

REFERENCE: R-5963D

PROJECT: 48599

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

CONTENTS

<u>LINE</u>	<u>STATION</u>	<u>PLAN</u>
-Y2-	11+80.00 - 29+00.00	4-5
-L-	239+74.21 - 251+25.33	5

CROSS SECTIONS

<u>LINE</u>	<u>STATION</u>	<u>SHEETS</u>
-Y2-	12+50 - 29+00	6-24
-L-	247+50 - 249+50	25-27

APPENDICES

<u>APPENDIX</u>	<u>TITLE</u>	<u>SHEETS</u>
A	LABORATORY TEST RESULTS	28-33

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

ROADWAY
SUBSURFACE INVESTIGATION

COUNTY CHATHAM
PROJECT DESCRIPTION SR 1809 (SUTTLES ROAD)
TO CHATHAM PARK WAY

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5963D	1	

CAUTION NOTICE

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

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

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

- NOTES:
- 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
CG2 EXPLORATION
S. PATTERSON, PG

INVESTIGATED BY CG2, PLLC
DRAWN BY M. BREWER, PE
CHECKED BY R. KRAL, PE
SUBMITTED BY CG2, PLLC
DATE OCTOBER 2023

Prepared in the Office of:
 **CAROLINAS
GEOTECHNICAL
GROUP**
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SUITE 800
CHARLOTTE, NC 28227
(980) 339-8684



DocuSigned by:
D. Matthew Brewer, PE 10/02/2023
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SIGNATURE DATE
**DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED**

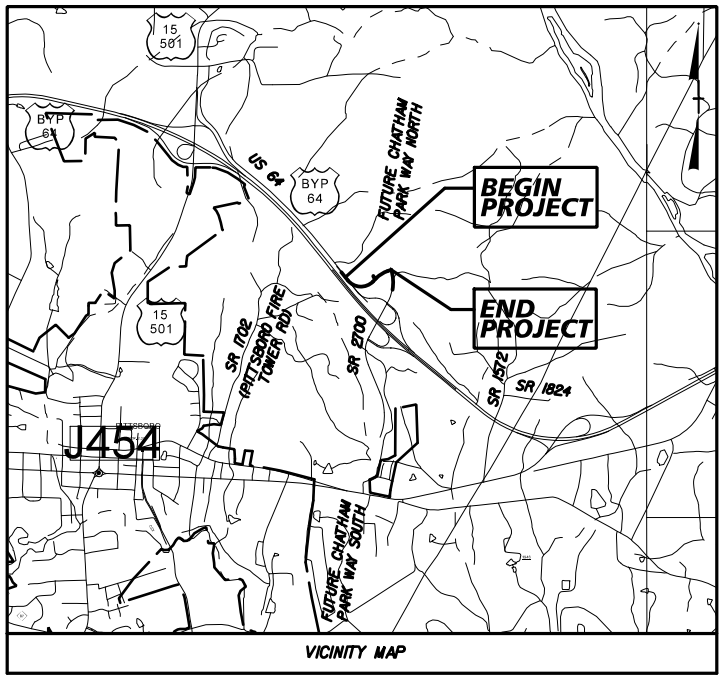
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

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 298, 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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 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 (SROD) - 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										WEATHERING																																							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) 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.										MINERALOGICAL COMPOSITION										GROUND WATER																			
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										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																																							
PERCENTAGE OF MATERIAL										MISCELLANEOUS SYMBOLS										ROCK HARDNESS																																							
ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY										VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 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.										SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE										VERY THICKLY BEDDED MORE THAN 10 FEET THICKLY BEDDED 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										BENCH MARK: N/A ELEVATION: N/A FEET									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										INDURATION																																							
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										UNDERCUT UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.																																							
SOIL MOISTURE - CORRELATION OF TERMS										ABBREVIATIONS										FRACATURE SPACING										BEDDING																													
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION										AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI. - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL w - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT Wg - DRY UNIT WEIGHT SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO										TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FOOT VERY CLOSE LESS THAN 0.16 FEET										TERM THICKNESS VERY THICKLY BEDDED 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET																													
LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SL - SHRINKAGE LIMIT										DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> DIEDRICH D50 <input type="checkbox"/> MOBILE B29										ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT										HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST																													
PLASTICITY										EQUIPMENT USED ON SUBJECT PROJECT										INDURATION																																							
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH																																																											
COLOR																																																											
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																											
																														NOTES: ROADWAY DESIGN AND SURVEY INFORMATION DATED 08/03/23 PROVIDED BY NCDOT. USED r5930.ls-+ln.+ln DATED 8/3/2023 TO OBTAIN ELEVATION INFORMATION																													

09/28/99

TIP PROJECT: R-5963D

SEE SHEET 1A FOR INDEX OF SHEETS
SEE SHEET 1B FOR CONVENTIONAL PLAN SHEET SYMBOLS



VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
CHATHAM COUNTY

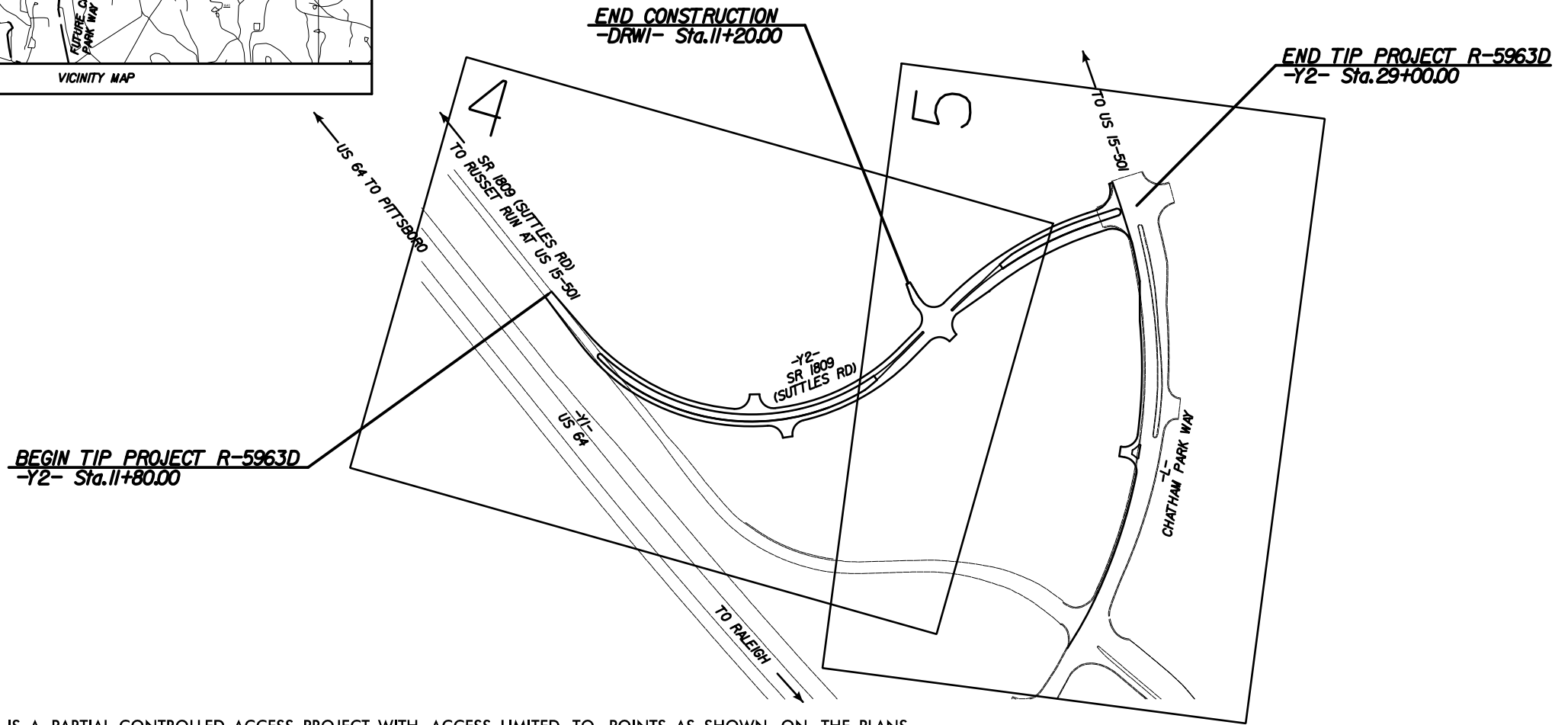
LOCATION: SR 1809 (SUTTLES ROAD) TO CHATHAM PARK WAY

TYPE OF WORK: GRADING, DRAINAGE, AND PAVING

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5963D	2A	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
48599.1.5		P.E.	
48599.2.9		RW & UTIL	
48599.3.5		CONST.	



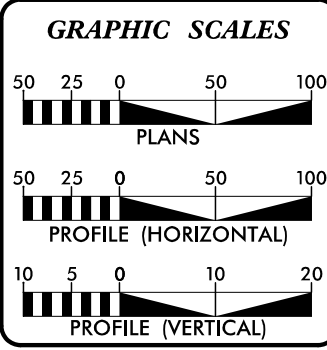
65% PLANS



CHATHAM PARK WAY IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS LIMITED TO POINTS AS SHOWN ON THE PLANS
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
DOCUMENT NOT CONSIDERED FINAL
UNLESS ALL SIGNATURES COMPLETED

CONTRACT:



R-5963D DESIGN DATA

ADT 2025 =	2000
ADT 2045 =	5200
K =	8%
D =	55
T =	3%*
V =	40 MPH
* (TTST 1% + DUAL 2%)	
FUNCTIONAL CLASSIFICATION:	LOCAL

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT R-5963D	=	0.326 MILES
TOTAL LENGTH TIP PROJECT R-5963D	=	0.326 MILES

PLANS PREPARED FOR THE NCDOT BY: **Kimley Horn**

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: JULY 28, 2023

LETTING DATE: DECEMBER 19, 2023

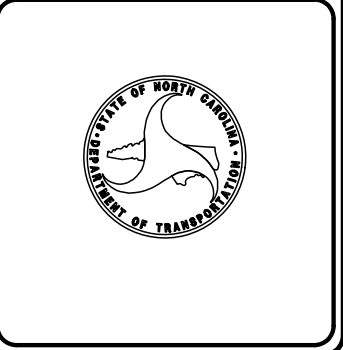
VANCE W. BLANTON, P.E. PROJECT ENGINEER
TYLER G. SPRING, P.E. PROJECT DESIGN ENGINEER
JEFFERY A. STRODER, P.E. PROJECT MANAGER NCDOT HIGHWAY DIVISION 8

HYDRAULICS ENGINEER

SIGNATURE: _____ P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: _____ P.E.



\$FILE\$ 9/29/2023

10/2/2023

WBS ELEMENT: 48599.1.5
 T.I.P. NO.: R-5963D
 PROJECT ID: 42597
 COUNTY: Chatham
 DESCRIPTION: SR 1809 (Suttles Road) to Chatham Park Way

 SUBJECT: Geotechnical Roadway Inventory Report

PROJECT DESCRIPTION

Based on a review of the plans provided to us by NCDOT, we understand this project will construct an access route on a new alignment which will connect Suttles Road to Chatham Park Way in Pittsboro, Chatham County, North Carolina. This project is for the realignment of Suttles Road and is approximately 0.326 miles in length, measured along -Y2- (Suttles Road) from Station 11+80 to 29+00. Additional widening is planned along -L- (Chatham Park Way) in order to tie into the new alignment for -Y2-. The roadway construction along the new alignment consists of a two-lane roadway facility with access drives. The improvements to Chatham Park Way are related to the addition of a Multi-Use Path (MUP) along the west side of the alignment.

The provided roadway plans generally indicate cuts on the order of up to 10 to 20 feet will be required to achieve proposed grades along -Y2- and -L-. Fills on the order of 10 to 35 feet are planned along -Y2- in order to achieve proposed grades. Slopes are planned to be oriented at a 2:1 (horizontal:vertical) geometry.

The following alignments are included as part of this investigation:

<u>Alignment</u>	<u>Stations</u>
-Y2-	11+80 to 29+00
-L-	239+74 to 251+25
-DRW1-	10+00 to 11+20

The geotechnical field investigation was conducted by CG2 during August 2023. A subcontracted drilling crew was used to drill and sample each of the seventeen (17) borings included in this report. The drill rig utilized was an ATV-mounted CME 550X equipped with an automatic hammer. Standard Penetration Tests (SPT) were performed at selected depths within each boring. Representative soil samples were collected for visual-manual classification in the field and evaluated in the office by a professional geologist working under the supervision of a licensed engineer. Select soil samples were submitted for laboratory analysis by an approved NCDOT M&T testing facility.

PHYSIOGRAPHY AND GEOLOGY

The project corridor is located within the Piedmont Physiographic Province of North Carolina. The Piedmont Physiographic Province generally consists of hills and ridges which are intertwined with an established system of draws, streams, and valleys. According to the 1985 Geologic Map of North Carolina, the bedrock under the site consists metamorphosed dacitic to rhyolitic flows and tuffs interbedded with mafic and intermediate metavolcanic rock. Crystalline rock and weathered rock encountered during this investigation consisted of Meta-Andesite and Meta-Tuff.

Within the project alignment, much of the bedrock is overlain by near-surface material consisting of residual soils. Residual soils are derived from in situ chemical and physical weathering of the rock in the area and vary in thickness. The residual soils in this region are typically finer grained with a higher clay content near the surface due to advanced weathering, and typically become coarser grained with increasing depth as the degree of weathering decreases. As the degree of weathering decreases, the residual soils generally retain the overall appearance and fabric of the parent rock (sometimes referred to as "saprolite"). The boundary between

soil and rock is not always sharply defined. A transitional zone termed "weathered rock" is often found overlying the parent bedrock. Weathered rock is defined as material requiring 100 blows with less than one foot of penetration from the SPT hammer.

In general, maximum existing grades occur near -Y2- Station 22+00 and generally the site drains to lower elevation areas near Stations 16+50 to 17+00 and toward the end of the project near Station 29+00 at the -Y2- intersection with -L-. Generally, positive drainage exists from right to left along -Y2- and from left to right along -L-.

SOIL PROPERTIES

Roadway embankment soils are similar in nature to residual soils and may be derived from nearby sources. Roadway embankment soils were observed in Boring Y2_2789L during the roadway investigation due to the presence of state-maintained roadways. This material consists of stiff, silty clay (A-7-6) with trace gravel and organics.

Residual soils were encountered underneath the roadway embankment soils at Y2_2879L and beneath the ground surface in the remaining borings performed during this investigation. The fine-grained residual soils generally consist of medium stiff to hard, sandy silts (A-4), clayey silts (A-5), sandy clays (A-6), and silty clays (A-7-6 & A-7-5). Coarse grained residual soils consisted of very dense, silty sand (A-2-4). Trace amounts of gravel-sized rock fragments were encountered intermittently within the residual soils. Manganese oxide staining was observed at various depths within the residual soils. The soil plasticity index (PI) ranged from 4 to 50 in the residual soils encountered.

Weathered rock was encountered along the project alignment within 11 borings. The weathered rock encountered consists of Meta-Tuff and Meta-Andesite. The top of weathered rock was encountered at depths ranging from approximately 3.5 (EL 522) to 18.5 (EL 531) feet below the existing ground surface. Small lenses of weathered rock were encountered within some of the borings intermittently across the project.

Crystalline rock was encountered along the project alignment within one boring (L_24758L) that was terminated on crystalline rock. The crystalline rock encountered was classified as Meta-Andesite and was encountered at a depth of 23.5 feet (EL 535) below the existing ground surface. For the boring terminated on crystalline rock where rock was not recovered, the rock was classified based on materials recovered within the boring or on proximal rock outcrop type adjacent to the roadway study area.

GROUNDWATER

Groundwater measurements were attempted during August 2023. Groundwater measurements were attempted at the completion of drilling in each boring, at which time groundwater was not encountered in the majority of the borings. Groundwater was encountered at Borings Y2_1654R and Y2_1706L at depths ranging from 14.5 to 15.5 feet below existing grades. Subsequent groundwater measurements were attempted after at least 24 hours following the completion of drilling in all borings, at which time groundwater was not encountered, with one exception. Groundwater was encountered at a depth of 2.5 feet below existing grades in Boring Y2_1654R. Please note that a rain event occurred at the end of the previous day and may have influenced this water level reading, as this boring was performed within a natural drainage area. The soils encountered in the borings were generally described as moist.

Water wells were not observed within the proposed construction corridor; however, wells may be encountered that were not observed during our field services.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

Very soft to soft or very loose to loose soils were not encountered in borings on the project.

Highly plastic soils (PI > 25) were extensively encountered across the project, and were specifically encountered at the following locations:

<u>Alignment</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-Y2-	18+75 to 28+75	LT to RT

Shallow groundwater was not encountered within 6 feet of the proposed subgrade. However, shallow groundwater was encountered within approximately 3 feet of existing grades at the following location:

<u>Alignment</u>	<u>Stations</u>	<u>Offsets (ft)</u>
-Y2-	16+54	LT to RT

Crystalline rock was not encountered above or within 6 feet of the proposed grade.

Rock Outcrops: Rock outcrops were not observed within the project limits. However, several rock outcrops (Meta-Andesite) were observed just east of the project area.

GEOTECHNICAL TESTING

Two bulk samples were collected during the investigation in Boring Y2_2396L from 2.0 to 7.0 feet and Boring Y2_2602R from 8.0 to 15.0 feet below the existing ground surface. Standard proctor testing and CBR testing were performed on these recovered bulk samples.

Sample No.	Alignment	Stations	Offsets (ft)	Sample Depth (ft)
Bulk-1	-Y2-	23+96	30 LT	2.0-7.0
Bulk-2	-Y2-	26+02	49 RT	8.0-15.0

Sincerely,
Carolin's Geotechnical Group, PLLC

DocuSigned by:
Robert E. Kral, PE
3181C2BA5F54455...
Robert E. Kral, PE
Senior Geotechnical Engineer

DocuSigned by:
D. Matthew Brewer, PE
386129C0A4C1462...
D. Matthew Brewer, PE
Senior Geotechnical Engineer

5/14/20

-Y1- US 64

PI Sta 37+31.04
Δ = 0° 50' 02.8" (LT)
D = 0° 34' 22.6"
L = 145.58'
T = 72.79'
R = 10000.00'
SE = EXIST
RO = EXIST

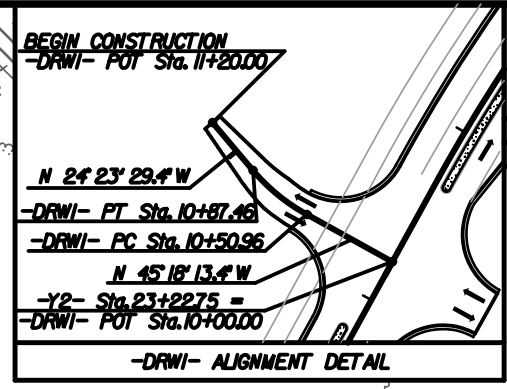
-Y2- SUTTLES ROAD

PI Sta 19+42.40
Δ = 96° 38' 32.8" (LT)
D = 10° 44' 58.8"
L = 899.03'
T = 598.67'
R = 533.00'
SE = 04
RO = 120'

-DRWI-

PI Sta 10+69.42
Δ = 20° 54' 44.0" (RT)
D = 57° 17' 44.8"
L = 36.50'
T = 18.45'
R = 100.00'
SE = N/A
RO = N/A

BM#4 ELEVATION = 573.48'
N 723.699 E 1,954.828
BRG = N 15° 09' 15" W
DIST = 195.7' FROM BY2-210
RAILROAD SPIKE IN 12" GUM



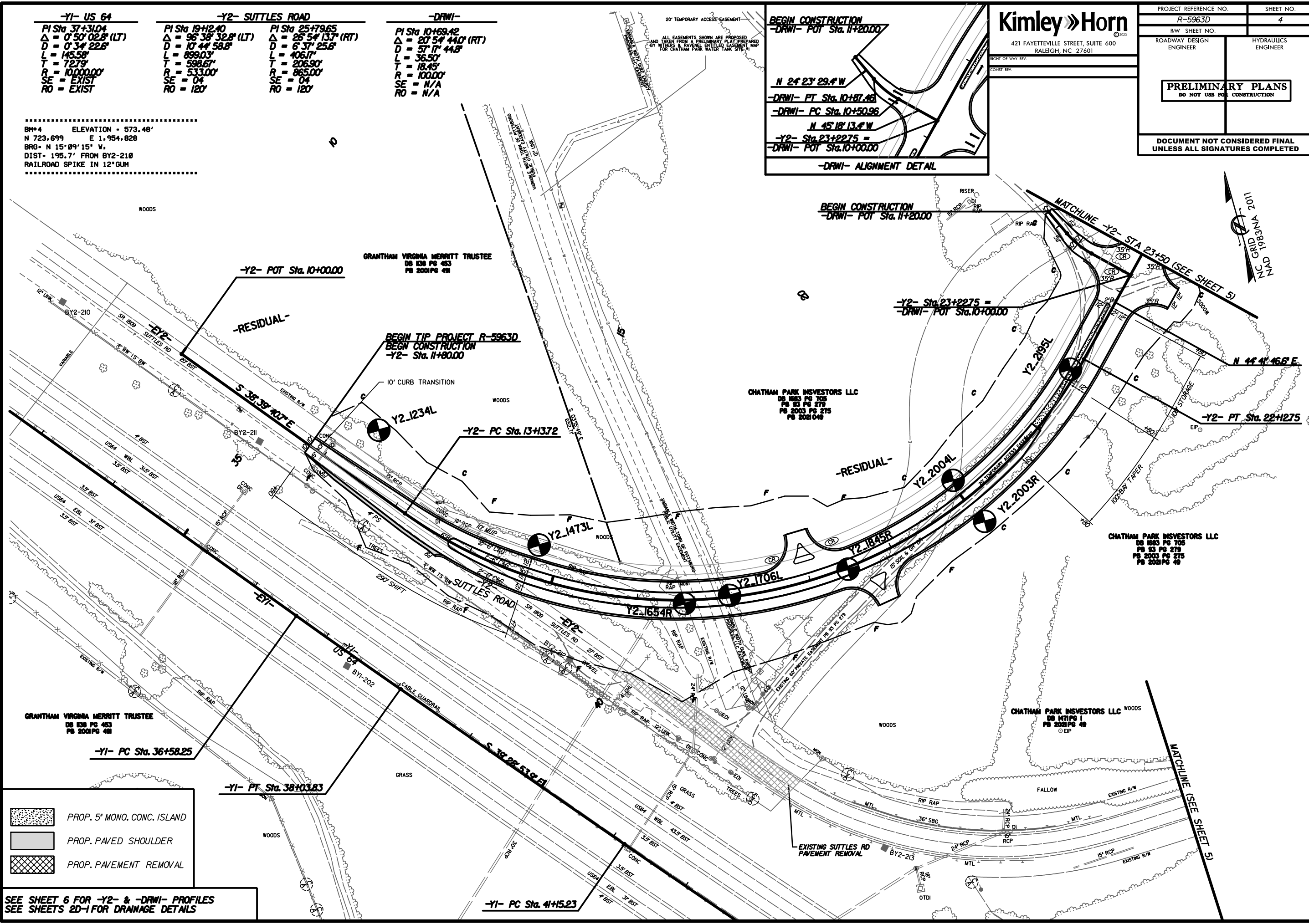
Kimley Horn
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NC 27601

PROJECT REFERENCE NO. R-5963D	SHEET NO. 4
R/W SHEET NO.	HYDRAULICS ENGINEER
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

REVISIONS

\$FILE\$

9/29/2023



- PROP. 5' MONO. CONC. ISLAND
- PROP. PAVED SHOULDER
- PROP. PAVEMENT REMOVAL

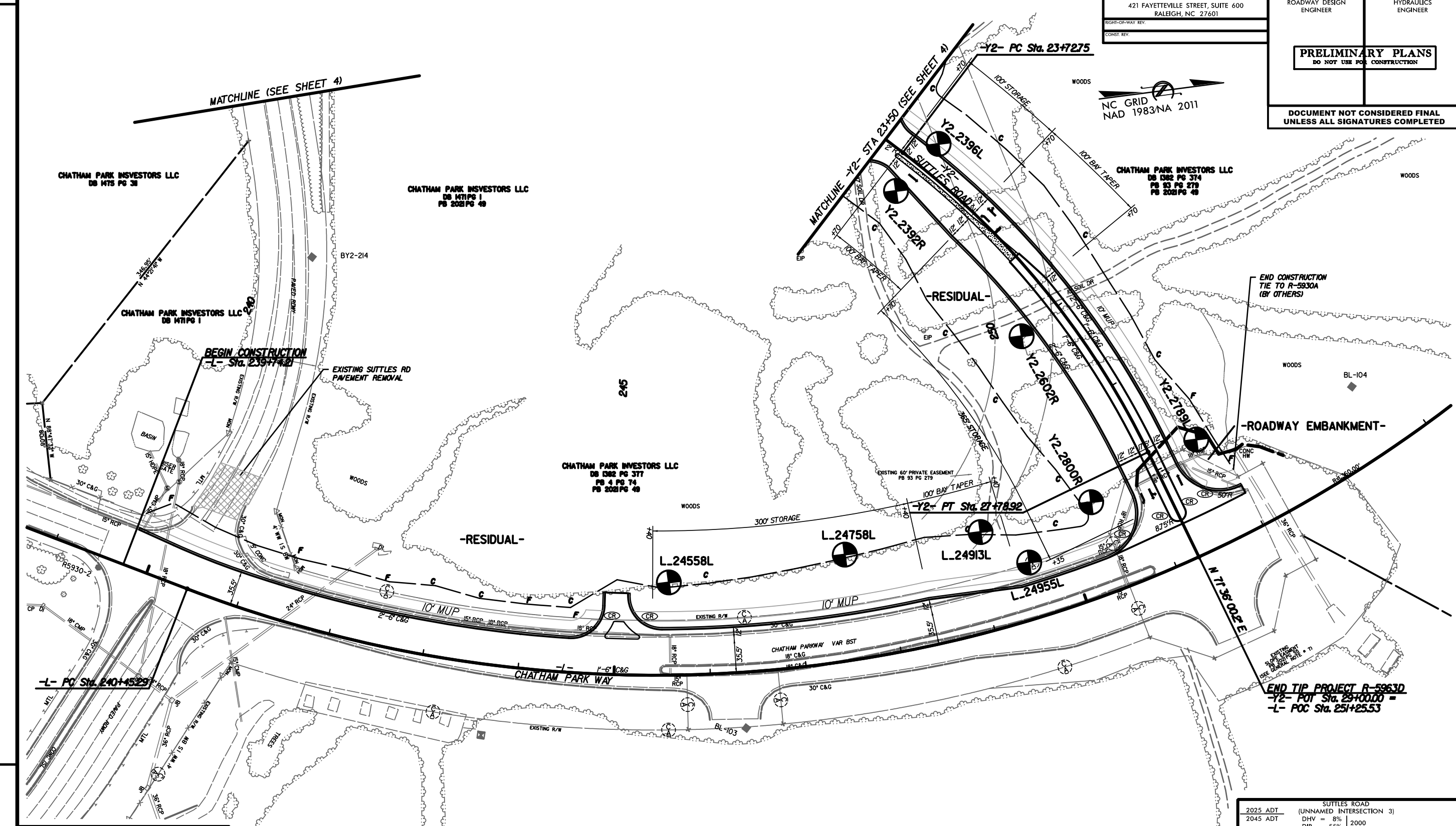
SEE SHEET 6 FOR -Y2- & -DRWI- PROFILES
SEE SHEETS 2D-1 FOR DRAINAGE DETAILS



5/14/99

REVISIONS

\$FILE\$



- PROP. 5" MONO. CONC. ISLAND
- PROP. PAVED SHOULDER
- PROP. PAVEMENT REMOVAL

 BM#3 ELEVATION = 548.21'
 N 722.729 E 1.956.641
 BL STATION 27+88.5 73.5' RIGHT
 L STATION 34+21.49 73.78' RIGHT
 RAILROAD SPIKE IN 28'OAK

-Y2- SUTTLES ROAD	-L- CHATHAM PARK WAY
PI Sta 25+79.65	PI Sta 248+38.68
Δ = 26° 54' 13.7" (RT)	Δ = 60° 30' 59.0" (LT)
D = 6' 37" 25.8'	D = 4' 12" 46.5'
L = 406.17'	L = 1,436.45'
T = 206.90'	T = 793.39'
R = 865.00'	R = 1,360.00'
SE = 04	SE = EXIST
RO = 120'	RO = N/A

SUTTLES ROAD (UNNAMED INTERSECTION 3)		-L- CHATHAM PARK WAY	
2025 ADT	30500	9700	1200
2045 ADT	3900	3700	3900
DHV = 8%	2000	DHV = 8%	1500
DIR = 55%	5200	DIR = 60%	1800
TST = 1%		TST = 2%	
DUAL = 2%		DUAL = 3%	
		DHV = 8%	5500
		DIR = 55%	7500
		TST = 1%	
		DUAL = 2%	
		SUTTLES ROAD (UNNAMED INTERSECTION 3)	
		DHV = 8%	
		DIR = 55%	
		TST = 1%	
		DUAL = 2%	

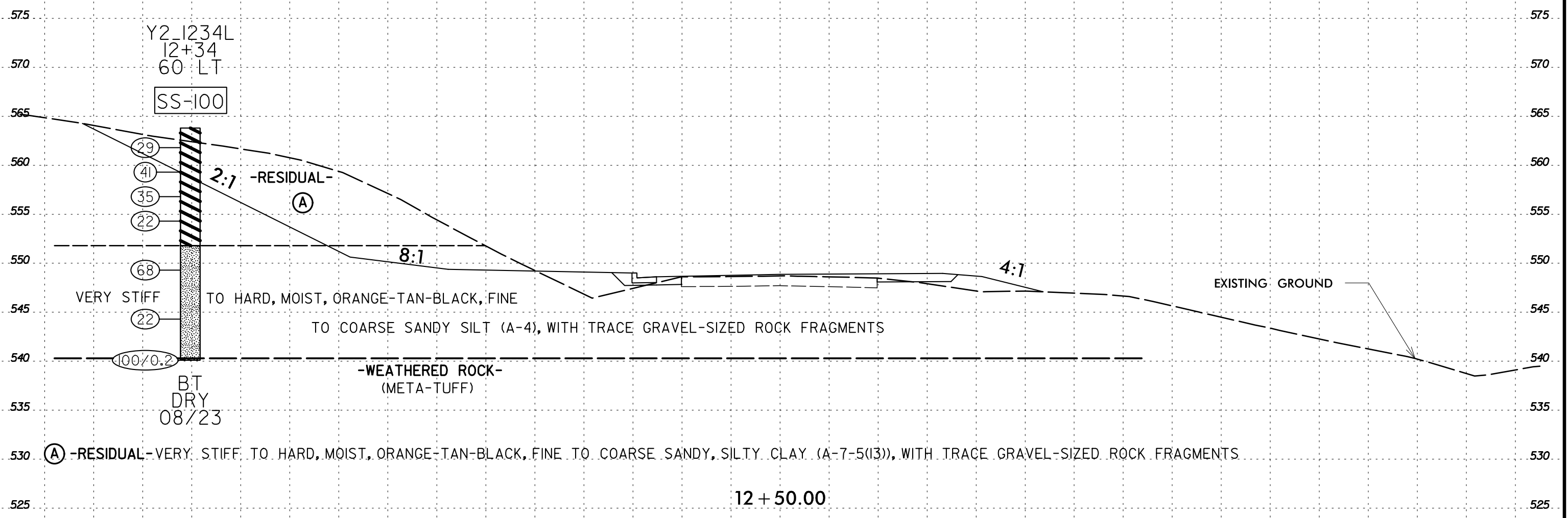
SEE SHEET 6 FOR -Y2- PROFILE
 SEE SHEET 2D-1 FOR DRAINAGE DETAILS

9/29/2023

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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-100	60 LT	12+34 -Y2-	6.0 - 7.5'	A-7-5(13)	46	13	15	4	31	50	100	87	82	19.0	-

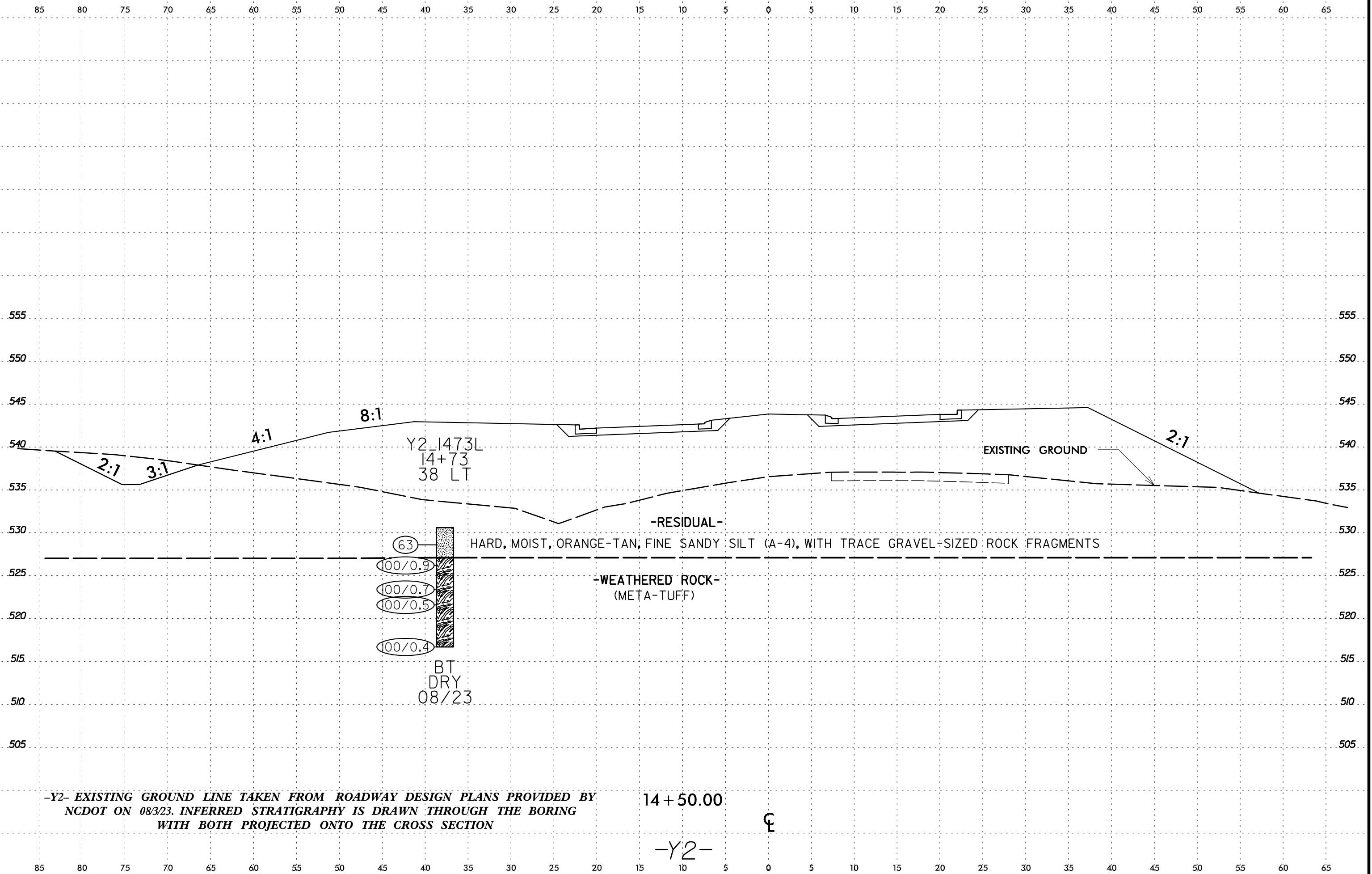


-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

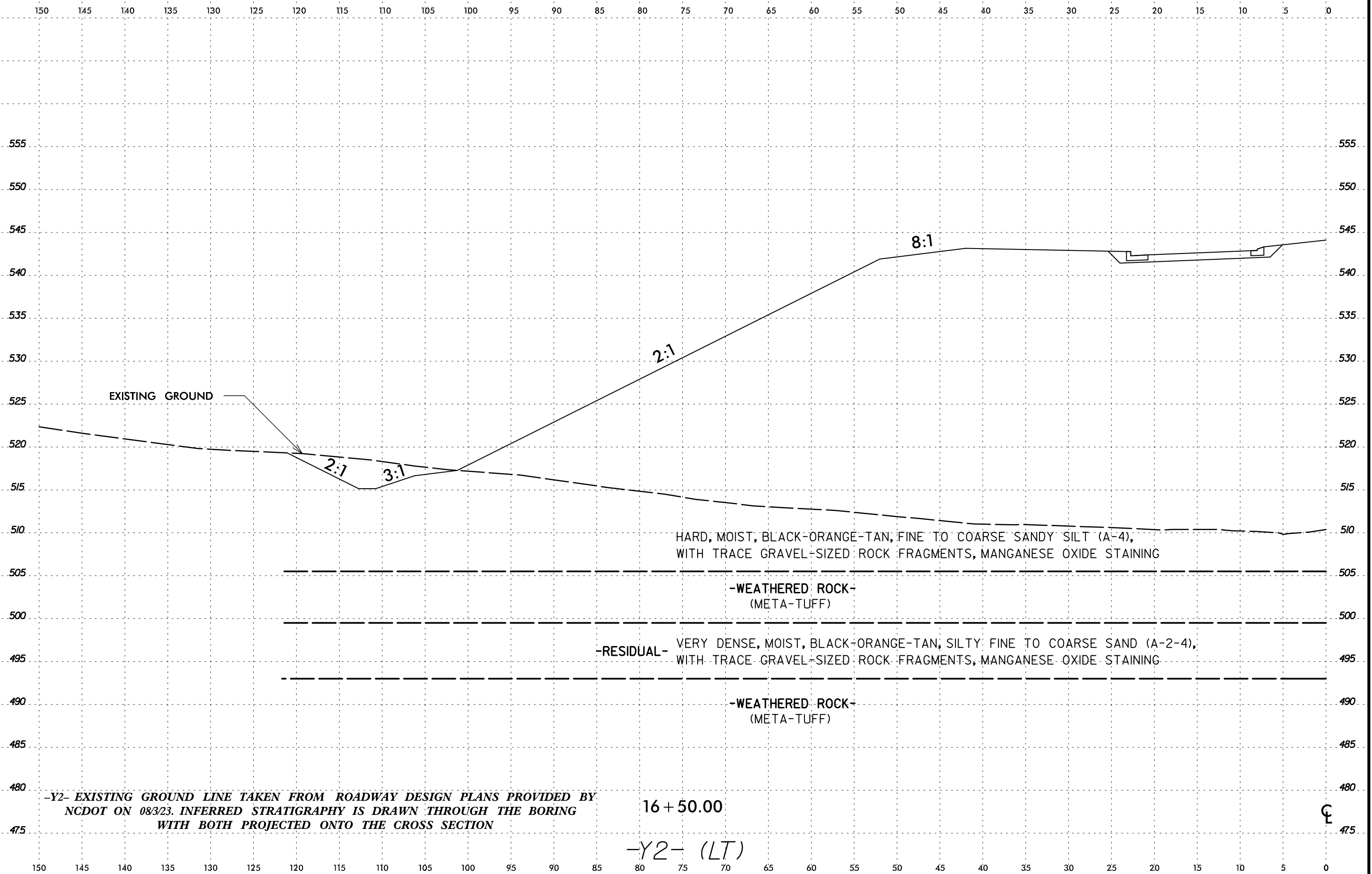
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-Y2-

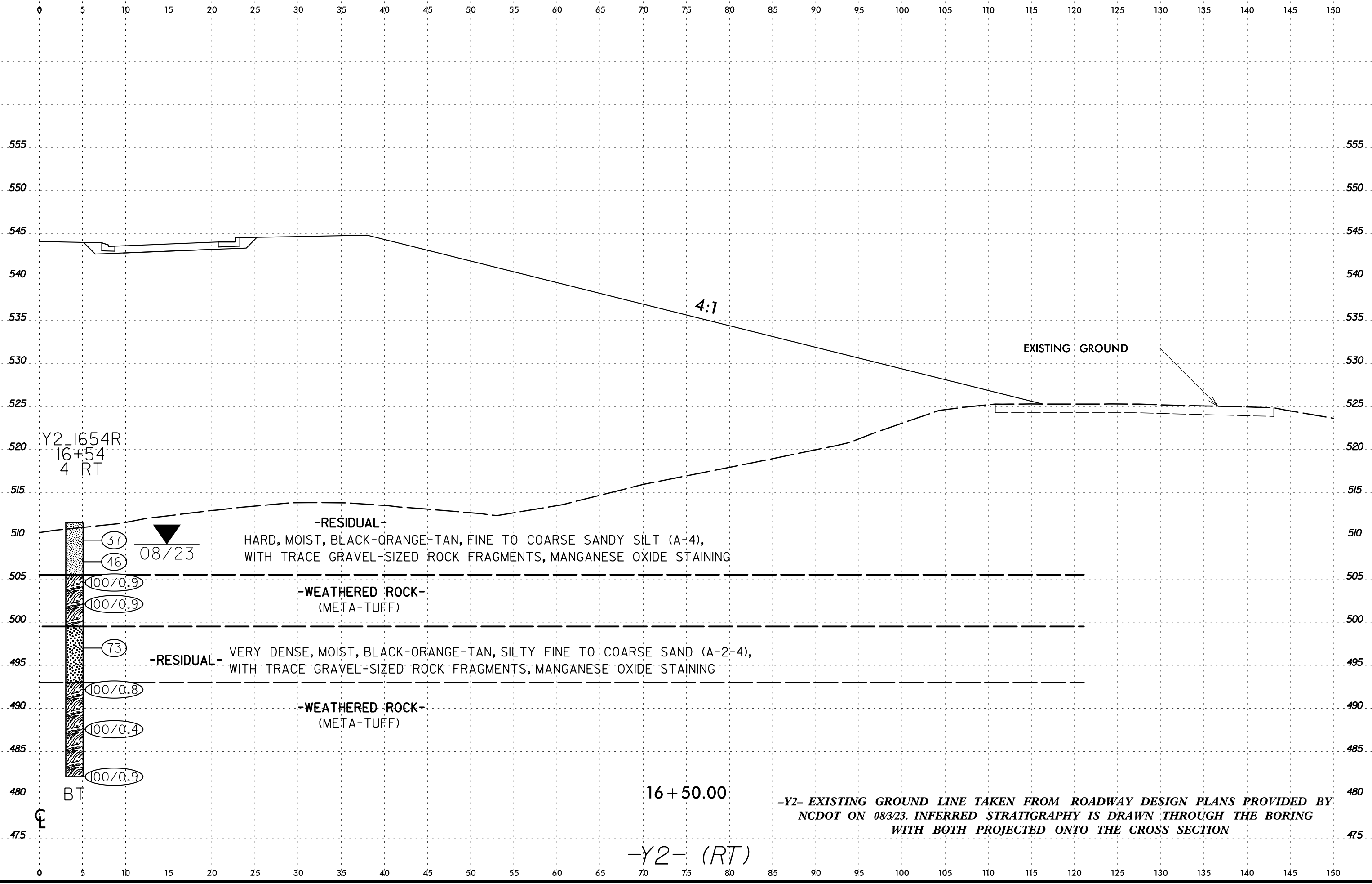
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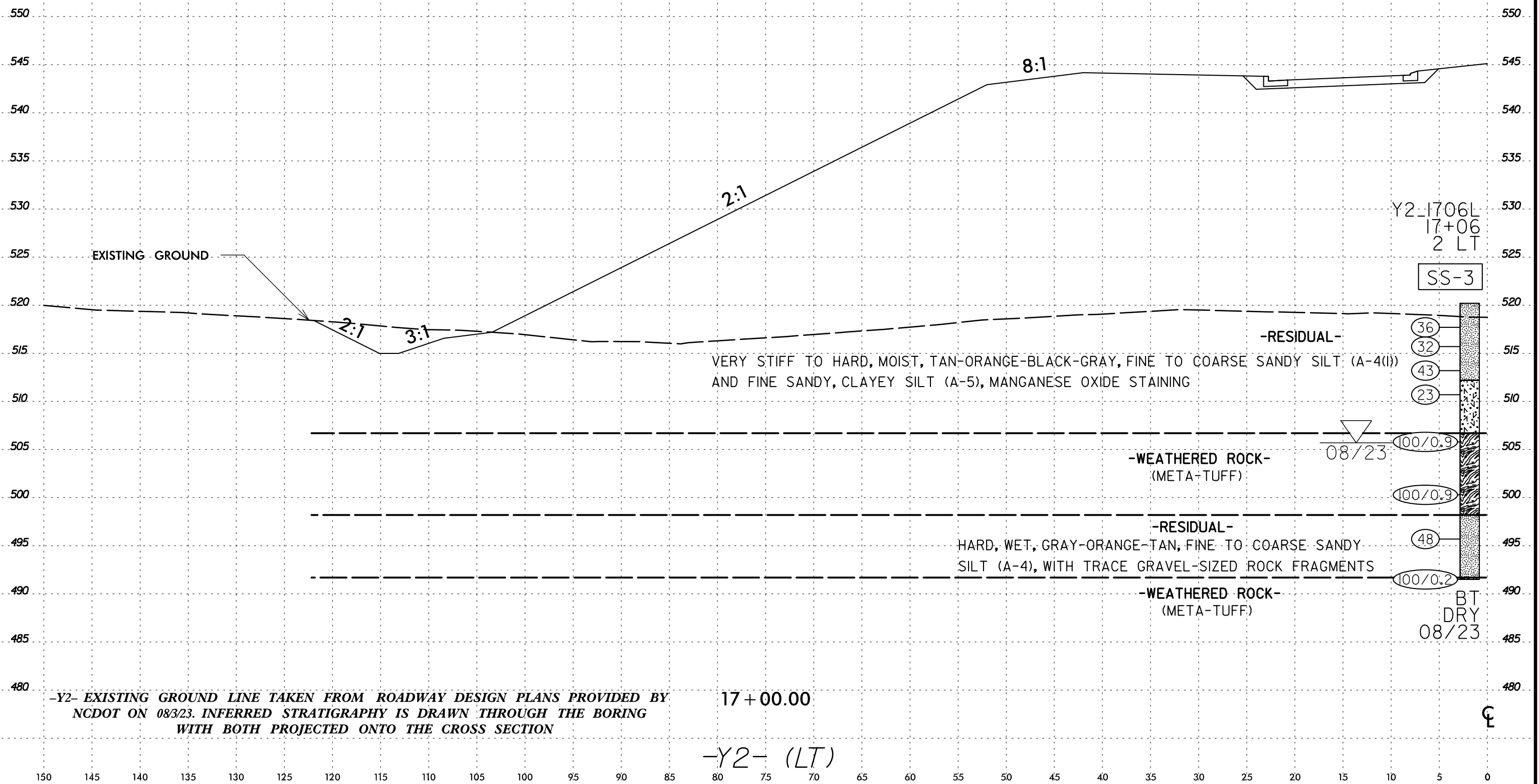
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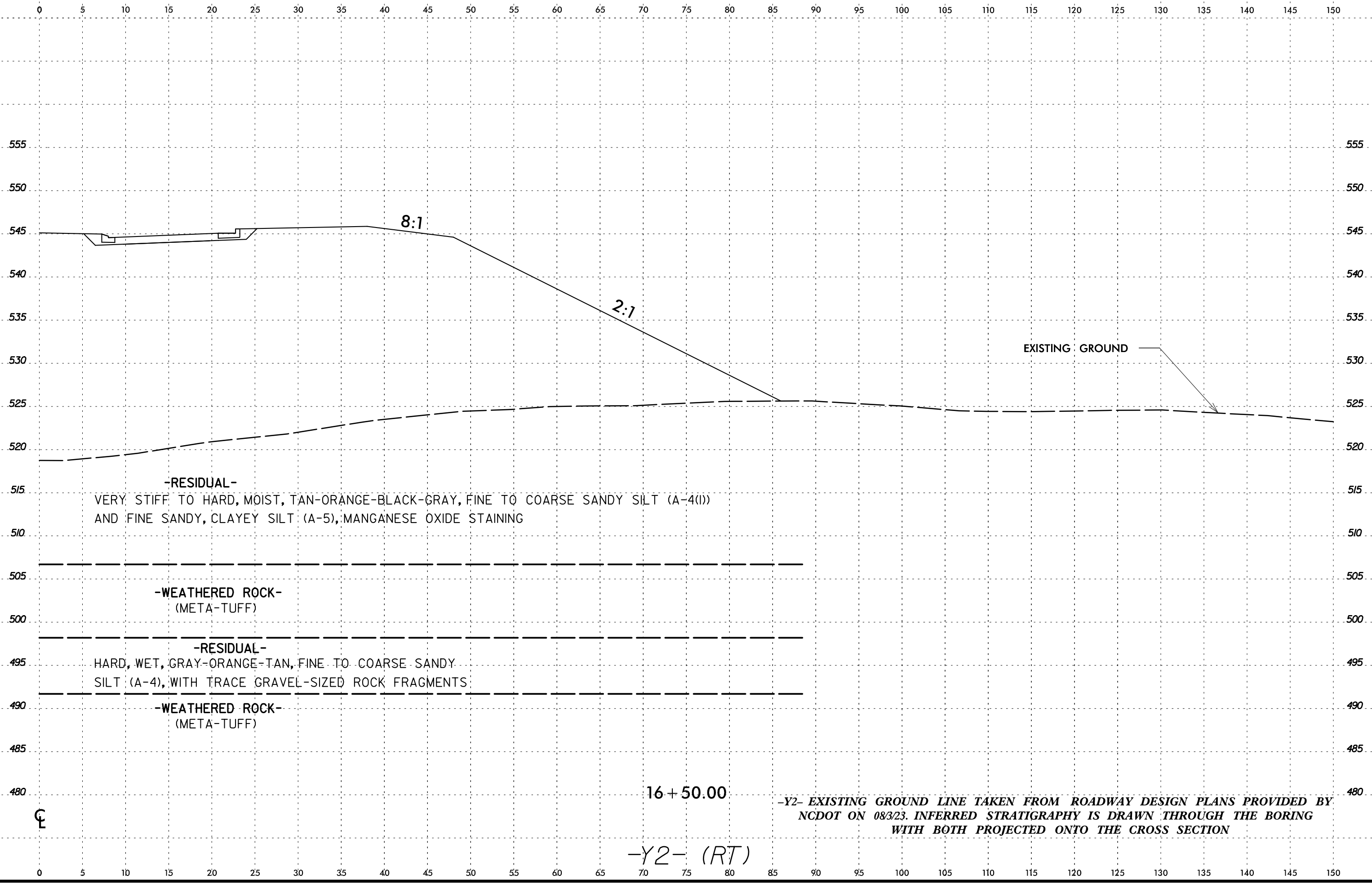
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150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

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	2 LT	17+06 -Y2-	6.0 - 7.5'	A-4(1)	28	4	18	29	31	22	100	92	58	15.9	-

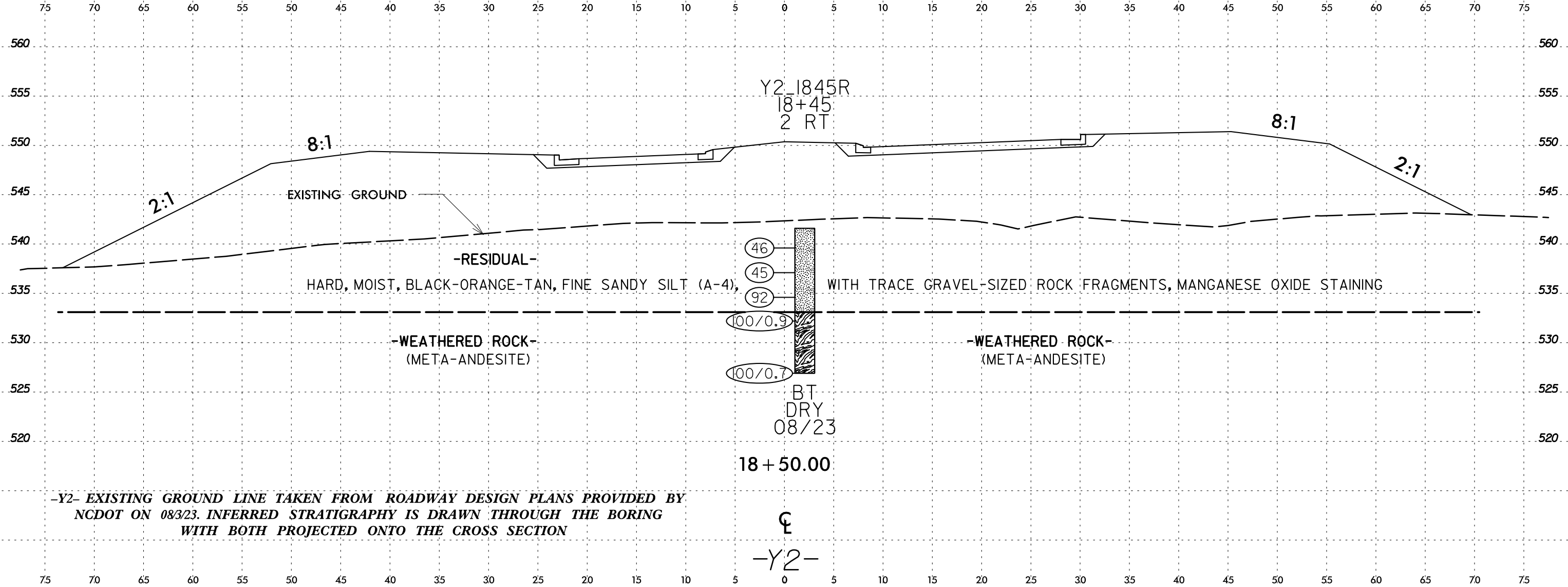
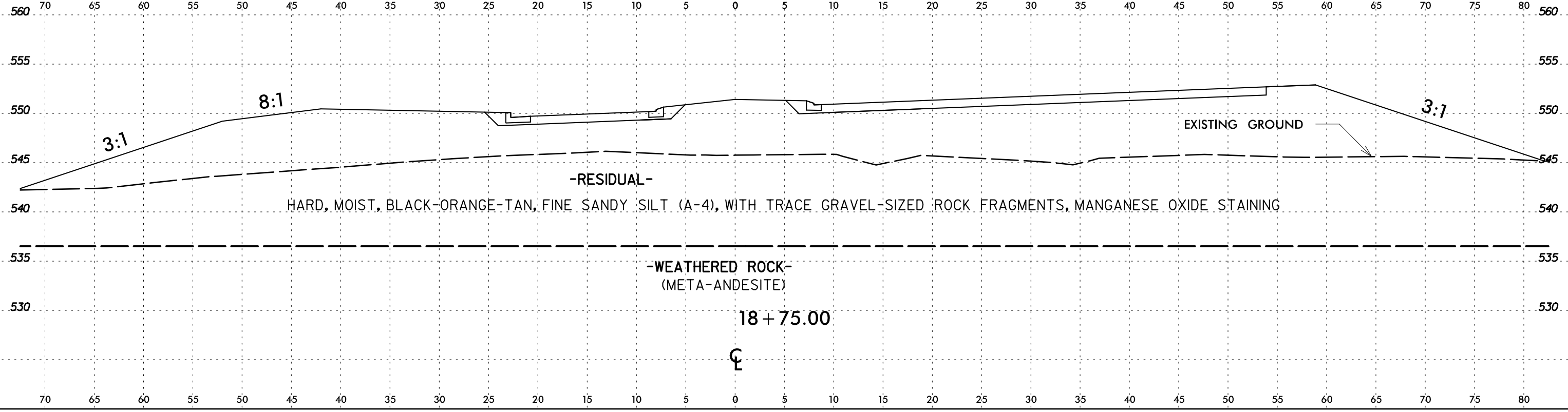




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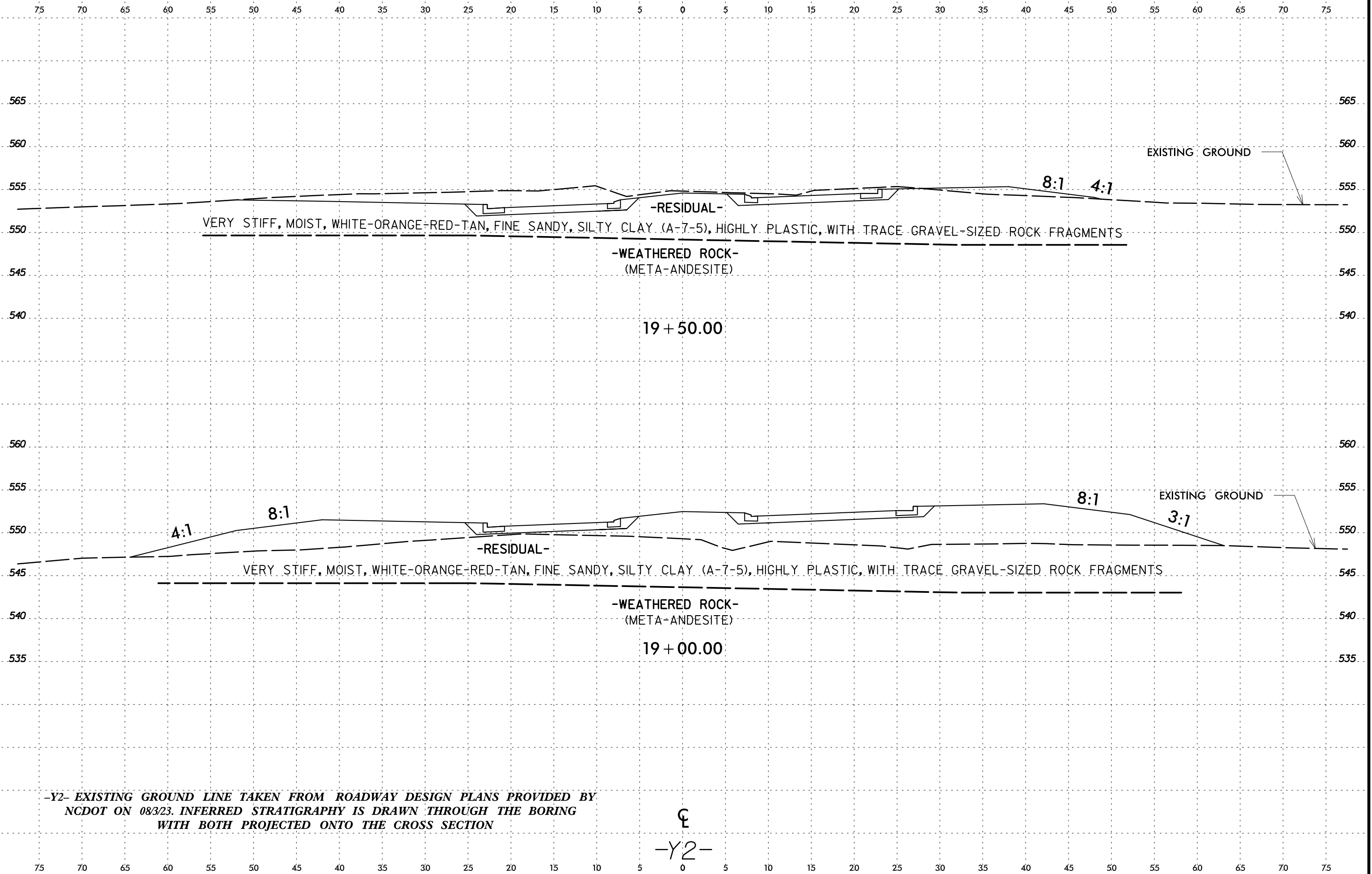
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-Y2- (RT)



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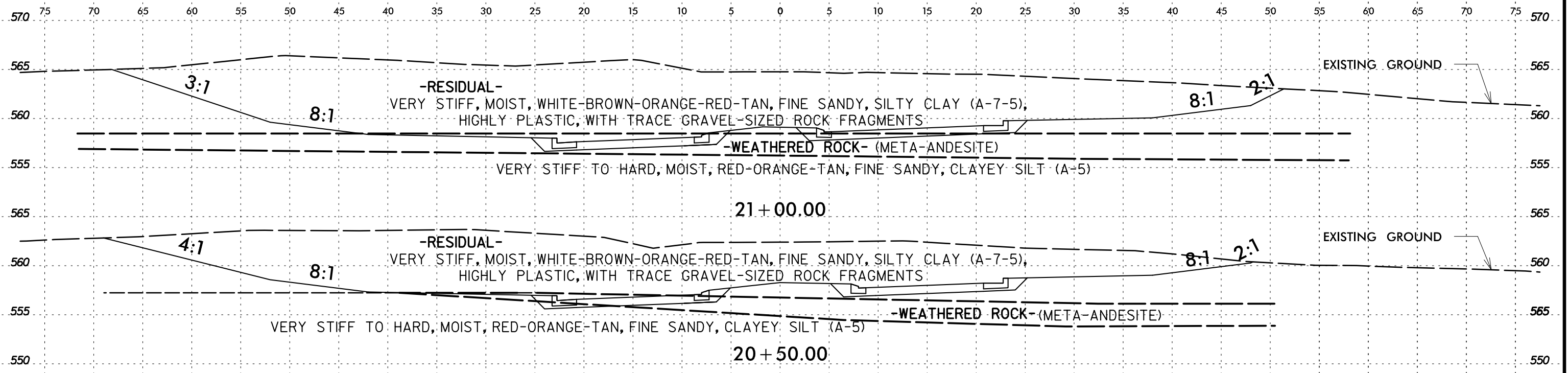
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-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

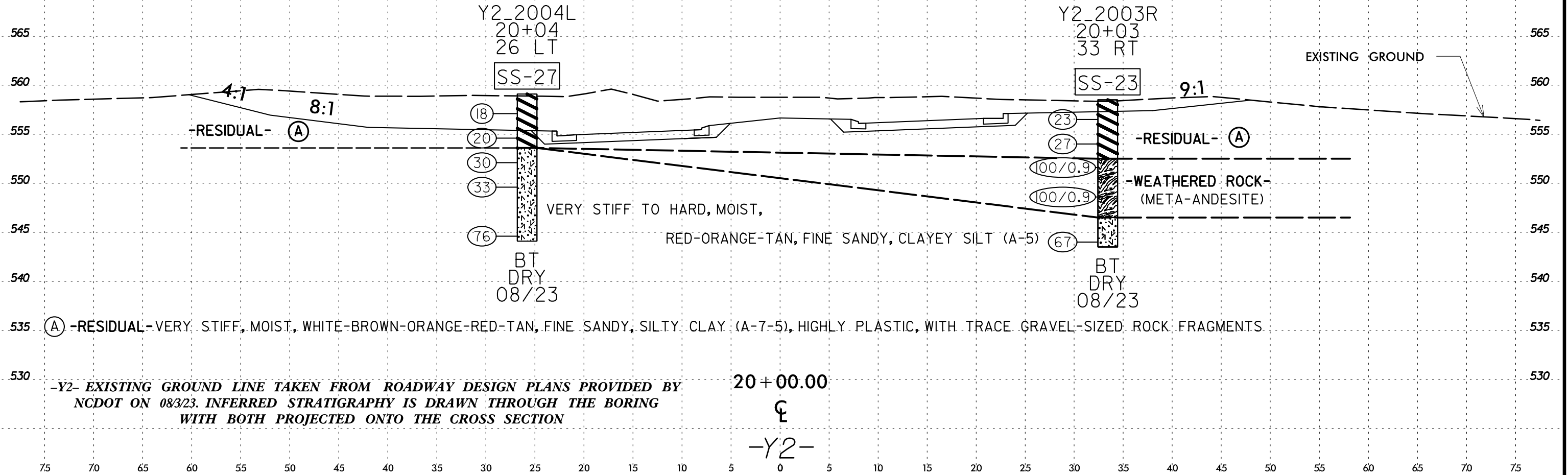
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SOIL TEST RESULTS

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-23	33 RT	20+03 -Y2-	3.5 - 5.0'	A-7-5(26)	64	30	9	9	27	55	91	85	77	22.9	-
SS-27	26 LT	20+04 -Y2-	1.0 - 2.5'	A-7-5(34)	66	30	1	10	24	65	100	99	91	30.3	-

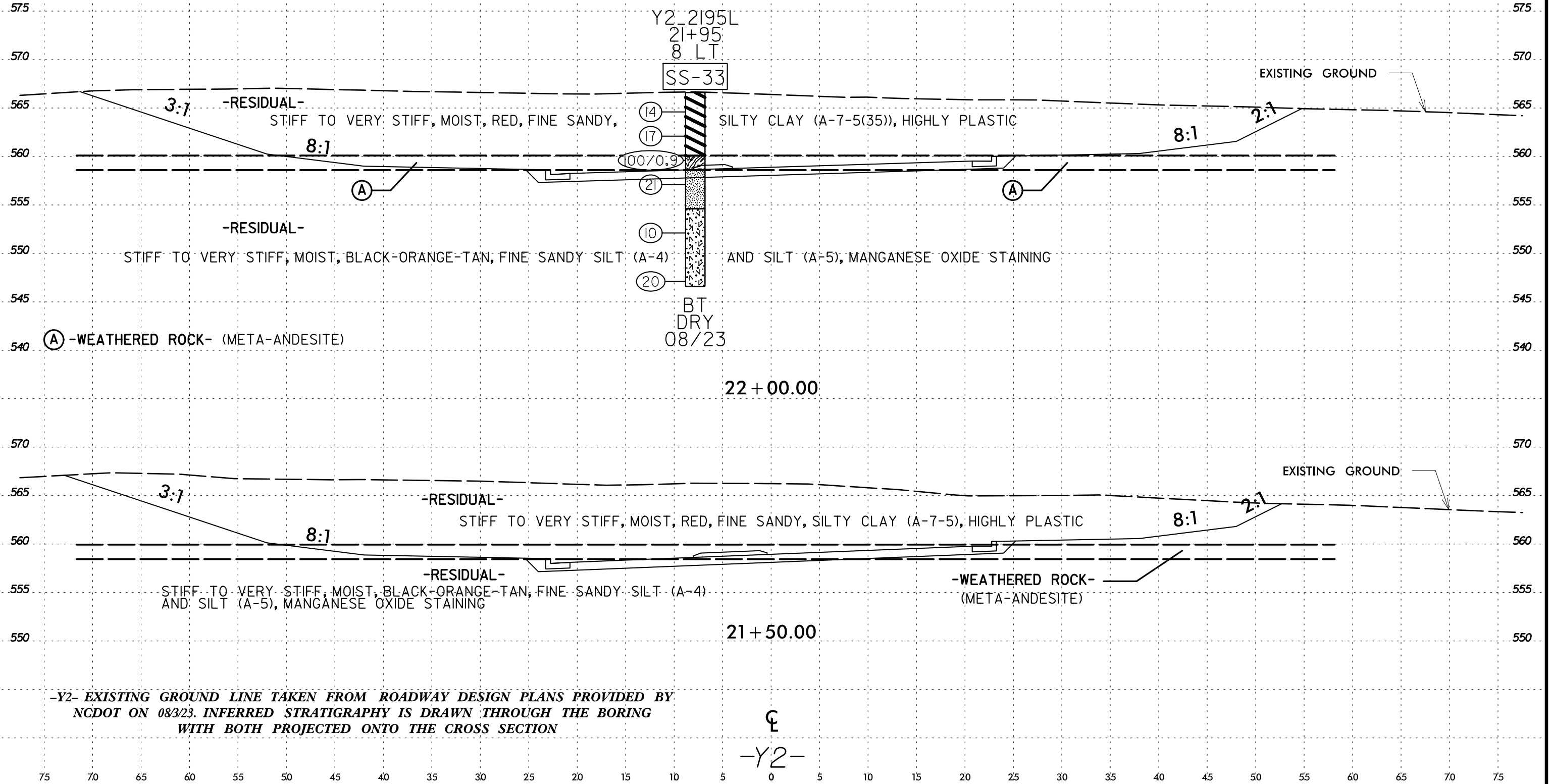


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SOIL TEST RESULTS

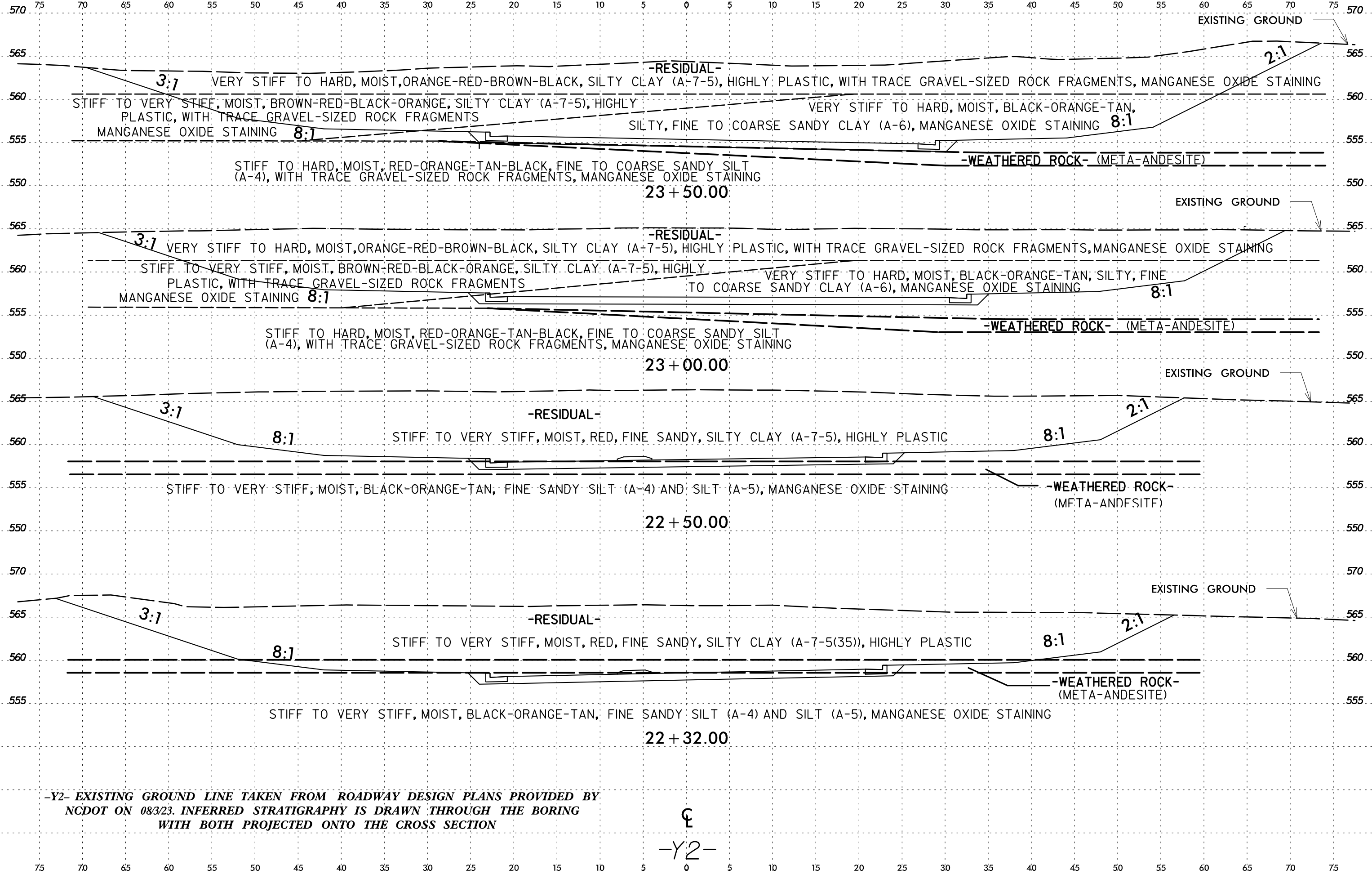
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-33	8 LT	21+95 -Y2-	3.5 - 5.0'	A-7-5(35)	67	30	2	8	21	69	100	99	93	34.8	-



-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
 NCDOT ON 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING
 WITH BOTH PROJECTED ONTO THE CROSS SECTION

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 -Y2-

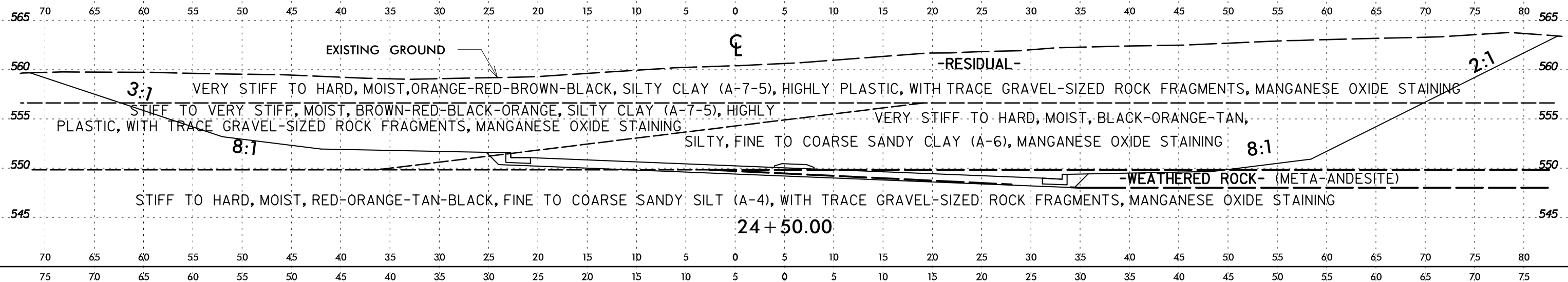
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-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

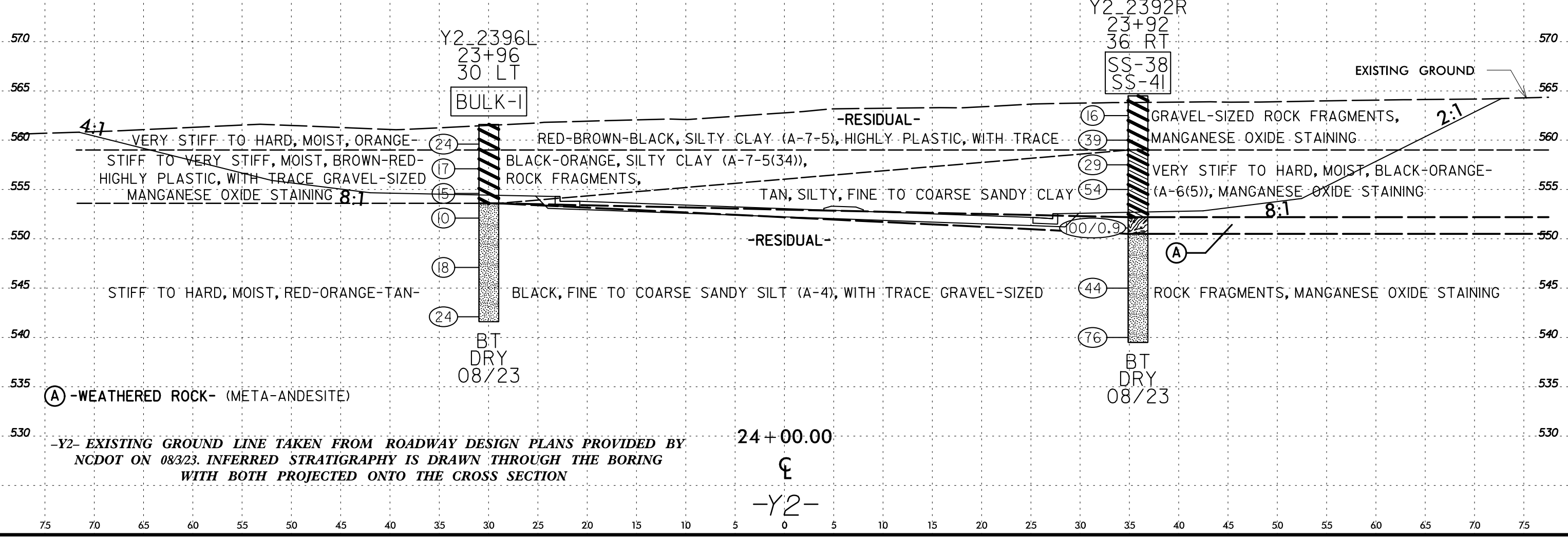
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SOIL TEST RESULTS

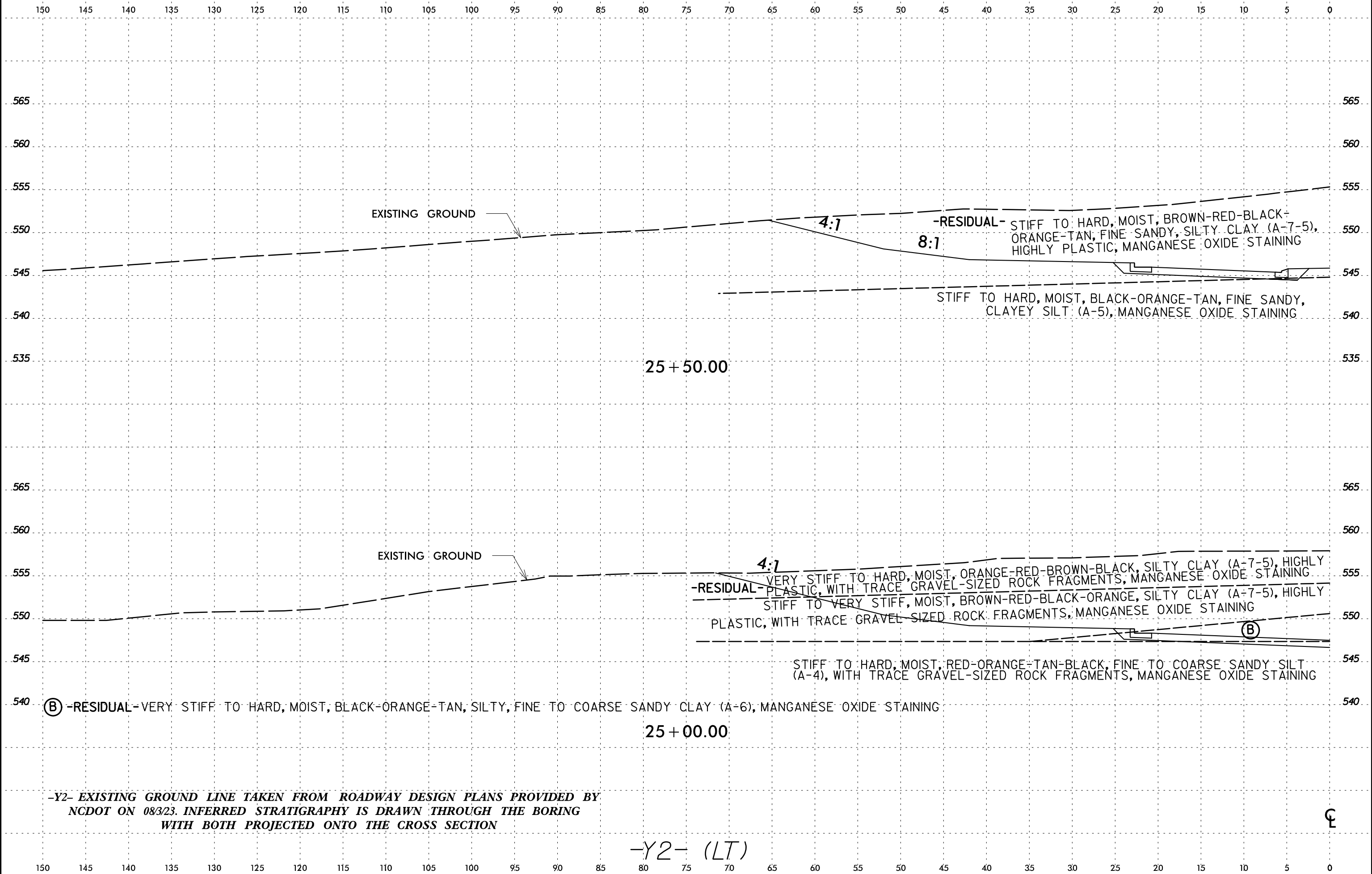
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							C. SAND	F. SAND	SILT	CLAY	10	40	200		
BULK-1	30 LT	23+96 -Y2-	2.0 - 7.0'	A-7-5(34)	69	29	4	5	16	75	99	96	92	39.0	-
SS-38	36 RT	23+92 -Y2-	1.0 - 2.5'	A-7-5(56)	85	50	4	4	18	74	99	97	93	34.6	-
SS-41	36 RT	23+92 -Y2-	8.5 - 10.0'	A-6(5)	39	13	26	12	26	36	87	69	56	17.0	-



-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

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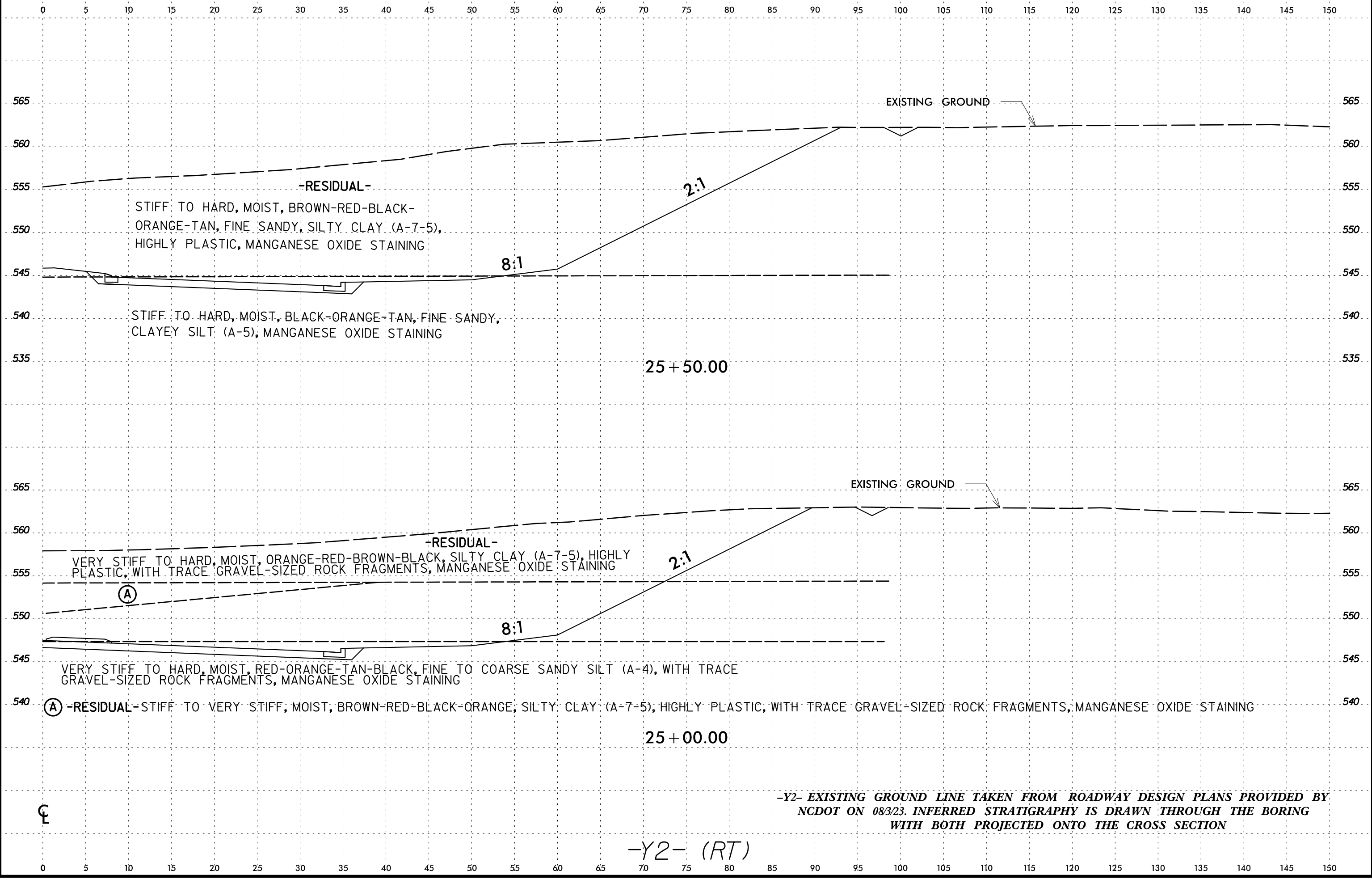
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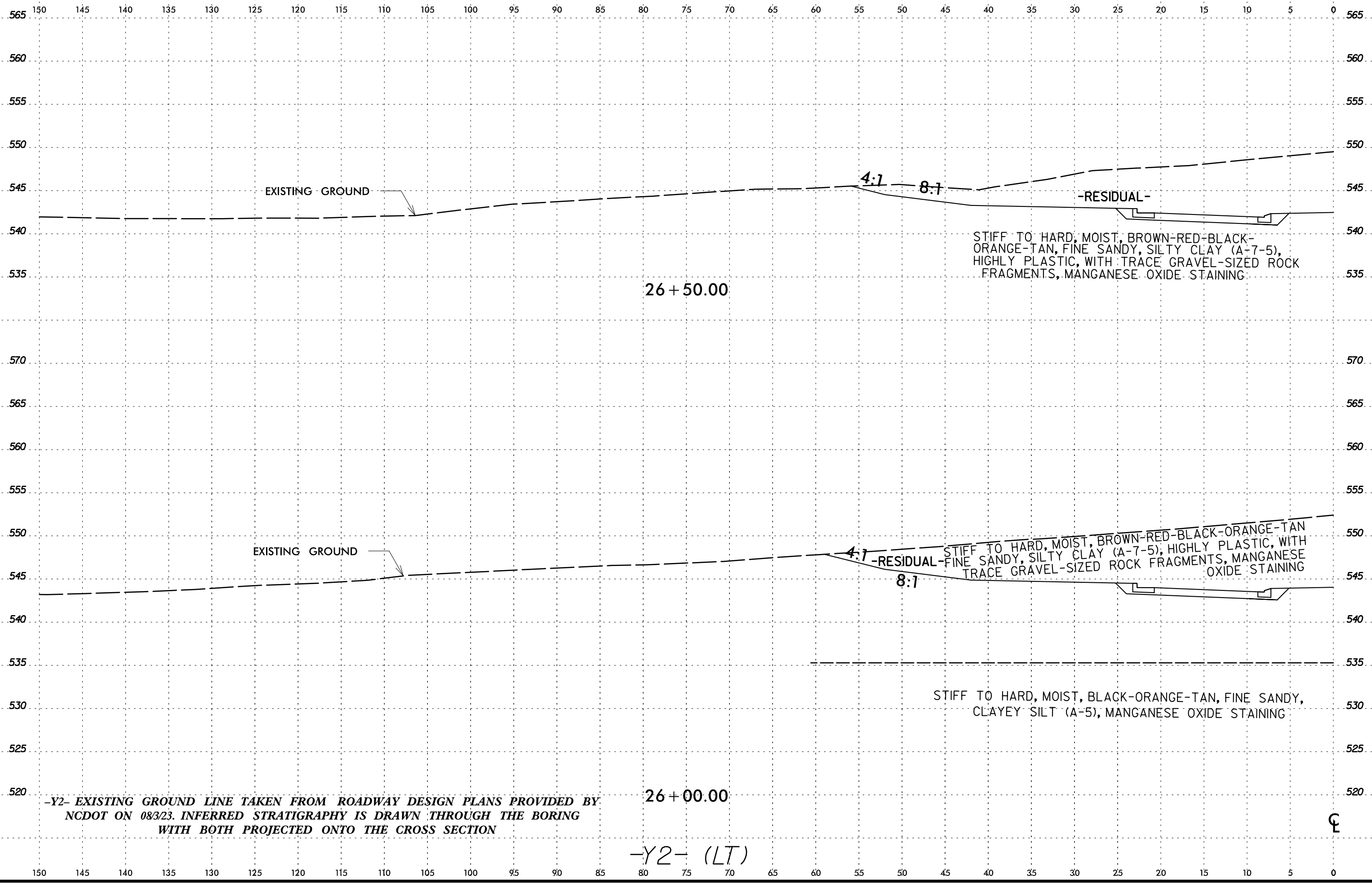
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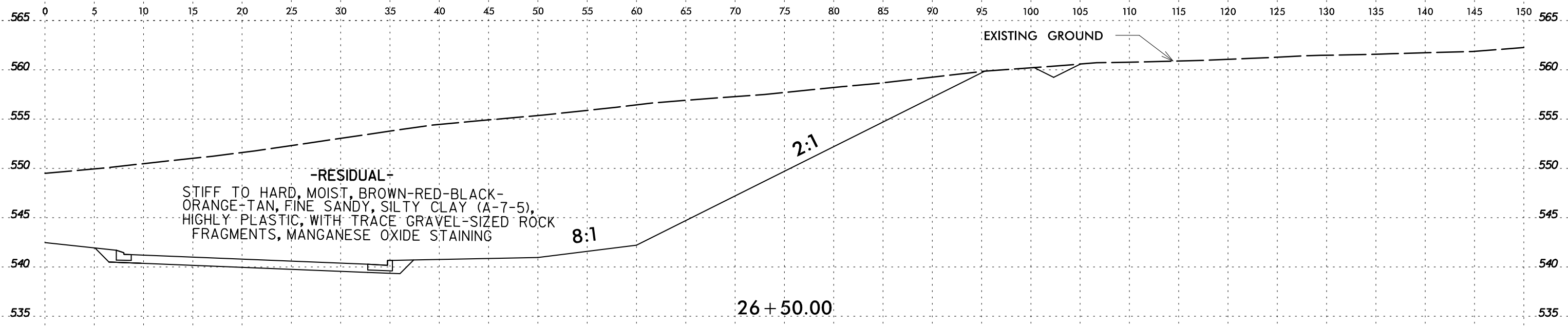
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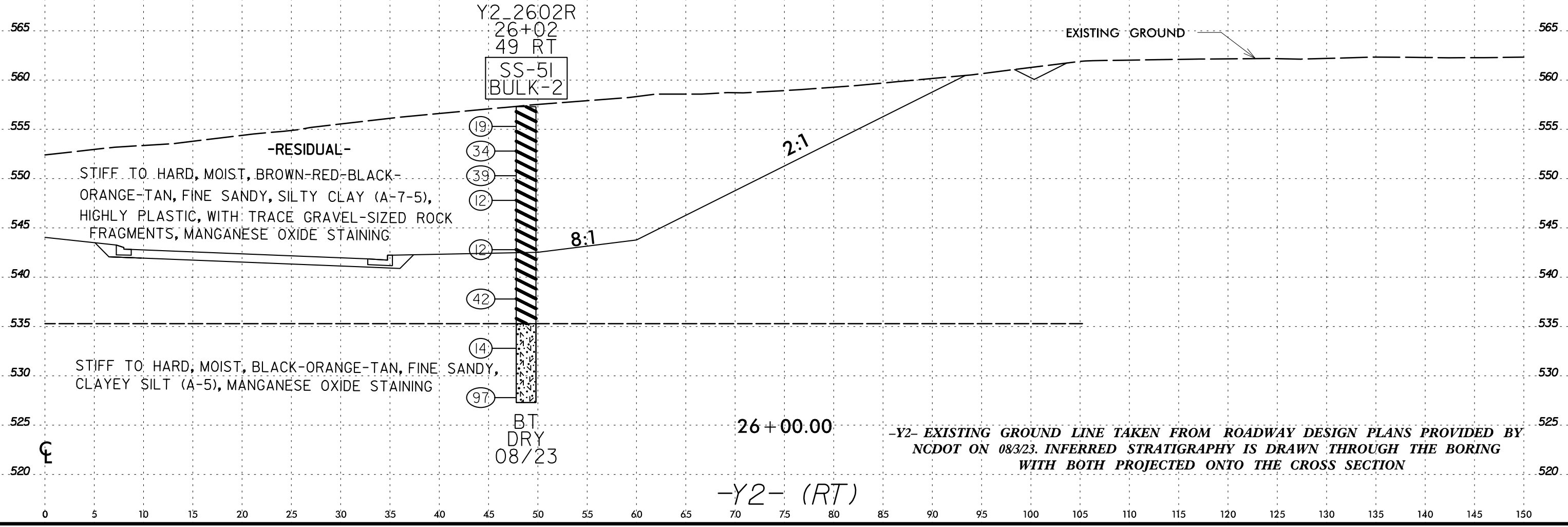
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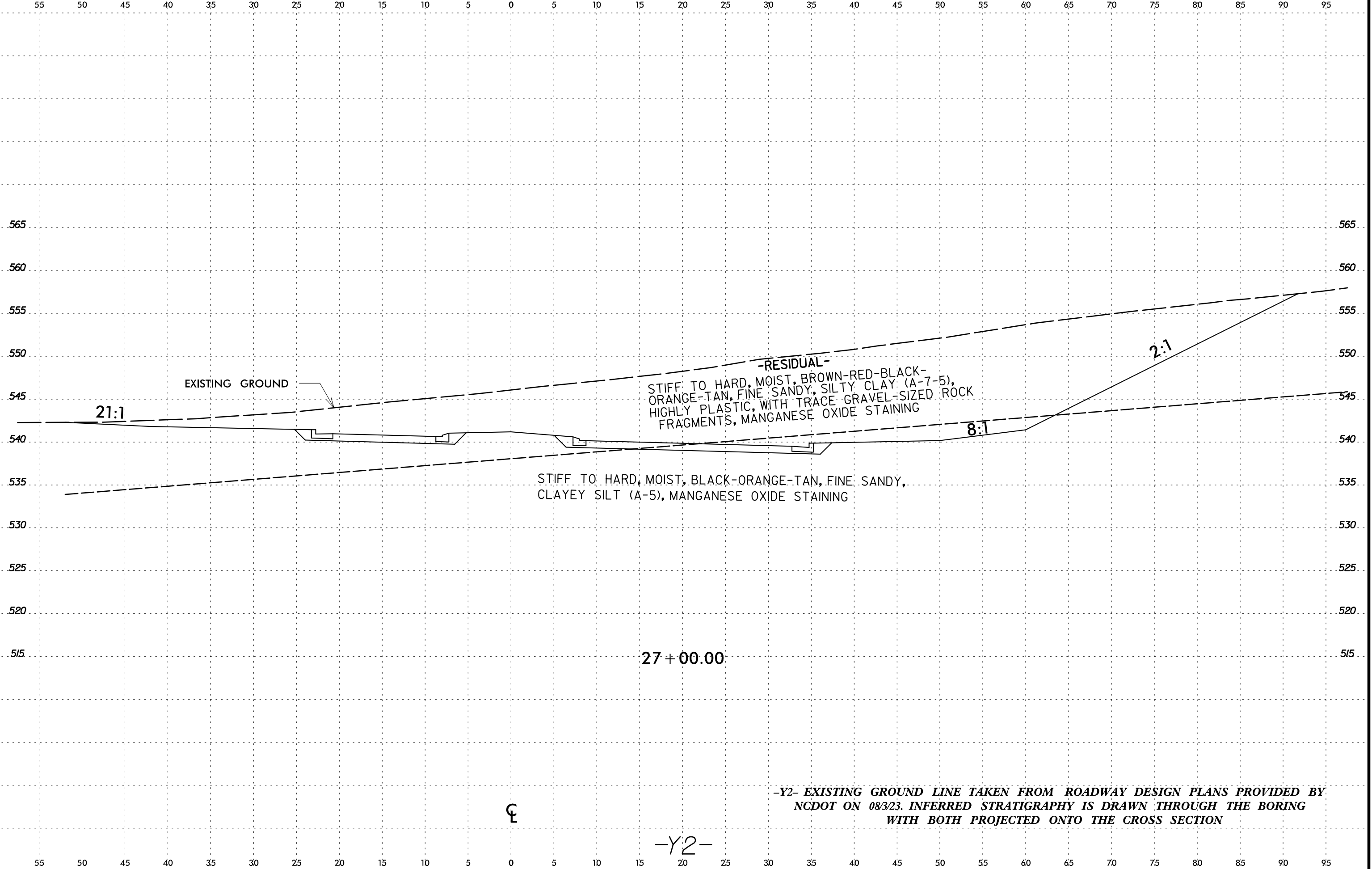


SOIL TEST RESULTS

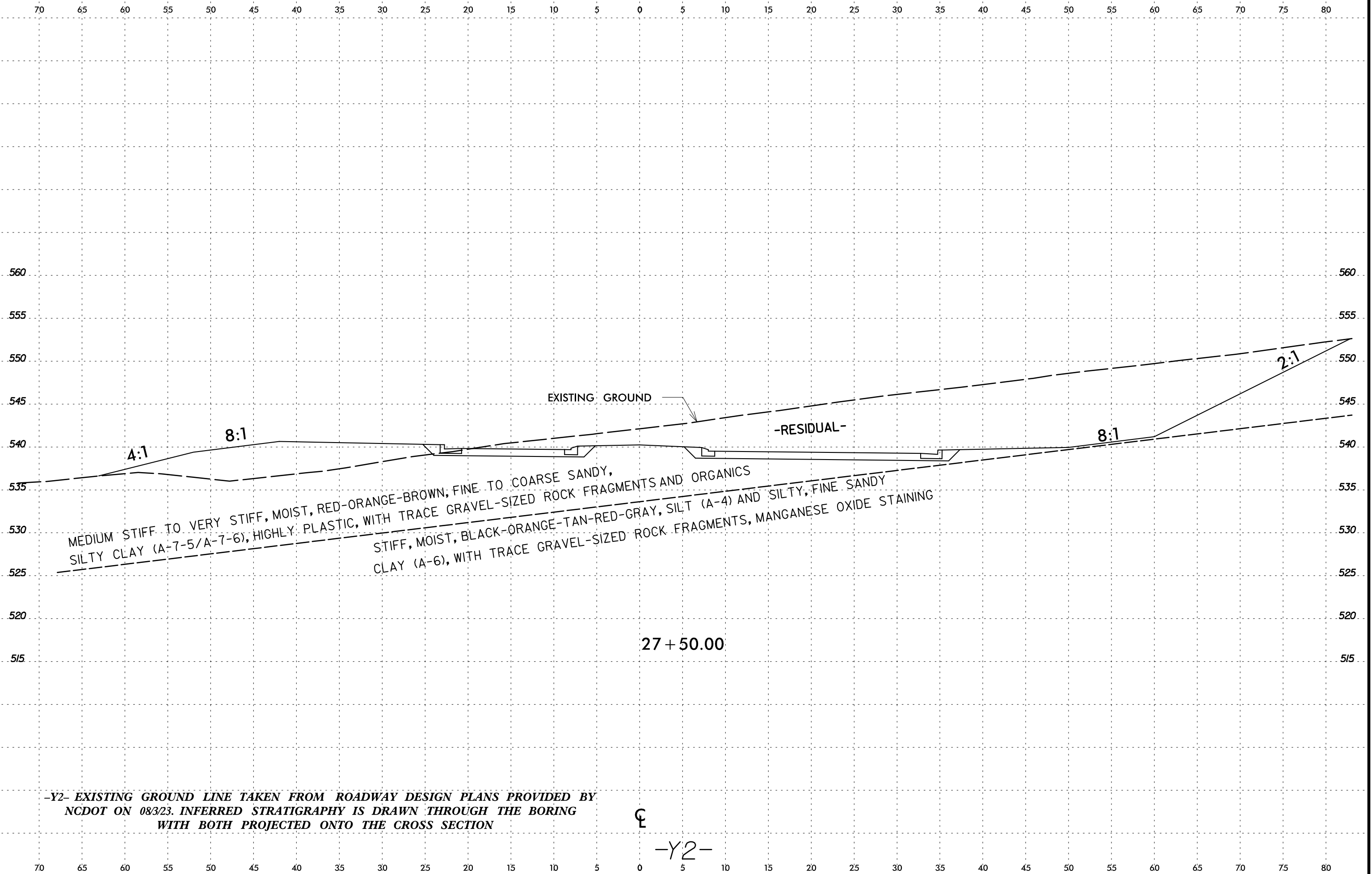
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-51	49 RT	26+02 -Y2-	1.0 - 2.5'	A-7-5(39)	71	38	4	4	23	69	94	91	88	23.9	-
BULK-2	49 RT	26+02 -Y2-	8.0 - 15'	A-7-5(41)	77	33	2	4	22	72	99	97	94	39.0	-



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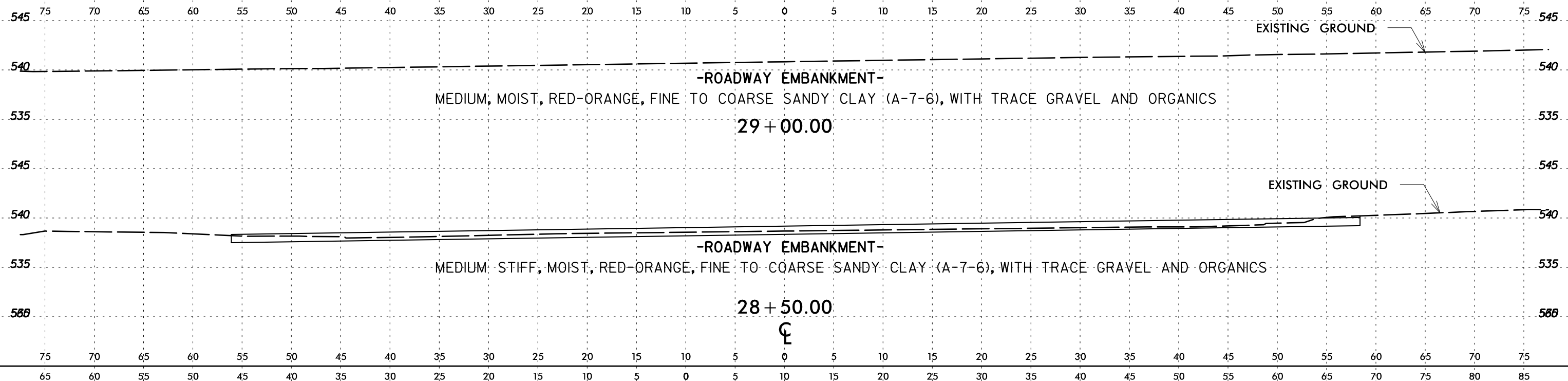
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###SERIAL###



-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

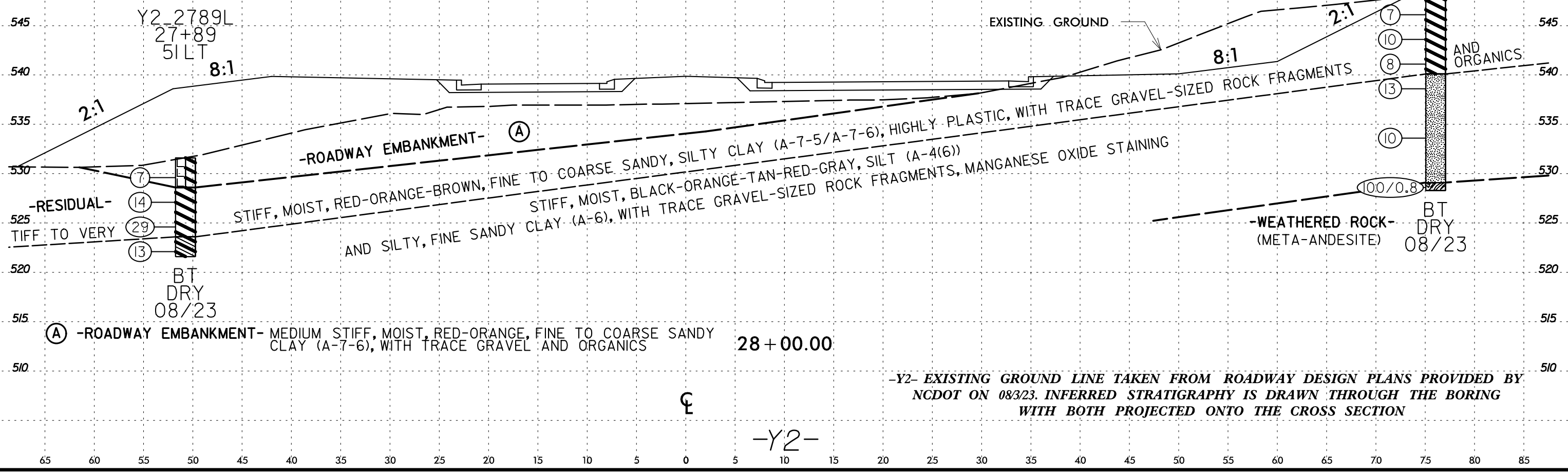
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-Y2-

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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-63	76 RT	28+00 -Y2-	1.0 - 2.5'	A-7-6(24)	55	26	7	6	24	63	93	88	83	28.4	-
SS-66	76 RT	28+00 -Y2-	8.5 - 10.0'	A-4(6)	40	5	8	19	43	30	100	95	79	34.4	-



Y2_2800R
 28+00
 76 RT
 SS-63
 SS-66

Y2_2789L
 27+89
 SILT

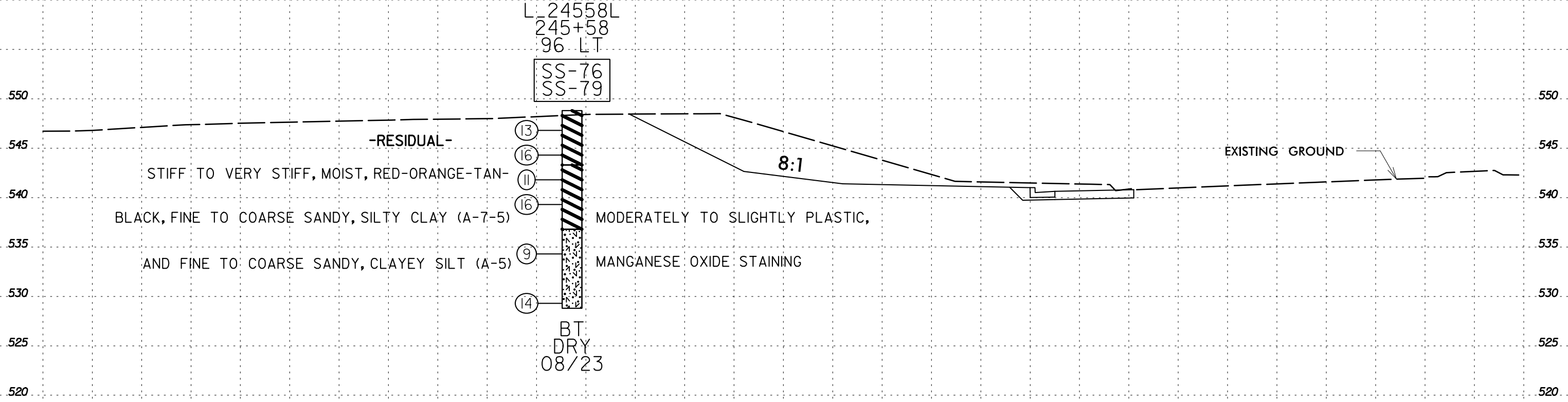
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-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY
 NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING
 WITH BOTH PROJECTED ONTO THE CROSS SECTION

150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

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-76	96 LT	245+58 -L-	1.0 - 2.5'	A-7-5(28)	68	21	3	4	28	65	98	95	92	26.4	-
SS-79	96 LT	245+58 -L-	8.5 - 10.0'	A-7-5(18)	56	15	5	10	35	50	100	97	88	33.0	-



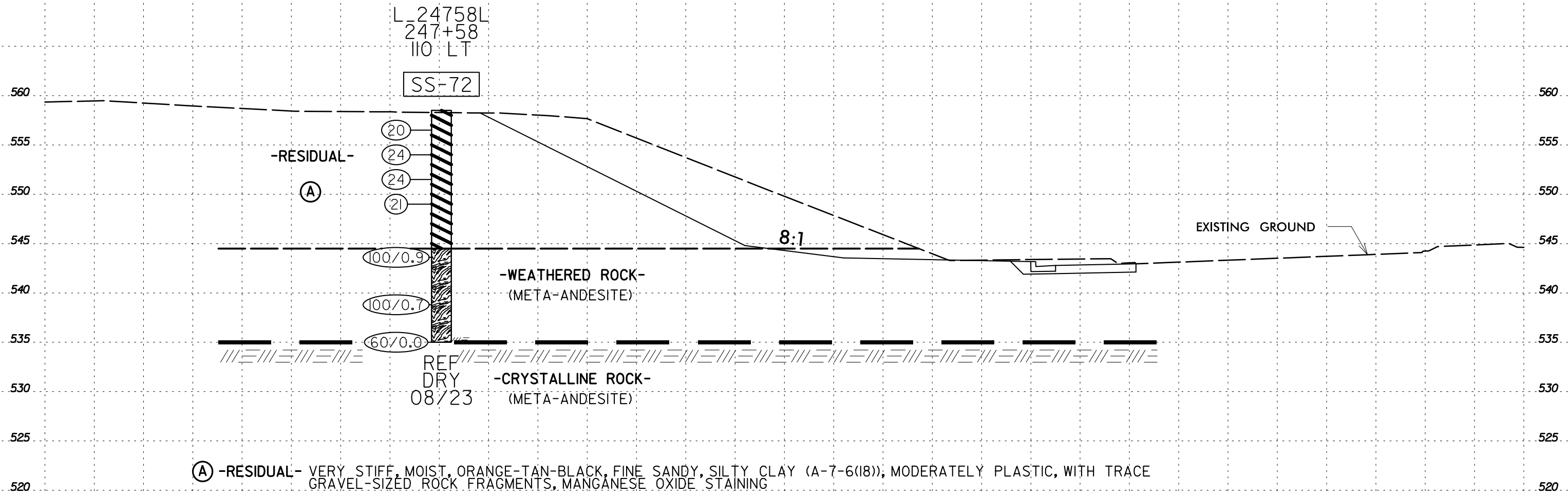
-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

-L- (LT)

150 145 140 135 130 125 120 115 110 105 100 95 90 85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0

SOIL TEST RESULTS

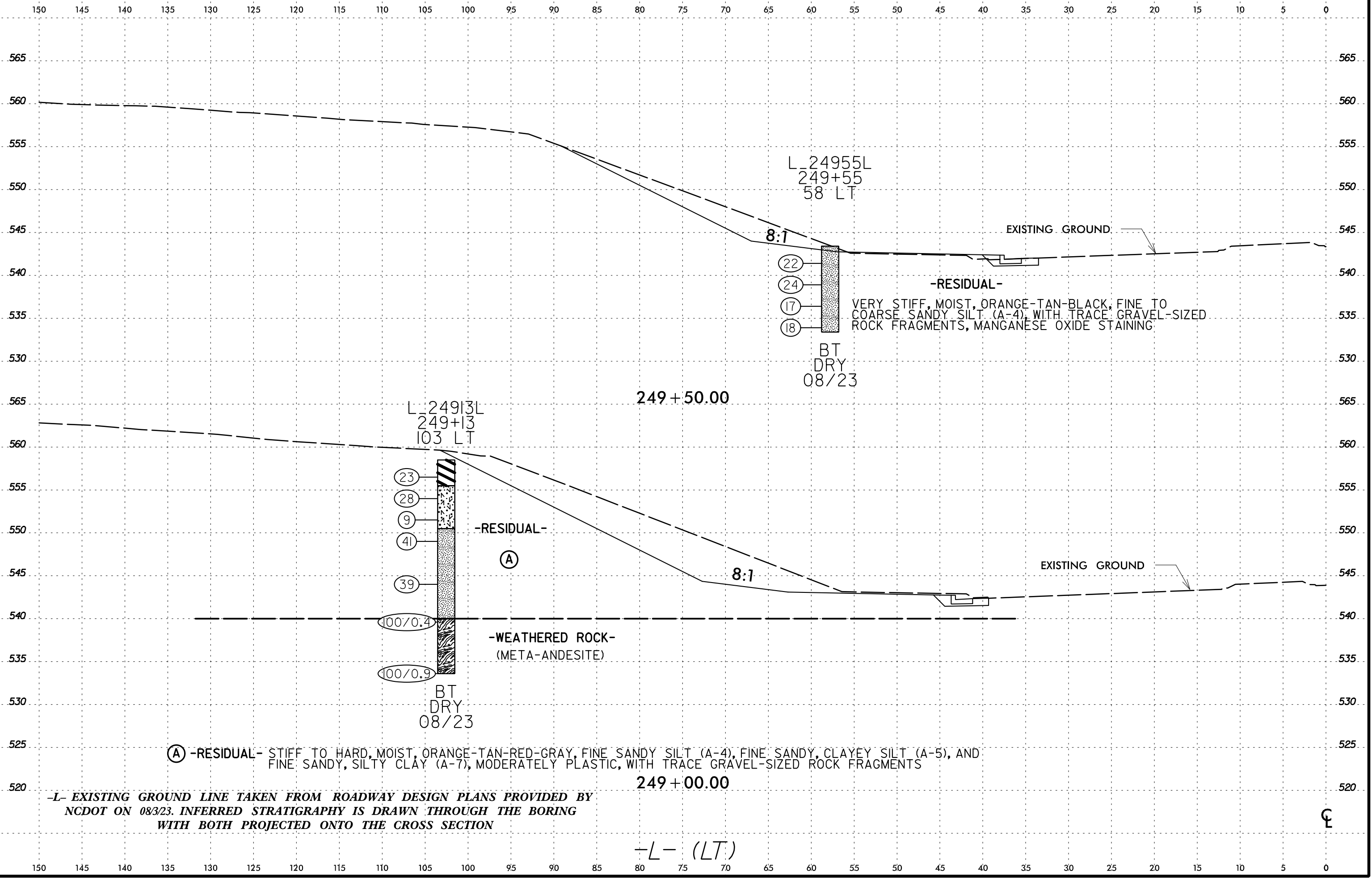
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-72	110 LT	247+58 -L-	8.5 - 10.0'	A-7-6(18)	46	20	5	9	31	55	92	89	82	20.2	-



-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

-L- (LT)

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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
APPENDIX A
LABORATORY TEST RESULTS

REFERENCE: R-5963D

PROJECT: 48599

Prepared in the Office of:



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CARY, NC 27513

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www.falconengineers.com
Firm License: C-3193
NCDOT LAB CERT NO. 105-0803



LABORATORY TEST RESULTS
SR 1809 (Suttles Road) to Chatham Park Way
Chatham County, NC
NCDOT Project: R-5963D
Falcon Engineering Project No: G23053.00

SAMPLE NO.	ALIGNMENT/BORING	NORTHING	EASTING	DEPTH INTERVAL	AASHTO CLASS.	ATTERBERG LIMITS		PERCENT BY WEIGHT				PERCENT RETAINED #4	PERCENT PASSING SIEVE			MOISTURE (%)	ORGANICS (%)
						LL	PI	C.SAND	F.SAND	SILT	CLAY		#10	#40	#200		
SS-100	Y2_1234L	723270	1955187	6.0-7.5	A-7-5(13)	46	13	15	4	31	50	0.0	100	87	82	19.0	N/A
SS-3	Y2_1706L	722979	1955521	6.0-7.5	A-4(1)	28	4	18	29	31	22	0.0	100	92	58	15.9	N/A
SS-23	Y2_2003R	722981	1955825	3.5-5.0	A-7-5(26)	64	30	9	9	27	55	4.7	91	85	77	22.9	N/A
SS-27	Y2_2004L	723036	1955803	1.0-2.5	A-7-5(34)	66	30	1	10	24	65	0.0	100	99	91	30.3	N/A
SS-33	Y2_2195L	723122	1955967	3.5-5.0	A-7-5(35)	67	30	2	8	21	69	0.0	100	99	93	34.8	N/A
SS-38	Y2_2392R	723230	1956136	1.0-2.5	A-7-5(56)	85	50	4	4	18	74	0.1	99	97	93	34.6	N/A
SS-41	Y2_2392R	723230	1956136	8.5-10.0	A-6(5)	39	13	26	12	26	36	6.7	87	69	56	17.0	N/A
Bulk-1	Y2_2396L	723230	1956136	2.0-7.0	A-7-5(34)	69	29	4	5	16	75	0.4	99	96	92	39.0	N/A
SS-51	Y2_2602R	723340	1956303	1.0-2.5	A-7-5(39)	71	38	4	4	23	69	5.4	94	91	88	23.9	N/A
Bulk-2	Y2_2602R	723340	1956303	8.0-15.0	A-7-5(41)	77	33	2	4	22	72	0.8	99	97	94	39.0	N/A
SS-63	Y2_2800R	723389	1956483	1.0-2.5	A-7-6(24)	55	26	7	6	24	63	3.4	93	88	83	28.4	N/A
SS-66	Y2_2800R	723389	1956483	8.5-10.0	A-4(6)	40	5	8	19	43	30	0.0	100	95	79	34.4	N/A
SS-76	L_24558L	722943	1956509	1.0-2.5	A-7-5(28)	68	21	3	4	28	65	0.9	98	95	92	26.4	N/A
SS-79	L_24558L	722943	1956509	8.5-10.0	A-7-5(18)	56	15	5	10	35	50	0.0	100	97	88	33.0	N/A
SS-72	L_24758L	723128	1956504	8.5-10.0	A-7-6(18)	46	20	5	9	31	55	7.2	92	89	82	20.2	N/A

Reviewed By

Certification: 105-0803

Falcon Engineering, Inc. 1210 Trinity Road, Suite 110, Cary, NC 27513



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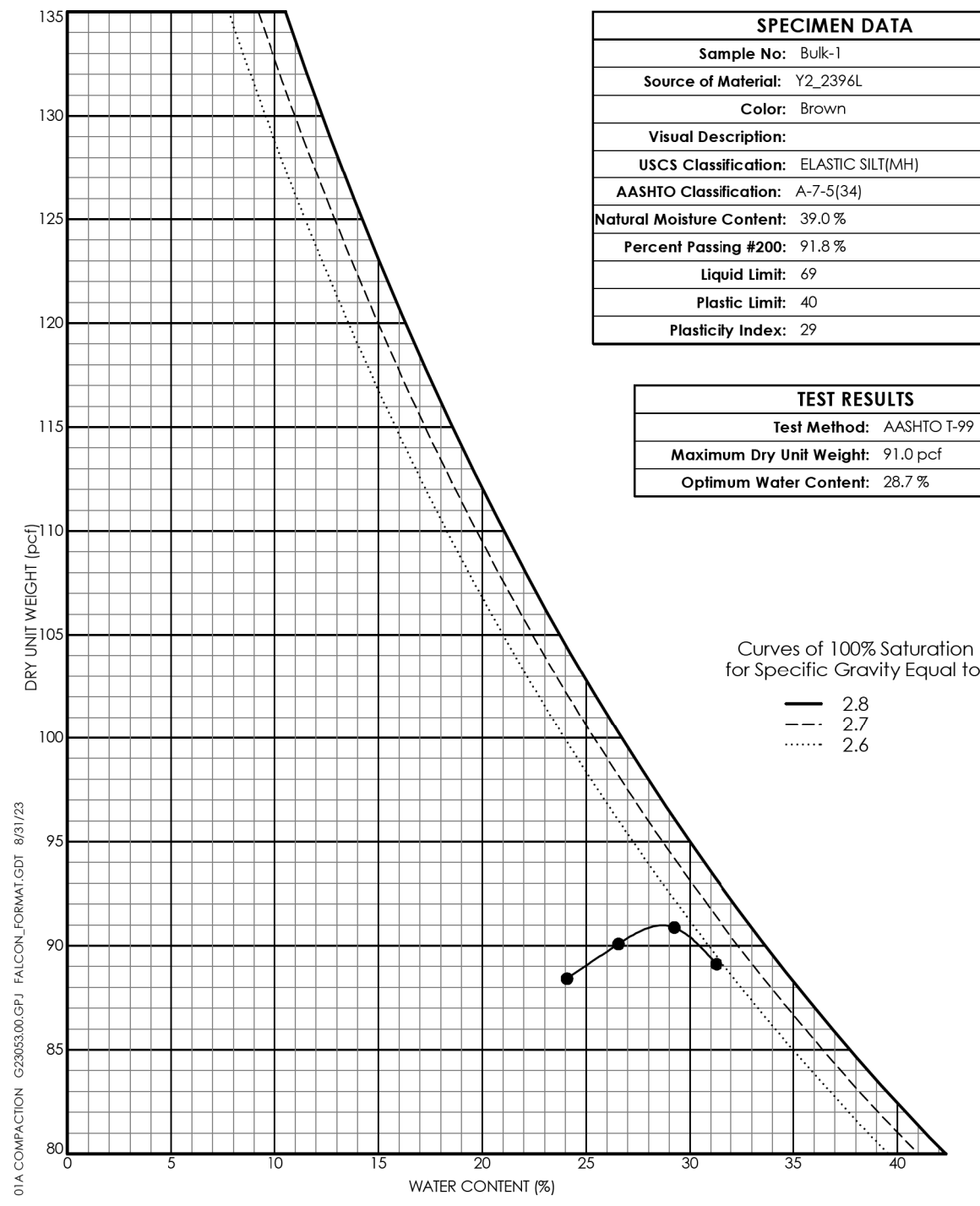
LABORATORY COMPACTION TEST RESULTS

PAGE 1 OF 2

Project No.: R-5963D
Project Name: SR 1809 (Suttles Road) to Chatham Park Way
Way to US 64
Project Location: Chatham County, NC

SPECIMEN DATA	
Sample No:	Bulk-1
Source of Material:	Y2_2396L
Color:	Brown
Visual Description:	
USCS Classification:	ELASTIC SILT(MH)
AASHTO Classification:	A-7-5(34)
Natural Moisture Content:	39.0 %
Percent Passing #200:	91.8 %
Liquid Limit:	69
Plastic Limit:	40
Plasticity Index:	29

TEST RESULTS	
Test Method:	AASHTO T-99
Maximum Dry Unit Weight:	91.0 pcf
Optimum Water Content:	28.7 %



01A COMPACTION G23053.00.GPJ FALCON_FORMAT.GDT 8/31/23



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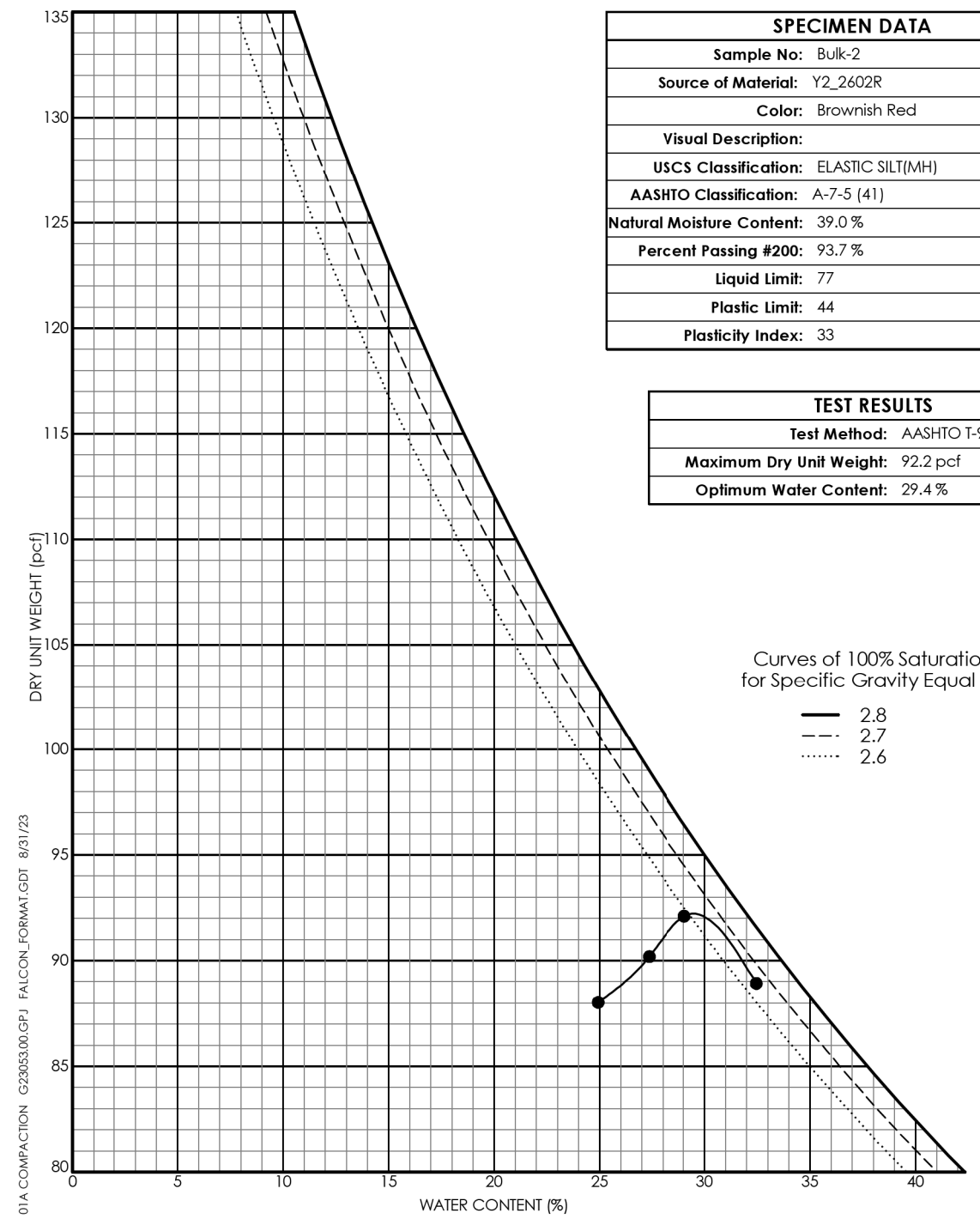
LABORATORY COMPACTION TEST RESULTS

PAGE 2 OF 2

Project No.: R-5963D
Project Name: SR 1809 (Suttles Road) to Chatham Park Way
Way to US 64
Project Location: Chatham County, NC

SPECIMEN DATA	
Sample No:	Bulk-2
Source of Material:	Y2_2602R
Color:	Brownish Red
Visual Description:	
USCS Classification:	ELASTIC SILT(MH)
AASHTO Classification:	A-7-5 (41)
Natural Moisture Content:	39.0 %
Percent Passing #200:	93.7 %
Liquid Limit:	77
Plastic Limit:	44
Plasticity Index:	33

TEST RESULTS	
Test Method:	AASHTO T-99
Maximum Dry Unit Weight:	92.2 pcf
Optimum Water Content:	29.4 %



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CALIFORNIA BEARING RATIO TEST RESULTS
ASTM D1883 / AASHTO T193



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CALIFORNIA BEARING RATIO TEST RESULTS
ASTM D1883 / AASHTO T193

Project No.: R-5963D		Tested By: C. Sullivan		Test Date: 2023-05-09	
Project Name: SR 1809 (Suttles Road) to Chatham Park Way					
Boring ID: Y2_2396L		Sample ID: Bulk-1		Sample Depth: 2.0-7.0 ft	
MOLDED SPECIMEN TEST DATA					
Wt. of Mold + Wet Soil:	20473 g	Moisture Content Before Molding	After Molding	Max. Dry Unit Weight:	91.0 pcf
Wt. of Mold:	16488 g	Tare Wt.:	6.70 g 7.20 g	Optimum Moisture Content:	28.7%
Wt. of Wet Soil:	3985 g	Wt. Tare + Wet Soil:	297.40 g 363.30 g	Percent Compaction:	100.0%
Mold Volume:	0.0750 cf	Wt. Tare + Dry Soil:	232.60 g 283.70 g	Compaction Method:	T-99
Wet Unit Weight:	117.1 pcf	Moisture Content:	28.7% 28.8%	Conversion Factors	
Dry Unit Weight:	91.0 pcf	Average Moisture Content:	28.7%	1 lb = 453.6 gram 1 cu. foot = 1728 cu. inch	
LOAD TEST DATA					
Penetration (in)	Load (lb)	Stress (psi)	Piston Calibration		
0.000	0	0.0	Strain Rate: 0.05 inch/minute		
0.025	59	19.7	Piston Diameter: 1.954 inch		
0.050	115	38.3	Piston Area: 2.999 sq. inch		
0.075	155	51.7	Swell Readings		
0.100	190	63.4	Soak Time: 96 hours		
0.125	219	73.0	Surcharge Weight: 10 lb		
0.150	241	80.4	Surcharge Stress: 51 psf		
0.175	263	87.7	Molded Sample Height: 4.584 inch		
0.200	283	94.4	Initial Dial Reading: 0.050 inch		
0.225	301	100.4	Final Dial Reading: 0.138 inch		
0.250	315	105.0	Percent Swell: 1.92%		
0.275	329	109.7	Additional Specimen Data		
0.300	345	115.0	Liquid Limit: 69 Percent Passing #4: 100%		
0.400	396	132.1	Plastic Limit: 40 Percent Passing #10: 99%		
0.500	443	147.7	Plasticity Index: 29 Percent Passing #40: 96%		
Readings After Soak		Additional Specimen Data			
Wt. Mold + Soaked Soil:	20585.00 g	Liquid Limit:	69	Percent Passing #4:	100%
Wt. Tare:	6.50 g	Plastic Limit:	40	Percent Passing #10:	99%
Wt. Wet Soil + Tare:	396.00 g	Plasticity Index:	29	Percent Passing #40:	96%
Wt. Tare + Dry Soil:	287.00 g			Percent Passing #200:	91.8%
Moisture Content:	38.9%				
Wet Unit Weight:	120.4 pcf	Color:	Brown		
Dry Unit Weight:	86.7 pcf	Visual Description:			
BEARING RATIO		USCS Classification:	ELASTIC SILT (MH)		
CBR at 0.1 inch:	6.3	AASHTO Classification:	JA-7-5 (34)		
CBR at 0.2 inch:	6.3				

2027 REPORT SHEET - CBR - G23053.00.GPJ - FALCON_FORMAT.GDT 9/16/23

Project No.: R-5963D		Tested By: C. Sullivan		Test Date: 2023-05-09	
Project Name: SR 1809 (Suttles Road) to Chatham Park Way					
Boring ID: Y2_2602R		Sample ID: Bulk-2		Sample Depth: 8.0-15.0 ft	
MOLDED SPECIMEN TEST DATA					
Wt. of Mold + Wet Soil:	20514 g	Moisture Content Before Molding	After Molding	Max. Dry Unit Weight:	92.2 pcf
Wt. of Mold:	16460 g	Tare Wt.:	6.30 g 6.40 g	Optimum Moisture Content:	29.4%
Wt. of Wet Soil:	4054 g	Wt. Tare + Wet Soil:	310.80 g 411.90 g	Percent Compaction:	100.0%
Mold Volume:	0.0749 cf	Wt. Tare + Dry Soil:	241.60 g 319.60 g	Compaction Method:	T-99
Wet Unit Weight:	119.3 pcf	Moisture Content:	29.4% 29.5%	Conversion Factors	
Dry Unit Weight:	92.2 pcf	Average Moisture Content:	29.4%	1 lb = 453.6 gram 1 cu. foot = 1728 cu. inch	
LOAD TEST DATA					
Penetration (in)	Load (lb)	Stress (psi)	Piston Calibration		
0.000	0	0.0	Strain Rate: 0.05 inch/minute		
0.025	58	19.3	Piston Diameter: 1.954 inch		
0.050	122	40.7	Piston Area: 2.999 sq. inch		
0.075	178	59.4	Swell Readings		
0.100	225	75.0	Soak Time: 96 hours		
0.125	259	86.4	Surcharge Weight: 10 lb		
0.150	291	97.0	Surcharge Stress: 51 psf		
0.175	317	105.7	Molded Sample Height: 4.579 inch		
0.200	342	114.0	Initial Dial Reading: 0.050 inch		
0.225	361	120.4	Final Dial Reading: 0.126 inch		
0.250	376	125.4	Percent Swell: 1.66%		
0.275	391	130.4	Additional Specimen Data		
0.300	402	134.1	Liquid Limit: 77 Percent Passing #4: 99%		
0.400	446	148.7	Plastic Limit: 44 Percent Passing #10: 99%		
0.500	489	163.1	Plasticity Index: 33 Percent Passing #40: 97%		
Readings After Soak		Additional Specimen Data			
Wt. Mold + Soaked Soil:	20584.00 g	Liquid Limit:	77	Percent Passing #4:	99%
Wt. Tare:	6.50 g	Plastic Limit:	44	Percent Passing #10:	99%
Wt. Wet Soil + Tare:	343.10 g	Plasticity Index:	33	Percent Passing #40:	97%
Wt. Tare + Dry Soil:	252.10 g			Percent Passing #200:	93.7%
Moisture Content:	37.1%				
Wet Unit Weight:	121.4 pcf	Color:	Brownish Red		
Dry Unit Weight:	88.6 pcf	Visual Description:			
BEARING RATIO		USCS Classification:	ELASTIC SILT (MH)		
CBR at 0.1 inch:	7.5	AASHTO Classification:	JA-7-5 (41)		
CBR at 0.2 inch:	7.6				

2027 REPORT SHEET - CBR - G23053.00.GPJ - FALCON_FORMAT.GDT 9/16/23

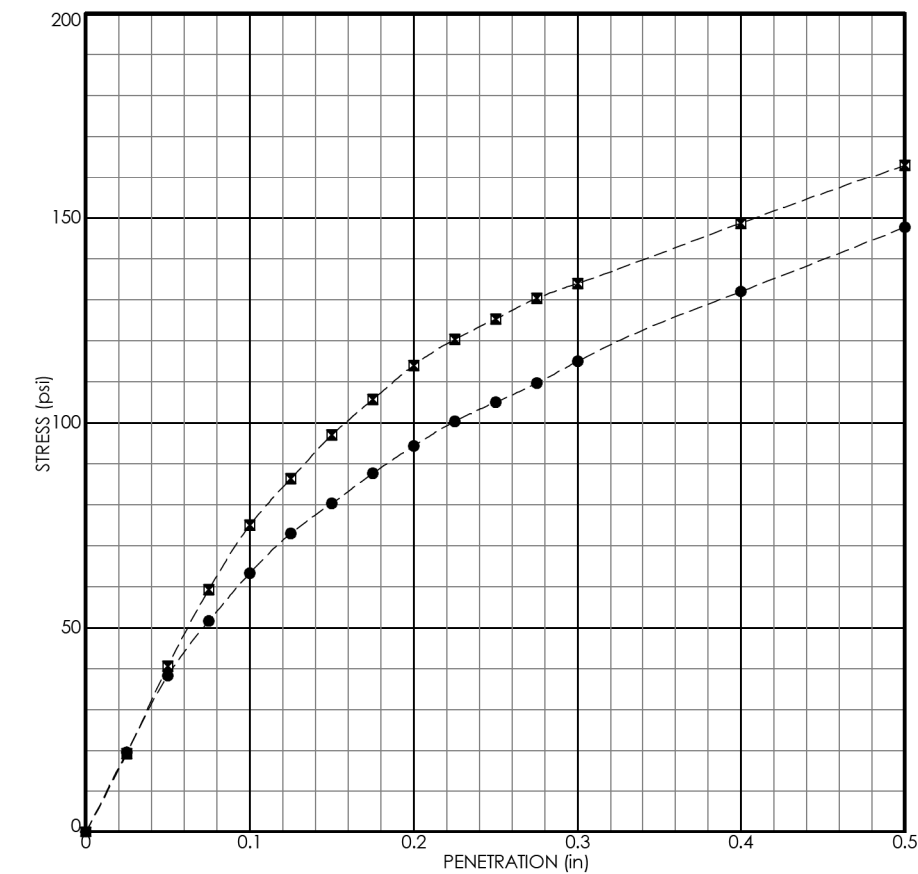


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CALIFORNIA BEARING RATIO TEST RESULTS

PAGE 1 OF 1

Project No.: R-5963D
Project Name: SR 1809 (Suttles Road) to Chatham Park Way
Way to US 64
Project Location: Chatham County, NC



Sample ID	Boring ID	Depth (ft)	Visual Description USCS Classification AASHTO Classification
● Bulk-1	Y2_2396L	2.0-7.0	Brown, ELASTIC SILT MH A-7-5
■ Bulk-2	Y2_2602R	8.0-15.0	Brownish Red, ELASTIC SILT MH A-7-5

Sample ID	Molded Specimen Data				% Ret. #4	% Pass. #200	CBR at Penetration		Percent Swell	Symbol	
	Dry Unit Wt.	MC	% Comp.	Method			0.1 inch	0.2 inch		USCS	AASHTO
● Bulk-1	91.0 pcf	28.7%	100.0%	T-99	0.4	91.8	6.3	6.3	1.92%	MH	A-7-5 (34)
■ Bulk-2	92.2 pcf	29.4%	100.0%	T-99	0.8	93.7	7.5	7.6	1.66%	MH	A-7-5 (41)

04-CBR TEST RESULTS - C:\29053.00.GPJ FALCON-FORMAT.GDT 9/16/23

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SPECIFIC GRAVITY OF SOILS

AASHTO T100

PROJECT #: G23053.00

DATE: 9/28/2023

PROJECT NAME: R-5963D | SR 1809 (Suttles Road) to Chatham Park Way

SOIL DESCRIPTION: A-7-5(34) LL: 69 PI: 29

SAMPLE LOCATION: Y2_2396L Station: 23+96 Offset: 30' LT

SAMPLE DEPTH: 2.0-7.0

SAMPLING DATE: N/A

SAMPLED BY: N/A

SAMPLE #	Bulk-1	
PYCHNOMETER #	E	
A PYCHNOMETER WT.:	170.28	
B DRY SOIL WT. PLUS PYCH. WT.	221.53	
C DRY WT. (B-A)	51.25	
D SAMPLE + PYCH.WT. + H2O	701.00	
E Tx (°C)	23.1	
F PYCH.WT. + H ₂ O AT Tx	668.60	

APPARENT SPECIFIC GRAVITY at Tx

G	C/(C+F-D)	2.719	
	AVERAGE	2.719	

K = Density of H2O at Tx / Density of H2O AT 20°C

H	DENSITY OF H2O AT Tx	0.9975460	
I	DENSITY OF H2O AT 20°C	0.9982343	0.9982343
K	H/I	0.9993105	

APPARENT SPECIFIC GRAVITY at 20°C

	G*K	2.717	
	AVERAGE	2.717	

Tested By: C. Sullivan

FALCON ENGINEERING, INC.

1210 TRINITY RD., SUITE 110, CARY, NC 27513

SPECIFIC GRAVITY OF SOILS

AASHTO T100

PROJECT #: G23053.00

DATE: 9/28/2023

PROJECT NAME: R-5963D | SR 1809 (Suttles Road) to Chatham Park Way

SOIL DESCRIPTION: A-7-5(41) LL: 77 PI: 33

SAMPLE LOCATION: Y2_2602R Station: 26+02 Offset: 49' RT

SAMPLE DEPTH: 8.0-15.0

SAMPLING DATE: N/A

SAMPLED BY: N/A

SAMPLE #	Bulk-2	
PYCHNOMETER #	F	
A PYCHNOMETER WT.:	178.25	
B DRY SOIL WT. PLUS PYCH. WT.	230.74	
C DRY WT. (B-A)	52.49	
D SAMPLE + PYCH.WT. + H2O	709.57	
E Tx (°C)	25.9	
F PYCH.WT. + H ₂ O AT Tx	676.20	

APPARENT SPECIFIC GRAVITY at Tx

G	C/(C+F-D)	2.745	
	AVERAGE	2.745	

K = Density of H2O at Tx / Density of H2O AT 20°C

H	DENSITY OF H2O AT Tx	0.9968417	
I	DENSITY OF H2O AT 20°C	0.9982343	0.9982343
K	H/I	0.9986050	

APPARENT SPECIFIC GRAVITY at 20°C

	G*K	2.741	
	AVERAGE	2.741	

Tested By: C. Sullivan