STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5710A	1	12

REFERENCE: U-5710A

PROJECT: 50115

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *NEW HANOVER*

PROJECT DESCRIPTION *NEW LOCATION NORTHWESTERN QUADRANT CONNECTION BETWEEN US 74 (EASTWOOD RD.) AND SR 1409 (MILITARY CUTOFF RD.)*

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 MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

NOTES:
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

C. ALEXANDER

L. PUGH

J. HOLLAND

INVESTIGATED BY *C. ALEXANDER*

DRAWN BY *S. V. HUDSON, LG*

CHECKED BY *J. LEE STONE, LG*

SUBMITTED BY *S. V. HUDSON, LG*

DATE *OCTOBER 2018*

CATLIN
Engineers and Scientists
Wilmington, North Carolina

NORTH CAROLINA LICENSED SEAL 1583 GEOLOGIST STEVEN V. HUDSON

DocuSigned by:
62EFD88181E4457...
SIGNATURE

11/6/2018
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5710A	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 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
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [ ] AUTOMATIC [ ] MANUAL

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

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

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: ELEVATIONS REFERENCED TO FILE "U5710 MERGED TIN.tin" DATED 10/16/18 HORIZONTAL LOCATIONS OBTAINED WITH GPS
ELEVATION: FEET

NOTES:

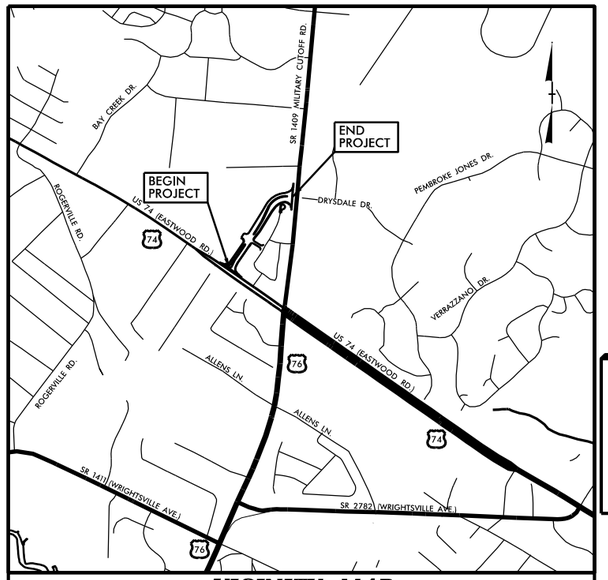
U.C.P. = UNDIVIDED COASTAL PLAIN

DATE: 8-15-14

09/08/09

TIP PROJECT: U-5710A

See Sheet 1B For Conventional Symbols



VICINITY MAP
(NOT TO SCALE)

65% PLANS

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

NEW HANOVER COUNTY

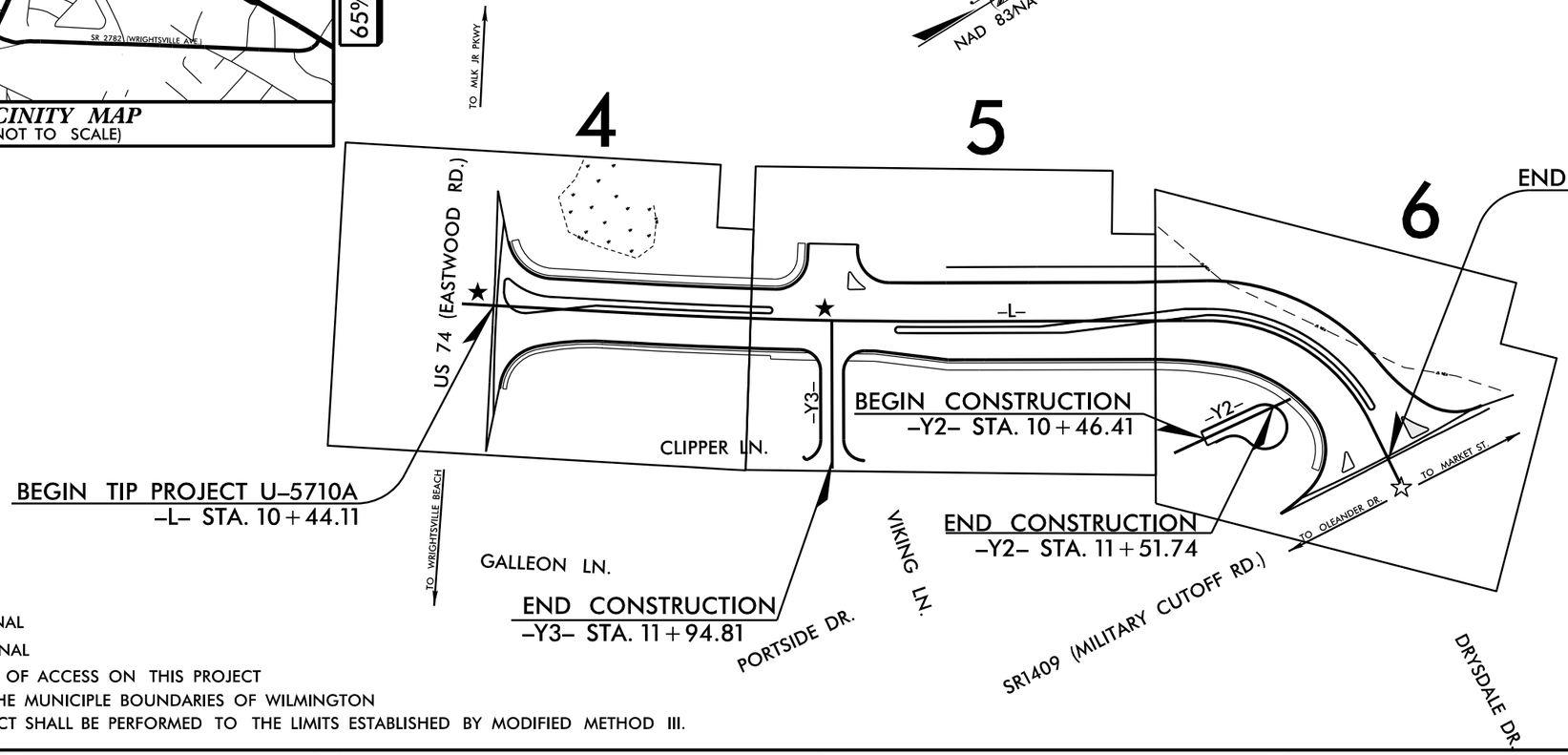
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5710A	3	12

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
50115.1.2	N/A	P.E.

LOCATION: *NEW LOCATION NORTHWESTERN QUADRANT CONNECTION BETWEEN US 74 (EASTWOOD RD.) AND SR 1409 (MILITARY CUTOFF RD.)*

TYPE OF WORK: *GRADING, PAVING, DRAINAGE AND SIGNALS*

NAD 83/NA 2011



☆ MODIFIED TRAFFIC SIGNAL
★ PROPOSED TRAFFIC SIGNAL
THERE IS PARTIAL CONTROL OF ACCESS ON THIS PROJECT
THIS PROJECT IS WITHIN THE MUNICIPLE BOUNDARIES OF WILMINGTON
CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY MODIFIED METHOD III.

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

CONTRACT:

GRAPHIC SCALES

20 10 0 20 40
PLANS

20 10 0 20 40
PROFILE (HORIZONTAL)

5 2.5 0 5 10
PROFILE (VERTICAL)

DESIGN DATA

ADT 2020 = 4,800
ADT 2040 = 24,000
V = 40 MPH
FUNC CLASS = URBAN COLLECTOR
STATEWIDE TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT U-5710A = 0.251 MILES

TOTAL LENGTH TIP PROJECT U-5710A = 0.251 MILES

Prepared by the Office of:
HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
NOVEMBER 10, 2018

LETTING DATE:
APRIL 21, 2020

PHILLIP E. ROGERS, PE
PROJECT ENGINEER

CASEY E. HARRIS, PE
PROJECT DESIGN ENGINEER

MICHAEL BASS
NCDOT CONTACT

HYDRAULICS ENGINEER

P.E.
SIGNATURE:

ROADWAY DESIGN ENGINEER

P.E.
SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

PLOT DRIVER: $PLTDRVS$ PENTABLE: $PENTBL$
USER: $USER$ DATE: $DATE$ TIME: $TIME$
FILE: $PWVARVAULTPATHDESC$

October 2018

WBS Number: 50115.1.2
TIP Number: U-5710A
F.A .Project NA
County: New Hanover
Description: New Location Northwestern Quadrant Connection Between US 74 (Eastwood Road) and SR 1409 (Military Cutoff Road)
CATLIN Number: 218100

SUBJECT: Geotechnical Inventory Report

Project Description

This project begins on US 74 (Eastwood Road) at a point 920± feet northwest of the existing intersection of Eastwood Road and SR 1409 (Military Cutoff Road) and extends northeast for approximately 0.25 miles to Military Cutoff Road. This geotechnical investigation was confined to the areas of proposed construction.

Fieldwork was conducted in October of 2018. Hand auger borings were completed at various locations along the project corridor with Dynamic Cone Penetration Testing (DCP) conducted at two locations. Representative soil samples were collected for visual classification in the field and for laboratory analysis.

The following alignments were investigated. Subsurface profiles are included in this report.

Line	Station(±)
-L-	10+44 to 23+68
-Y3-	10+00 to 11+94

Areas of Special Geotechnical Interest

1) The entire project exhibits seasonal high groundwater.

2) Cohesive soils that may have the potential to cause embankment/subgrade and or slope stability problems during construction were identified along -L- from approximate station 15+55 to 22+95.

3) A detention pond was identified approximately 40 feet left of -L- from 22+85± to 23+50±.

Physiography and Geology

This project corridor is located within the Coastal Plain physiographic province. Topography along the project is nearly flat to gently sloping. Ground elevations range from 20± to 25± feet above sea level.

Surficial soils in this area are generally classified as undivided coastal plain sediments.

Ground Water

Ground water data was collected in October 2018. Ground water was encountered within two (2) to five (5) feet of the ground surface throughout the project area.

Soils

Undivided coastal plain sediments are composed of 1± to 6 or more feet of very loose to loose sand and silty and clayey sand (A-3, A-2-4) interbedded with an approximately one (1) to two (2) feet thick layer of soft to medium stiff sandy clay (A-6) identified along -L- from approximately 15+55 to 22+95. Samples taken within these cohesive soils returned natural moisture percentage of 33%. Loose silty and clayey sand with little (3.3%) organic material was encountered along -L- from approximate station 14+60 to 15+27 and -Y3- from station 10+00 to 10+50.

PROJECT REFERENCE NO.	SHEET NO.
U-5710A	4
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

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

BEGIN CONSTRUCTION
BEGIN TIP PROJECT U-5710A
-L- STA. 10+44.11
(SEE TIP PROJECT U-5710)

-L- PC Sta. 12+38.92

NAD 83/NA 2011

-L- POT Sta. 10+00.00

MATCHLINE -L- STA. 14+00, SEE SHEET 5

N 34° 53' 26.1" E

280' STORAGE

+91.78

PROPOSED SIGNAL
SEE SHEET 7 FOR -L- PROFILE

REVISIONS

PLOT DRIVER: $PLTDRVS$ PENTABLE: $PENTBLS$
USER: $USER$ DATE: $DATE$ TIME: $TIME$
FILE: $PWVARVAULTPATHDESC$

PROJECT REFERENCE NO.	SHEET NO.
U-5710A	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

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St. Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NAD 83/NA 2011

-L- PT Sta. 16+70.71

-L- POC Sta. 15+12.47 =
-Y3- POT Sta. 10+00.00

-L- +00.00
110.00' LT

-L- +60.00
110.00' LT

-L- +00.00
118.00' LT

-L- +00.00
118.00' LT

MATCHLINE -L- STA. 14+00, SEE SHEET 4

MATCHLINE -L- STA. 19+60, SEE SHEET 6

CHORD

+32.05

+91.34

2'-6" C&G

R 3'

4'

12'

60'

75'

DCP

-L-

15+00

+30.00

VAR.

+69.35

+73.00

+51.43

N 31° 35' 31.0" E

1'-6" C&G

C/A FENCE

F

E

PDE

C

ISFD

2' CONC

20.5' CONC

15" C&G

80" BLK WALL (TYP.)

END 5' SIDEWALK
BEGIN PROP. CCT
STA. 14+29.09

END CONSTRUCTION
-Y3- STA. 11+94.81

S 58° 24' 11.4" E

-Y3-

-Y3- POT Sta. 12+04.82

CLIPPER LN 18' BST

ECM

★ PROPOSED SIGNAL
SEE SHEET 7 FOR -L- PROFILE
SEE SHEET 7 FOR -Y3- PROFILE

REVISIONS

PLOT DRIVER: $PLTDRVS$
USER: $USER$
FILE: $PWVARVAULTPATHDESC$

DATE: $DATE$

PENTABLE: $PENTBLS$
TIME: $TIME$

PROJECT REFERENCE NO.	SHEET NO.
U-5710A	6
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

HDR Engineering, Inc. of the Carolinas
555 Fayetteville St, Suite 900 Raleigh, N.C. 27601
N.C.B.E.L.S. License Number: F-0116

NAD 83/NA 2011

-L- +30.00
138.00' LT

-L- +90.00
138.00' LT

-L- +65.00
142.00' LT

-L- +20.00
142.00' LT

-L- PT Sta. 23+10.34

-L- +70.00
142.00' LT

-L- PC Sta. 20+31.43

-L- POT Sta. 24+06.05

-L- +31.00
EX. R/W

MATCHLINE -L- STA. 19+60, SEE SHEET 5

DCP

-L-

280' STORAGE

380' STORAGE

575' STORAGE

-Y2- POT Sta. 11+78.23

-Y2- POT Sta. 10+00.00

BEGIN CONSTRUCTION
-Y2- STA. 10+46.41

END CONSTRUCTION
END TIP PROJECT U-5710A
-L- STA. 23+68.78
(SEE TIP PROJECT U-5710)

☆ MODIFIED SIGNAL
SEE SHEET 7 FOR -L- PROFILE

N 31° 35' 31.0" E

N 64° 16' 42" E

S 84° 29' 06" E

CHORD

SPECIAL CONC. CURB

2'-6" C&G

1'-6" C&G

15' C&G

30" C&G

24" C&G

2'-1" (TYP.)

12'

14'

75'

VAR.

R 30'

R 4.5

20'

C/A FENCE

WOODS

ISFD

POND

RIP RAP

PLASTIC POST

85' BST

125' BST

EXISTING R/W

PLOT DRIVER: $PLTDRV$
USER: $USER$
FILE: $PWVARVAULTPATHDESC$

PENTABLE: $PENTBL$
DATE: $DATE$
TIME: $TIME$

REVISIONS

5/28/99

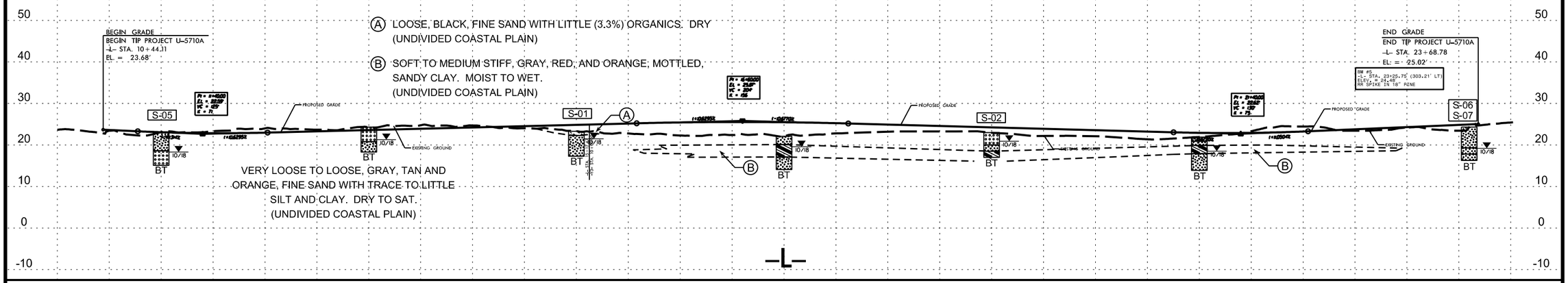
PROJECT REFERENCE NO.	SHEET NO.
U-5710A	7
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

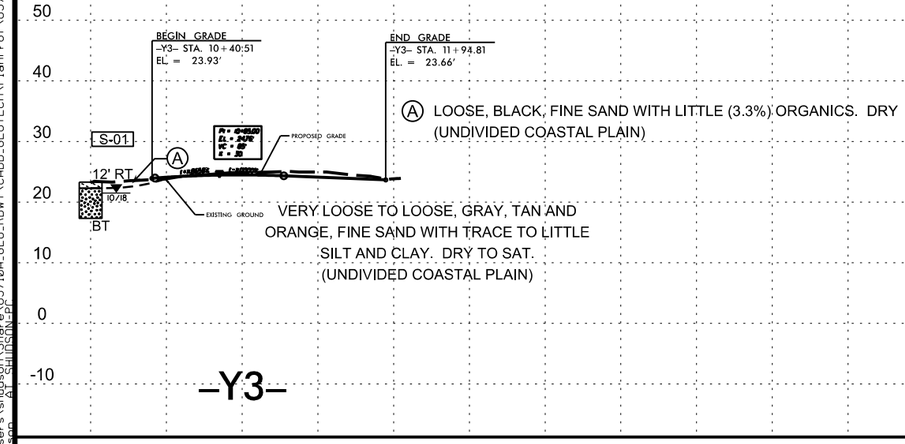
INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SOIL TEST RESULTS

SAMPLE NUMBER	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		
S-05	CL	11+00	0.0 - 3.0	A-2-4(0)	NP	NP	6.8	76.6	7.6	9.1	100	100	18	-	-
S-01	CL	15+00	0.0 - 1.0	A-2-4(0)	NP	NP	6.7	78.6	9.7	5.0	99.7	99	16	28	3.3
S-02	CL	19+00	4.5 - 5.5	A-6(5)	31	15	2.6	45.8	21.0	30.5	100	100	55	33	-
S-06	CL	23+60	0.0 - 4.0	A-2-4(0)	NP	NP	13.1	66.4	7.8	12.8	97.8	98	23	-	-
S-07	CL	23+60	5.0 - 6.0	A-2-4(0)	NP	NP	12.7	65.3	7.7	14.3	99.9	99	23	-	-





22-OCT-2018 15:41
C:\Users\shudson\Share\U5710A_GEO_RDWY\CADD_GEOTECH\PlanProf\U5710A_GEO_RDWY_PFL_REV.dgn
shudson
21 SHEETS(2)

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5710A	8

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

40 30 20 10 40 30 20 10 0

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

21+50

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

4:1

10/18

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

21+00

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

20+50

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

20+00

$-L-$

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

25-OCT-2018 08:07
C:\Users\shudson\Share\U5710A_GEO_RDWY\CADD_GEOTECH\xsc\U5710A_GEO_XSI_2000-2350.dgn
shudson AT SHUDSON-PC

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5710A	9

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

40 30 20 10 0 -10

4:1 22+99 23+20 10/18 23+03 4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

23+00

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

22+50

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

SOFT TO MEDIUM STIFF, GRAY, RED, AND ORANGE, MOTTLED, SANDY CLAY. MOIST TO WET. (UNDIVIDED COASTAL PLAIN)

4:1

VERY LOOSE TO LOOSE, GRAY, TAN AND ORANGE, FINE SAND WITH TRACE TO LITTLE SILT AND CLAY. DRY TO SAT. (UNDIVIDED COASTAL PLAIN)

22+00

-L-

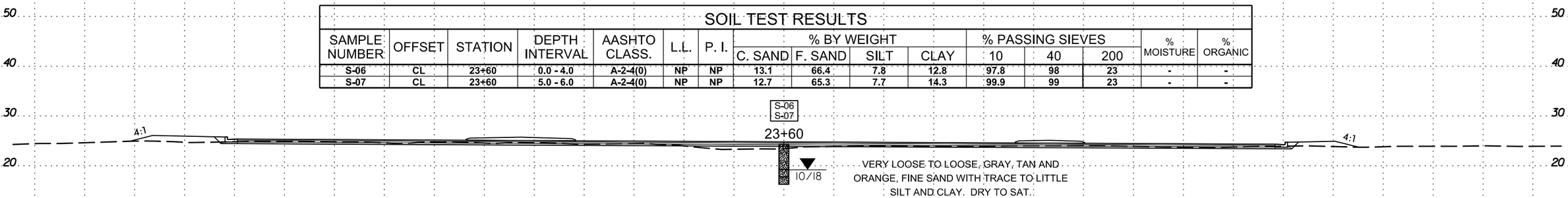
25-OCT-2018 08:08
C:\Users\shudson\Share\U5710A_GEO_RDWY\CADD_GEOTECH\xsc\U5710A_GEO_XSI_2000-2350.dgn
shudson
AT SHUDSON-PC

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	U-5710A	10

SOIL TEST RESULTS

SAMPLE NUMBER	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		
S-06	CL	23+60	0.0 - 4.0	A-2-4(0)	NP	NP	13.1	66.4	7.8	12.8	97.8	98	23	-	-
S-07	CL	23+60	5.0 - 6.0	A-2-4(0)	NP	NP	12.7	65.3	7.7	14.3	99.9	99	23	-	-



25-OCT-2018 08:18
C:\Users\shudson\Share\U5710A_GEO_RDWY\CADD_GEOTECH\xsc\U5710A_GEO_XSI_2000-2350.dgn
shudson AT SHUDSON-PC

PROJECT REFERENCE NO.	SHEET NO.
U–5710A	11

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX I

KESSLER DCP LOGS

REFERENCE: U–5710A

PROJECT: 50115

CATLIN
Engineers and Scientists
Wilmington, North Carolina

CATLIN Engineers and Scientists

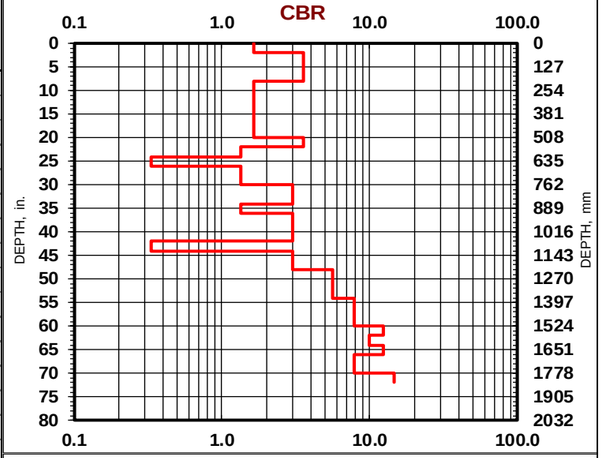
KESSLER DCP TEST DATA

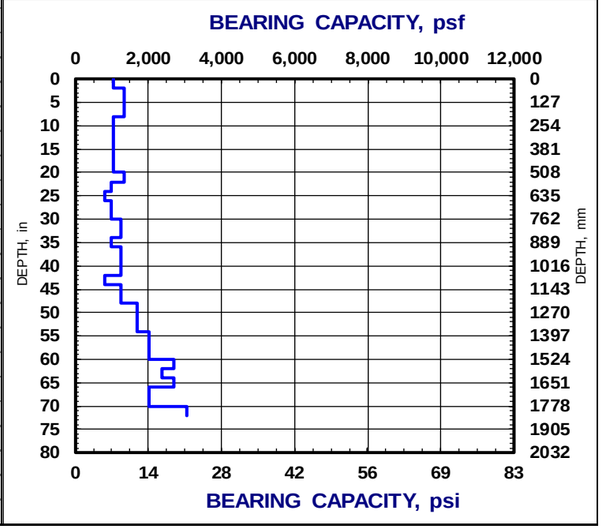
PROJECT NAME: SR 1409 (Military Cutoff Road) at Drysdale Drive to US-74 (Eastwood Road). TIP NO.: U-5710A
CATLIN NO.: 218100 Alignment: -L- WBS NO.: 50115.1.2
DATE: October 1, 2018 Station: 17+00 COUNTY: New Hanover
PERSONNEL: Lindsay Pugh Offset: CL BORE ID: **L_1700**
HAMMER TYPE: 10.1 lbs Notes:

24hr. Depth to Water:

INPUT DATA

Depth (in)	Soil Type (USCS)	No. of Blows	Cumulative Penetration (in)	Cumulative Penetration (mm)
0	---	0	0.0	0
2	SM	1	2.0	51
4	SM	2	4.0	102
6	SM	2	6.0	152
8	SM	2	8.0	203
10	SM	1	10.0	254
12	SM	1	12.0	305
14	SM	1	14.0	356
16	SM	0	16.0	406
18	SM	1	18.0	457
20	SM	1	20.0	508
22	SM	2	22.0	559
24	CL	2	24.0	610
26	CL	1	26.0	660
28	CL	2	28.0	711
30	CL	2	30.0	762
32	CL	3	32.0	813
34	CL	3	34.0	864
36	CL	2	36.0	914
38	CL	3	38.0	965
40	CL	3	40.0	1016
42	CL	3	42.0	1067
44	CL	1	44.0	1118
46	CL	3	46.0	1168
48	CL	3	48.0	1219
50	SM	3	50.0	1270
52	SM	3	52.0	1321
54	SM	3	54.0	1372
56	SM	4	56.0	1422
58	SM	4	58.0	1473
60	SM	4	60.0	1524
62	SM	6	62.0	1575
64	SM	5	64.0	1626
66	SM	6	66.0	1676
68	SM	7	68.0	1727
70	SM	8	70.0	1778
72	SM	7	72.0	1829





NOTES:

1. Field testing performed in general accordance with ASTM D 6951-03 *Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications*.
2. CBR = California Bearing Ratio
3. For all Clay soils (CL) below CBR 10%, use the equation CBR = 1 / (0.017019*PR)^2, where PR is the DCP penetration rate in mm per blow.
4. For all Fat Clay soils (CH) soils, use the equation CBR = 1 / (0.002871*PR).
5. For all soils except CL soils below CBR 10% and CH soils, use the equation CBR = 292 / PR$^{1.12}$.
6. Bearing capacity of shallow spread footings based on approximate interrelationships of CBR and Bearing values (*Design of Concrete Airport Pavement*, Portland Cement Association, page 8, 1955), where psf = lbs/ft^2, and psi = lbs/in^2.

CATLIN Engineers and Scientists

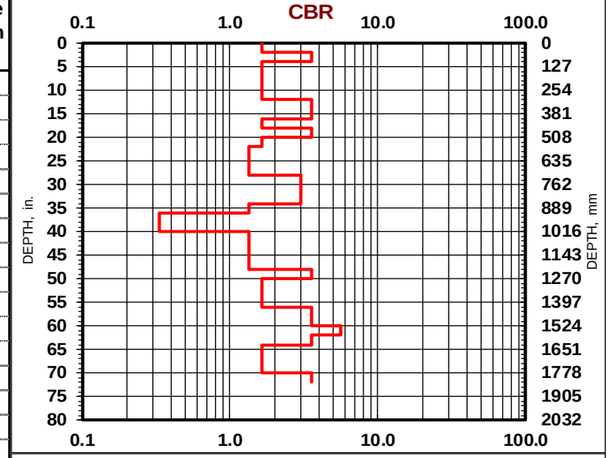
KESSLER DCP TEST DATA

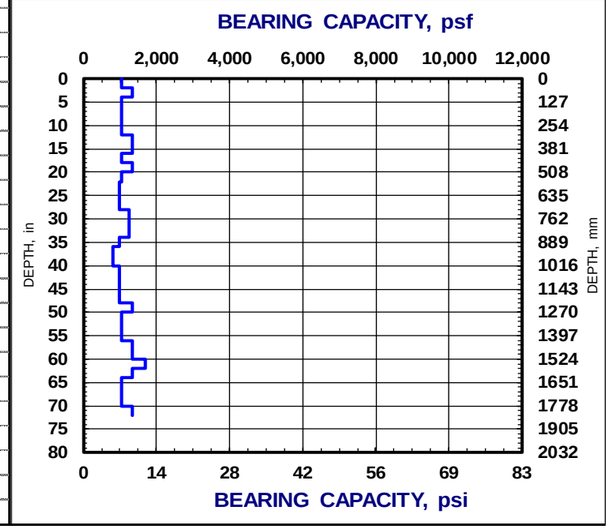
PROJECT NAME: SR 1409 (Military Cutoff Road) at Drysdale Drive to US-74 (Eastwood Road). TIP NO.: U-5710A
CATLIN NO.: 218100 Alignment: -L- WBS NO.: 50115.1.2
DATE: October 1, 2018 Station: 21+00 COUNTY: New Hanover
PERSONNEL: Lindsay Pugh Offset: CL BORE ID: **L_2100**
HAMMER TYPE: 10.1 lbs Notes:

24hr. Depth to Water:

INPUT DATA

Depth (in)	Soil Type (USCS)	No. of Blows	Cumulative Penetration (in)	Cumulative Penetration (mm)
0	---	0	0.0	0
2	SM	1	2.0	51
4	SM	2	4.0	102
6	SM	1	6.0	152
8	SM	1	8.0	203
10	SM	1	10.0	254
12	SM	1	12.0	305
14	SC	2	14.0	356
16	SC	2	16.0	406
18	SC	1	18.0	457
20	SC	2	20.0	508
22	SC	1	22.0	559
24	CL	2	24.0	610
26	CL	2	26.0	660
28	CL	2	28.0	711
30	CL	3	30.0	762
32	CL	3	32.0	813
34	CL	3	34.0	864
36	CL	2	36.0	914
38	CL	1	38.0	965
40	CL	1	40.0	1016
42	CL	2	42.0	1067
44	CL	2	44.0	1118
46	CL	2	46.0	1168
48	CL	2	48.0	1219
50	SC	2	50.0	1270
52	SC	1	52.0	1321
54	SC	1	54.0	1372
56	SC	1	56.0	1422
58	SC	2	58.0	1473
60	SC	2	60.0	1524
62	SC	3	62.0	1575
64	SC	2	64.0	1626
66	SC	1	66.0	1676
68	SC	3	68.0	1727
70	SC	2	70.0	1778
72	SC	2	72.0	1829





NOTES:

1. Field testing performed in general accordance with ASTM D 6951-03 *Standard Test Method for Use of the Dynamic Cone Penetrometer in Shallow Pavement Applications*.
2. CBR = California Bearing Ratio
3. For all Clay soils (CL) below CBR 10%, use the equation CBR = 1 / (0.017019*PR)^2, where PR is the DCP penetration rate in mm per blow.
4. For all Fat Clay soils (CH) soils, use the equation CBR = 1 / (0.002871*PR).
5. For all soils except CL soils below CBR 10% and CH soils, use the equation CBR = 292 / PR$^{1.12}$.
6. Bearing capacity of shallow spread footings based on approximate interrelationships of CBR and Bearing values (*Design of Concrete Airport Pavement*, Portland Cement Association, page 8, 1955), where psf = lbs/ft^2, and psi = lbs/in^2.