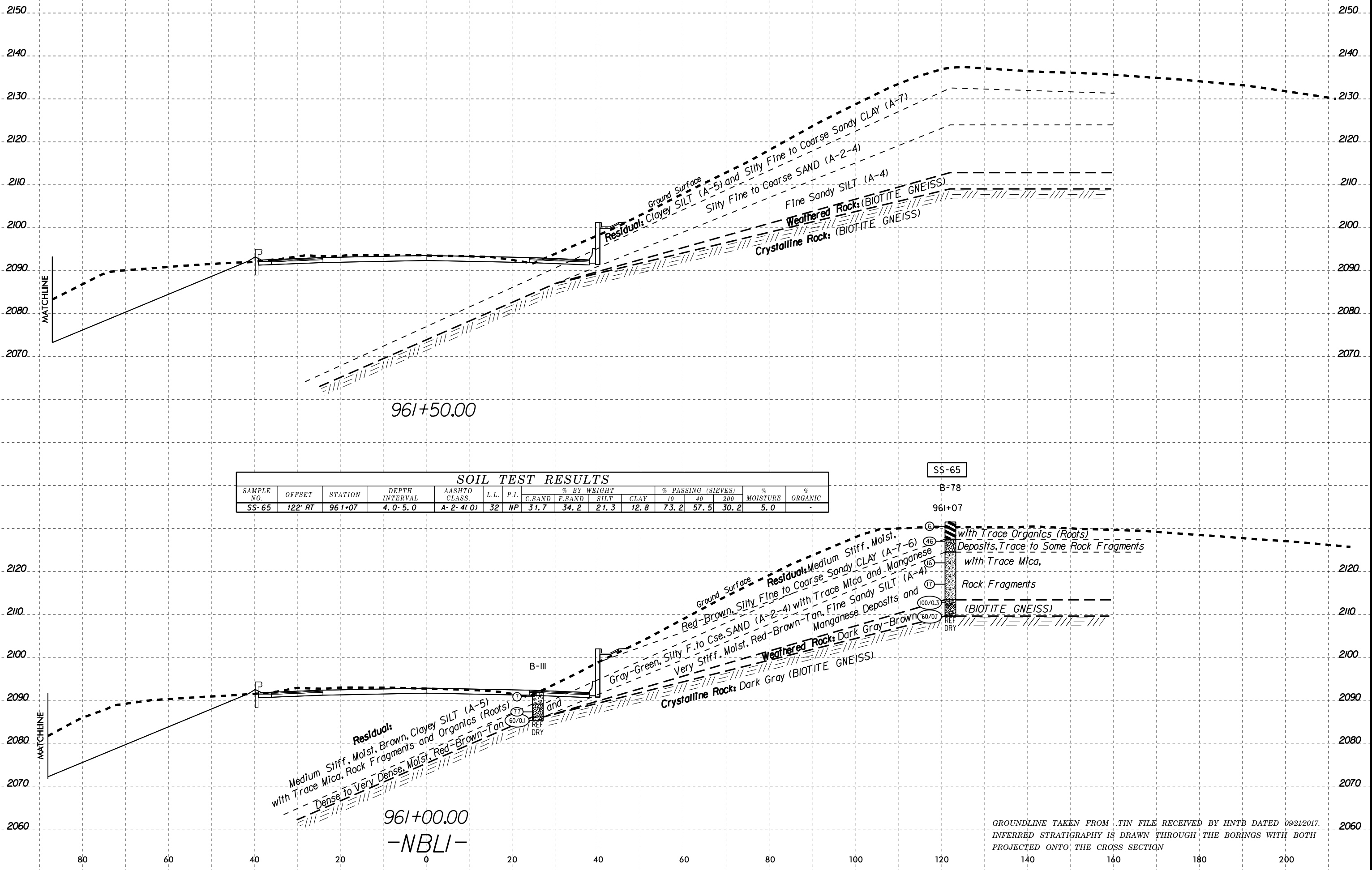
SOIL TEST RESULTS

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-30	56' LT	960+24	3.5-5.0	A-2-4(0)	29	NP	24.7	38.1	18.0	19.2	80.5	70.0	35.0	17.1	-

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GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

960+00.00
-NBLI-



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-65	122' RT	961+07	4.0-5.0	A-2-4(0)	32	NP	31.7	34.2	21.3	12.8	73.2	57.5	30.2	5.0	-

SS-65

B-78

961+07

Residual:
 Medium Stiff, Moist, Brown, Clayey SILT (A-5)
 with Trace Mica, Rock Fragments and Organics (Roots)
 Dense to Very Dense, Moist, Red-Brown-Tan
 and

Ground Surface
 Residual: Medium Stiff, Moist, Red-Brown, Silty Fine to Coarse SANDY CLAY (A-7-6) Deposits, Trace to Some Rock Fragments with Trace Mica.
 Red-Brown, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Manganese
 Gray-Green, Silty, F. to Cse. SAND (A-2-4) with Trace Mica and Manganese
 Very Stiff, Moist, Red-Brown-Tan, Fine Sandy SILT (A-4) and Manganese Deposits and
Weathered Rock: Dark Gray-Brown (BIOTITE GNEISS)
Crystalline Rock: Dark Gray (BIOTITE GNEISS)

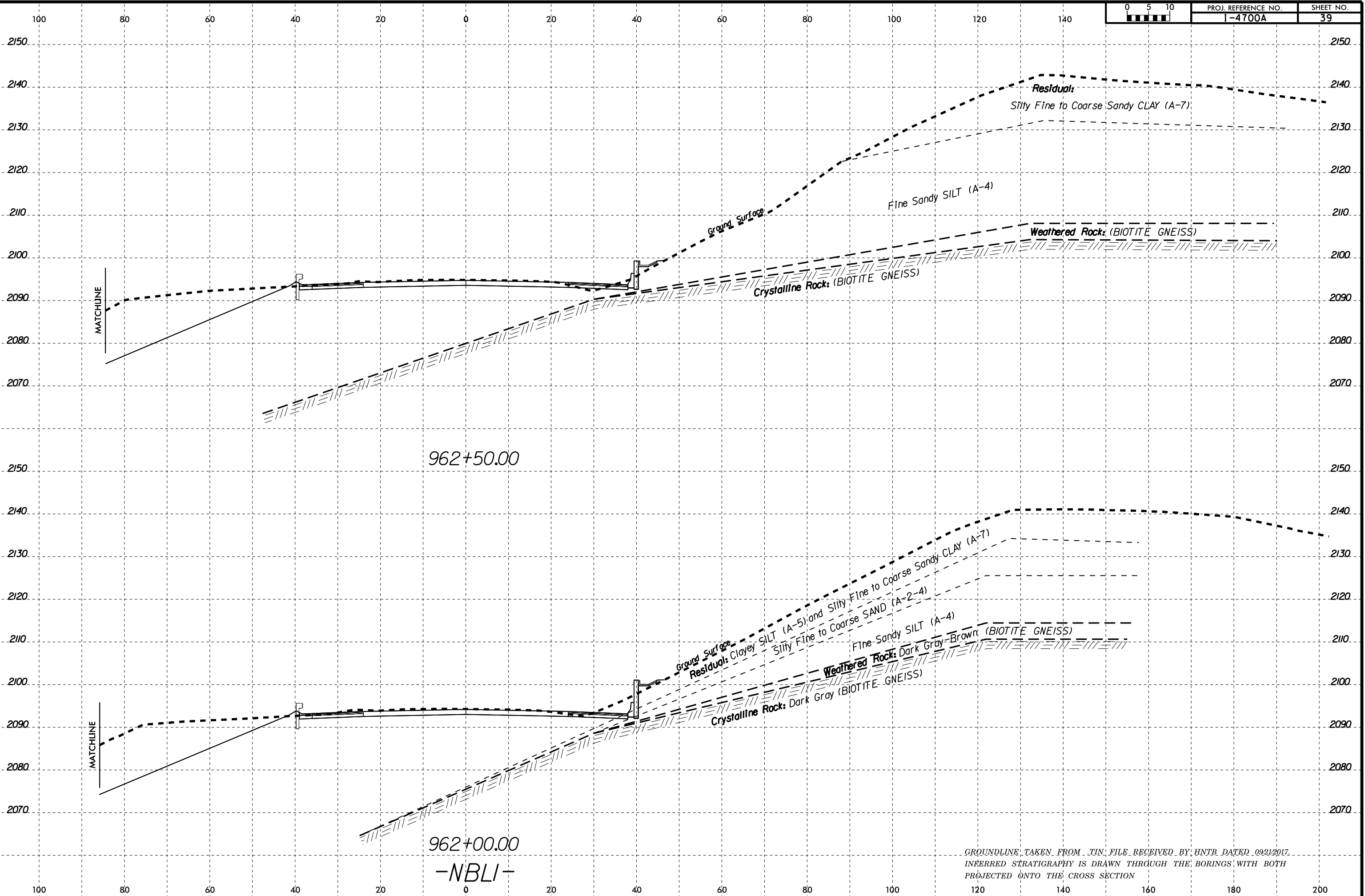
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 T.Walker

6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	39



962+50.00

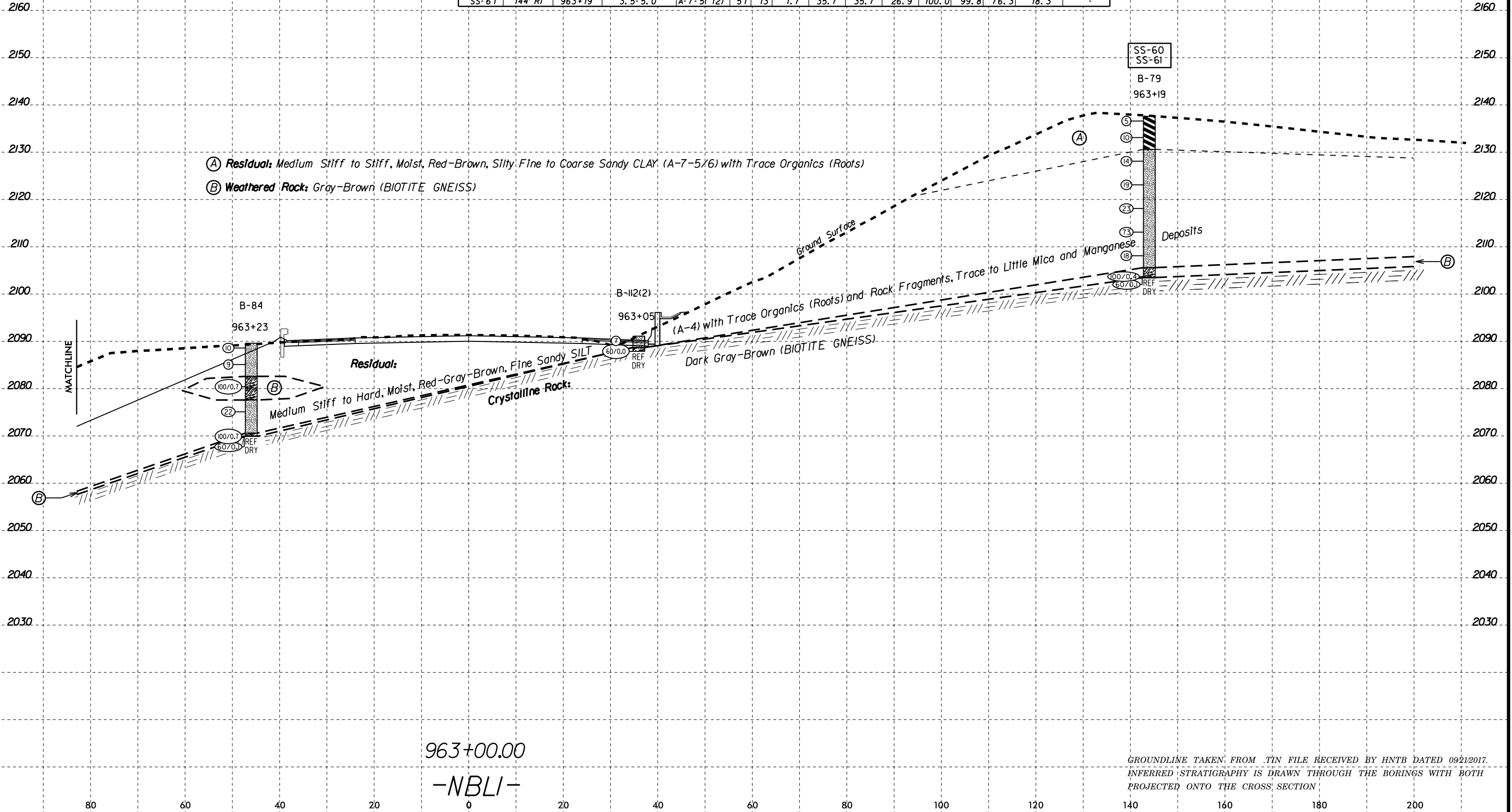
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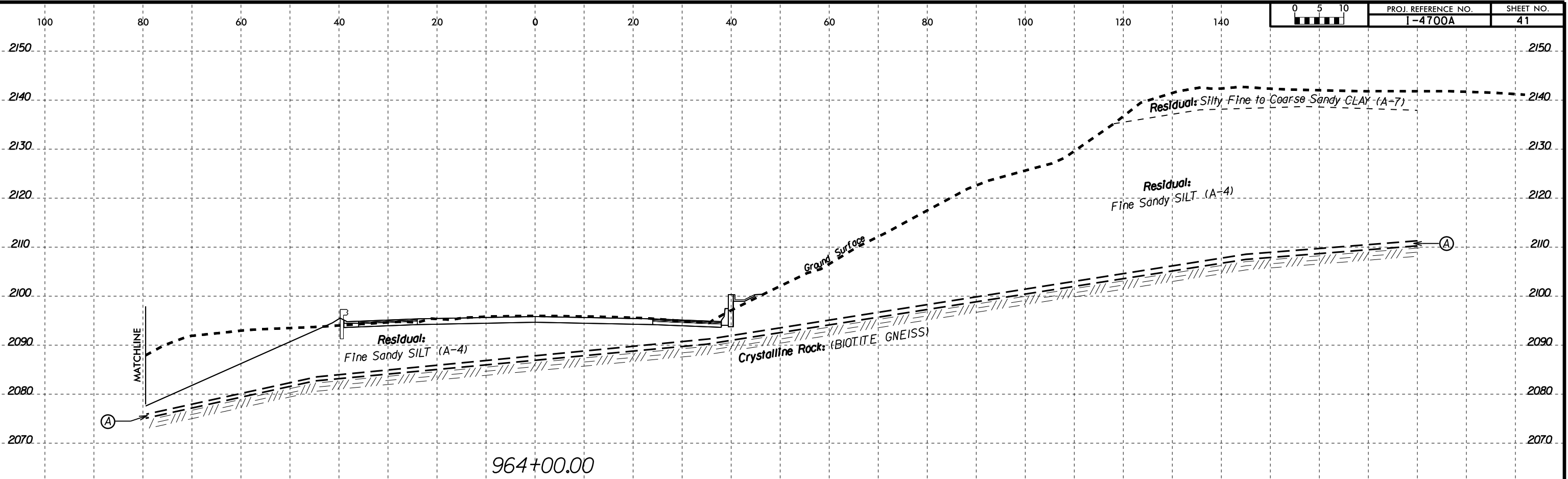
SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-60	144' RT	963+19	0.0-1.5	A-7-6(11)	42	20	10.1	24.3	14.3	51.3	88.1	83.4	62.4	17.8	-
SS-61	144' RT	963+19	3.5-5.0	A-7-5(12)	51	13	1.7	35.7	35.7	26.9	100.0	99.8	76.3	18.3	-



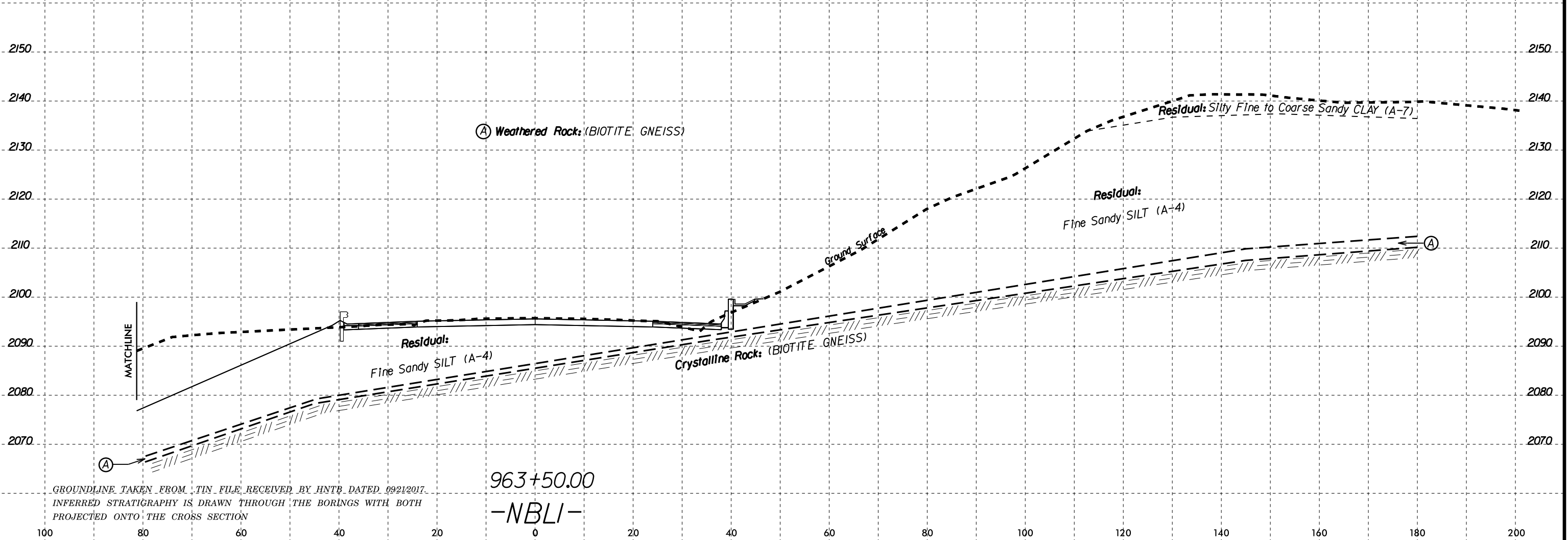
6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	41



964+00.00



963+50.00

-NBLI-

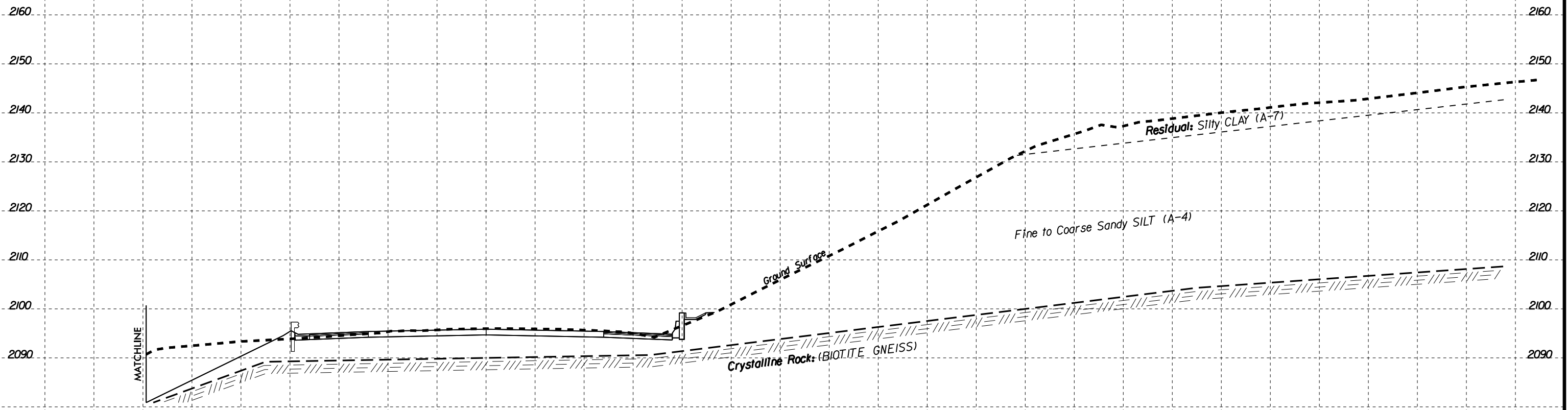
GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

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 Walker

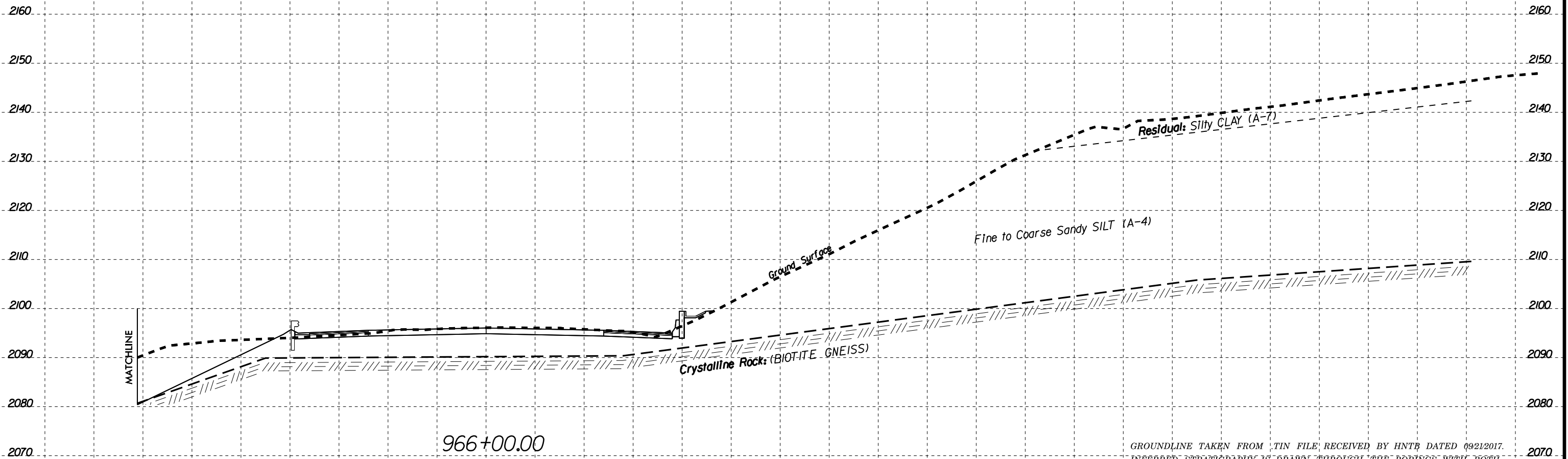
6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	44



966+50.00

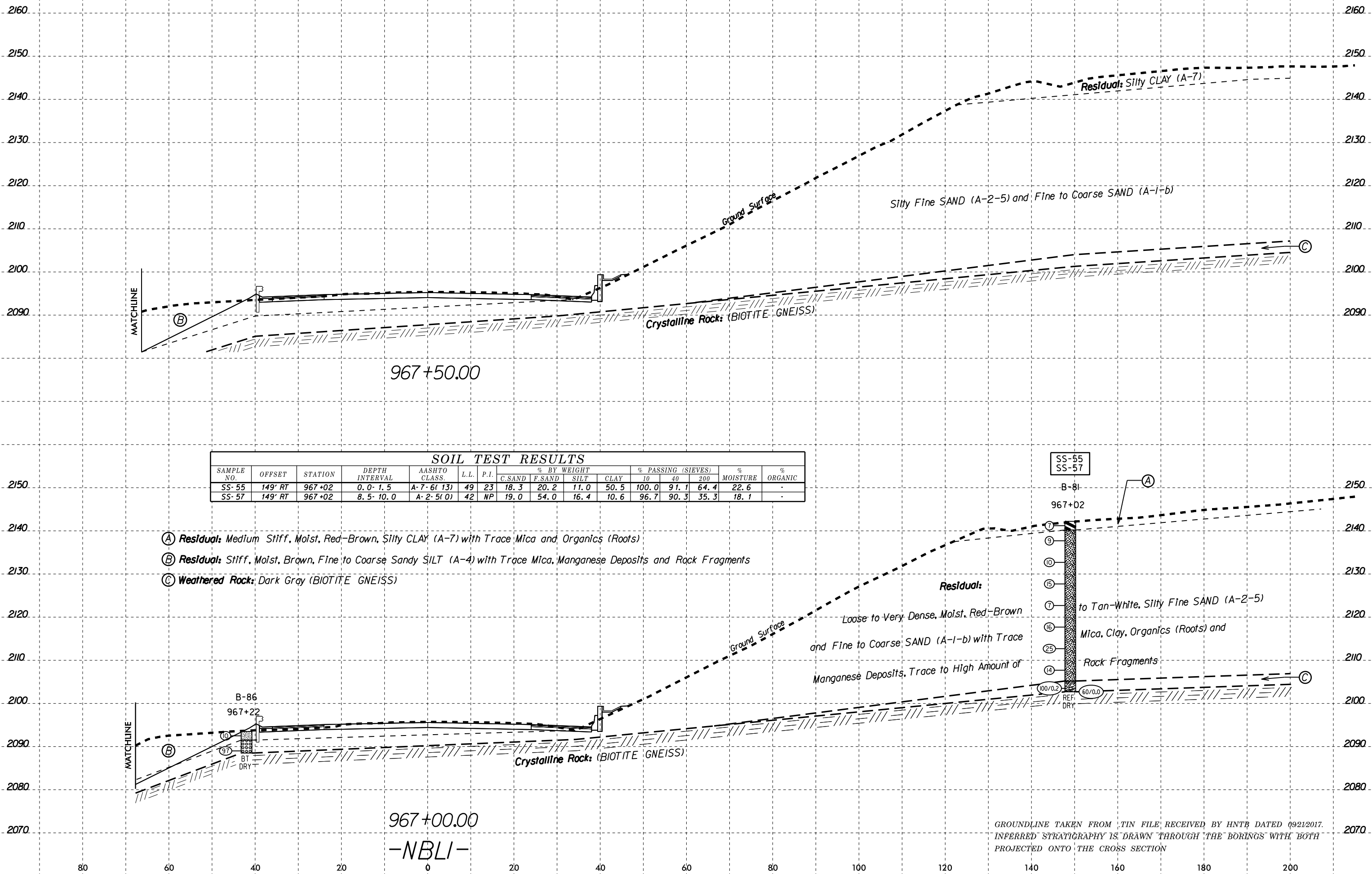


966+00.00

-NBLI-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

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 T:\Walker



967+50.00

967+00.00

-NBLI-

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-55	149' RT	967+02	0.0-1.5	A-7-6(13)	49	23	18.3	20.2	11.0	50.5	100.0	91.1	64.4	22.6	-
SS-57	149' RT	967+02	8.5-10.0	A-2-5(0)	42	NP	19.0	54.0	16.4	10.6	96.7	90.3	35.3	18.1	-

- Ⓐ Residual: Medium Stiff, Moist, Red-Brown, Silty CLAY (A-7) with Trace Mica and Organics (Roots)
- Ⓑ Residual: Stiff, Moist, Brown, Fine to Coarse Sandy SILT (A-4) with Trace Mica, Manganese Deposits and Rock Fragments
- Ⓒ Weathered Rock: Dark Gray (BIOTITE GNEISS)

SS-55
SS-57

B-81

967+02

7

9

10

15

7

16

25

14

100/0.2

REF. DRY

60/0.0

100/0.2

REF. DRY

100/0.2

REF. DRY

100/0.2

REF. DRY

100/0.2

REF. DRY

100/0.2

REF. DRY

100/0.2

REF. DRY

100/0.2

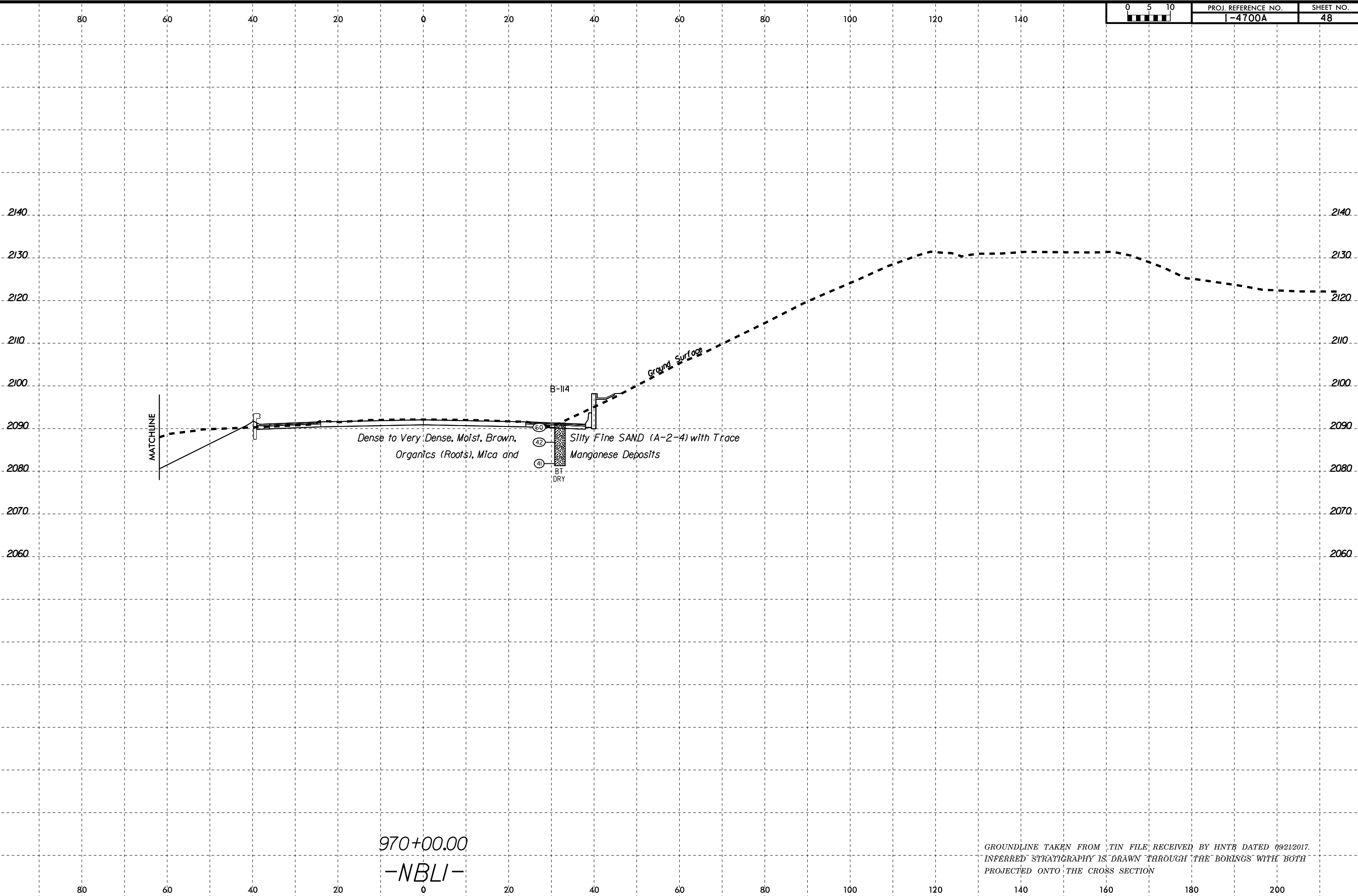
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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

6/23/16



PROJ. REFERENCE NO.	SHEET NO.
I-4700A	48



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970+00.00
-NBLI-

GROUNDLINE TAKEN FROM 'TIN FILE' RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

6/23/16

80

60

40

20

0

20

40

60

80

100

120

140



PROJ. REFERENCE NO.
I-4700A

SHEET NO.
49

2130

2120

2110

2100

2090

2080

2070

2060

2130

2120

2110

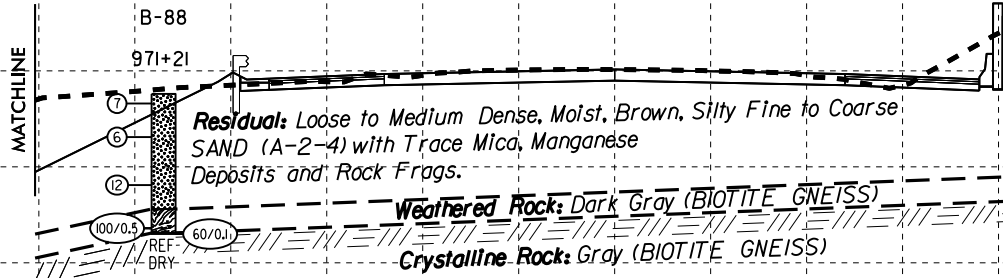
2100

2090

2080

2070

2060



971+00.00

-NBLI-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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Walker

80

60

40

20

0

20

40

60

80

100

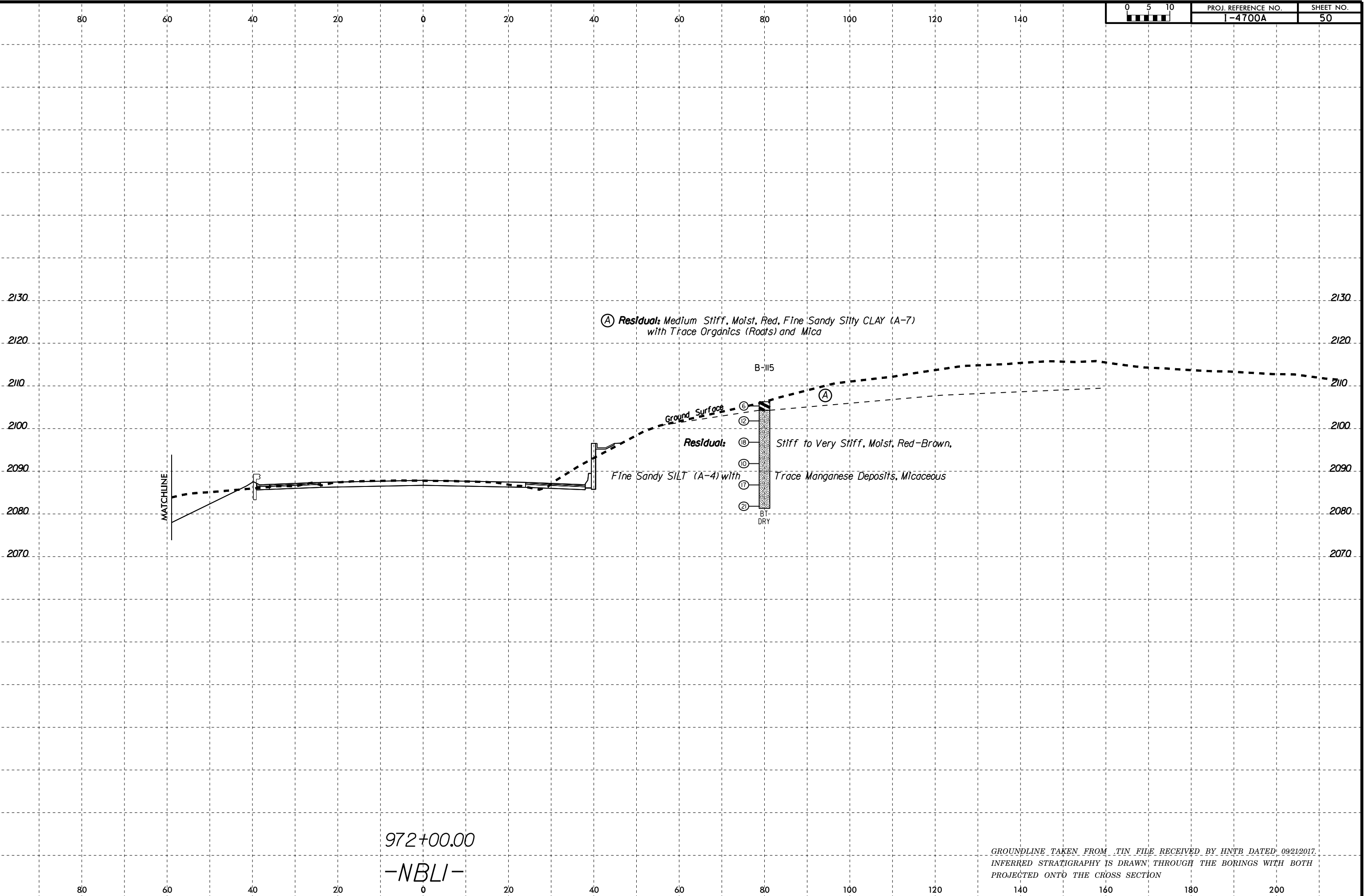
120

140

160

180

200



(A) *Residual: Medium Stiff, Moist, Red, Fine Sandy Silty CLAY (A-7) with Trace Organics (Roots) and Mica*

B-115

Ground Surface

Residual: Stiff to Very Stiff, Moist, Red-Brown,

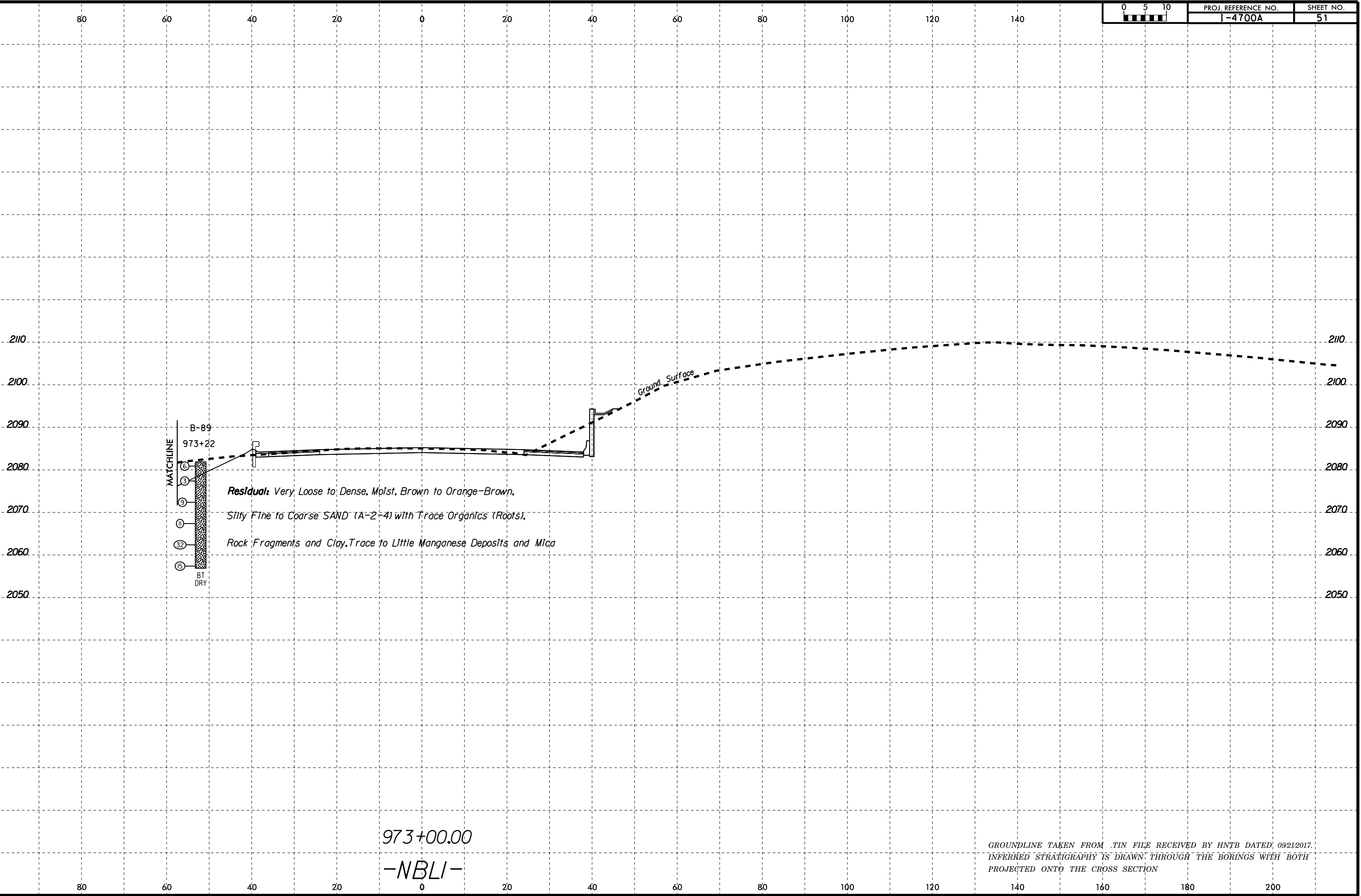
Fine Sandy SILT (A-4) with Trace Manganese Deposits, Micaceous

BT
DRY

972+00.00

-NBL1-

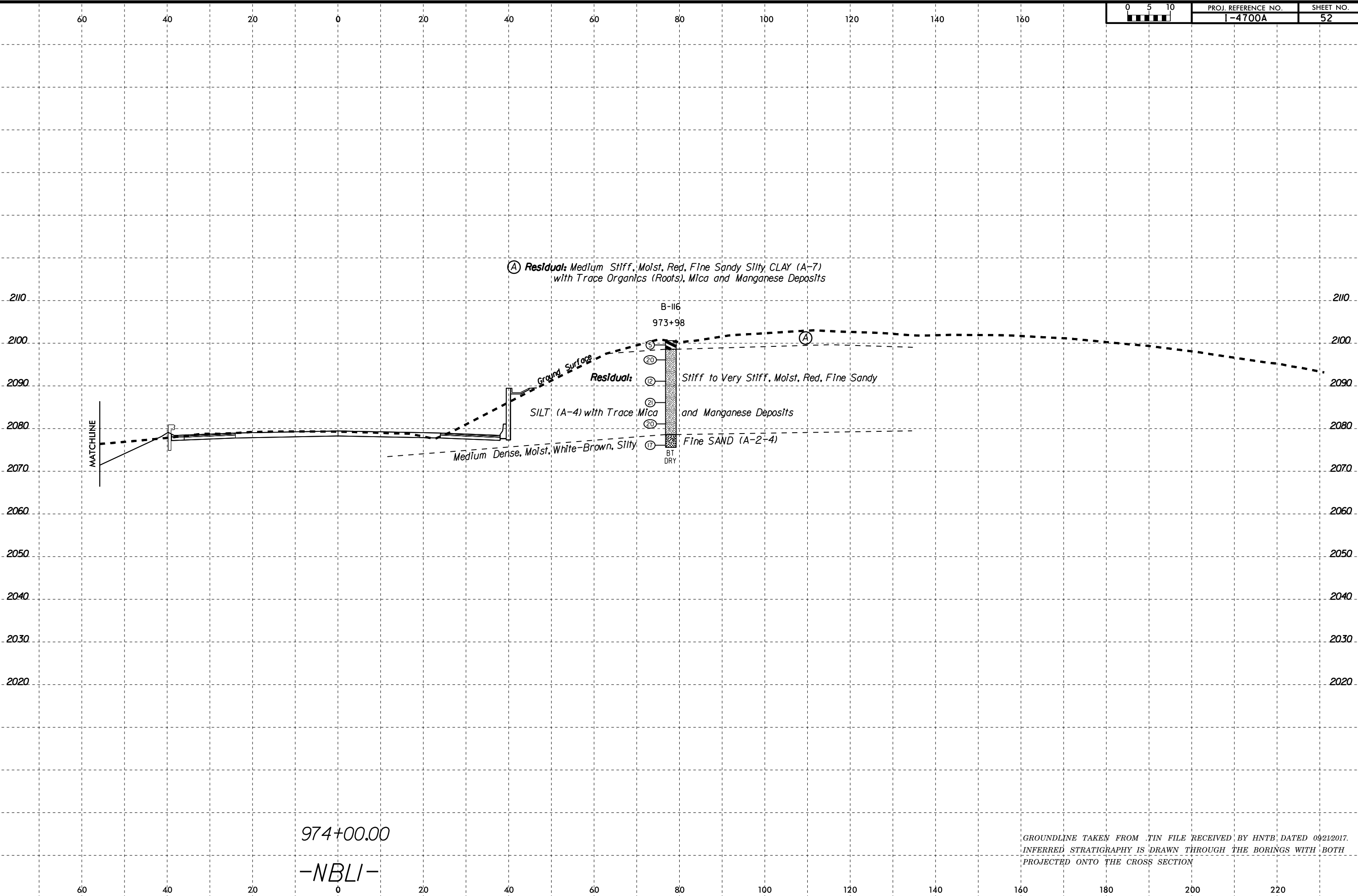
GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION



973+00.00
-NBLI-

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

6/23/16

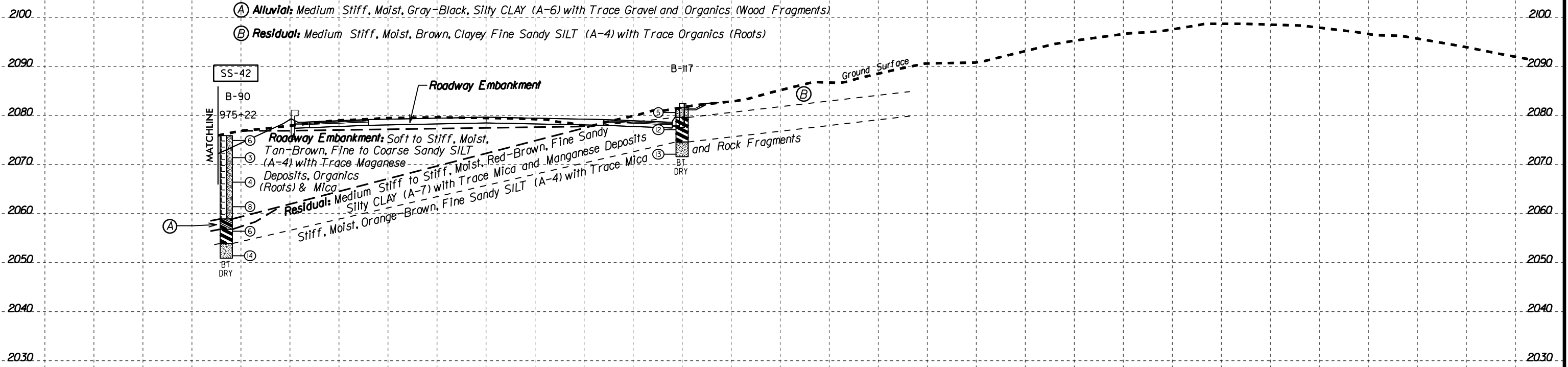


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GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB, DATED 09/21/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

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-42	53' LT	975+22	0.1-1.5	A-4(0)	40	NP	23.7	44.3	16.7	15.3	97.5	86.4	39.8	24.0	-

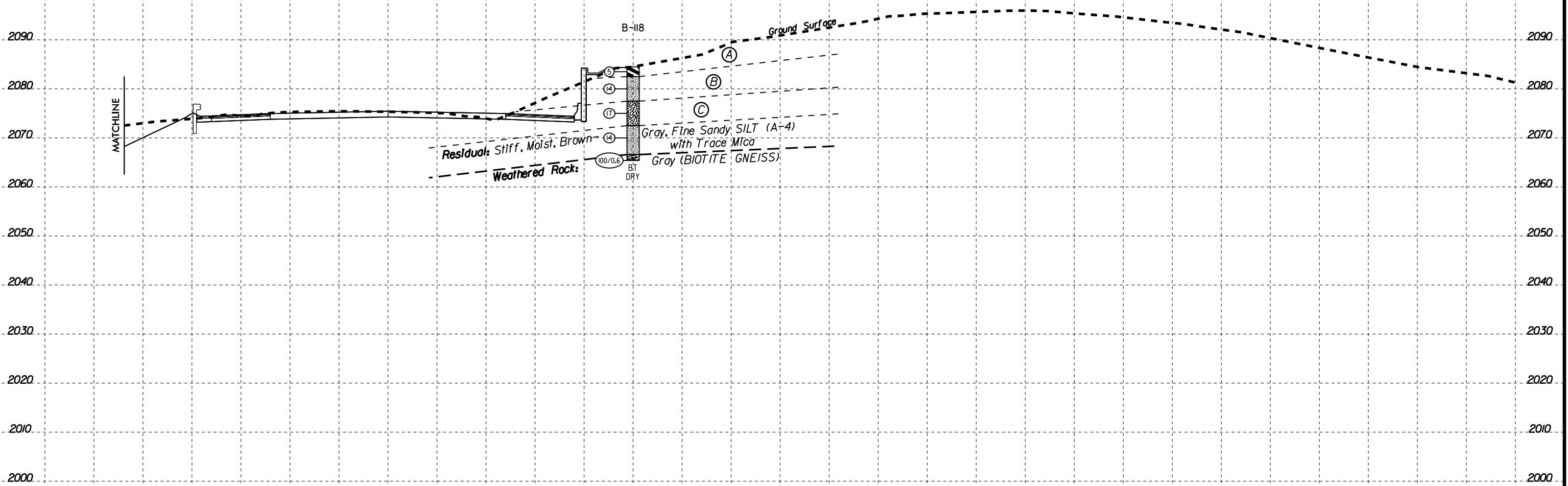
- (A) Alluvial: Medium Stiff, Moist, Gray-Black, Silty CLAY (A-6) with Trace Gravel and Organics (Wood Fragments)
- (B) Residual: Medium Stiff, Moist, Brown, Clayey, Fine Sandy SILT (A-4) with Trace Organics (Roots)



975+00.00
-NBLI-

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

- (A) **Residual:** Medium Stiff, Moist, Red-Brown, Fine to Coarse Sandy Silty CLAY (A-7) with Trace Organics (Roots) and Rock Fragments
- (B) **Residual:** Stiff, Moist, Red-Brown, Clayey Fine Sandy SILT (A-4) with Trace Rock Fragments and Mica
- (C) **Residual:** Medium Dense, Moist, Gray-White-Tan, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Rock Fragments

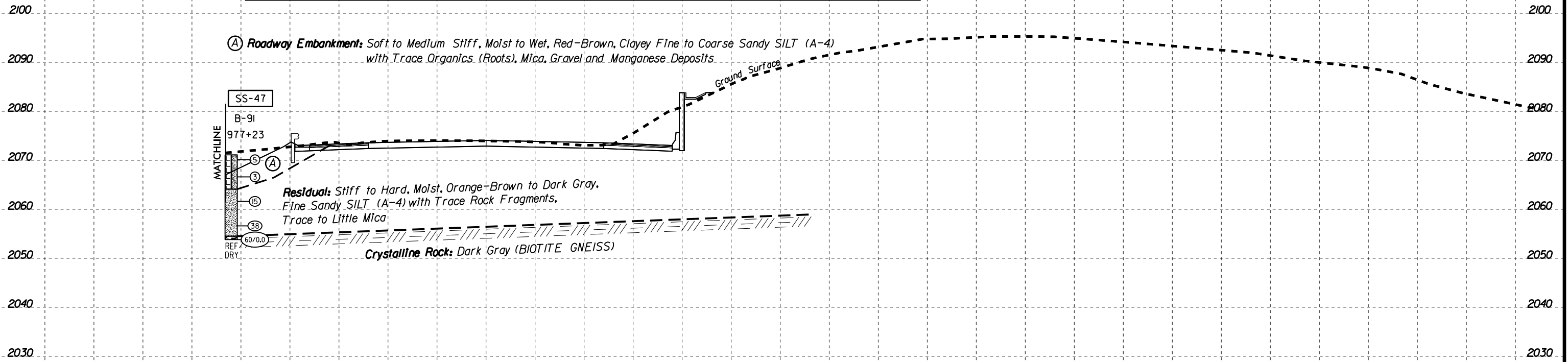


976+50.00
-NBLI-

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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

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-47	52' LT	977+23	3.5-5.0	A-4(0)	32	NP	24.4	36.1	14.2	25.3	94.7	82.9	43.8	28.2	-



(A) **Roadway Embankment:** Soft to Medium Stiff, Moist to Wet, Red-Brown, Clayey Fine to Coarse Sandy SILT (A-4) with Trace Organics (Roots), Mica, Gravel and Manganese Deposits.

SS-47
B-91
977+23
MATCHLINE
REF. DRY

Residual: Stiff to Hard, Moist, Orange-Brown to Dark Gray, Fine Sandy SILT (A-4) with Trace Rock Fragments, Trace to Little Mica.

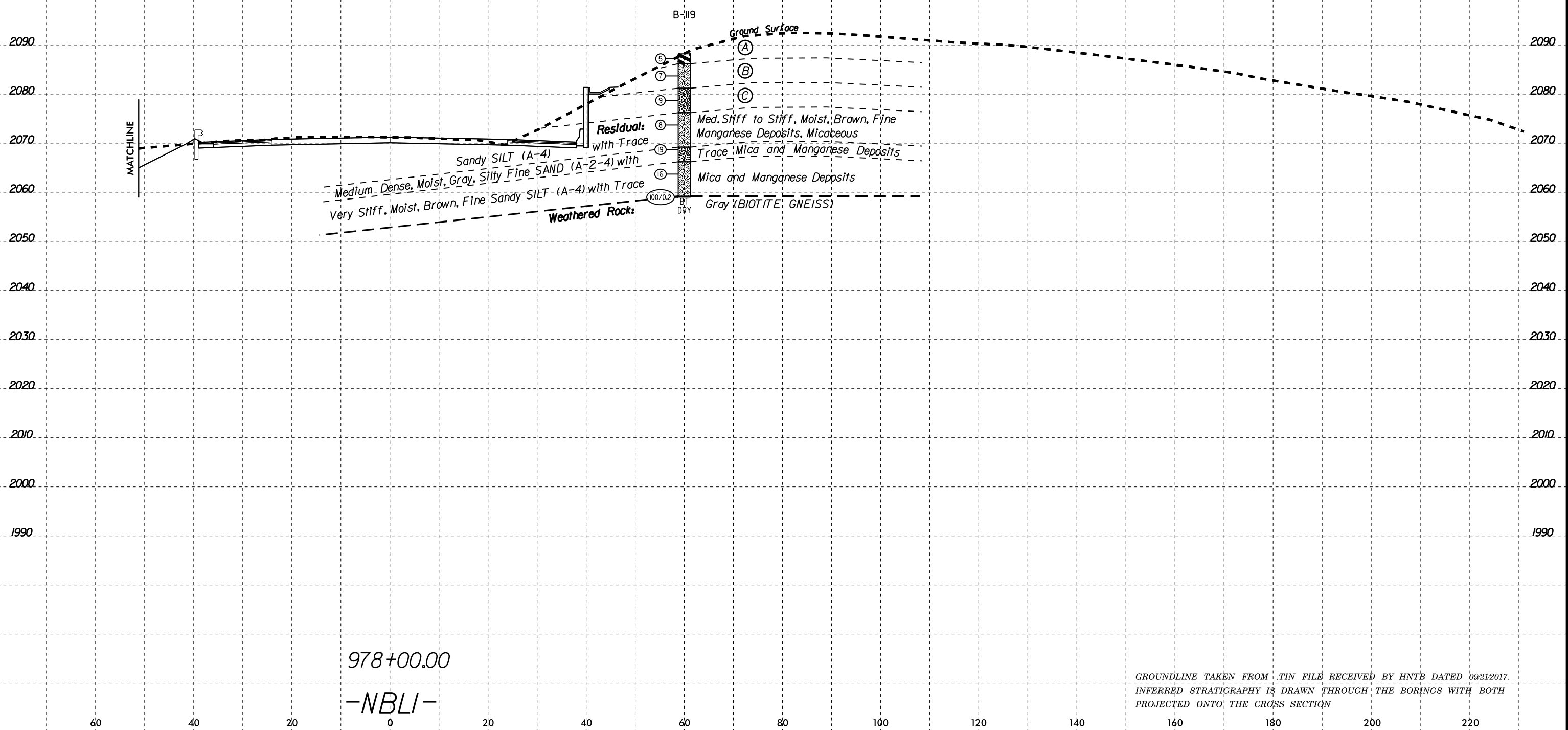
Crystalline Rock: Dark Gray (BIOTITE GNEISS)

977+00.00
-NBLI-

GROUNDLINE TAKEN FROM .TIN FILE RECEIVED BY HNTB DATED 09/21/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

80 60 40 20 0 20 40 60 80 100 120 140 160 180 200

- (A) **Residual:** Medium Stiff, Moist, Red, Fine to Coarse Sandy Silty CLAY (A-7) with Trace Organics (Wood Fragments), Mica, and Quartz Fragments
- (B) **Residual:** Medium Stiff, Moist, Red-Brown, Fine Sandy SILT (A-4) with Trace Mica
- (C) **Residual:** Loose, Moist, Gray, Silty Fine SAND (A-2-4) with Trace Mica and Manganese Deposits

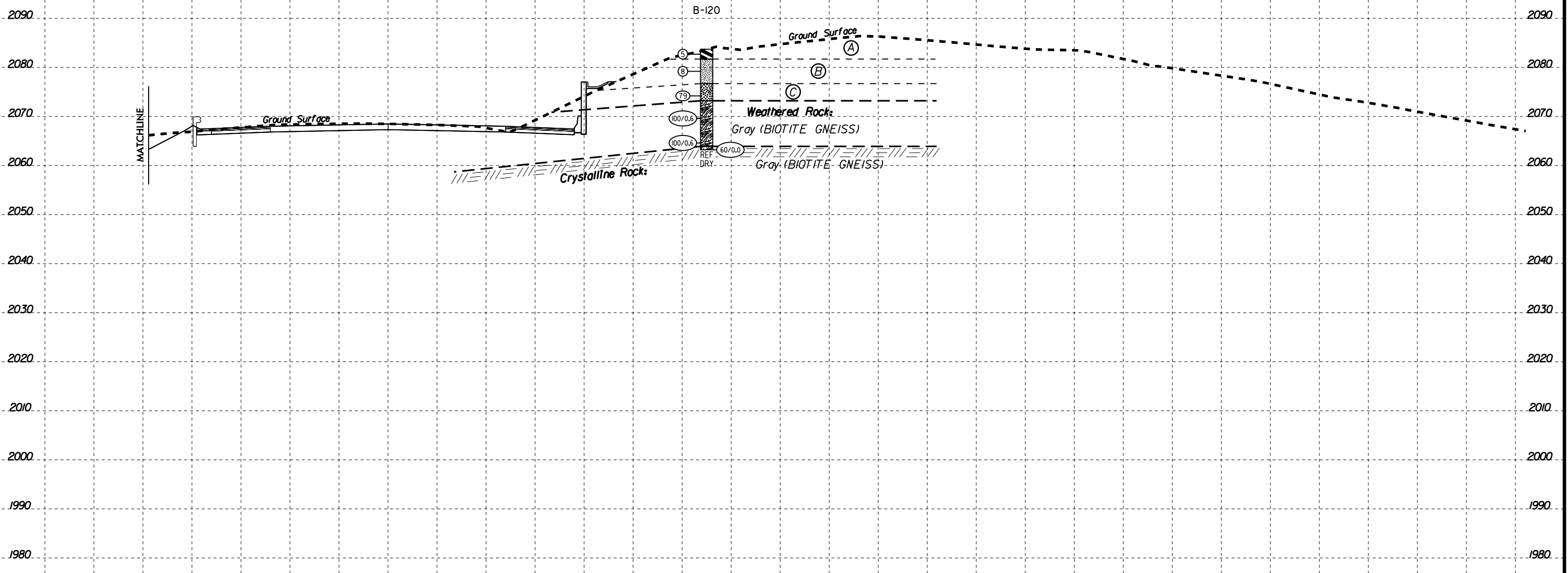


978+00.00

-NBLI-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

- (A) *Residual: Medium Stiff, Moist, Red, Fine to Coarse Sandy Silty CLAY (A-7) with Trace Organics (Roots) and Mica*
- (B) *Residual: Medium Stiff to Stiff, Moist, Brown, Fine to Coarse Sandy SILT (A-4) with Trace Mica and Manganese Deposits*
- (C) *Residual: Very Dense, Moist, Gray-White, Silty Fine to Coarse SAND (A-2-4) with Trace Mica and Some Rock Fragments*



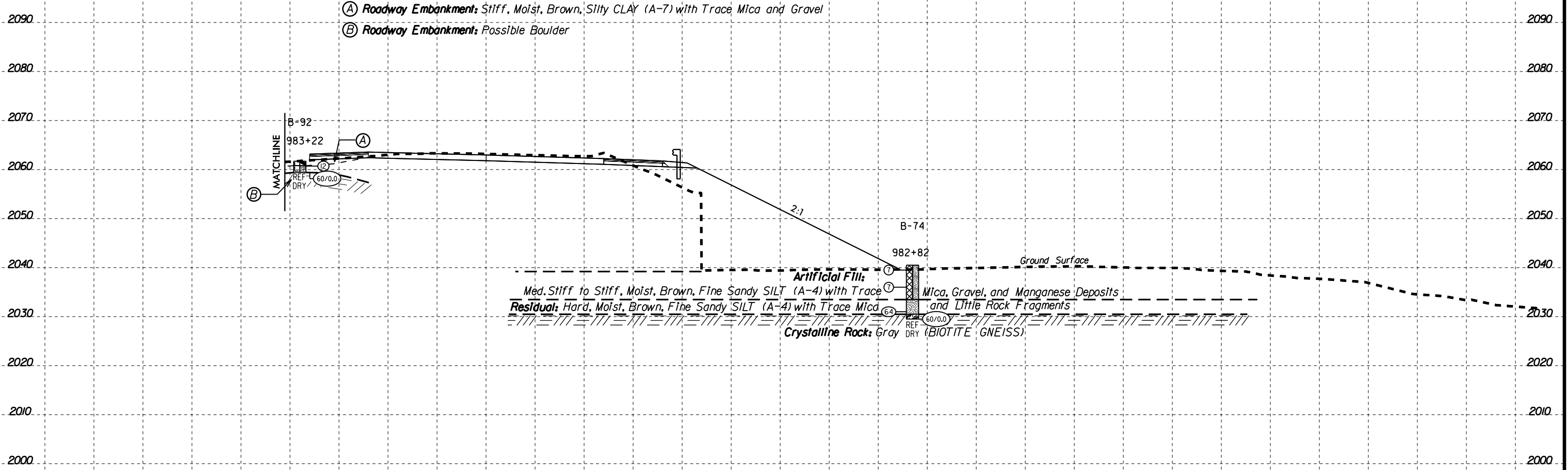
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INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

6/23/16



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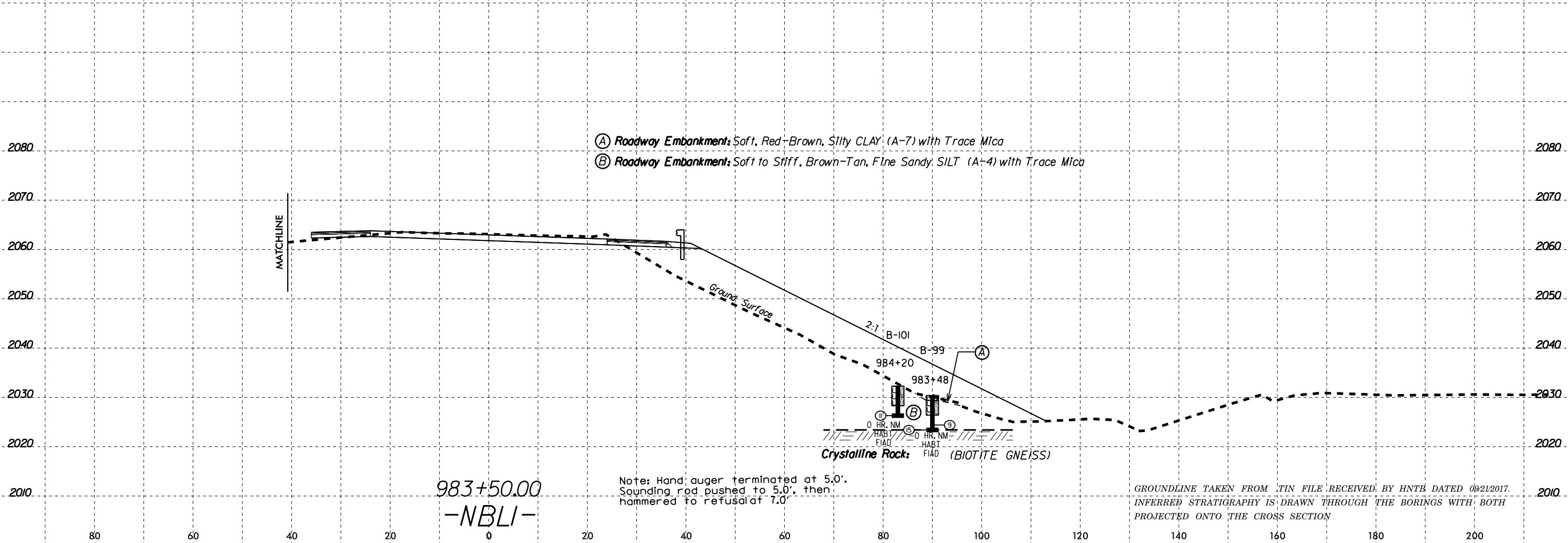
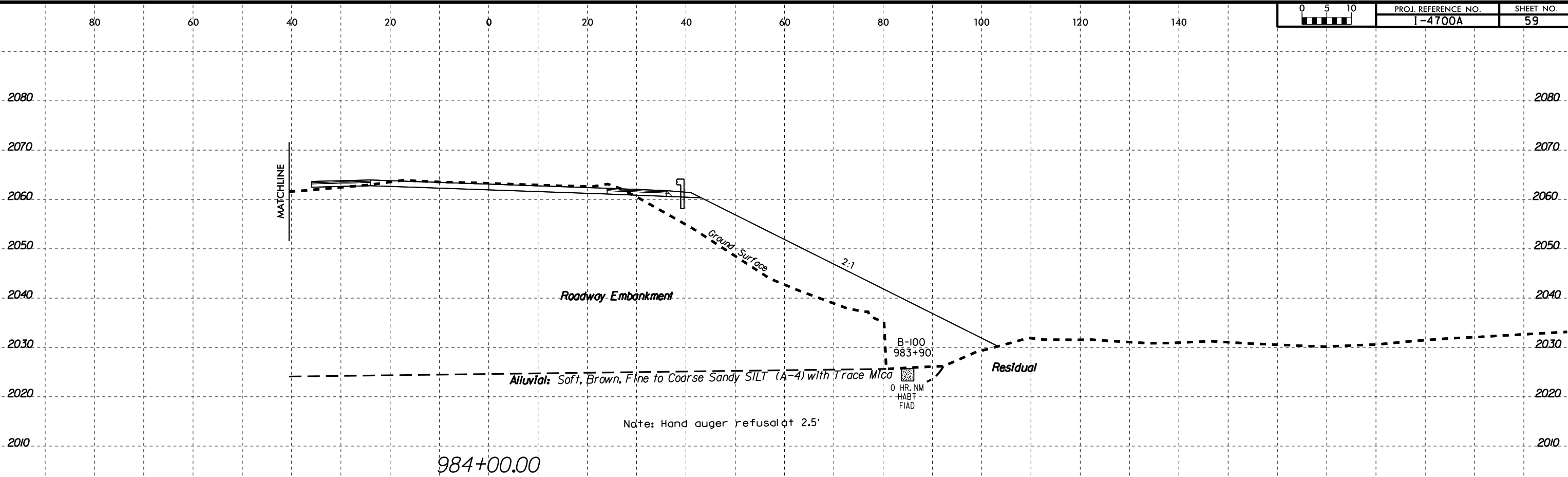
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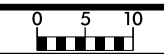
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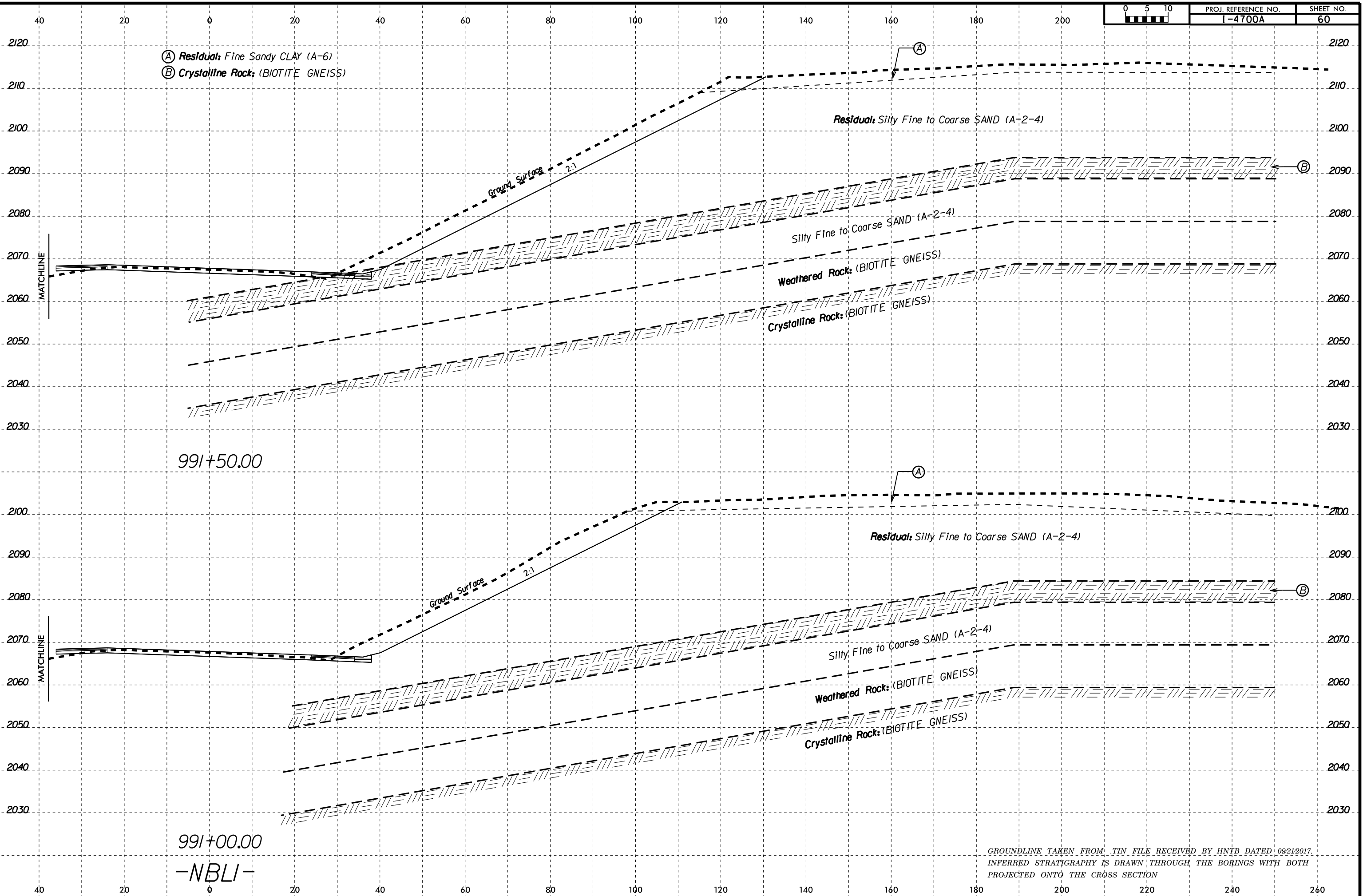
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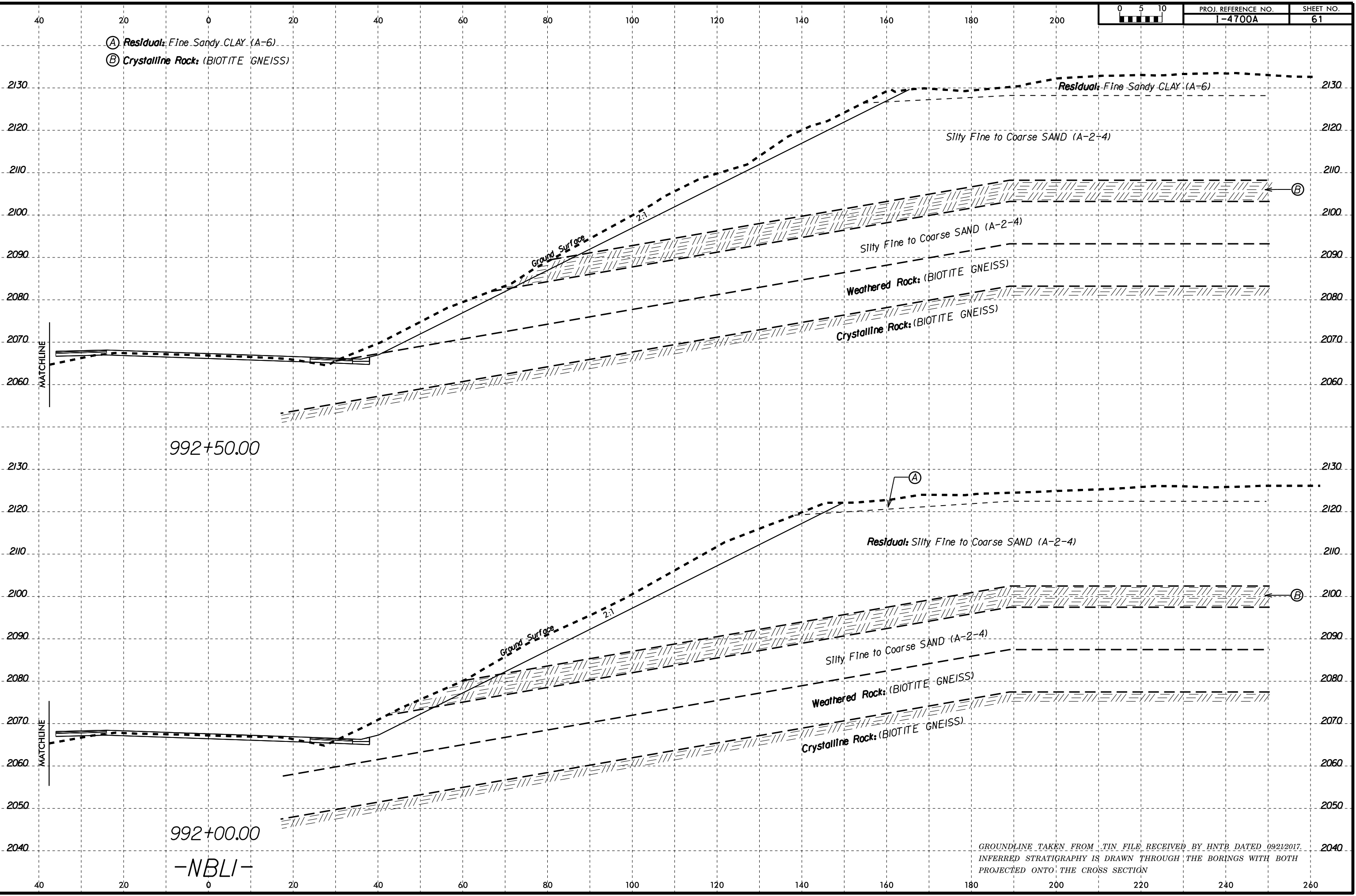


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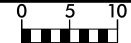
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6/23/16
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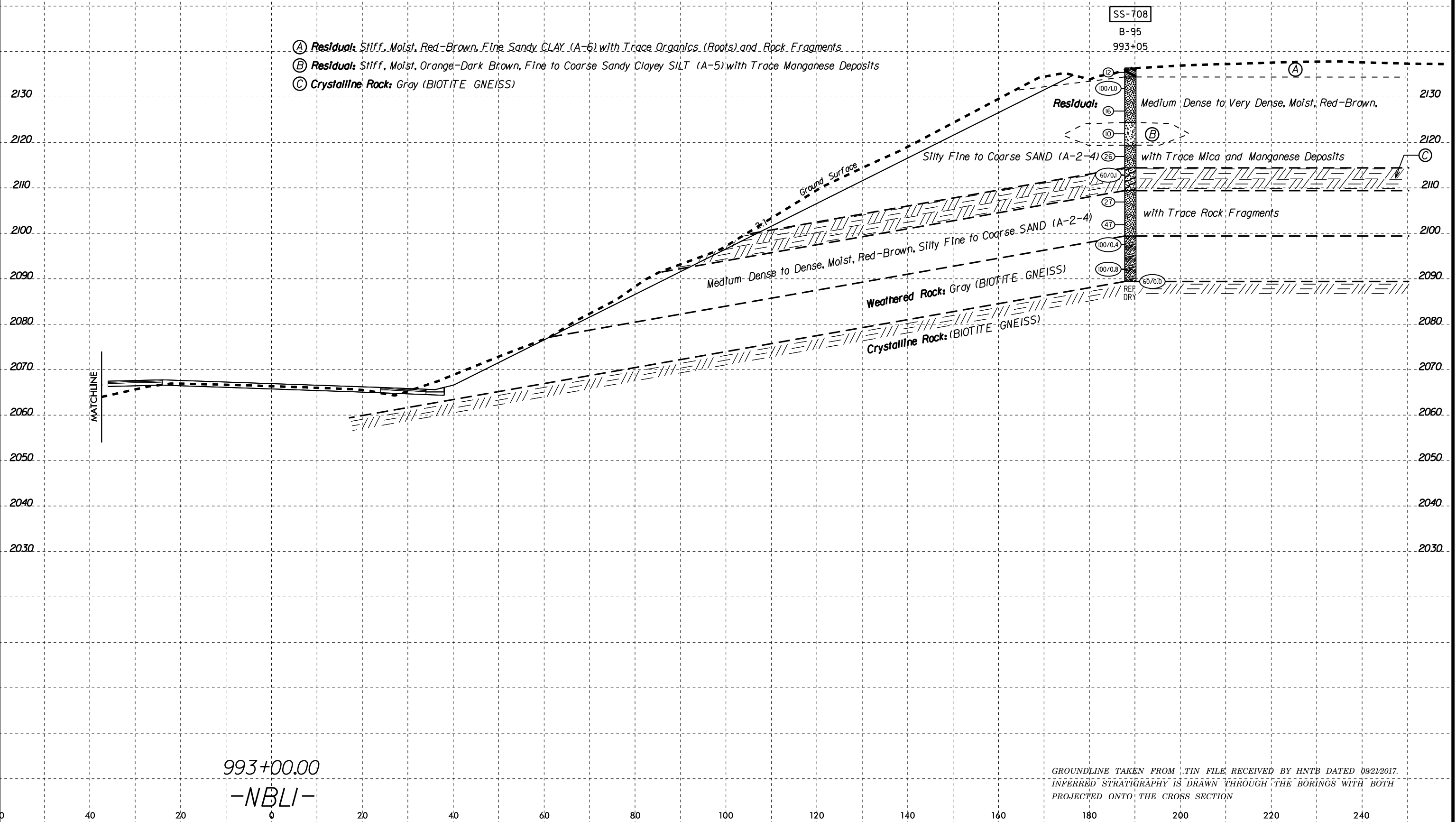
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 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE CROSS SECTION

6/23/16



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-708	189' RT	993+05	0.0-1.5	A-6(B)	39	17	16.4	18.9	13.7	51.0	86.9	79.2	58.7	17.9	-

- (A) Residual: Stiff, Moist, Red-Brown, Fine Sandy CLAY (A-6) with Trace Organics (Roots) and Rock Fragments
- (B) Residual: Stiff, Moist, Orange-Dark Brown, Fine to Coarse Sandy Clayey SILT (A-5) with Trace Manganese Deposits
- (C) Crystalline Rock: Gray (BIOTITE GNEISS)



993+00.00
-NBLI-

GROUNDLINE TAKEN FROM TIN FILE, RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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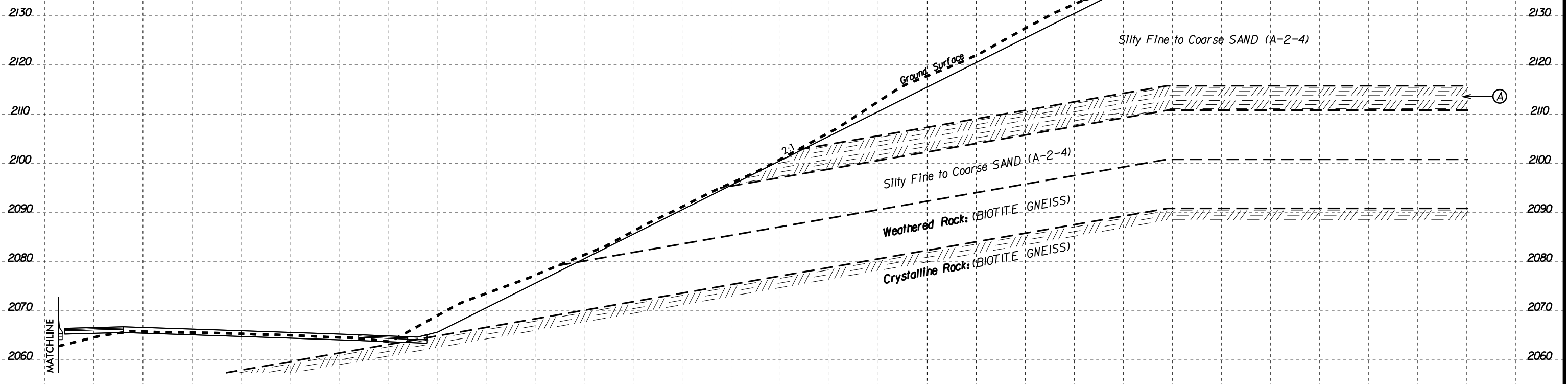
6/23/16

Ⓐ Crystalline Rock: (BIOTITE GNEISS)

Residual: Fine Sandy CLAY (A-6)

Silty Fine to Coarse SAND (A-2-4)

Ground Surface

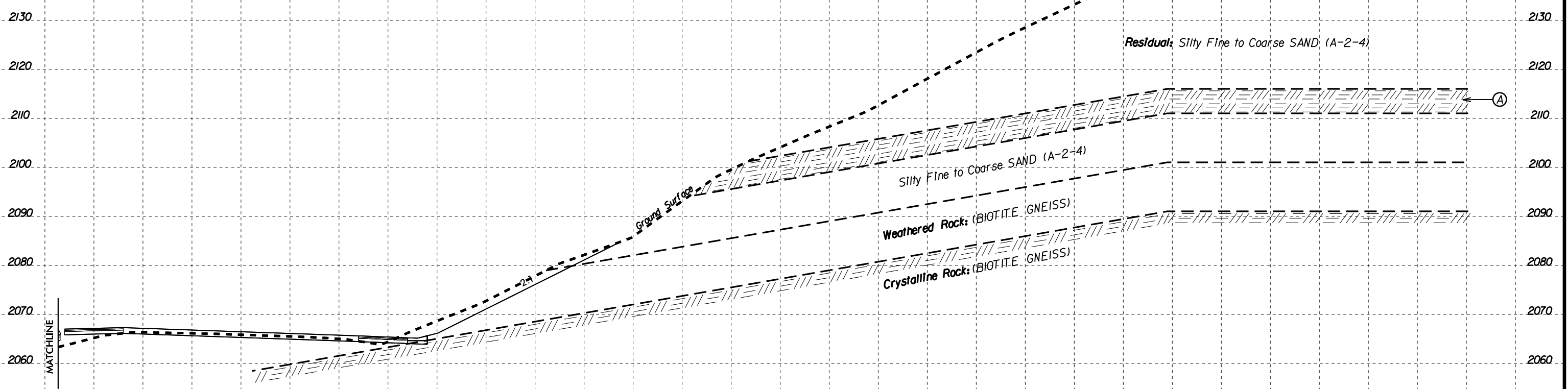


994+00.00

Residual: Fine Sandy CLAY (A-6)

Residual: Silty Fine to Coarse SAND (A-2-4)

Ground Surface



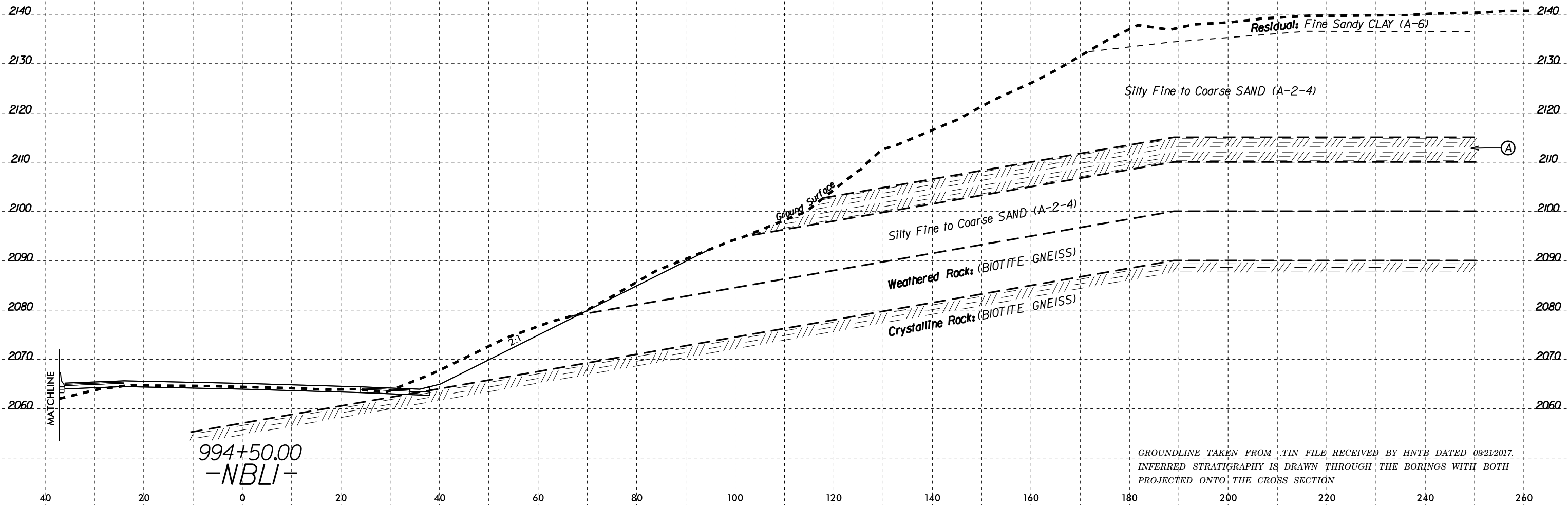
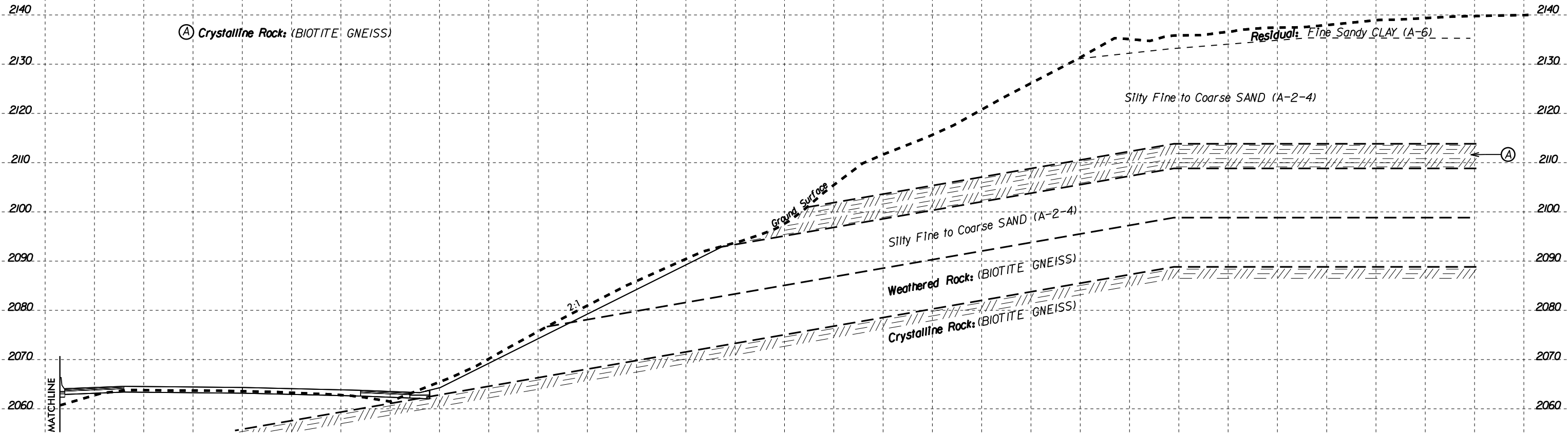
993+50.00

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GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

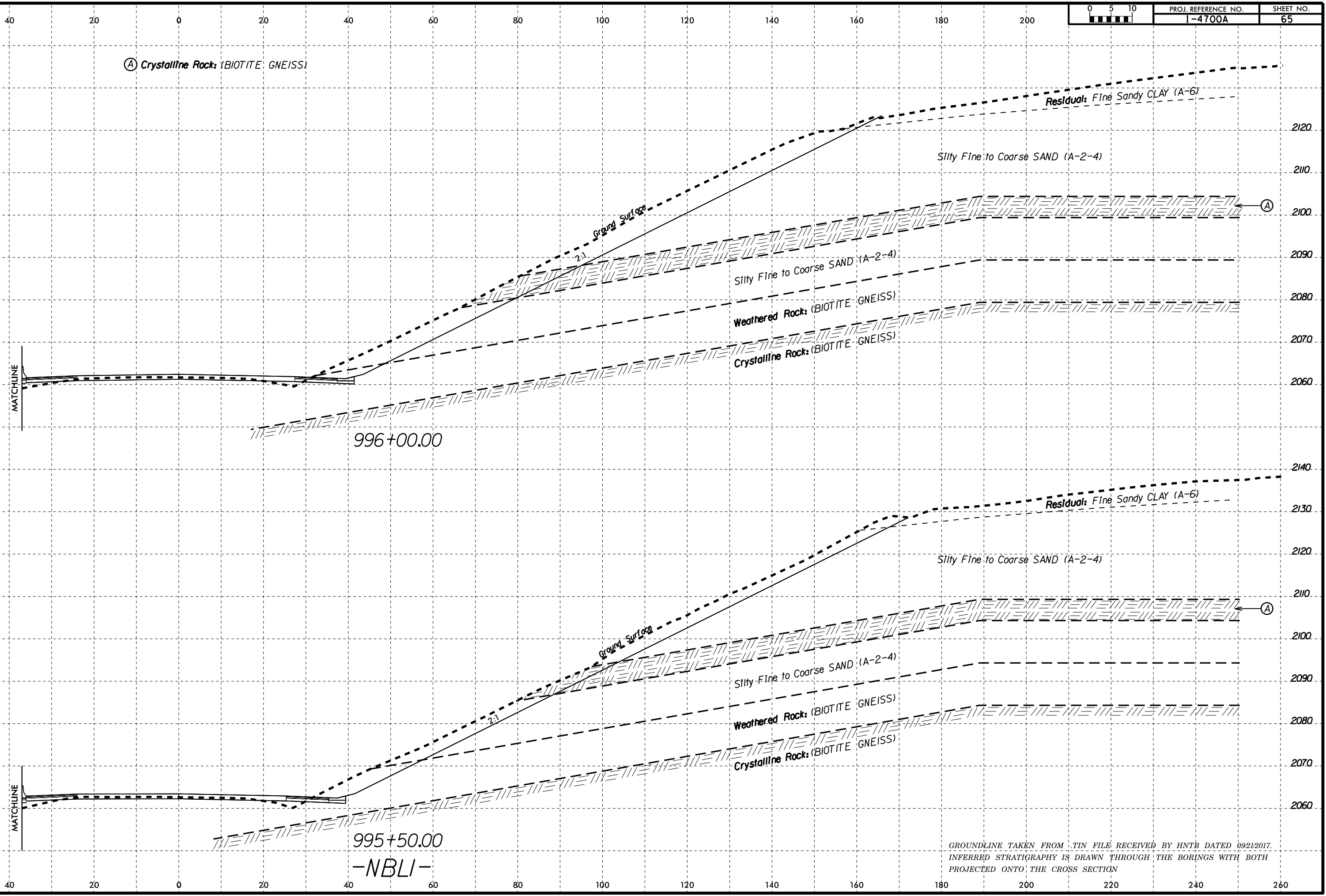
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6/23/16
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Walker-A 660261102



GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

6/23/16
05-SEP-2018 11:41
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Walker-A



GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

-NBLI-

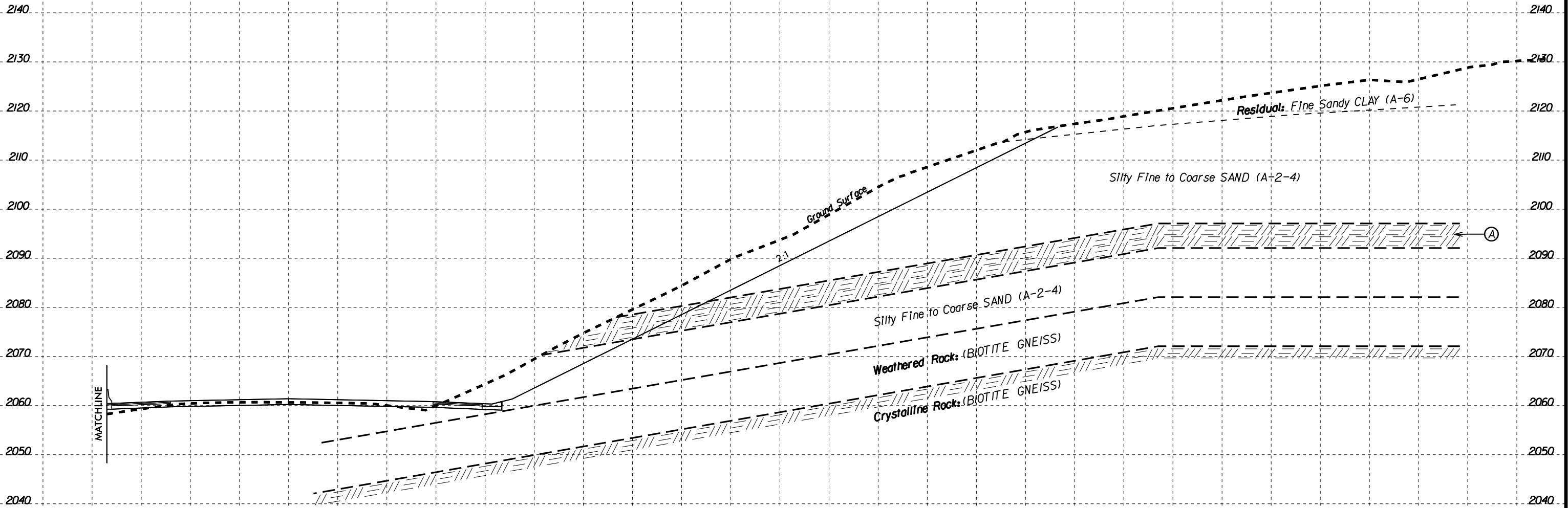
6/23/16

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PROJ. REFERENCE NO.	SHEET NO.
I-4700A	66

Continued on -L2- 997+00 (Sheet 104)



996+50.00

-NBLI-

GROUNDLINE TAKEN FROM TIN FILE RECEIVED BY HNTB DATED 09/21/2017.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH
PROJECTED ONTO THE CROSS SECTION

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