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

REFERENCE: R-5963D

PROJECT: 48599

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

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

CROSS SECTIONS

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

APPENDICES

APPENDIX	TITLE	SHEETS
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

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:

1. 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.
2. 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:

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386129C0A4C1462...
10/02/2023

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-5963D	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX		— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0		0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND				SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

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

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [X] CME-550X
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] DIEDRICH D50
- [ ] MOBILE B29

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:

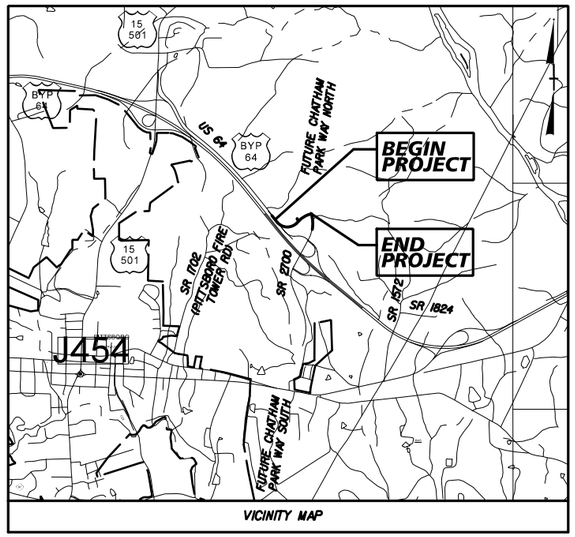
ROADWAY DESIGN AND SURVEY INFORMATION DATED 08/03/23 PROVIDED BY NCDOT.

USED r5930_ls_tin.tin DATED 8/3/2023 TO OBTAIN ELEVATION INFORMATION

DATE: 8-15-14

09/08/99

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

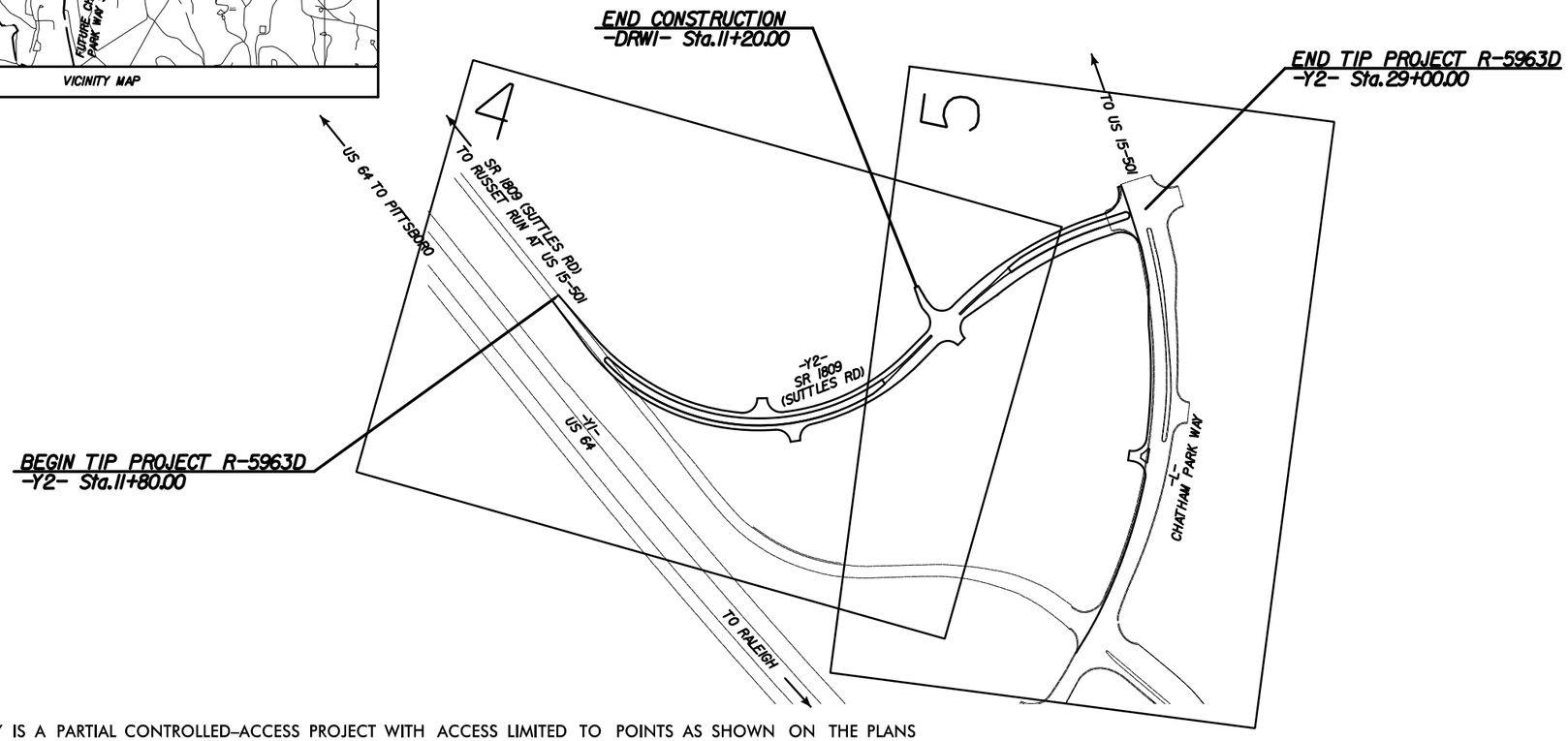
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5963D	2A	

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
48599.1.5		P.E.
48599.2.9		RW & UTIL
48599.3.5		CONST.

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

TYPE OF WORK: GRADING, DRAINAGE, AND PAVING

NC GRID
NAD 1983NA 2011



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

TIP PROJECT: R-5963D

65% PLANS

CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

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

NC LICENSE #P-0102
PATTERSON STREET, SUITE 300
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

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.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

$FILE$
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:

Alignment	Stations
-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:

Alignment	Stations	Offsets (ft)
-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:

Alignment	Stations	Offsets (ft)
-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,

Carolinas 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

5/14/99

-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 = 10,000.00'
SE = EXIST
RO = EXIST

-Y2- SUTTLES ROAD

PI Sta 19+12.40
Δ = 96° 38' 32.8" (LT)
D = 10° 44' 58.8"
L = 899.03'
T = 598.67'
R = 533.00'
SE = .04
RO = 120'

PI Sta 25+79.65
Δ = 26° 54' 13.7" (RT)
D = 6° 37' 25.6"
L = 406.17'
T = 206.90'
R = 865.00'
SE = .04
RO = 120'

-DRW1-

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 ©2023
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NC 27601

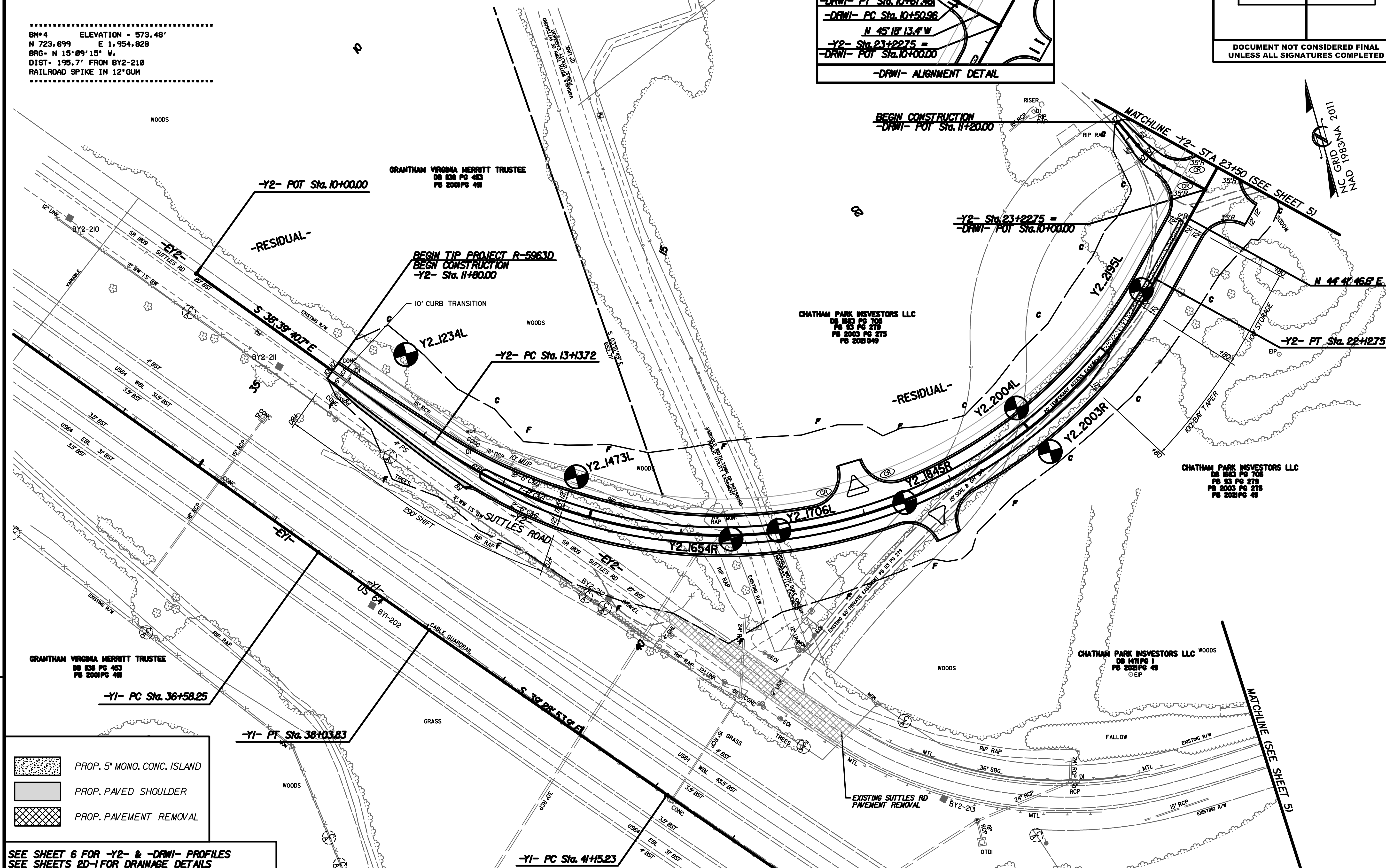
RIGHT-OF-WAY REV.
CONST. REV.

PROJECT REFERENCE NO.	SHEET NO.
R-5963D	4
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



BEGIN CONSTRUCTION
-DRW1- POT Sta. 11+20.00
N 24° 23' 29.4" W
-DRW1- PT Sta. 10+87.46
-DRW1- PC Sta. 10+50.96
N 45° 18' 13.4" W
-Y2- Sta. 23+22.75 =
-DRW1- POT Sta. 10+00.00
-DRW1- ALIGNMENT DETAIL
ALL EASEMENTS SHOWN ARE PROPOSED AND TAKEN FROM A PRELIMINARY PLAT PREPARED BY WITHERS & RAVENEL ENTITLED EASEMENT MAP FOR CHATHAM PARK WATER TANK SITE #1
20' TEMPORARY ACCESS EASEMENT
WOODS
GRANTHAM VIRGINIA MERRITT TRUSTEE
DB 1136 PG 453
PB 2001 PG 491
-Y2- POT Sta. 10+00.00
-RESIDUAL-
BEGIN TIP PROJECT R-5963D
BEGIN CONSTRUCTION
-Y2- Sta. 11+80.00
10' CURB TRANSITION
S 38° 39' 40.7" E
Y2_1234L
-Y2- PC Sta. 13+13.72
Y2_1473L
Y2_1654R
Y2_1706L
Y2_1845R
Y2_2004L
Y2_2003R
Y2_2195L
CHATHAM PARK INSVESTORS LLC
DB 1683 PG 705
PB 93 PG 279
PB 2003 PG 275
PB 2021 PG 49
-RESIDUAL-
RISER
BEGIN CONSTRUCTION
-DRW1- POT Sta. 11+20.00
MATCHLINE -Y2- STA 23+50 (SEE SHEET 5)
-Y2- Sta. 23+22.75 =
-DRW1- POT Sta. 10+00.00
N 44° 41' 46.6" E
-Y2- PT Sta. 22+12.75
100' STORAGE
100' BAY TAPER
NC GRID NAD 1983/NA 2011
-EY2-
SR 1809 SUTTLES RD
SUTTLES ROAD
-EY1-
-Y1-
US 64
CABLE GUARDRAIL
S 39° 28' 53.9" E
GRANTHAM VIRGINIA MERRITT TRUSTEE
DB 1136 PG 453
PB 2001 PG 491
-Y1- PC Sta. 36+58.25
-Y1- PT Sta. 38+03.83
CHATHAM PARK INSVESTORS LLC
DB 1471 PG 1
PB 2021 PG 49
WOODS
GRASS
FALLOW
EXISTING SUTTLES RD PAVEMENT REMOVAL
MATCHLINE (SEE SHEET 5)
-Y1- PC Sta. 41+15.23

[dotted pattern]	PROP. 5" MONO. CONC. ISLAND
[grey fill]	PROP. PAVED SHOULDER
[crosshatch]	PROP. PAVEMENT REMOVAL

SEE SHEET 6 FOR -Y2- & -DRW1- PROFILES
SEE SHEETS 2D-1 FOR DRAINAGE DETAILS

REVISIONS

$$FILE$$

9/29/2023

PROJECT REFERENCE NO.	SHEET NO.
R-5963D	5
R/W SHEET NO.	

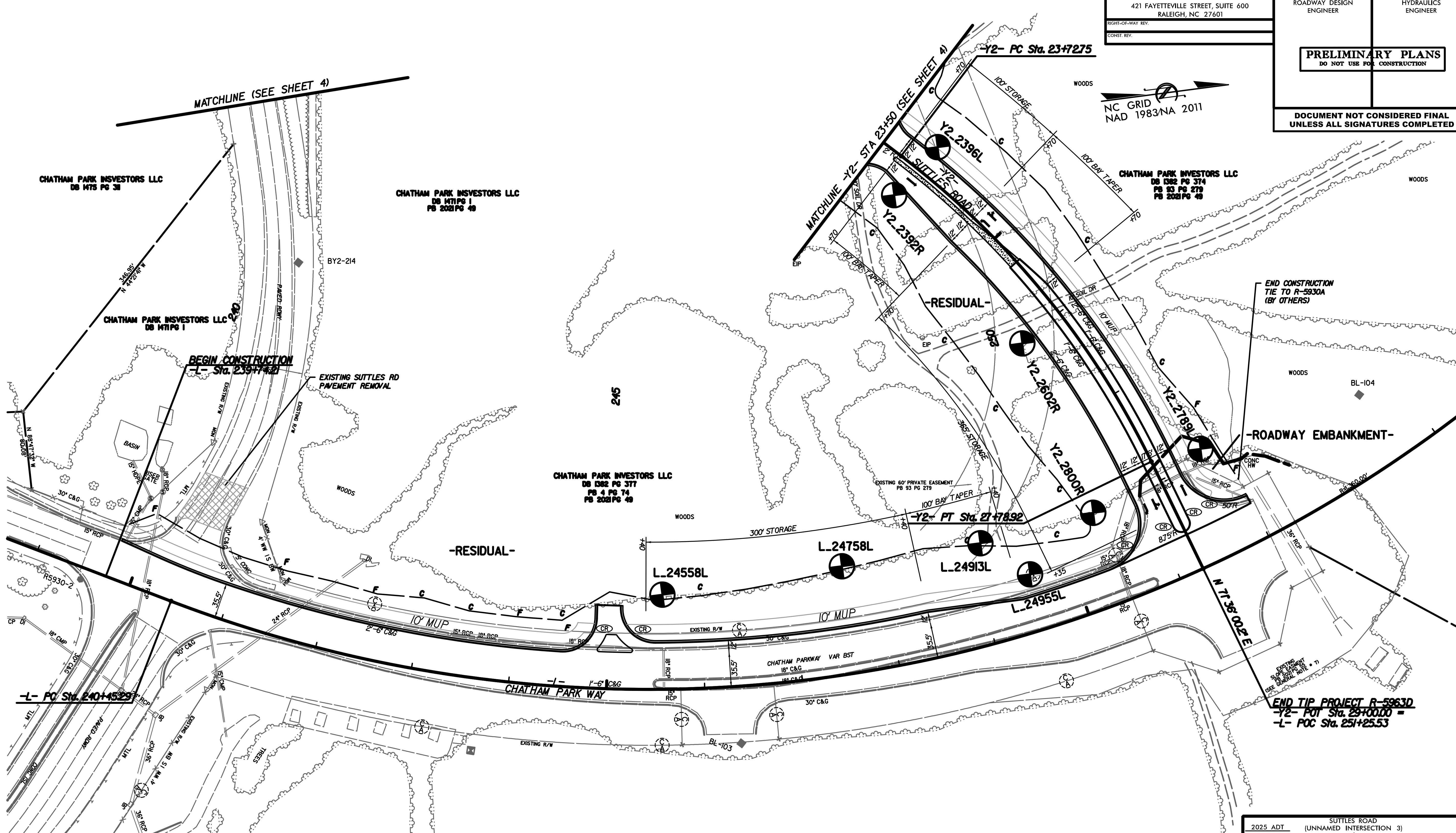
Kimley»Horn
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NC 27601

RIGHT-OF-WAY REV.
CONST. REV.

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



(dotted pattern)	PROP. 5" MONO. CONC. ISLAND
(grey fill)	PROP. PAVED SHOULDER
(cross-hatch)	PROP. PAVEMENT REMOVAL

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

BM#3 ELEVATION = 540.21'
N 722,729 E 1,956,641
BL STATION 27+08.5, 73.5' RIGHT
L STATION 34+21.49, 73.78' RIGHT
RAILROAD SPIKE IN 20"OAK

-Y2- SUTTLES ROAD
PI Sta 25+79.65
Δ = 26° 54' 13.7" (RT)
D = 6° 37' 25.6"
L = 406.17'
T = 206.90'
R = 865.00'
SE = .04
RO = 120'

-L- CHATHAM PARK WAY
PI Sta 248+38.68
Δ = 60° 30' 59.0" (LT)
D = 4° 12' 46.5"
L = 1,436.45'
T = 793.39'
R = 1,360.00'
SE = EXIST
RO = N/A

2025 ADT
2045 ADT

SUTTLES ROAD (UNNAMED INTERSECTION 3)
DHV = 8%
DIR = 55%
TTST = 1%
DUAL = 2%
2000 / 5200

9700 / 30500 — 1200 / 3900 — 500 / 800 — 6800 / 24000

-L- CHATHAM PARK WAY
DHV = 8%
DIR = 60%
TTST = 2%
DUAL = 3%

3700 / 5200 — 1500 / 1800

-L- CHATHAM PARK WAY
DHV = 8%
DIR = 55%
TTST = 2%
DUAL = 3%

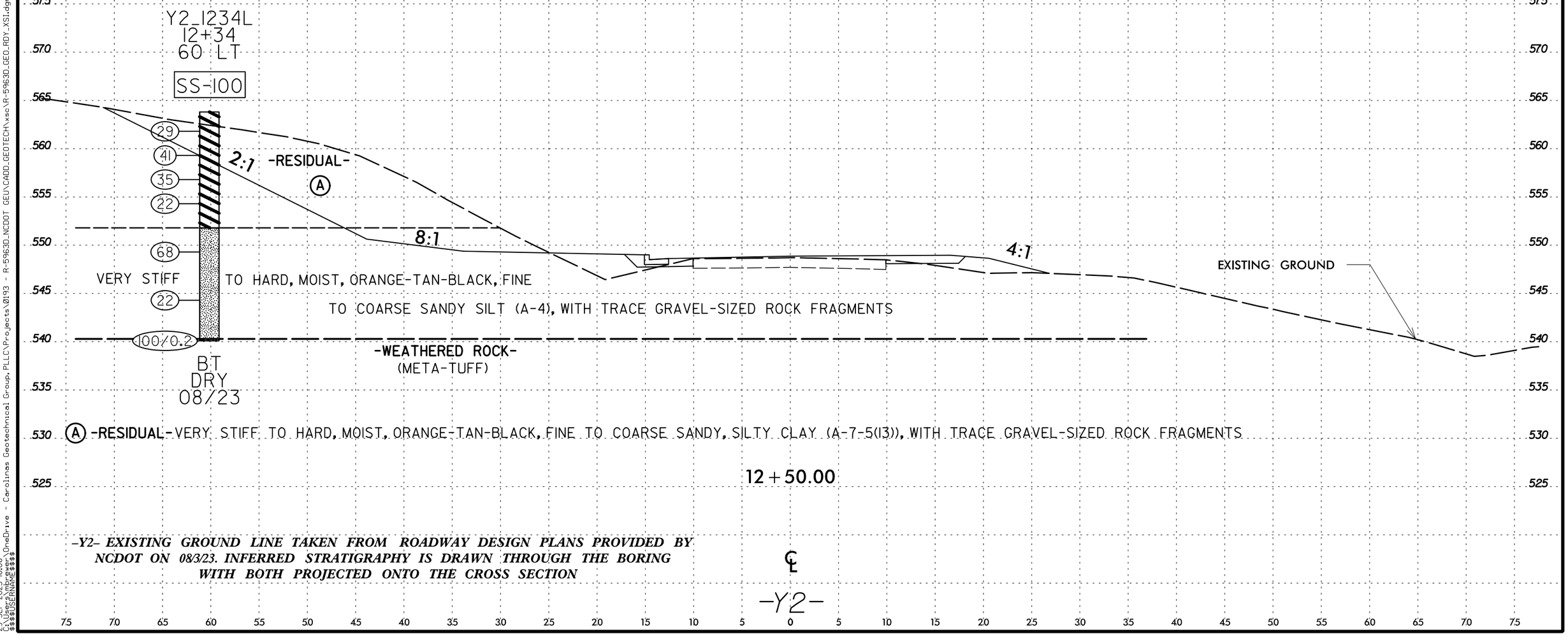
DHV = 8%
DIR = 55%
TTST = 1%
DUAL = 2%
5500 / 7500

DHV = 8%
DIR = 55%
TTST = 1%
DUAL = 2%
SUTTLES ROAD (UNNAMED INTERSECTION 3)

REVISIONS
$FILE$
9/29/2023
5/14/99

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 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	7

85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65

555 550 545 540 535 530 525 520 515 510 505

8:1 4:1 2:1 3:1 8:1 2:1

Y2_I473L
I4+73
38 LT

EXISTING GROUND

-RESIDUAL-

HARD, MOIST, ORANGE-TAN, FINE SANDY SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS

-WEATHERED ROCK-
(META-TUFF)

63
100/0.9
100/0.7
100/0.5
100/0.4

BT
DRY
08/23

-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

14+50.00 ℄

-Y2-

29-SEP-2023 16:06
C:\Users\mbrewer\OneDrive - Carolinas Geotechnical Group, PLLC\Projects\0193 - R-5963D_NCDOT GEU\CADD_GEOTECH\xsc\R-5963D_GEO_RDY_XS1.dgn
$$$$USERNAME$$$$

8:1

2:1

EXISTING GROUND

2:1 3:1

HARD, MOIST, BLACK-ORANGE-TAN, FINE TO COARSE SANDY SILT (A-4),
WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

-WEATHERED ROCK-
(META-TUFF)

-RESIDUAL- VERY DENSE, MOIST, BLACK-ORANGE-TAN, SILTY FINE TO COARSE SAND (A-2-4),
WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

-WEATHERED ROCK-
(META-TUFF)

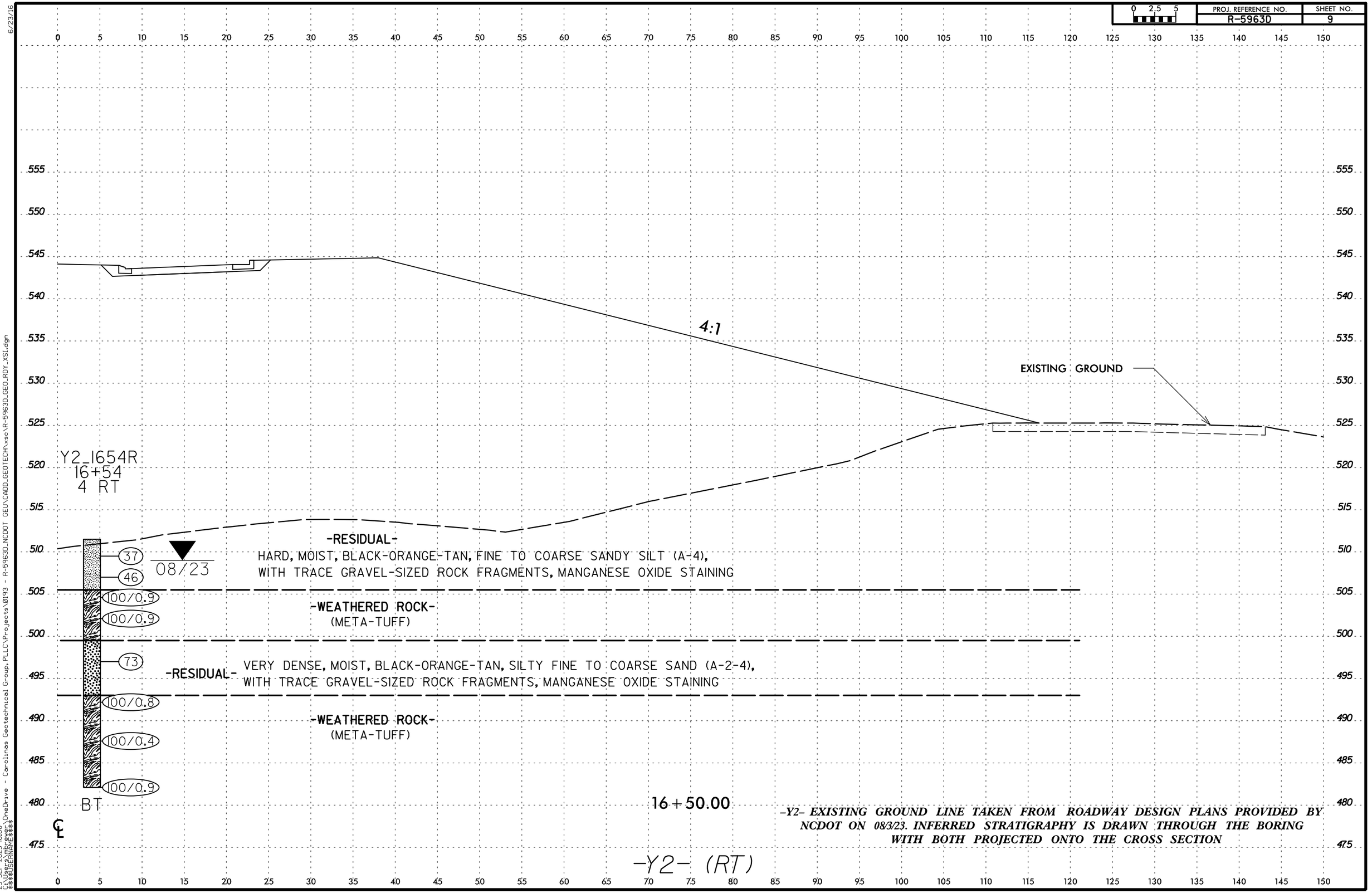
-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

16+50.00

℄

-Y2- (LT)

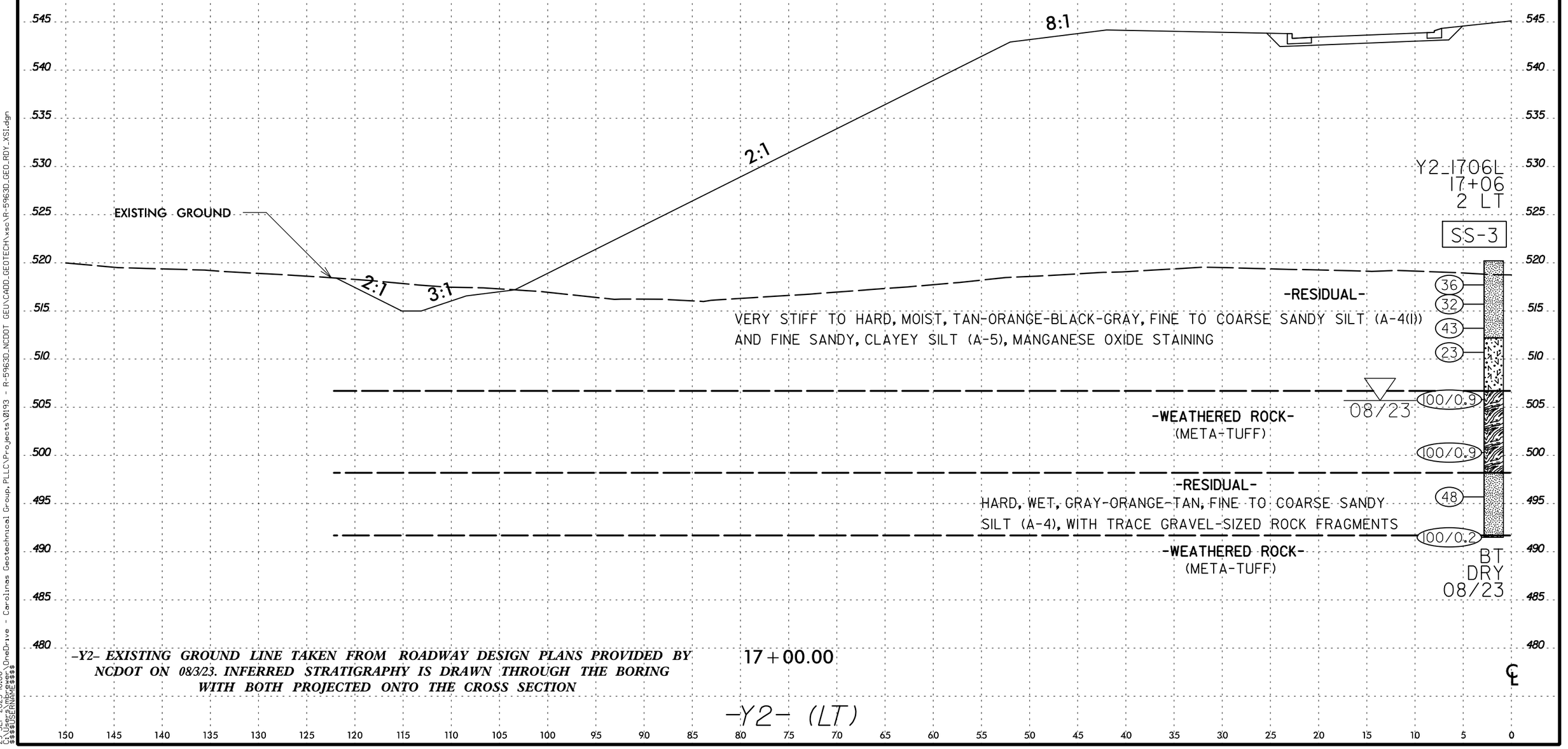
0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	9



-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

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	-



-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

17+00.00

-Y2- (LT)

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	11

8:1

2:1

EXISTING GROUND

-RESIDUAL-
VERY STIFF TO HARD, MOIST, TAN-ORANGE-BLACK-GRAY, FINE TO COARSE SANDY SILT (A-4(I))
AND FINE SANDY, CLAYEY SILT (A-5), MANGANESE OXIDE STAINING

-WEATHERED ROCK-
(META-TUFF)

-RESIDUAL-
HARD, WET, GRAY-ORANGE-TAN, FINE TO COARSE SANDY
SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS

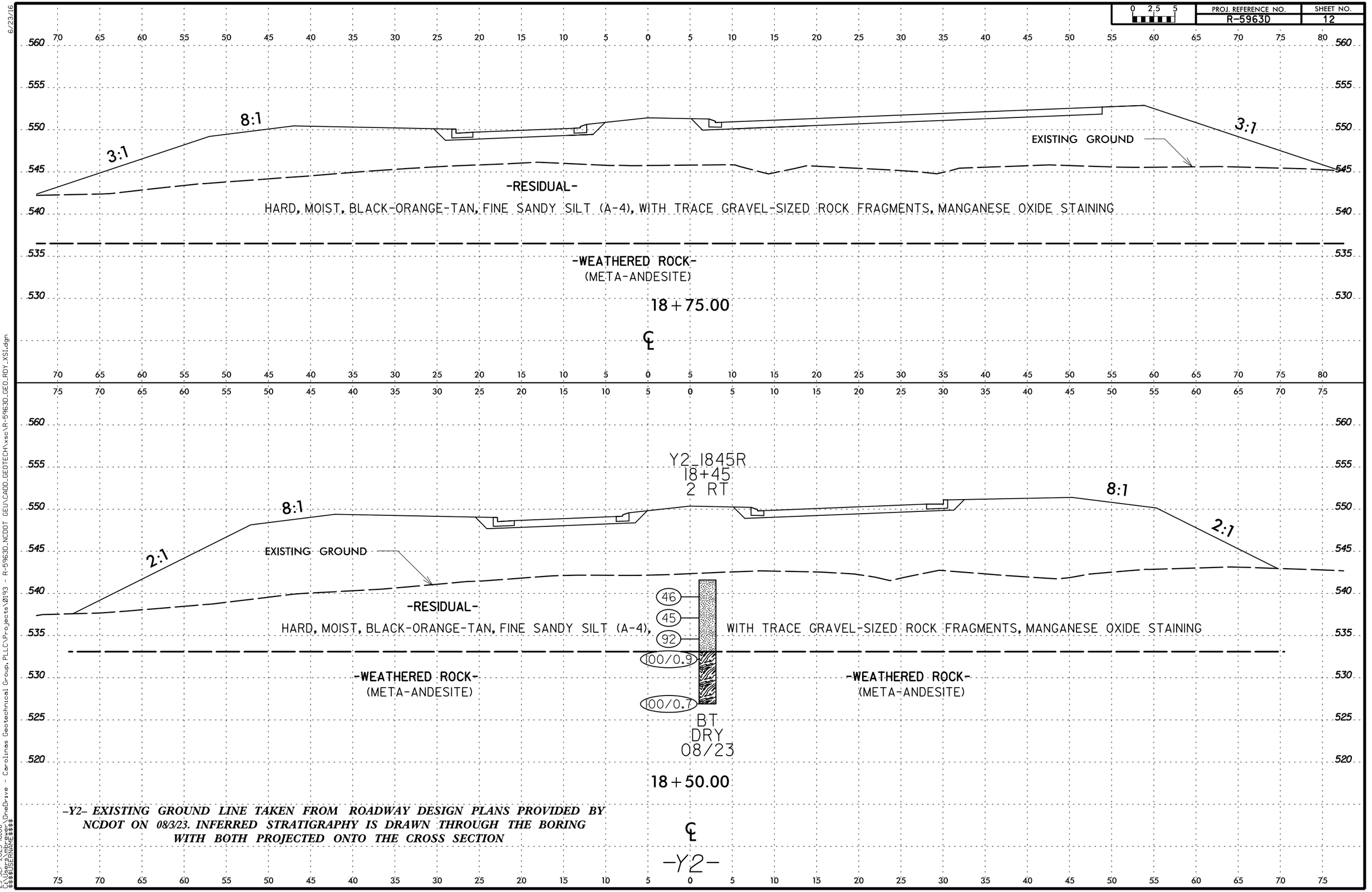
-WEATHERED ROCK-
(META-TUFF)

16+50.00

℄

-Y2- (RT)

-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



-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

6/23/16

29-SEP-2023 16:06
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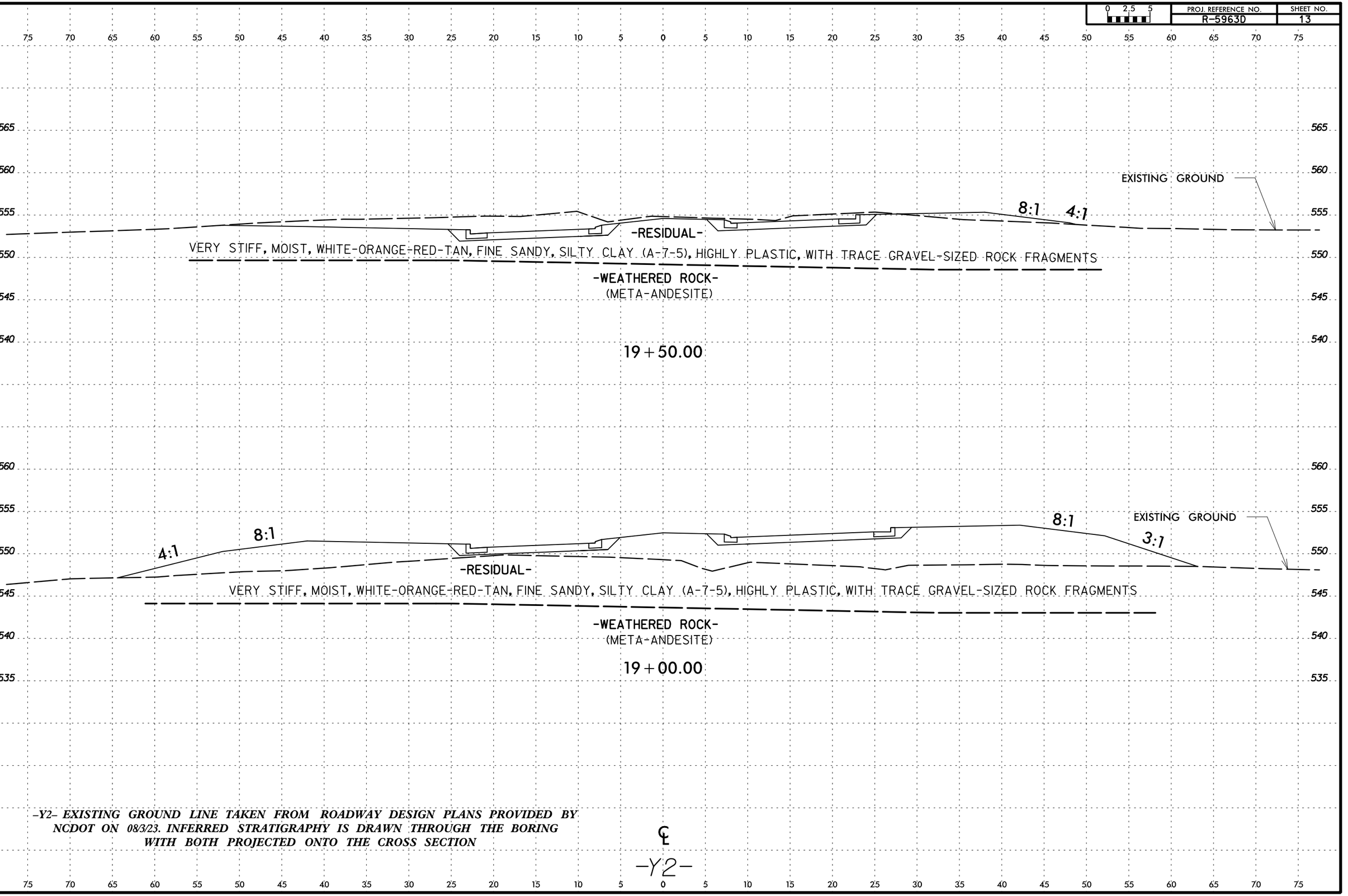
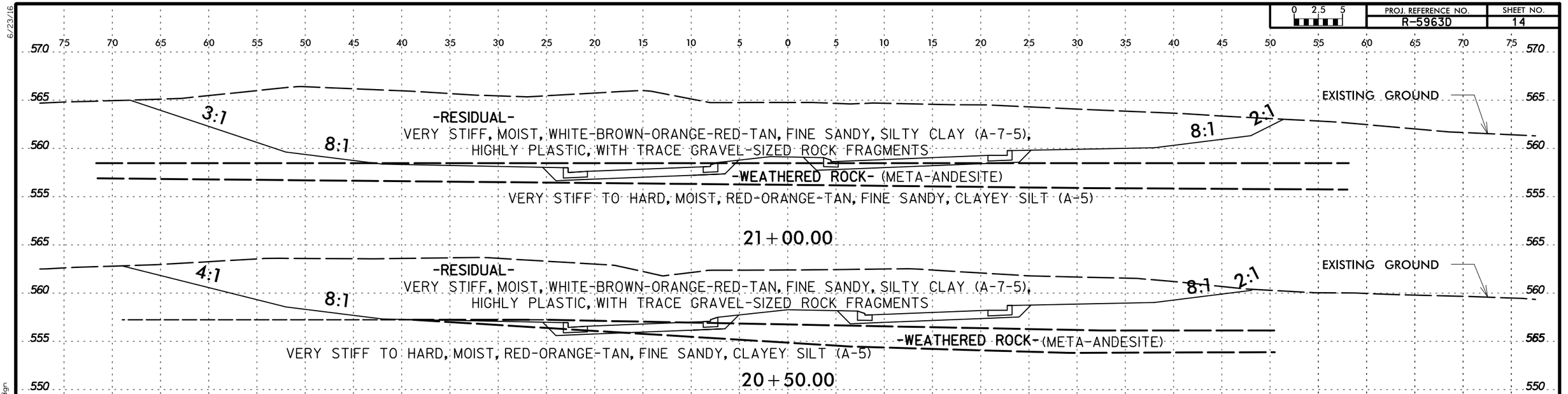
$$$$USERNAME$$$$

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	13



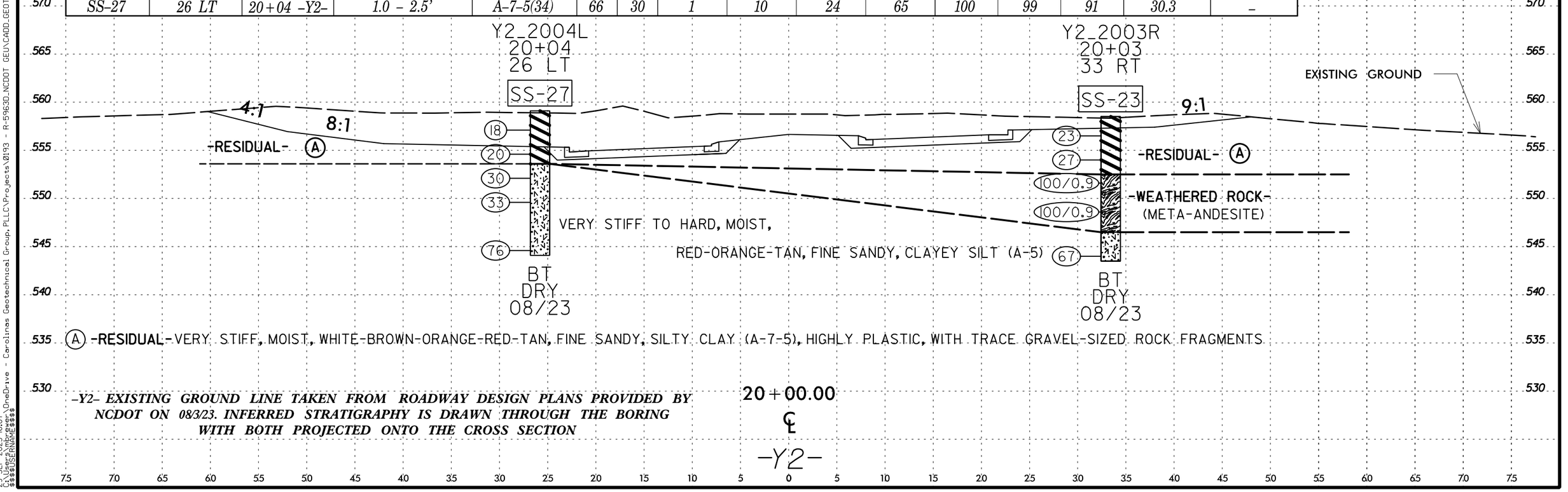
-Y2- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

℄
-Y2-



SOIL TEST RESULTS

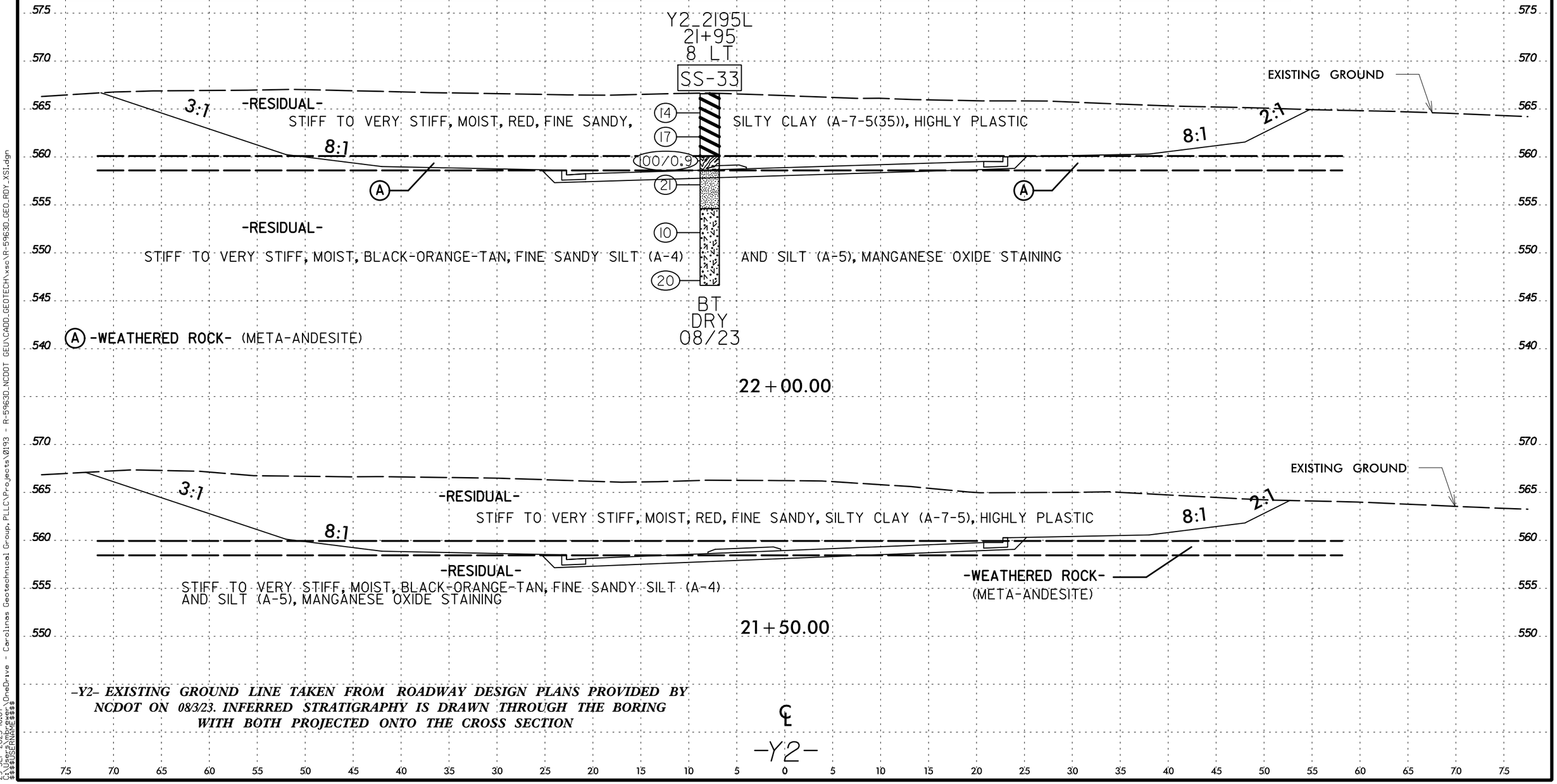
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-23	33 RT	20+03 -Y2-	3.5 - 5.0'	A-7-5(26)	64	30	9	9	27	55	91	85	77	22.9	-
SS-27	26 LT	20+04 -Y2-	1.0 - 2.5'	A-7-5(34)	66	30	1	10	24	65	100	99	91	30.3	-



-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

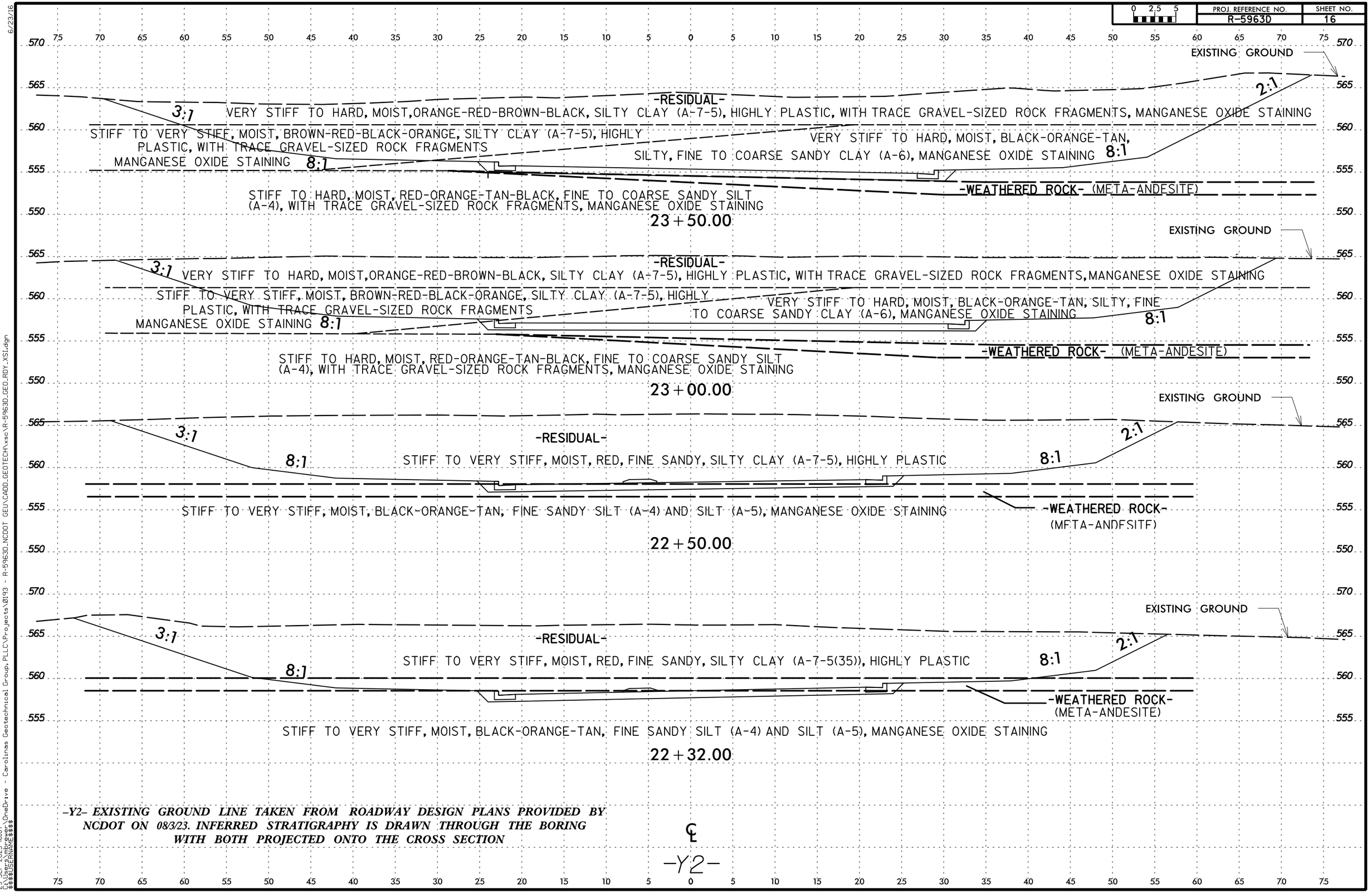
SOIL TEST RESULTS

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-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

℄
-Y2-



6/23/16

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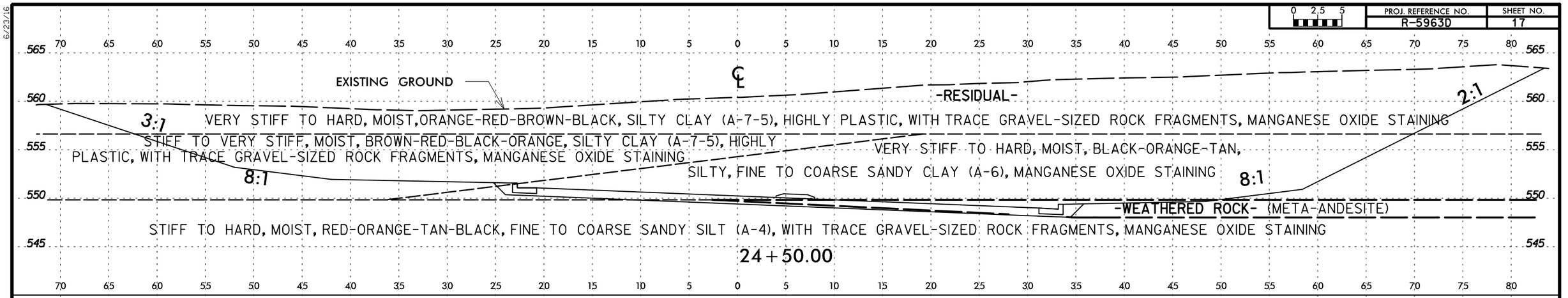
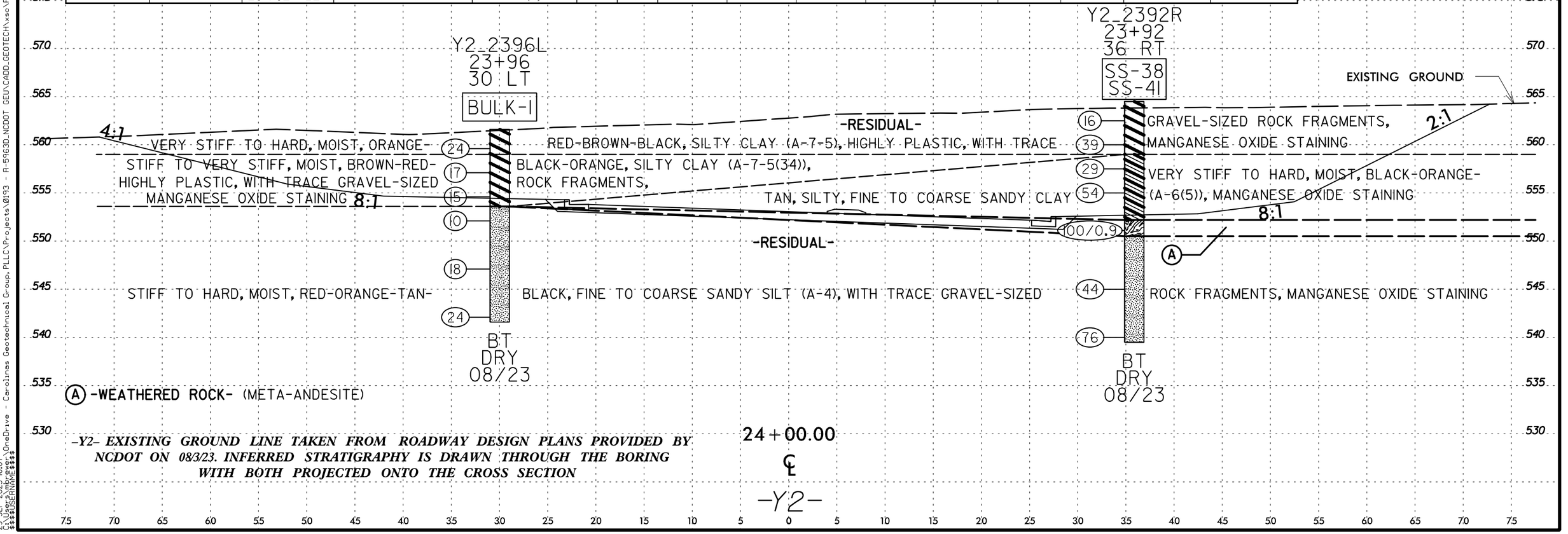


SOIL TEST RESULTS

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		
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 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING WITH BOTH PROJECTED ONTO THE CROSS SECTION

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	18

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

565 560 555 550 545 540 535

EXISTING GROUND

4:1

8:1

-RESIDUAL- STIFF TO HARD, MOIST, BROWN-RED-BLACK-ORANGE-TAN, FINE SANDY, SILTY CLAY (A-7-5), HIGHLY PLASTIC, MANGANESE OXIDE STAINING

STIFF TO HARD, MOIST, BLACK-ORANGE-TAN, FINE SANDY, CLAYEY SILT (A-5), MANGANESE OXIDE STAINING

25+50.00

565 560 555 550 545 540

EXISTING GROUND

4:1

-RESIDUAL- VERY STIFF TO HARD, MOIST, ORANGE-RED-BROWN-BLACK, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

STIFF TO VERY STIFF, MOIST, BROWN-RED-BLACK-ORANGE, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

Ⓑ

STIFF TO HARD, MOIST, RED-ORANGE-TAN-BLACK, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

Ⓑ -RESIDUAL- VERY STIFF TO HARD, MOIST, BLACK-ORANGE-TAN, SILTY, FINE TO COARSE SANDY CLAY (A-6), MANGANESE OXIDE STAINING

25+00.00

℄

-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

-Y2- (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

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6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	19

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

565 560 555 550 545 540 535

EXISTING GROUND

-RESIDUAL-

STIFF TO HARD, MOIST, BROWN-RED-BLACK-ORANGE-TAN, FINE SANDY, SILTY CLAY (A-7-5), HIGHLY PLASTIC, MANGANESE OXIDE STAINING

2:1

8:1

STIFF TO HARD, MOIST, BLACK-ORANGE-TAN, FINE SANDY, CLAYEY SILT (A-5), MANGANESE OXIDE STAINING

25+50.00

565 560 555 550 545 540

EXISTING GROUND

-RESIDUAL-

VERY STIFF TO HARD, MOIST, ORANGE-RED-BROWN-BLACK, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

Ⓐ

2:1

8:1

VERY STIFF TO HARD, MOIST, RED-ORANGE-TAN-BLACK, FINE TO COARSE SANDY SILT (A-4), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

Ⓐ -RESIDUAL- STIFF TO VERY STIFF, MOIST, BROWN-RED-BLACK-ORANGE, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

25+00.00

℄

-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

-Y2- (RT)

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

28-SEP-2023 16:25
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EXISTING GROUND

4:1

8:1

-RESIDUAL-

STIFF TO HARD, MOIST, BROWN-RED-BLACK-ORANGE-TAN, FINE SANDY, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

26+50.00

EXISTING GROUND

4:1

8:1

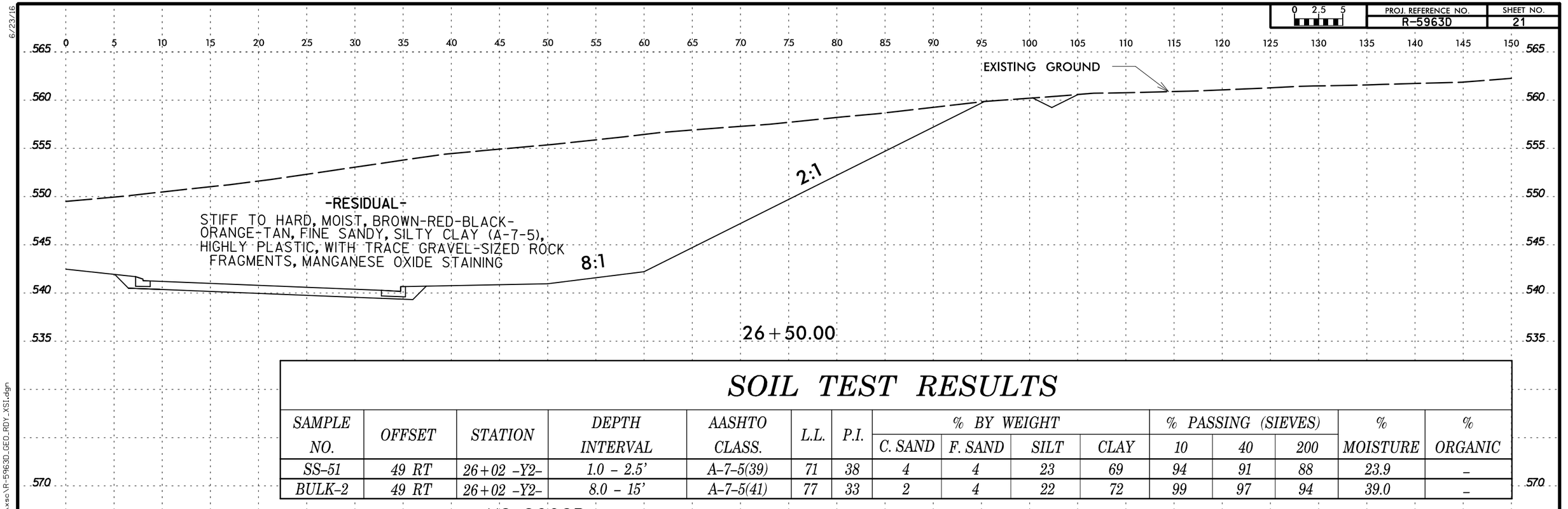
-RESIDUAL- STIFF TO HARD, MOIST, BROWN-RED-BLACK-ORANGE-TAN FINE SANDY, SILTY CLAY (A-7-5), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

STIFF TO HARD, MOIST, BLACK-ORANGE-TAN, FINE SANDY, CLAYEY SILT (A-5), MANGANESE OXIDE STAINING

-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

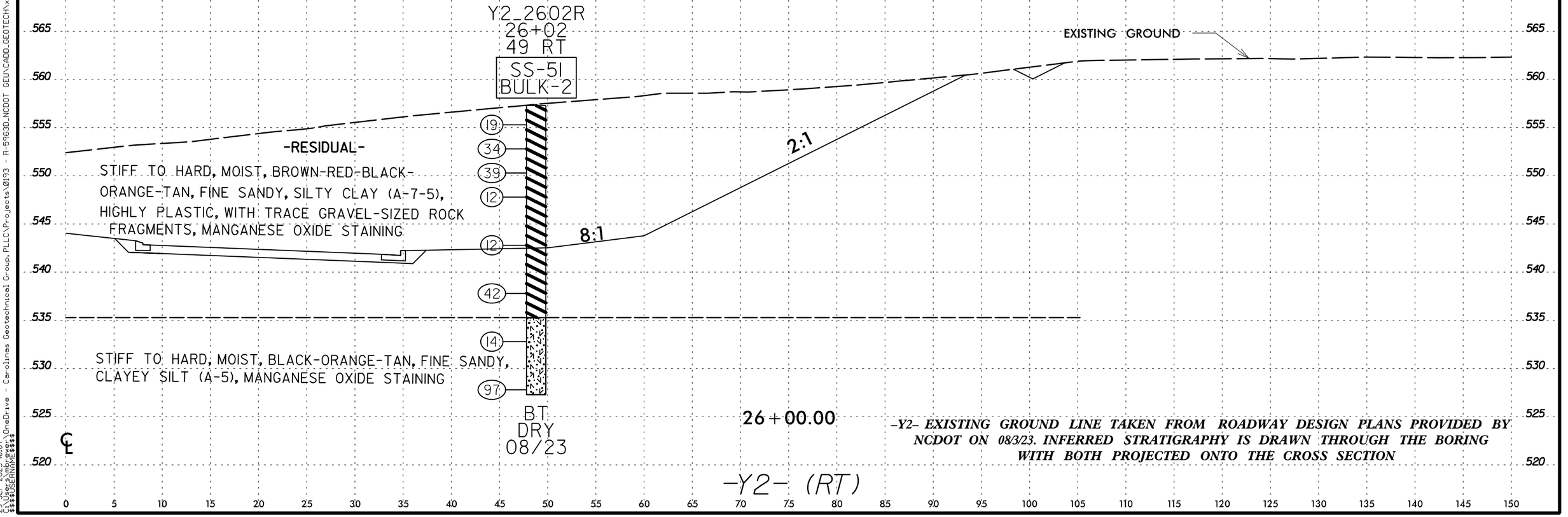
26+00.00

-Y2- (LT)



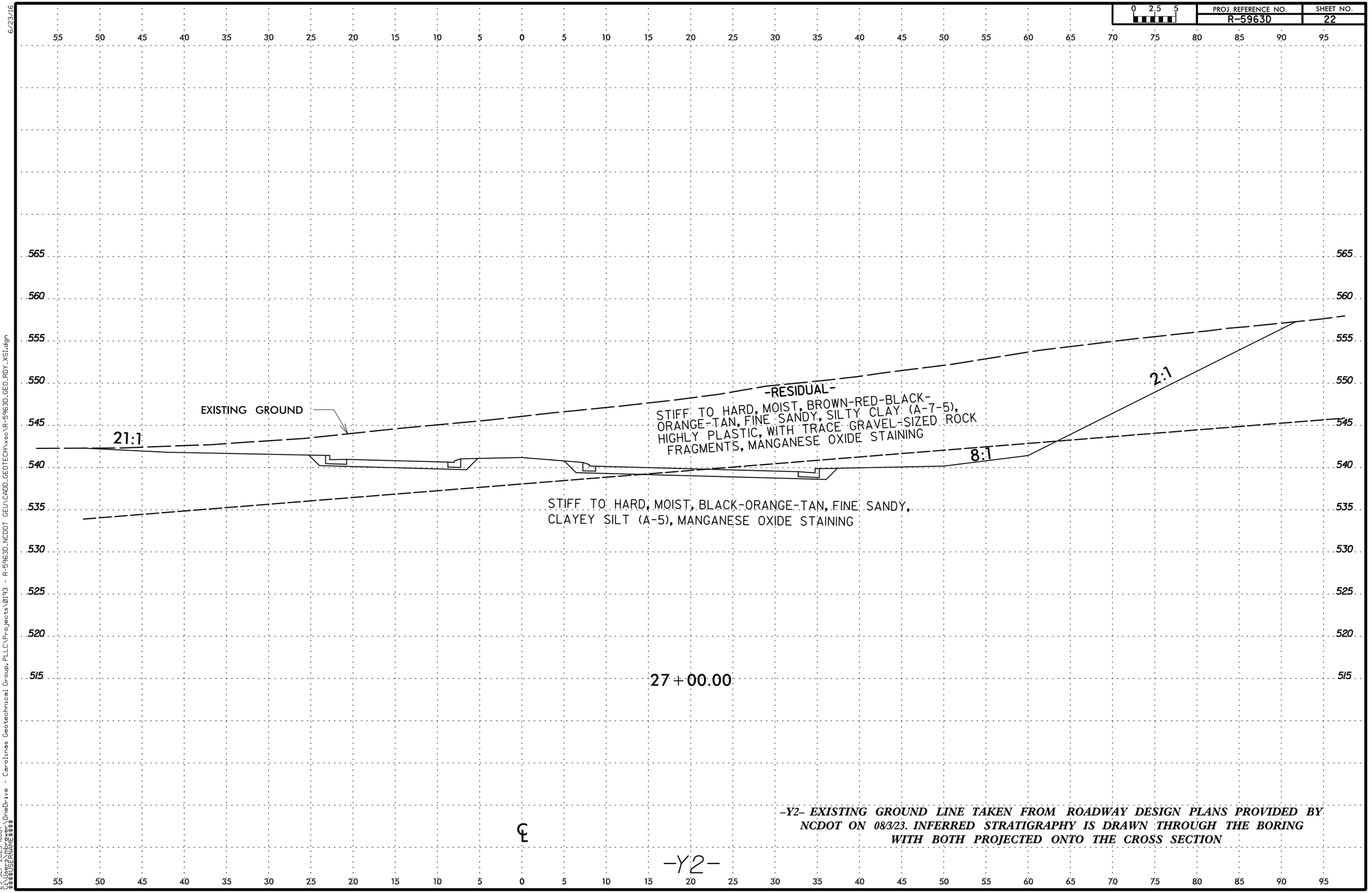
SOIL TEST RESULTS

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	–



-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

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	R-5963D	22



-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

70 65 60 55 50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80

560 555 550 545 540 535 530 525 520 515

EXISTING GROUND

-RESIDUAL-

4:1

8:1

2:1

8:1

MEDIUM STIFF TO VERY STIFF, MOIST, RED-ORANGE-BROWN, FINE TO COARSE SANDY, SILTY CLAY (A-7-5/A-7-6), HIGHLY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS AND ORGANICS

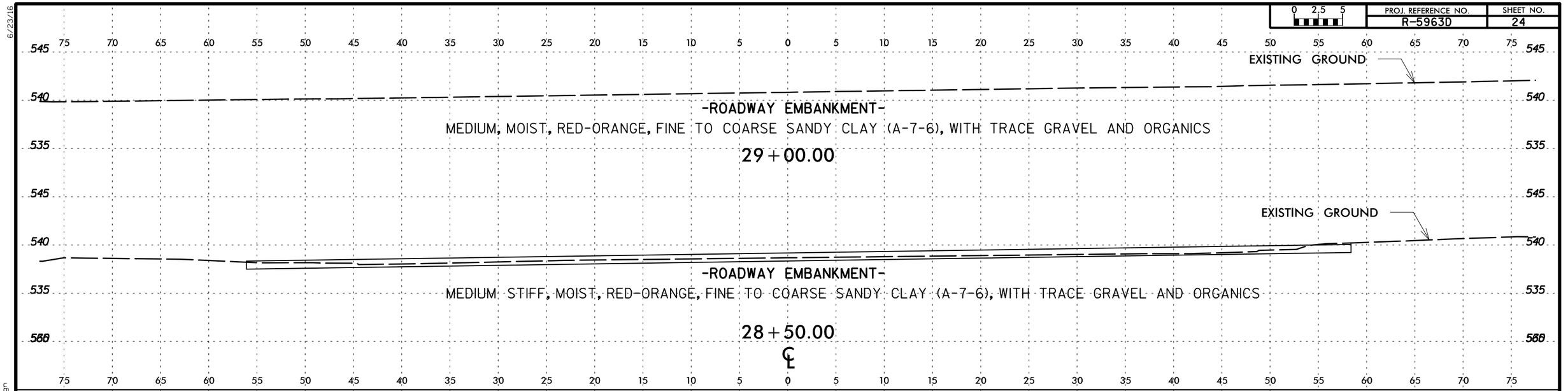
STIFF, MOIST, BLACK-ORANGE-TAN-RED-GRAY, SILT (A-4) AND SILTY, FINE SANDY CLAY (A-6), WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

27+50.00

-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

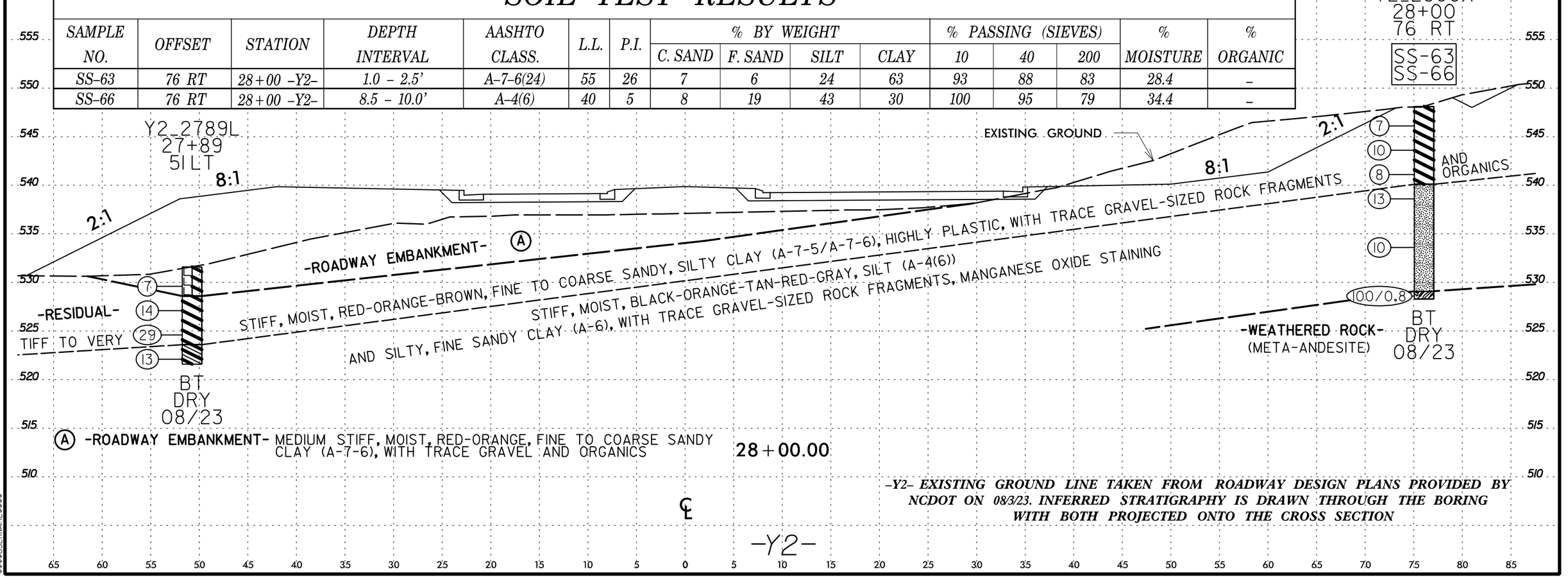
℄

-Y2-



SOIL TEST RESULTS

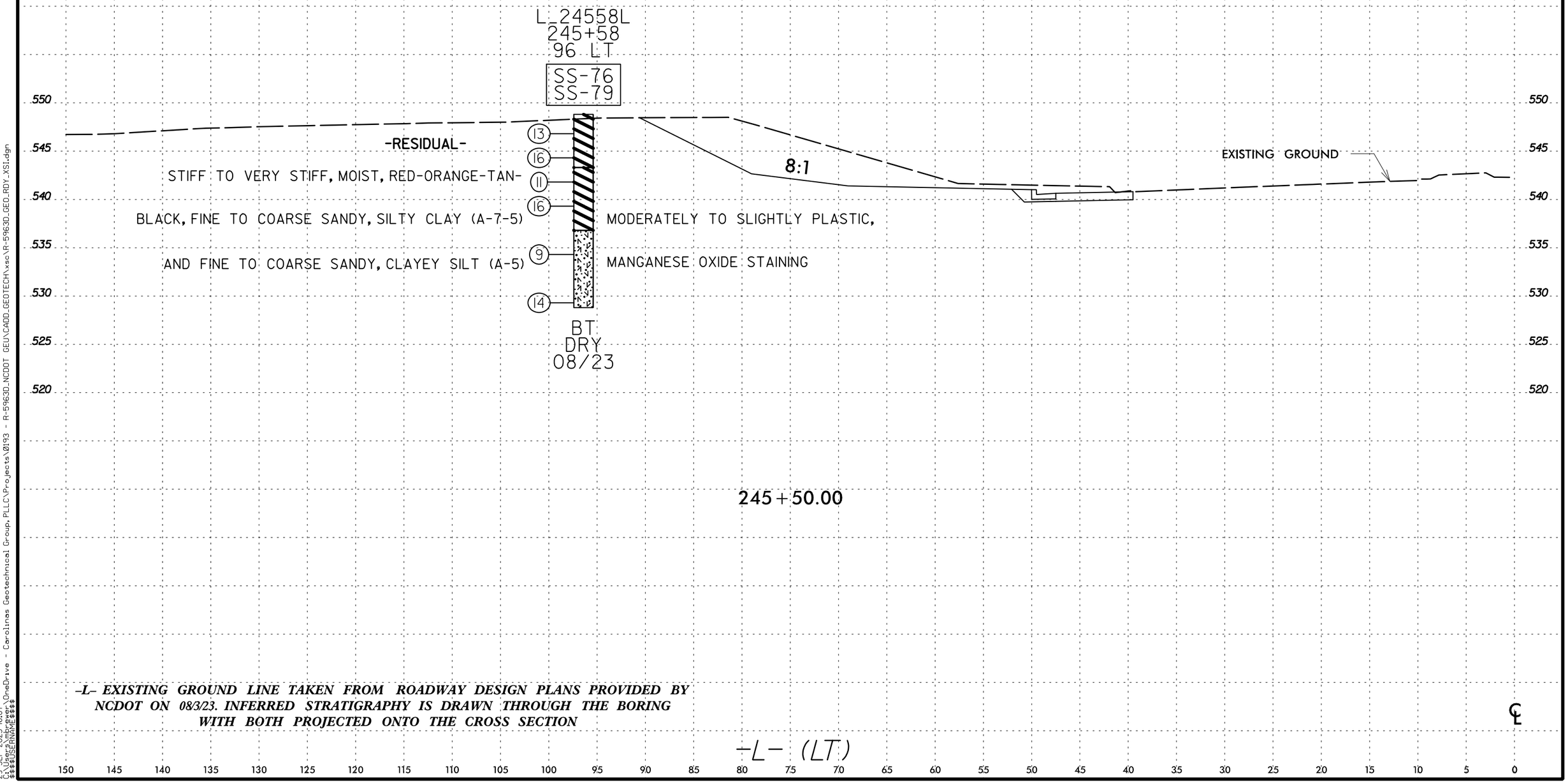
SAMPLE NO.	*OFFSET*	*STATION*	*DEPTH INTERVAL*	*AASHTO CLASS.*	*L.L.*	*P.I.*	*% BY WEIGHT*				*% PASSING (SIEVES)*			*% MOISTURE*	*% ORGANIC*
							C. SAND	*F. SAND*	*SILT*	*CLAY*	*10*	*40*	*200*		
SS-63	*76 RT*	*28+00 -Y2-*	*1.0 – 2.5'*	*A-7-6(24)*	*55*	*26*	*7*	*6*	*24*	*63*	*93*	*88*	*83*	*28.4*	–
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- 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

SOIL TEST RESULTS

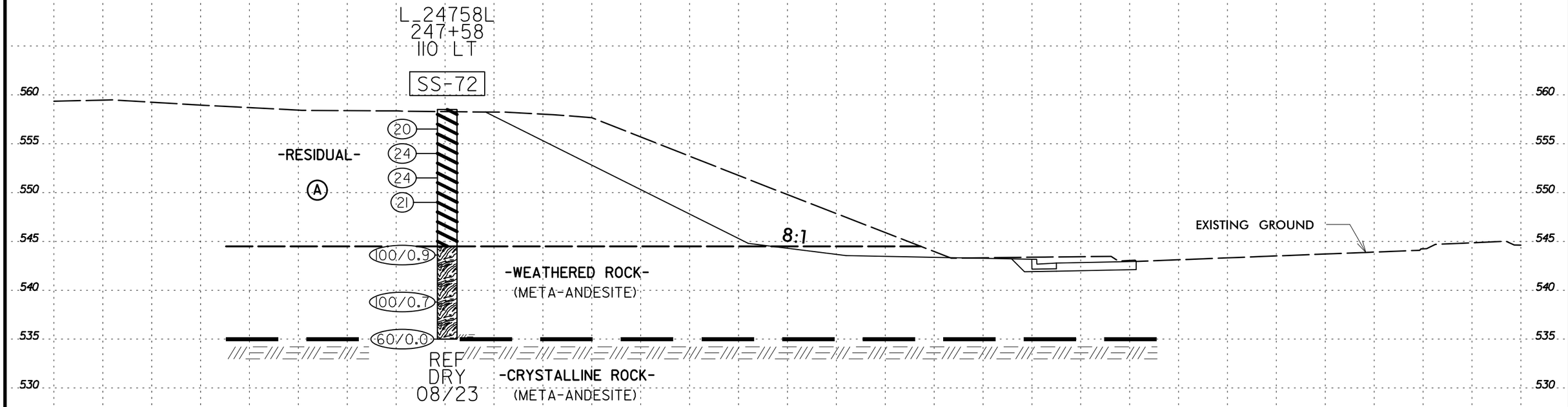
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-76	96 LT	245+58 -L-	1.0 - 2.5'	A-7-5(28)	68	21	3	4	28	65	98	95	92	26.4	-
SS-79	96 LT	245+58 -L-	8.5 - 10.0'	A-7-5(18)	56	15	5	10	35	50	100	97	88	33.0	-



-L- EXISTING GROUND LINE TAKEN FROM ROADWAY DESIGN PLANS PROVIDED BY NCDOT ON 08/3/23. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORING 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-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	-

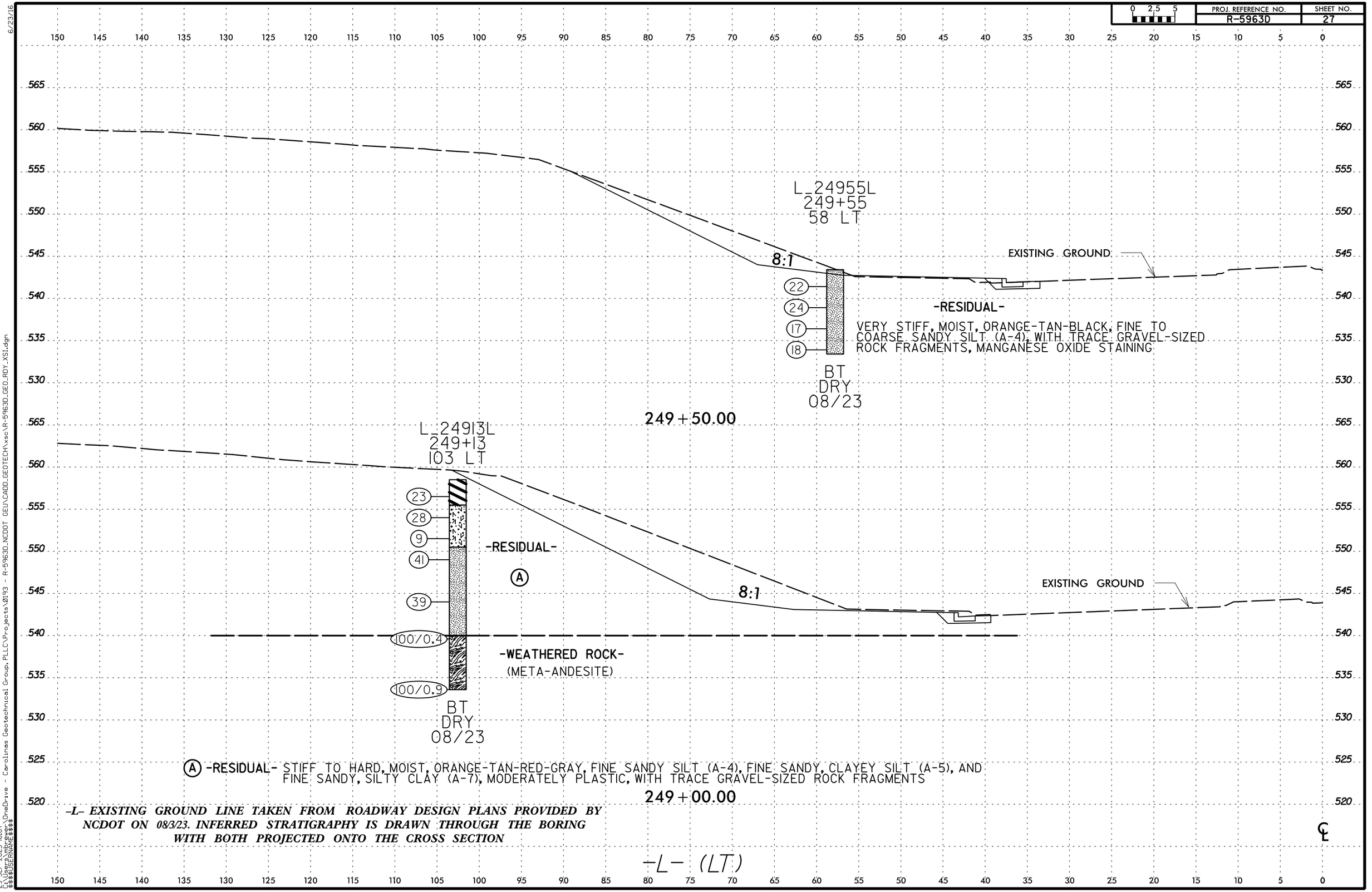


(A) **-RESIDUAL-** VERY STIFF, MOIST, ORANGE-TAN-BLACK, FINE SANDY, SILTY CLAY (A-7-6(18)), MODERATELY PLASTIC, WITH TRACE GRAVEL-SIZED ROCK FRAGMENTS, MANGANESE OXIDE STAINING

247+50.00

-L- 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

-L- (LT)



PROJECT REFERENCE NO.	SHEET NO.
R–5963D	28

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:
FALCON ENGINEERING
FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
CARY, NC 27513
PHONE: 919.871.0800
www.falconengineers.com
Firm License: C-3193
NCDOT LAB CERT NO. 105-0803

FALCON ENGINEERING

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

PROJECT REFERENCE NO.	SHEET NO.
R–5963D	30

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
CARY, NC 27513

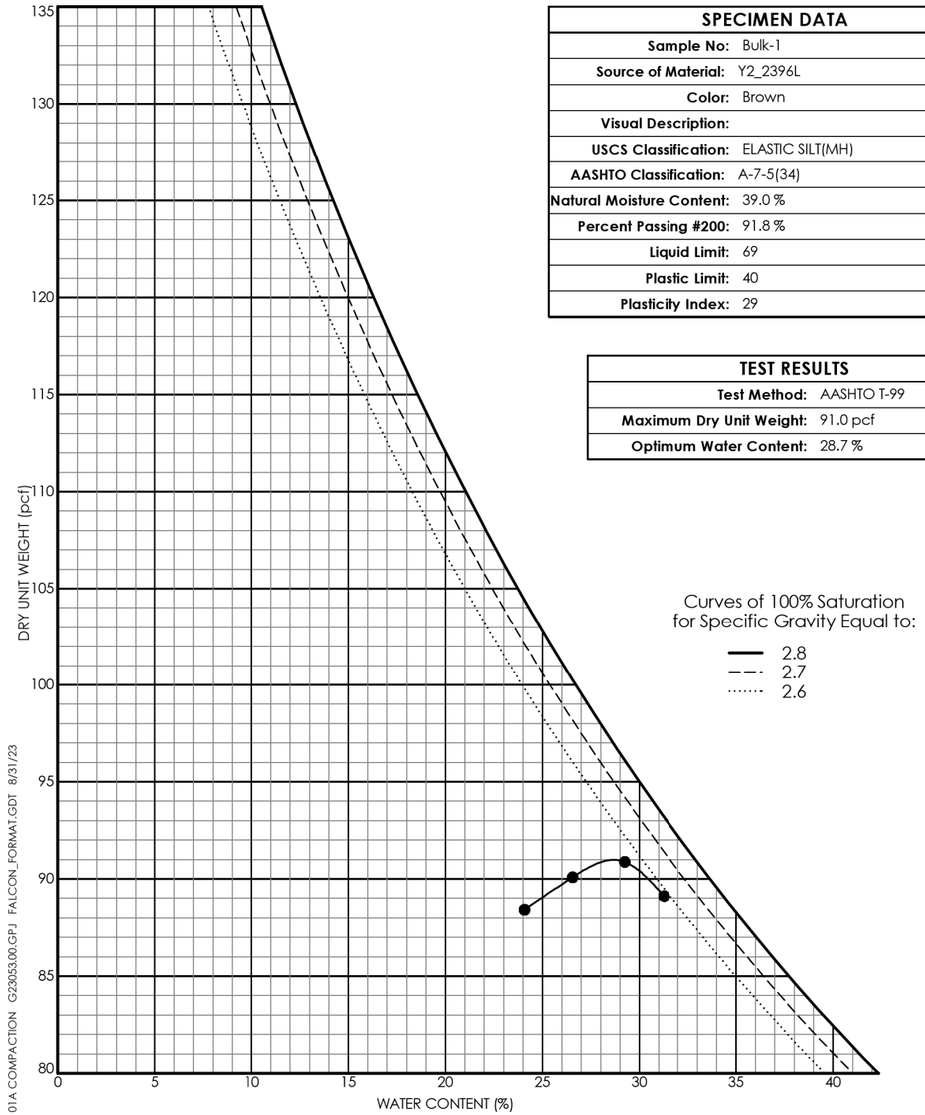
PHONE: 919.871.0800
www.falconengineers.com

LABORATORY COMPACTION TEST RESULTS

Project No.: R-5963D
Project Name: SR 1809 (Suttles Road) to Chatham Park 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

FALCON ENGINEERING, INC.
1210 TRINITY ROAD, SUITE 110
CARY, NC 27513

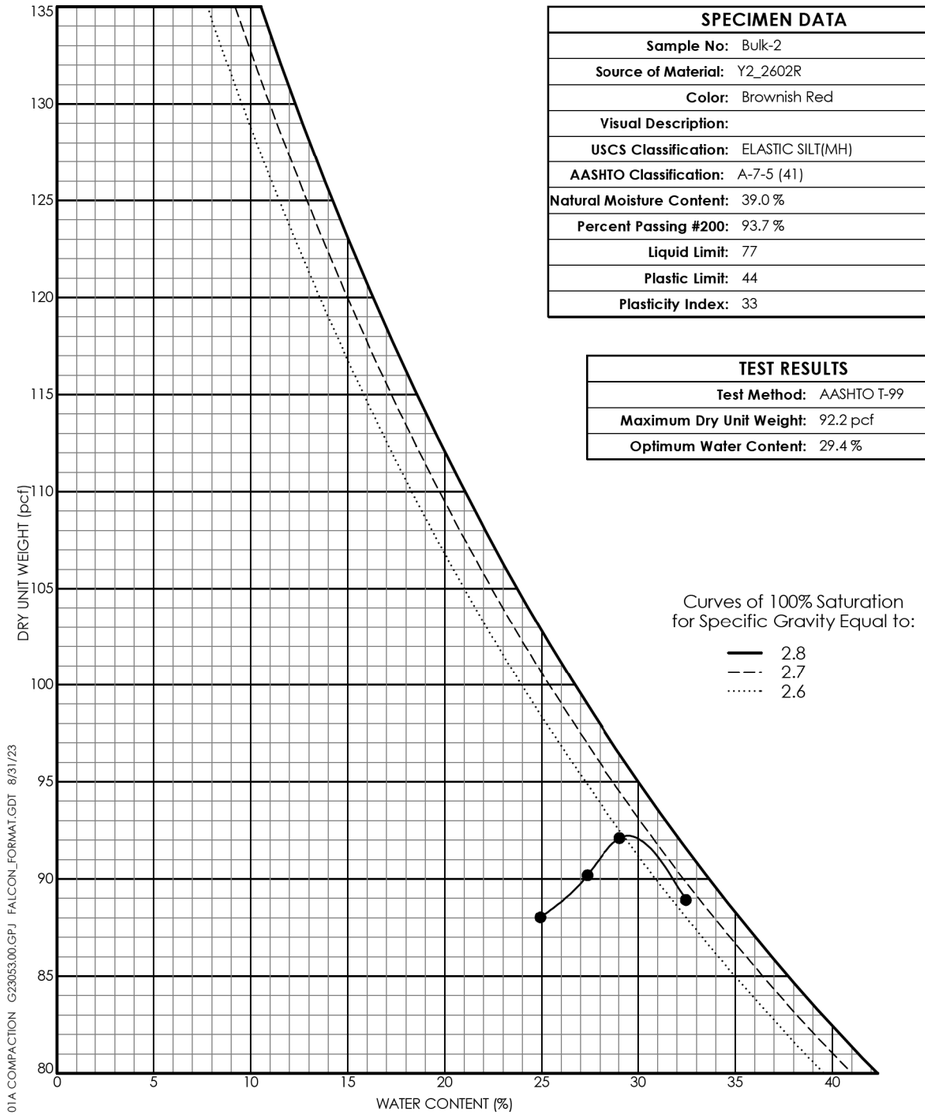
PHONE: 919.871.0800
www.falconengineers.com

LABORATORY COMPACTION TEST RESULTS

Project No.: R-5963D
Project Name: SR 1809 (Suttles Road) to Chatham Park 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 %



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

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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

		Moisture Content	Before Molding	After Molding		
Wt. of Mold + Wet Soil:	20473 g				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)
0.000	0	0.0
0.025	59	19.7
0.050	115	38.3
0.075	155	51.7
0.100	190	63.4
0.125	219	73.0
0.150	241	80.4
0.175	263	87.7
0.200	283	94.4
0.225	301	100.4
0.250	315	105.0
0.275	329	109.7
0.300	345	115.0
0.400	396	132.1
0.500	443	147.7

Piston Calibration
Strain Rate: 0.05 inch/minute
Piston Diameter: 1.954 inch
Piston Area: 2.999 sq. inch

Swell Readings
Soak Time: 96 hours
Surcharge Weight: 10 lb
Surcharge Stress: 51 psf
Molded Sample Height: 4.584 inch
Initial Dial Reading: 0.050 inch
Final Dial Reading: 0.138 inch
Percent Swell: 1.92%

Readings After Soak	
Wt. Mold + Soaked Soil:	20585.00 g
Wt. Tare:	6.50 g
Wt. Wet Soil + Tare:	396.00 g
Wt. Tare + Dry Soil:	287.00 g
Moisture Content:	38.9%
Wet Unit Weight:	120.4 pcf
Dry Unit Weight:	86.7 pcf

BEARING RATIO

CBR at 0.1 inch: **6.3**

CBR at 0.2 inch: **6.3**

Additional Specimen Data

Liquid Limit:	69	Percent Passing #4:	100%
Plastic Limit:	40	Percent Passing #10:	99%
Plasticity Index:	29	Percent Passing #40:	96%
		Percent Passing #200:	91.8%

Color: Brown
Visual Description:
USCS Classification: ELASTIC SILT (MH
AASHTO Classification:)A-7-5 (34)

207 REPORT SHEET - CBR G23053.00.GPJ FALCON_FORMAT.GDT 9/6/23

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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_2602R **Sample ID:** Bulk-2 **Sample Depth:** 8.0-15.0 ft

MOLDED SPECIMEN TEST DATA

		Moisture Content	Before Molding	After Molding		
Wt. of Mold + Wet Soil:	20514 g				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)
0.000	0	0.0
0.025	58	19.3
0.050	122	40.7
0.075	178	59.4
0.100	225	75.0
0.125	259	86.4
0.150	291	97.0
0.175	317	105.7
0.200	342	114.0
0.225	361	120.4
0.250	376	125.4
0.275	391	130.4
0.300	402	134.1
0.400	446	148.7
0.500	489	163.1

Piston Calibration
Strain Rate: 0.05 inch/minute
Piston Diameter: 1.954 inch
Piston Area: 2.999 sq. inch

Swell Readings
Soak Time: 96 hours
Surcharge Weight: 10 lb
Surcharge Stress: 51 psf
Molded Sample Height: 4.579 inch
Initial Dial Reading: 0.050 inch
Final Dial Reading: 0.126 inch
Percent Swell: 1.66%

Readings After Soak	
Wt. Mold + Soaked Soil:	20584.00 g
Wt. Tare:	6.50 g
Wt. Wet Soil + Tare:	343.10 g
Wt. Tare + Dry Soil:	252.10 g
Moisture Content:	37.1%
Wet Unit Weight:	121.4 pcf
Dry Unit Weight:	88.6 pcf

BEARING RATIO

CBR at 0.1 inch: **7.5**

CBR at 0.2 inch: **7.6**

Additional Specimen Data

Liquid Limit:	77	Percent Passing #4:	99%
Plastic Limit:	44	Percent Passing #10:	99%
Plasticity Index:	33	Percent Passing #40:	97%
		Percent Passing #200:	93.7%

Color: Brownish Red
Visual Description:
USCS Classification: ELASTIC SILT (MH
AASHTO Classification:)A-7-5 (41)

207 REPORT SHEET - CBR G23053.00.GPJ FALCON_FORMAT.GDT 9/6/23

PROJECT REFERENCE NO.	SHEET NO.
R–5963D	32

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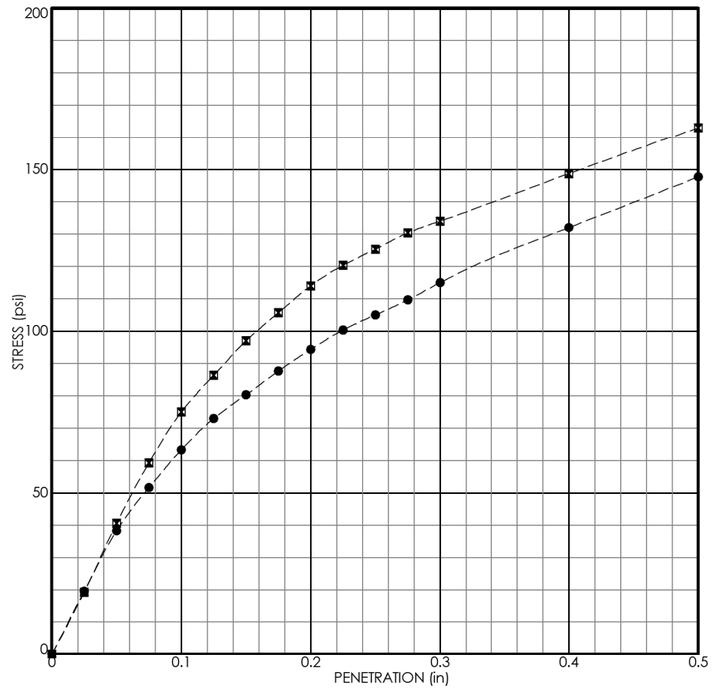
CALIFORNIA BEARING RATIO TEST RESULTS

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.	% Pass.	CBR at Penetration		Percent	Symbol	
	Dry Unit Wt.	MC	% Comp.	Method	#4	#200	0.1 inch	0.2 inch	Swell	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)

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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_20 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 H20 AT 20°C

H	DENSITY OF H20 AT Tx	0.9975460	
I	DENSITY OF H20 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

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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(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_20 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 H20 AT 20°C

H	DENSITY OF H20 AT Tx	0.9968417	
I	DENSITY OF H20 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