STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HL-0025	1	14

REFERENCE: HL-0025

PROJECT: 49491

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

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LINE	STATION	PLAN	PROFILE
-L-	11+04.26 - 26+50.00	4-5	6
-Y2-	11+00.00 - 15+65.00	5	7
-Y4-	10+45.00 - 13+36.85	5	7

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY RESULTS	8-11

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *MECKLENBURG*

PROJECT DESCRIPTION *GREYLOCK RIDGE ROAD EXTENSION FROM E. JOHN STREET TO TANK TOWN ROAD IN MATTHEWS, NC*

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

GOODNIGHT, D. J.

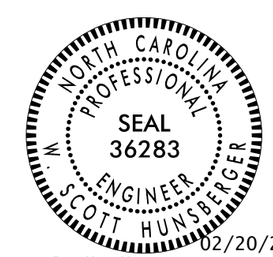
INVESTIGATED BY *FALCON ENG.*

DRAWN BY *HUNSBERGER, W. S.*

CHECKED BY *CROCKETT, S. C.*

SUBMITTED BY *FALCON ENG.*

DATE *DECEMBER 2023*



02/20/2024

DocuSigned by:
W. Scott Hunsberger
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SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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	50 MX											GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#40	30 MX	50 MX	51 MN											
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
MATERIAL PASSING #40 LL	—		—	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
PI	6 MX		NP	10 MX	10 MX	11 MN	11 MN	10 MX	10 MX	11 MN	11 MN			
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
GRAIN SIZE 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 SL — SHRINKAGE LIMIT	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
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
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] MOBILE B-29
- [ ] _____

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: BORING ELEVATIONS TAKEN FROM TIN FILE
HL0025_ls_u4714_merged.tin DATED 02/13/23
ELEVATION: FEET

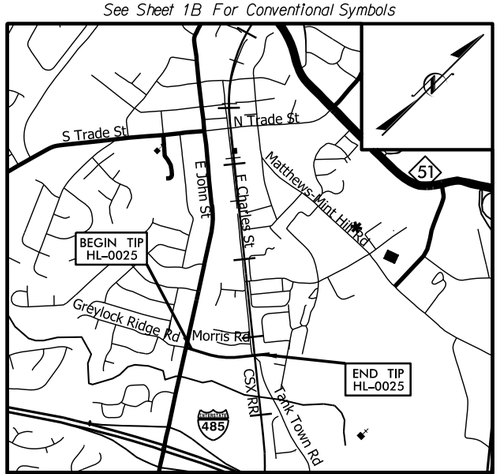
NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	HL–0025	3	14

STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION
49490.1.1		PE

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



VICINITY MAP
N.T.S.

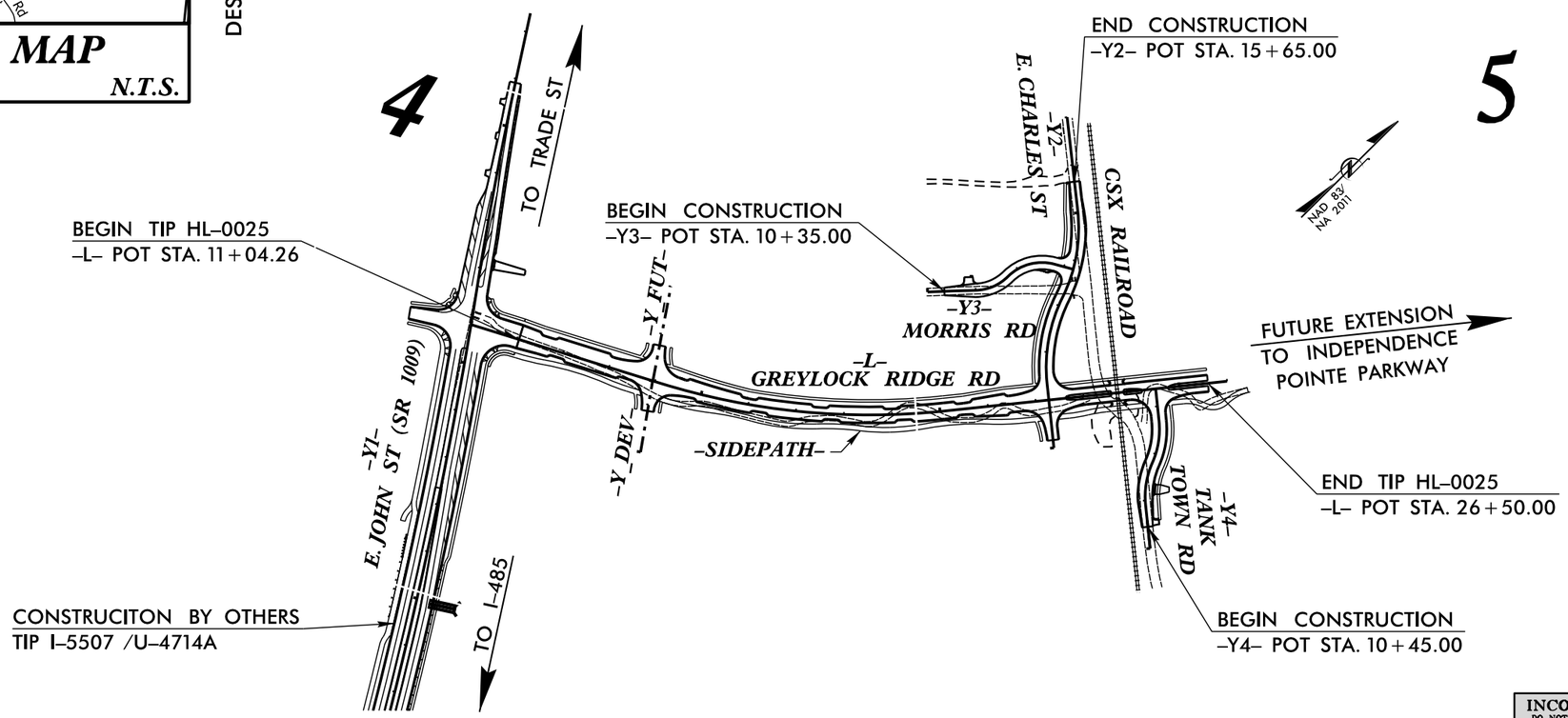
30% ROADWAY PLANS
DESIGN RECOMMENDATION PLANSET
12 /09 /2021

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

MECKLENBURG COUNTY

LOCATION: GREYLOCK RIDGE ROAD EXTENSION FROM E. JOHN ST. TO TANK TOWN RD. IN MATTHEWS, NC

TYPE OF WORK: GRADING, DRAINAGE, AND PAVING



NOTES:
1. CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD II.
2. THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF THE TOWN OF MATTHEWS.

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

TIP PROJECT: HL–0025

CONTRACT:

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2023 = 9,050
ADT 2040 = 11,600
K = 9 %
D = 55 %
T = 3 % *
V = 30 MPH
* TTST=1% DUALS=2%
FUNC CLASS = LOCAL
SUB–REGIONAL TIER

PROJECT LENGTH

LENGTH OF ROADWAY TIP PROJECT HL–0025 = *0.293 MILES*

TOTAL LENGTH TIP PROJECT HL–0025 = *0.293 MILES*

PLANS PREPARED BY:

A. MORTON THOMAS AND ASSOCIATES, INC.
6131 FALLS OF NEUSE ROAD, SUITE 101 RALEIGH, NC 27609
(919) 855-9989 NC LICENSE NO. F-1049
WWW.AMTENGINEERING.COM

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
SEPTEMBER 27, 2022

LETTING DATE:
JULY 17, 2024

MATTHEW LAMY, P.E
PROJECT ENGINEER

JOCELYN ADORNO, EI
PROJECT DESIGN ENGINEER

DONALD GRIFFITH
NCDOT CONTACT – DIVISION 10

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

ROADWAY DESIGN ENGINEER

SIGNATURE: *P.E.*

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION

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09/08/99

Roadway Subsurface Investigation Report - Inventory

Greylock Ridge Road Extension from E. John Street to Tank Town Road
Mecklenburg County, North Carolina
TIP: HL-0025 WBS: 49491.1.1
Falcon Project No.: G23005.00

Prepared for:
NCDOT GEU
1020 Birch Ridge Drive
Raleigh, NC 27610

Submitted by:
Falcon Engineering, Inc.
1210 Trinity Road, Suite 110
Cary, North Carolina 27513
(919) 871-0800
www.falconengineers.com

December 8, 2023

TIP:	HL-0025
WBS No.:	49491.1.1
COUNTY:	Mecklenburg
DESCRIPTION:	Greylock Ridge Road Extension from E. John Street to Tank Town Road
SUBJECT:	Roadway Subsurface Investigation – Inventory

PROJECT DESCRIPTION

This project consists of 3.2 miles of proposed new grading, realignment, and new roadway construction along Greylock Ridge Road in Mecklenburg County. A portion of Greylock Ridge Road will be extended from E. John Street to Tank Town Road. New tie-ins and minor improvements to Y-lines including new intersections at E. Charles Street and Tank Town Road with Greylock Ridge Road and other small drives are also included.

The investigation was conducted between January 30th, and September 30th, 2023. The information provided in this report are based solely on our site reconnaissance, soil test borings and laboratory test data, engineering evaluation of these data, and generally accepted soil and foundation engineering practices and principles.

A total of twelve (12) Standard Penetration Test (SPT) borings were performed for the proposed roadway alignments and retaining walls. All mechanical borings were drilled using a Mobil B-29 or CME 550x ATV rig equipped with 2 ¼-inch inside diameter hollow-stem augers, and SPT testing was performed with an automatic hammer. Representative soil samples, collected with a split-barrel sampler, were selected for laboratory testing to verify visual field classifications. In addition, bulk samples were collected for standard Proctor compaction and California Bearing Ratio (CBR) testing.

The following alignments, totaling approximately 0.44 miles were explicitly investigated. Other minor Y-lines and driveways are included on the project but improvements are not anticipated to be significant enough to warrant investigation.

Alignment	Station (ft)
-L- (Graylock Ridge Road)	11+04.26—26+50.00
-Y2- (E. Charles Street)	11+00.00—15+65.00
-Y4- (Tank Town Road)	10+45.00—13+36.85

AREAS OF SPECIAL GEOTECHNICAL INTEREST

I. Shallow ground water was not encountered in the areas explored.

II. Alluvial soils were not encountered in the areas explored. Isolated alluvial soils may exist elsewhere on the site between borings in proximity to natural waterways.

III. Artificial Fill associated with the existing greenway was encountered at the following location:

Alignment	Station (ft)
-L-	18+01

IV. Highly plastic soils, with PI of greater than or equal to 26, were encountered at the following locations within 6 feet of the proposed grade:

Alignment	Station (ft)
-L-	13+00 to 17+00
-L-	21+97

PHYSIOGRAPHY AND GEOLOGY

The project site is in the Inner Piedmont Belt Physiographic Province of North Carolina. According to the ***Geologic Map of North Carolina*** (1985), the site is underlain by Metamorphosed Quartz Diorite (**PzZG**) – foliated to massive.

Existing site topography is typical of North Carolina's Foothills Region. The Foothills Region is a portion of the Western Piedmont that approaches the Mountain Region. Terrain is typically more rugged than the majority of the Piedmont, but with less overall elevation change than the Mountain Region. Topography along the project is generally rolling, with steeper ravines in the vicinity of streams or existing roadway cuts. The existing ground surface generally grades upward in the upstation direction, with elevations ranging from a high of around 715 feet to a low of around 673 feet.

Existing land use within the project corridor is undeveloped with an existing greenway running the length of the L line. On either side of the project corridor, the land is generally developed with residential areas, with some commercial development to the south of the corridor.

SOIL PROPERTIES

A variety of soils were encountered along the project, including existing roadway embankments, residual soils, and weathered rock. Areas where soils at the ground surface are of a unique origin (i.e. not residual soils) are approximately delineated on the boring location plans based on subsurface conditions encountered in nearby borings, and various topographical, vegetative, or other visual surface features.

Topsoil and rootmat was encountered in grassy, brushy, and wooded areas ranging in thickness from 0.1 to 0.5 feet, and typically on the order of 0.2 feet.

Artificial Fill soils were encountered at the ground surface adjacent to the existing greenway. These consist of up to 2.0 feet of moist, loose, silty sands (A-2-4) with trace gravel.

Residual soils were encountered at the ground surface, or beneath roadway embankments. These soils consist of moist to wet, loose to dense, clayey and silty sands (A-2-4 and A-2-6) and medium stiff to hard, sandy clay and silt, clayey silt, and silty clays (A-4, A-5, and A-7).

Weathered Rock (WR) is a very hard material with properties intermediate of soil and rock. WR is classified as having an N-value of greater than 100 blows per one foot. WR encountered on the project generally consists of tan metamorphosed quartz diorite. WR was encountered at one location explored at approximately elevation 681.3 ft, msl.

GROUNDWATER PROPERTIES

Groundwater levels were measured at the time of boring completion, and in many cases after a waiting period of at least 24 hours. Borings drilled within and in close proximity to existing roadways, and within residential or commercial areas likely to see pedestrian traffic were backfilled immediately after completion due to safety considerations.

Groundwater levels across the site were generally deep, with encountered depths greater than 10 feet below ground surface. An existing stream, a tributary to Fourmile Creek, runs parallel to the project corridor, approximately 500-600 feet to the south.

ADDITIONAL LABORATORY TESTING

The following bulk samples were obtained:

Sample	Location	Depth (ft)	Test
BS-1	12+03, 9' LT, -L-	1.0-8.5	California Bearing Ratio, Standard Proctor
BS-2	20+02, 5' LT, -L-	1.0-8.5	California Bearing Ratio, Standard Proctor

Classification test results for bulk samples are included in the subsurface profiles and cross sections and Standard Proctor and California Bearing Ratio (CBR) data is attached in the Appendix.

CLOSING

Falcon appreciates the opportunity to have provided our geotechnical engineering services for the above referenced project. If you have any questions concerning the contents of this report or need additional information, please do not hesitate to contact our office.

FALCON ENGINEERING, INC.

Report Prepared By:

W. Scott Hunsberger, PE
Geotechnical Engineer

Report Reviewed By:

Jeremy R. Hamm, PE
Geotechnical Engineering Manager

PROJECT REFERENCE NO.	SHEET NO.
HL-0025	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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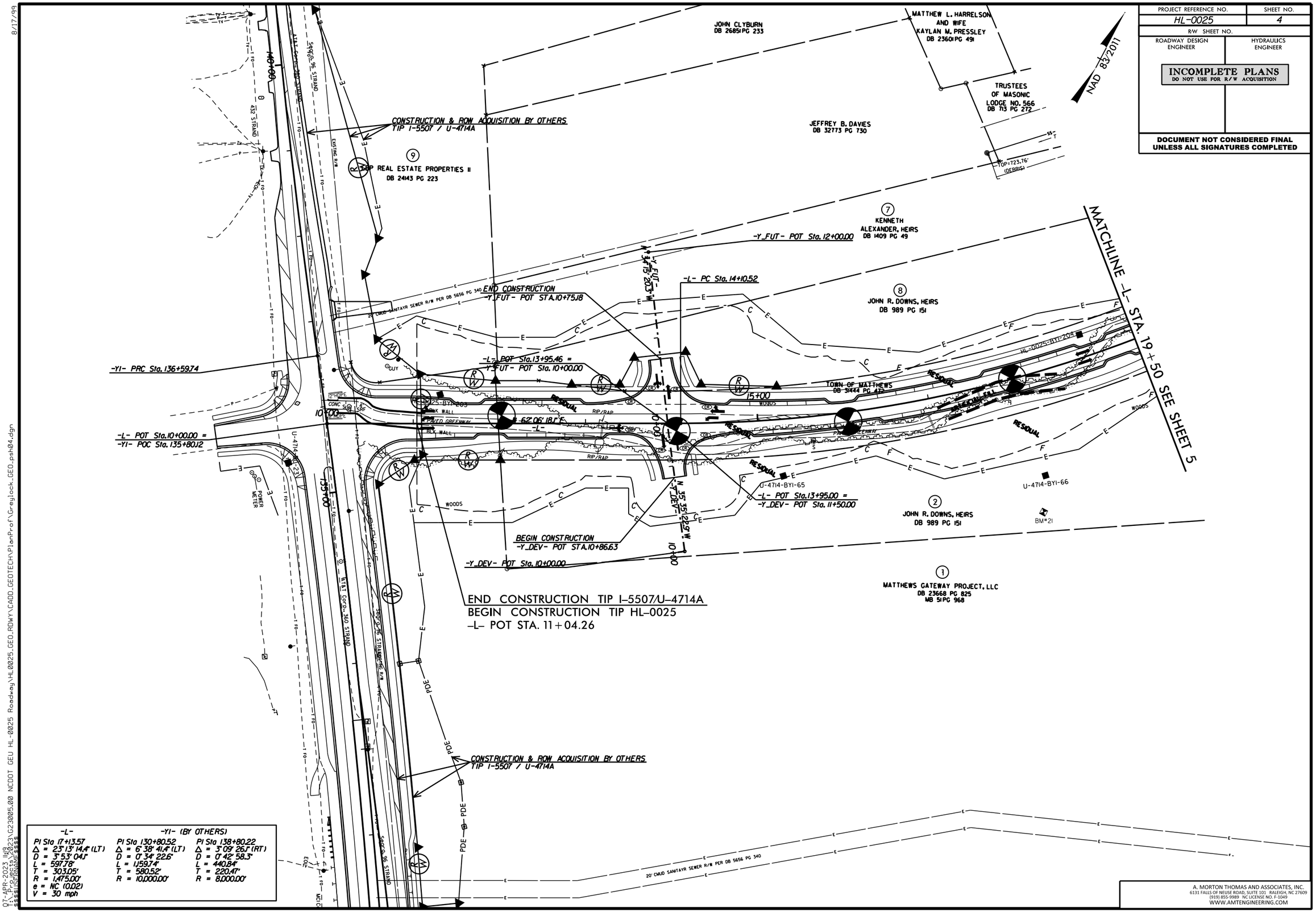

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PROJECT REFERENCE NO.	SHEET NO.
HL-0025	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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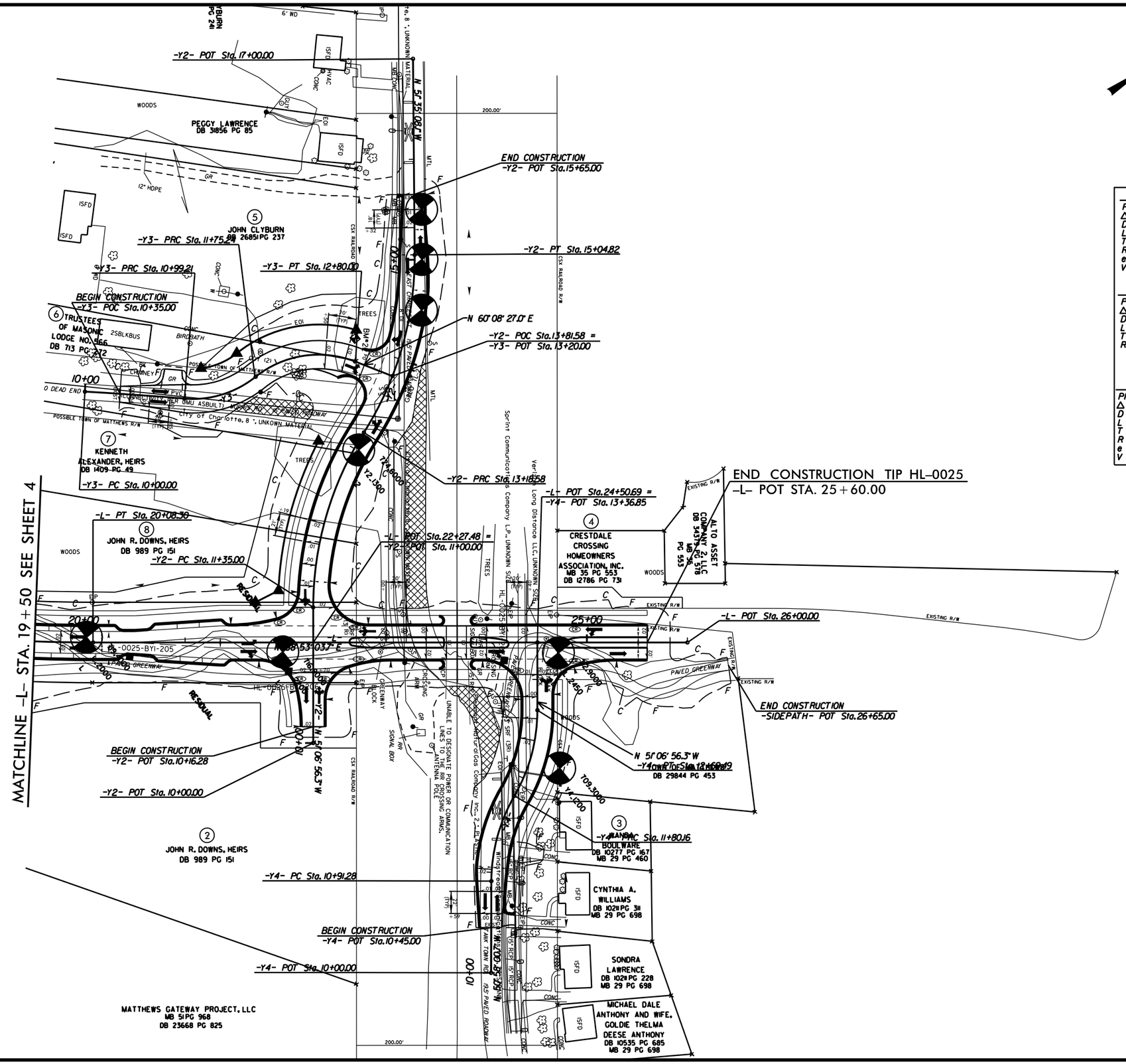

-L-	-Y2-	
PI Sta 17+13.57	PI Sta 12+29.31	PI Sta 14+14.33
Δ = 23° 13' 14.4" (LT)	Δ = 32° 21' 49.0" (RT)	Δ = 32° 50' 00.8" (LT)
D = 3° 53' 04.1"	D = 17° 37' 46.1"	D = 17° 37' 46.1"
L = 597.78'	L = 183.58'	L = 186.24'
T = 303.05'	T = 94.31'	T = 95.76'
R = 1,475.00'	R = 325.00'	R = 325.00'
e = NC (0.02)	e = NC (0.02)	e = NC (0.02)
V = 30 mph	V = 30 mph	V = 30 mph

-Y3-		
PI Sta 10+49.61	PI Sta 11+39.17	PI Sta 12+33.00
Δ = 1° 37' 26.8" (RT)	Δ = 43° 33' 33.5" (LT)	Δ = 60° 01' 28.3" (RT)
D = 1° 38' 13.3"	D = 57° 17' 44.8"	D = 57° 17' 44.8"
L = 99.21'	L = 76.03'	L = 104.76'
T = 49.61'	T = 39.96'	T = 57.76'
R = 3,500.00'	R = 100.00'	R = 100.00'
	e = NC (0.02)	e = NC (0.02)
	V = 20 mph	V = 20 mph

-Y4-	
PI Sta 12+25.88	PI Sta 11+36.76
Δ = 30° 06' 20.6" (LT)	Δ = 29° 57' 25.0" (RT)
D = 3° 42' 12.2"	D = 3° 42' 12.2"
L = 89.33'	L = 88.88'
T = 45.72'	T = 45.48'
R = 170.00'	R = 170.00'
e = NC (0.02)	e = NC (0.02)
V = 25 mph	V = 25 mph

PAVEMENT REMOVAL

AMT
A. MORTON THOMAS AND ASSOCIATES, INC.
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5/28/99

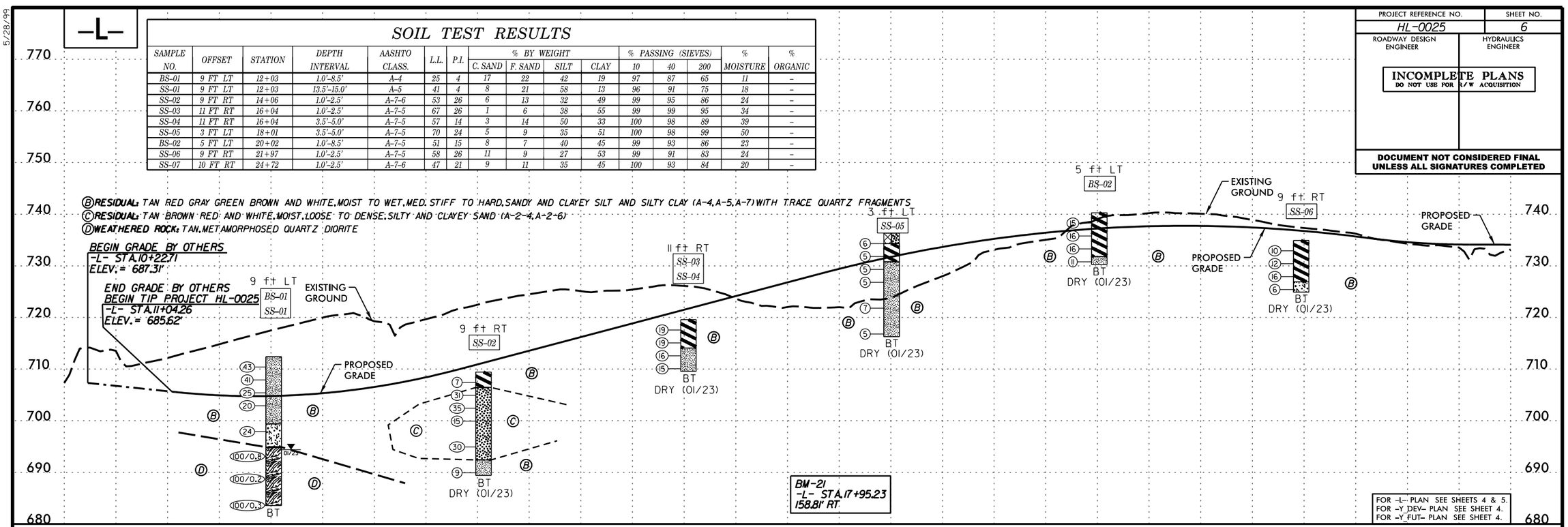
PROJECT REFERENCE NO.	SHEET NO.
HL-0025	6
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

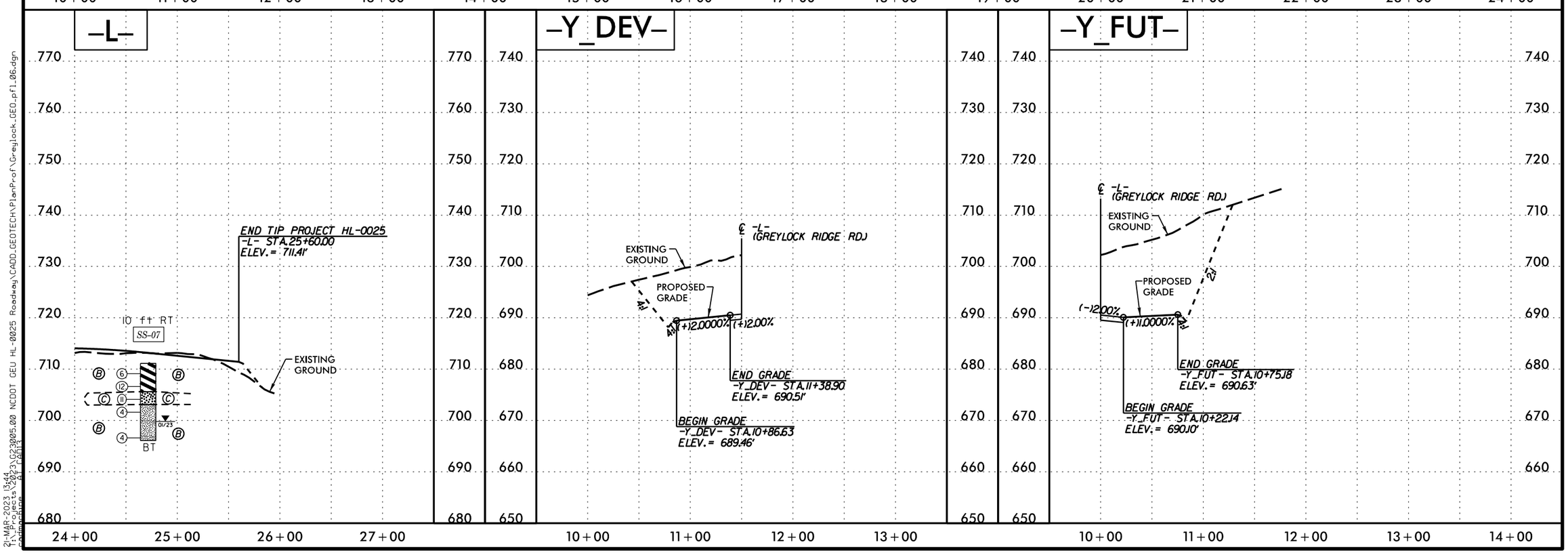
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
BS-01	9 FT LT	12+03	1.0'-8.5'	A-4	25	4	17	22	42	19	97	87	65	11	-
SS-01	9 FT LT	12+03	13.5'-15.0'	A-5	41	4	8	21	58	13	96	91	75	18	-
SS-02	9 FT RT	14+06	1.0'-2.5'	A-7-6	53	26	6	13	32	49	99	95	86	24	-
SS-03	11 FT RT	16+04	1.0'-2.5'	A-7-5	67	26	1	6	38	55	99	99	95	34	-
SS-04	11 FT RT	16+04	3.5'-5.0'	A-7-5	57	14	3	14	50	33	100	98	89	39	-
SS-05	3 FT LT	18+01	3.5'-5.0'	A-7-5	70	24	5	9	35	51	100	98	99	50	-
BS-02	5 FT LT	20+02	1.0'-8.5'	A-7-5	51	15	8	7	40	45	99	93	86	23	-
SS-06	9 FT RT	21+97	1.0'-2.5'	A-7-5	58	26	11	9	27	53	99	91	83	24	-
SS-07	10 FT RT	24+72	1.0'-2.5'	A-7-6	47	21	9	11	35	45	100	93	84	20	-





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PROJECT REFERENCE NO.	SHEET NO.
HL-0025	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

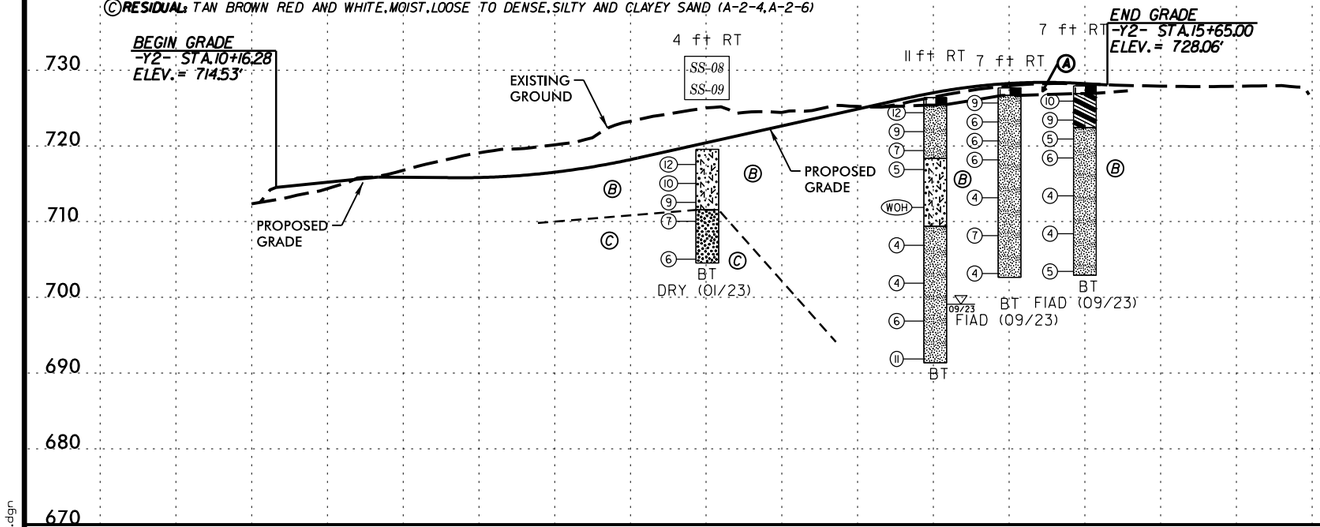
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-Y2-

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-08	4 FT RT	13+01	1.0'-2.5'	A-5	52	8	22	15	26	37	99	83	67	28	–
SS-09	4 FT RT	13+01	3.5'-5.0'	A-5	48	4	19	14	36	31	100	87	71	26	–

Ⓐ **ROADWAY EMBANKMENT:** PAVEMENT
Ⓑ **RESIDUAL:** TAN RED GRAY GREEN BROWN AND WHITE, MOIST TO SAT., V. SOFT TO HARD, SANDY AND CLAYEY SILT AND SANDY CLAY (A-4, A-5, A-6) W/ TRACE QUARTZ FRAGMENTS
Ⓒ **RESIDUAL:** TAN BROWN RED AND WHITE, MOIST, LOOSE TO DENSE, SILTY AND CLAYEY SAND (A-2-4, A-2-6)



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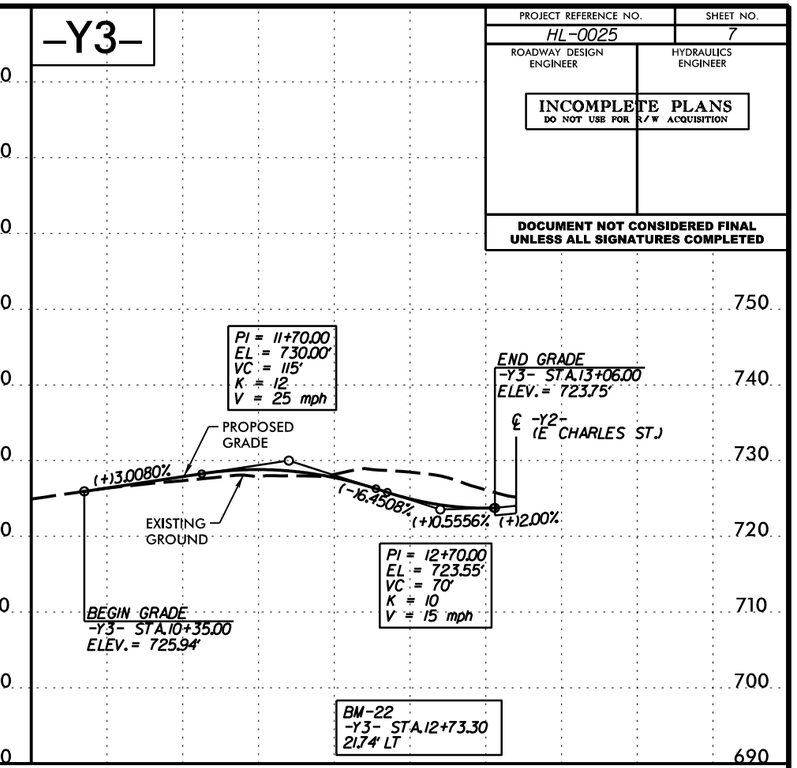

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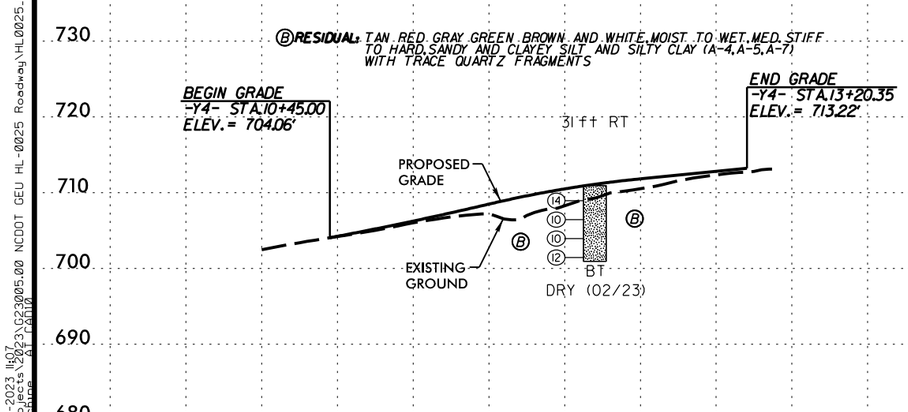
FOR -Y3- PLAN SEE SHEET 5.
FOR -Y4- PLAN SEE SHEET 5.

-Y4-



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CONTRACTOR AT CAUTION

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A
LABORATORY RESULTS

LABORATORY TEST RESULTS

Greylock Ridge Road Extension
Mecklenburg County, NC
NCDOT Project: HL-0025
Falcon Engineering Project No: G23005.00

SAMPLE		DEPTH	AASHTO	ATTERBERG LIMITS		PERCENT BY WEIGHT				PERCENT PASSING SIEVE			MOISTURE	BULK DENSITY	ORGANICS
NO.	LOCATION	INTERVAL	CLASS.	LL	PI	C.SAND	F.SAND	SILT	CLAY	#10	#40	#200	(%)	(pcf)	(%)
SS-01	L_1200	13.5-15.0	A-5(5)	41	4	8	21	58	13	96	91	75	18	N/A	N/A
SS-02	L_1400	1.0-2.5	A-7-6(25)	53	26	6	13	32	49	99	95	86	24	N/A	N/A
SS-03	L_1600	1.0-2.5	A-7-5(33)	67	26	1	6	38	55	99	99	95	34	N/A	N/A
SS-04	L_1600	3.5-5.0	A-7-5(18)	57	14	3	14	50	33	100	98	89	39	N/A	N/A
SS-05	L_1800	3.5-5.0	A-7-5(29)	70	24	5	9	35	51	100	98	89	50	N/A	N/A
SS-06	L_2200	1.0-2.5	A-7-5(25)	58	26	11	9	27	53	99	91	83	24	N/A	N/A
SS-07	L_2450	1.0-2.5	A-7-6(19)	47	21	9	11	35	45	100	93	84	20	N/A	N/A
SS-08	Y2_1300	1.0-2.5	A-5(7)	52	8	22	15	26	37	99	83	67	28	N/A	N/A
SS-09	Y2_1300	3.5-5.0	A-5(5)	48	4	19	14	36	31	100	87	71	26	N/A	N/A

Reviewed By

Certification: 105-0803

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

PHONE: 919.871.0800
www.falconengineers.com

CALIFORNIA BEARING RATIO TEST RESULTS

ASTM D1883 / AASHTO T193

Project No.: G23005.00	**Tested By:** J. Grabner	**Test Date:** 2023-16-02
Project Name: HL-0025 | Greylock Ridge Road Extension		
Boring ID: L_1200	**Sample ID:** BS-01	**Sample Depth:** 1.0-8.5 ft

MOLDED SPECIMEN TEST DATA

Wt. of Mold + Wet Soil:	20950 g	Moisture Content	Before Molding	After Molding	Max. Dry Unit Weight:	119.7 pcf
Wt. of Mold:	16495 g	Tare Wt.:	6.40 g	6.40 g	Optimum Moisture Content:	11.6%
Wt. of Wet Soil:	4455 g	Wt. Tare + Wet Soil:	275.10 g	414.60 g	Percent Compaction:	98.1%
Mold Volume:	0.0750 cf	Wt. Tare + Dry Soil:	247.50 g	372.20 g	Compaction Method:	698C
Wet Unit Weight:	130.9 pcf	Moisture Content:	11.5%	11.6%	Conversion Factors	
Dry Unit Weight:	117.4 pcf	Average Moisture Content:		11.5%	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	68	22.7
0.050	189	63.0
0.075	326	108.7
0.100	428	142.7
0.125	516	172.1
0.150	585	195.1
0.175	642	214.1
0.200	702	234.1
0.225	760	253.4
0.250	812	270.8
0.275	871	290.5
0.300	915	305.1
0.400	1116	372.2
0.500	1311	437.2

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:	0.086 inch
Percent Swell:	0.79%

Readings After Soak	
Wt. Mold + Soaked Soil:	21072.00 g
Wt. Tare:	206.70 g
Wt. Wet Soil + Tare:	450.40 g
Wt. Tare + Dry Soil:	417.30 g
Moisture Content:	15.7%
Wet Unit Weight:	134.5 pcf
Dry Unit Weight:	116.2 pcf

BEARING RATIO

CBR at 0.1 inch:	**16.0**
CBR at 0.2 inch:	**16.4**

Additional Specimen Data

Liquid Limit:	25	Percent Passing #4:	100%
Plastic Limit:	21	Percent Passing #10:	97%
Plasticity Index:	4	Percent Passing #40:	87%
		Percent Passing #200:	65.0%

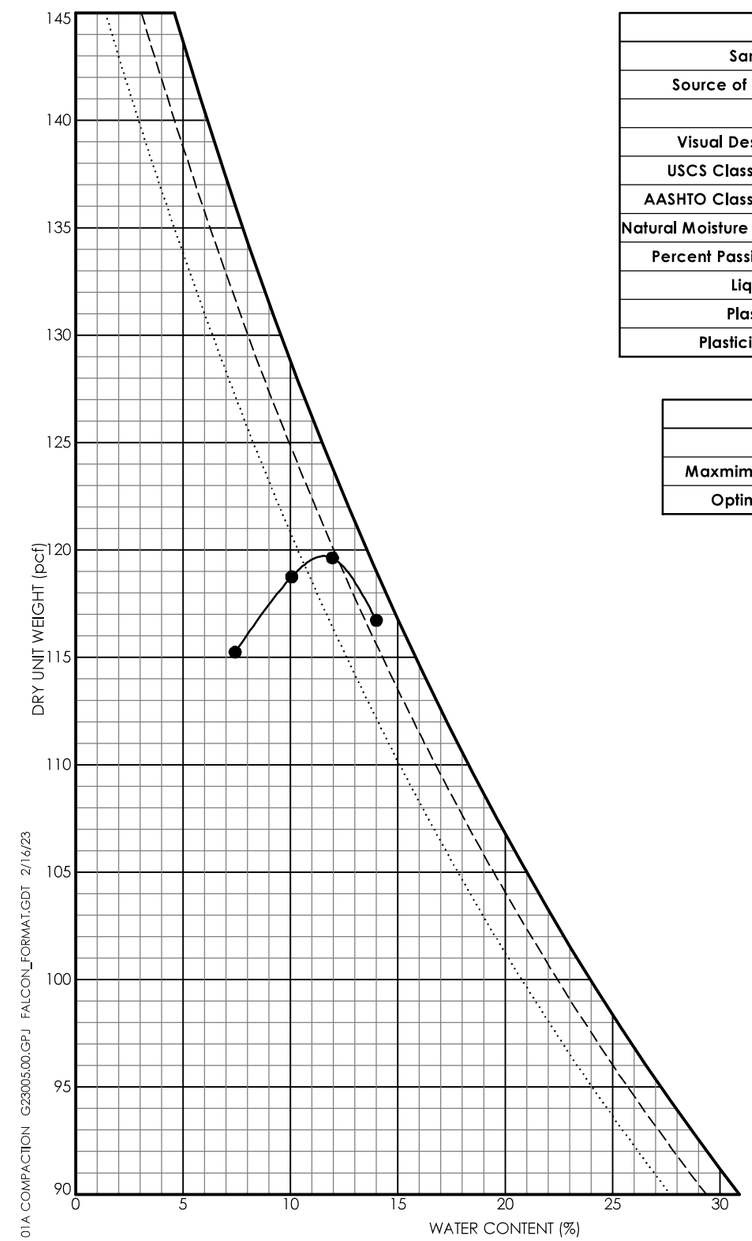
Color:	Yellowish Brown
Visual Description:	
USCS Classification:	SANDY SILTY CLAY (CL-ML)
AASHTO Classification:	A-4 (6)

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

PHONE: 919.871.0800
www.falconengineers.com

LABORATORY COMPACTION TEST RESULTS

Project No.: G23005.00
Project Name: HL-0025 | Greylock Ridge Road Extension
Project Location: Mecklenburg County, NC



SPECIMEN DATA	
Sample No:	BS-01
Source of Material:	L_1200
Color:	Yellowish Brown
Visual Description:	
USCS Classification:	SANDY SILTY CLAY(CL-ML)
AASHTO Classification:	A-4
Natural Moisture Content:	10.8 %
Percent Passing #200:	65.0 %
Liquid Limit:	25
Plastic Limit:	21
Plasticity Index:	4

TEST RESULTS	
Test Method:	AASHTO T-99
Maxmimum Dry Unit Weight:	119.7 pcf
Optimum Water Content:	11.6 %

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CALIFORNIA BEARING RATIO TEST RESULTS

ASTM D1883 / AASHTO T193

Project No.: G23005.00	**Tested By:** J. Grabner	**Test Date:** 2023-16-02
Project Name: HL-0025 | Greylock Ridge Road Extension		
Boring ID: L_2000	**Sample ID:** BS-02	**Sample Depth:** 1.0-8.5 ft

MOLDED SPECIMEN TEST DATA

Wt. of Mold + Wet Soil:	20575 g	Moisture Content	Before Molding	After Molding	Max. Dry Unit Weight:	102.4 pcf
Wt. of Mold:	16465 g	Tare Wt.:	6.30 g	6.40 g	Optimum Moisture Content:	20.5%
Wt. of Wet Soil:	4110 g	Wt. Tare + Wet Soil:	401.50 g	306.30 g	Percent Compaction:	98.0%
Mold Volume:	0.0749 cf	Wt. Tare + Dry Soil:	334.30 g	255.20 g	Compaction Method:	698C
Wet Unit Weight:	121.0 pcf	Moisture Content:	20.5%	20.5%	Conversion Factors	
Dry Unit Weight:	100.4 pcf	Average Moisture Content:		20.5%	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	53	17.7
0.050	93	31.0
0.075	130	43.4
0.100	162	54.0
0.125	187	62.4
0.150	208	69.4
0.175	228	76.0
0.200	245	81.7
0.225	265	88.4
0.250	280	93.4
0.275	297	99.0
0.300	313	104.4
0.400	378	126.1
0.500	441	147.1

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:	0.144 inch
Percent Swell:	2.05%

Readings After Soak	
Wt. Mold + Soaked Soil:	20713.00 g
Wt. Tare:	184.90 g
Wt. Wet Soil + Tare:	419.70 g
Wt. Tare + Dry Soil:	367.90 g
Moisture Content:	28.3%
Wet Unit Weight:	125.0 pcf
Dry Unit Weight:	97.4 pcf

BEARING RATIO

CBR at 0.1 inch:	**5.4**
CBR at 0.2 inch:	**5.4**

Additional Specimen Data

Liquid Limit:	51	Percent Passing #4:	100%
Plastic Limit:	36	Percent Passing #10:	99%
Plasticity Index:	15	Percent Passing #40:	93%
		Percent Passing #200:	86.1%

Color:	Brownish Red
Visual Description:	
USCS Classification:	ELASTIC SILT (MH)
AASHTO Classification:	A-7-5 (12)

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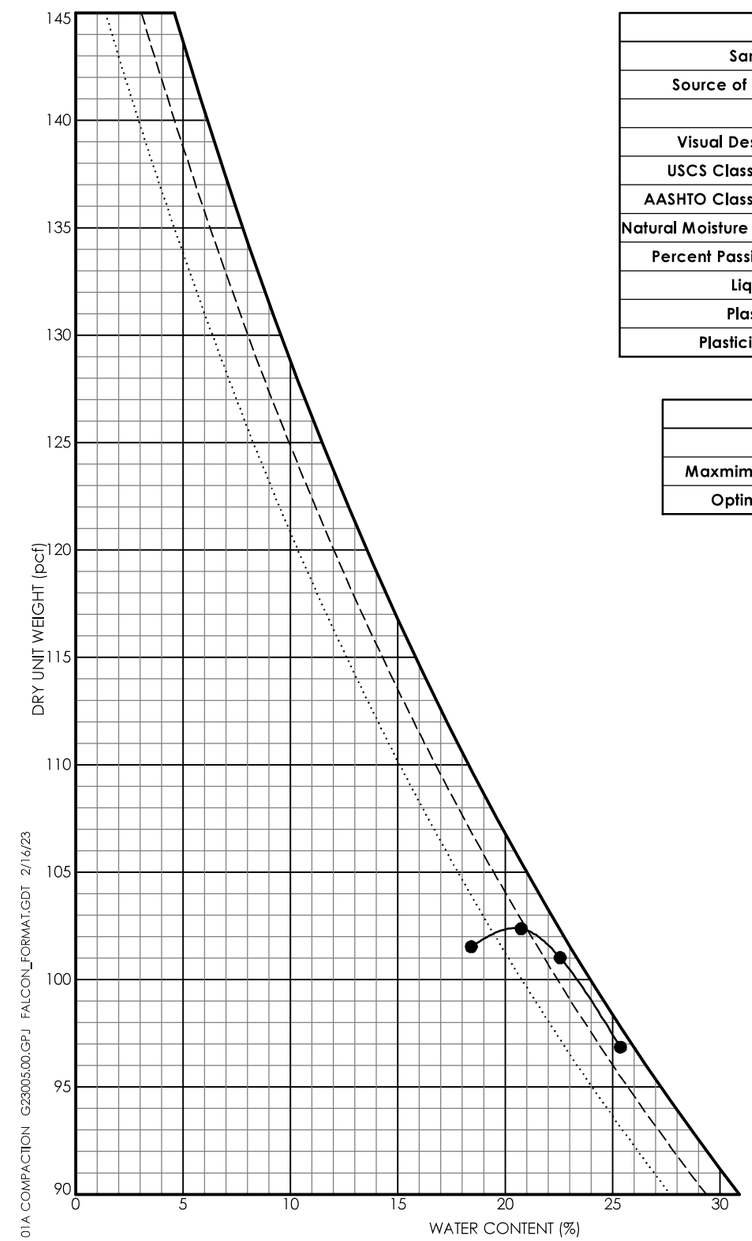
LABORATORY COMPACTION TEST RESULTS

Project No.: G23005.00
Project Name: HL-0025 | Greylock Ridge Road Extension
Project Location: Mecklenburg County, NC



Curves of 100% Saturation for Specific Gravity Equal to:

2.6
2.5
2.4

SPECIMEN DATA	
Sample No:	BS-02
Source of Material:	L_2000
Color:	Brownish Red
Visual Description:	
USCS Classification:	ELASTIC SILT(MH)
AASHTO Classification:	A-7-5
Natural Moisture Content:	23.3 %
Percent Passing #200:	86.1 %
Liquid Limit:	51
Plastic Limit:	36
Plasticity Index:	15

TEST RESULTS	
Test Method:	AASHTO T-99
Maxmimum Dry Unit Weight:	102.4 pcf
Optimum Water Content:	20.5 %