STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5639	1	12

REFERENCE: B-5639

PROJECT: 45594

CONTENTS

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *DUPLIN*

PROJECT DESCRIPTION *BRIDGE NO. 36 ON US HIGHWAY 11 OVER MAXWELL CREEK AT -L- STATION 23+55*

BRIDGE NO. 36 DETOUR ON -LDET- OVER MAXWELL CREEK AT -L_DET- STATION 18+59.5

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.

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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

CATLIN PERSONNEL

INVESTIGATED BY *S. V. HUDSON, LG*

DRAWN BY *S. V. HUDSON, LG*

CHECKED BY *J. L. STONE, LG*

SUBMITTED BY *S. V. HUDSON, LG*

DATE *OCTOBER 2019*

CATLIN
Engineers and Scientists
Washington, NC

NORTH CAROLINA LICENSED SEAL 1583 GEOLOGIST STEVEN V HUDSON

DocuSigned by:
01DB23BB746D469...
SIGNATURE

1/15/2020
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
B-5639	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
- [X] CME-55
- [X] 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
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2 7/8" 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: ELEVATION & LOCATIONS OBTAINED WITH RTK GPS

ELEVATION: FEET

NOTES:

FIAD = FILLED IMMEDIATELY AFTER DRILLING

U.C.P. = UNDIVIDED COASTAL PLAIN

VE = VERTICAL EXAGERATION

DATE: 8-15-14

CATLIN
Engineers and Scientists
Wilmington, North Carolina
Raleigh, North Carolina
Washington, North Carolina

PROJECT REFERENCE NO.	SHEET NO.
B-5639	3

SITE PLAN

0 30 60
FEET

SKEW = 90°

BEGIN BRIDGE
–L– STA. 22 + 70.00 +/–

END BRIDGE
–L– STA. 24 + 40.00 +/–

22+00

25+00

MAXWELL CREEK

EB1 BENT LINE

B1 BENT LINE

B2 BENT LINE

EB2 BENT LINE

B2-A

EB2-A

B1-A

–L–

BRIDGE #36
(CONC)

EB1-B

B1-B

B2-B

–L_DET–

TO SR 1912 (BLIND BRIDGE RD)

TO SR 1918 (LANDFILL RD)

NC HWY 11

EB1 DET BENT LINE

EB2 DET BENT LINE

17+00

20+00

BEGIN DETOUR BRIDGE
–L_DET– STA. 17 + 74.51 +/–

END DETOUR BRIDGE
–L_DET– STA. 19 + 44.51 +/–

WLB

WLE

JS

JS MHT

F

E

0 20 40
HORIZONTAL SCALE IN FEET
VE = 1.0

PROFILE THROUGH BORINGS PROJECTED ALONG -L-

CATLIN Engineers and Scientists
219077 220 Old Dairy Road Wilmington, NC 28405
Corporate Licensure No. for Engineering Services C-0585

PROJECT REFERENCE NO.	SHEET
B-5639	4

EB1-B
22+73
12' RT

B1-A
23+22
8' LT

B2-B
23+86
8' RT

EB2-A
24+40
16' LT

EXISTING LAND SURFACE

APPROXIMATE WATER SURFACE ELEVATION ON (08-28-19)

FIAD

BT

MEDIUM DENSE TO DENSE, LIGHT TO DARK GRAY, SAND AND SILTY AND CLAYEY SOFT TO VERY STIFF, DARK GRAY, CLAY WITH SHELL FRAGMENTS AND MICA. WET.

STIFF, GRAY, SANDY, CLAY AND SILT WITH SHELL FRAGS. WET.

MEDIUM DENSE TO VERY DENSE, GRAY TO BLUISH GRAY, SILTY AND CLAYEY SAND AND SAND, WITH SHELL FRAGMENTS

STIFF TO HARD, LIGHT TO DARK GRAY, CLAY, SANDY CLAY, AND SANDY SILT WITH HIGH SHELL FRAG. CONTENT. MOIST TO WET.

MED. DENSE TO VERY DENSE, GRAY TO BLUISH GRAY, SAND AND SILTY SAND. MOD. TO HIGH SHELL FRAG. CONTENT. SAT.

VERY SOFT, GRAY, CLAY WITH WOOD FRAGS. WET TO SAT. (ALLUVIAL)

SAND. SAT. (U.C.P.) (PEEDEE FORMATION)

TRACE WOOD FRAGMENTS. SAT.

Ⓐ MEDIUM STIFF, BROWN, GRAY, AND ORANGE, CLAY AND SANDY CLAY. MOIST. (ROADWAY EMBANKMENT)

Ⓑ VERY LOOSE TO LOOSE, ORANGE, TAN, BROWN, AND GRAY, SAND AND SILTY SAND. MOIST TO SAT. (ROADWAY EMBANKMENT)

Ⓒ VERY LOOSE TO LOOSE, BROWN, AND GRAY, SAND AND SILTY SAND WITH WELL ROUNDED GRAVEL. SAT. (ALLUVIAL)

Ⓓ HARD TO VERY HARD, FRIABLE TO INDURATED, GRAY, SANDY LIMESTONE.

NOTE: GROUNDLINE PROFILE ALONG -L- TAKEN FROM b5639_ls_tin.tin DATED 08/28/2019

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

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

22+50 23+00 23+50 24+00 24+50 25+00

0 20 40
HORIZONTAL SCALE IN FEET
VE = 1.0

PROFILE THROUGH BORINGS PROJECTED ALONG -L_DET-

CATLIN Engineers and Scientists
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220 Old Dairy Road
Wilmington, NC 28405
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PROJECT REFERENCE NO.	SHEET
B-5639	5

EB1-B
17+78
28' LT

B1-B
18+27
31' LT

B2-B
18+91
32' LT

EB2-A
19+44
57' LT

EXISTING LAND SURFACE

APPROXIMATE WATER SURFACE ELEVATION ON (08-28-19)

FIAD

BT

MEDIUM DENSE TO DENSE, LIGHT TO DARK GRAY, SAND AND SILTY AND CLAYEY SOFT TO VERY STIFF, DARK GRAY, CLAY AND SILT WITH SHELL FRAGMENTS WET.

MEDIUM DENSE TO VERY DENSE, STIFF, GRAY, SANDY CLAY AND SILT GRAY TO BLUISH GRAY, SILTY AND CLAYEY SAND

DENSE, GRAY, CLAYEY SAND WITH SHELL FRAGS. SAT.

STIFF TO HARD, LIGHT TO DARK GRAY, CLAY, SANDY CLAY, AND SANDY SILT WITH

MED. DENSE TO VERY DENSE, GRAY TO BLUISH GRAY, SAND AND SILTY SAND.

VERY SOFT, GRAY, CLAY WITH WOOD FRAGS. WET TO SAT. (ALLUVIAL)

SAND. SAT. (U.C.P.)

AND MICA. (PEEDEE FORMATION)

WITH SHELL FRAGS. WET.

AND SAND, WITH SHELL FRAGMENTS

TRACE WOOD FRAGMENTS. SAT.

HIGH SHELL FRAGMENT CONTENT. MOIST TO WET.

MOD. TO HIGH SHELL FRAG. CONTENT. SAT.

Ⓐ MEDIUM STIFF, BROWN, GRAY, AND ORANGE, CLAY AND SANDY CLAY. MOIST. (ROADWAY EMBANKMENT)

Ⓑ VERY LOOSE TO LOOSE, ORANGE, TAN, BROWN, AND GRAY, SAND AND SILTY SAND. MOIST TO SAT. (ROADWAY EMBANKMENT)

Ⓒ VERY LOOSE TO LOOSE, BROWN, AND GRAY, SAND AND SILTY SAND WITH WELL ROUNDED GRAVEL. SAT. (ALLUVIAL)

Ⓓ SOFT TO HARD, FRIABLE TO INDURATED, GRAY, SANDY LIMESTONE, CALCARENITE, OR DRILLER NOTED "HARD" LAYER

NOTE: GROUNDLINE PROFILE ALONG -L_DET- TAKEN FROM b5639_ls_tin.tin DATED 08/28/2019

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO PROFILE.

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

17+50 18+00 18+50 19+00 19+50 20+00

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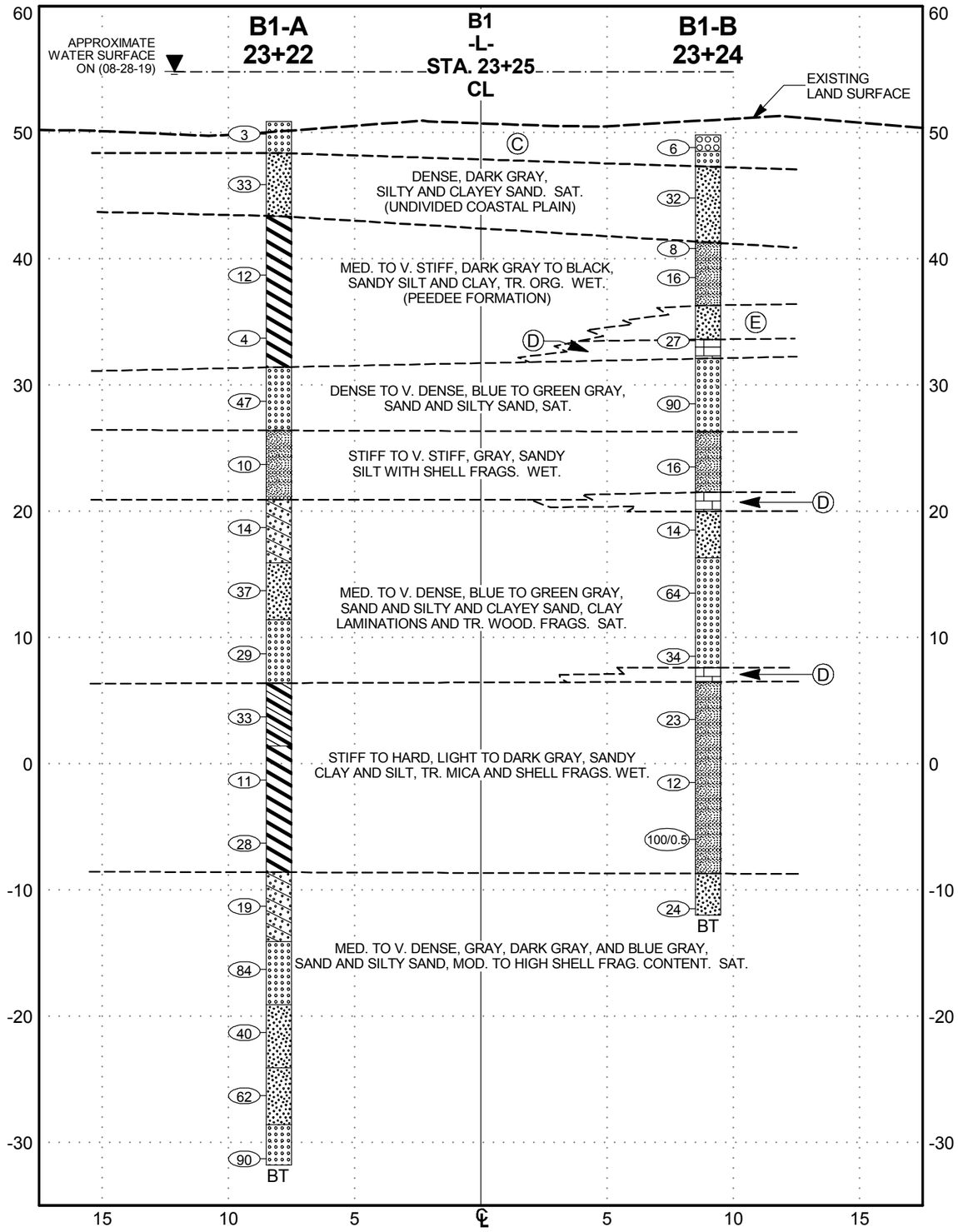
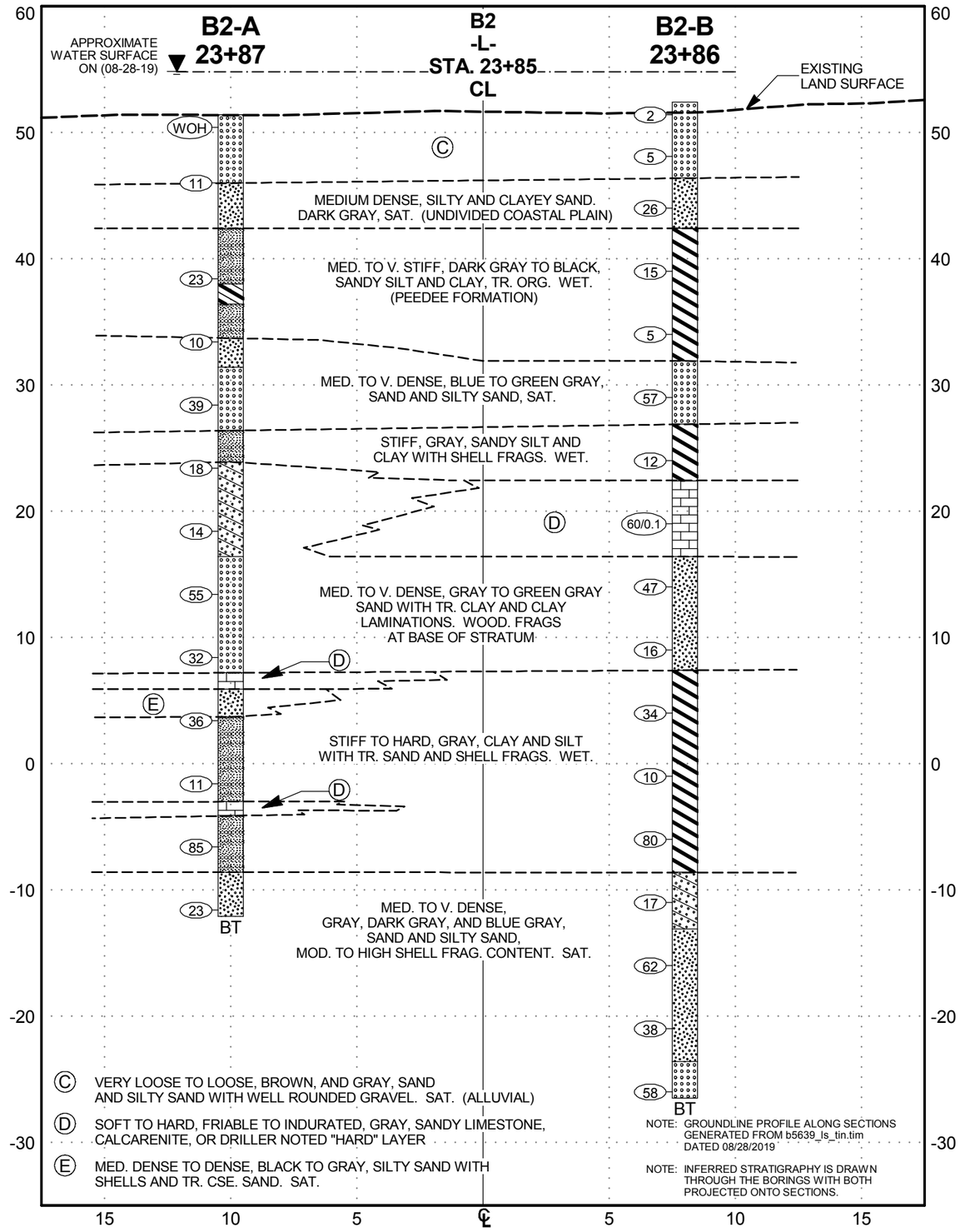
0 5 10
HORIZONTAL SCALE IN FEET
VE = 0.5

CROSS SECTION
BENT 1
SKEW = 90°



0 5 10
HORIZONTAL SCALE IN FEET
VE = 0.5

CROSS SECTION
BENT 2
SKEW = 90°



GEOTECHNICAL BORING REPORT
BORE LOG

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL		
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**	
BORING NO.: EB1-B	**STATION:** 22+73	**OFFSET:** 12 ft RT	**ALIGNMENT:** -L-	**0 HR.**	10.1
COLLAR ELEV.: 67.7 ft	**TOTAL DEPTH:** 64.9 ft	**NORTHING:** 408,391	**EASTING:** 2,309,945	**24 HR.**	FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary		**HAMMER TYPE:** AUTOMATIC	
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/23/19	**COMP. DATE:** 08/23/19	**SURFACE WATER DEPTH:** N/A		

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
70											
	67.7	0.0								67.7 GROUND SURFACE	0.0
65			2	3	2	5		D		**ROADWAY EMBANKMENT** BROWN TO ORANGE, CLAY	
	63.7	4.0								65.2	2.5
60			2	2	2	4		D		ORANGE, TAN, AND BROWN, F. SAND	
	59.3	8.4									
55			1	1	1	2		M			
	54.3	13.4								56.2	11.5
50			WOH	WOH	WOH	0		Sat.		**ALLUVIAL** BROWN, SILTY, F. SAND	
	49.3	18.4								51.7	16.0
45			3	9	8	17		Sat.		**UNDIVIDED COASTAL PLAIN** LIGHT GRAY, F. SAND	
	44.3	23.4								46.2	21.5
40			5	5	4	9		W		**COASTAL PLAIN** DARK GRAY, SANDY CLAY AND CLAY, MICA AND WOOD FRAGS. AT BASE OF STRATUM (PEEDEE FORMATION)	
	39.3	28.4									
35			5	5	4	9		W			
	34.3	33.4									
30			2	4	6	10		Sat.			
	29.3	38.4								30.7	37.0
25			24	33	45	78		Sat.		GRAY AND OLIVE GREEN, F. AND CSE. SAND	
	24.3	43.4								26.2	41.5
20			4	5	7	12		Sat.		GRAY, CLAYEY, F. SAND WITH HIGH SHELL FRAG. CONTENT	
	19.3	48.4								21.2	46.5
15			5	9	15	24		Sat.		GRAY, F. AND CSE. SAND WITH HIGH SHELL FRAG. CONTENT AND TR. CLAY	
	14.3	53.4								16.2	51.5
10			11	16	29	45		Sat.		GRAY, CLAYEY, F. AND CSE. SAND WITH SHELL FRAGS.	
	9.3	58.4								10.7	57.0
5			7	93/0.4		100/0.9		Sat.		GRAY, SANDY LIMESTONE	
	4.3	63.4								7.7	60.0
			9	17	24	41		Sat.		GRAY, CLAYEY, F. AND CSE. SAND WITH SHELL FRAGS.	
										2.8	64.9
										BORING TERMINATED AT ELEVATION 2.8 ft IN DENSE CLAYEY SAND (PEEDEE FORMATION)	

NCDOT BORE DOUBLE B5639_GEO_BRDG_MAXWELL_CATLIN.GPJ NCDOT_CATLIN.GDT 10/24/19

CATLIN Engineers and Scientists
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Corporate Licensure No. for Engineering Services C-0585

PROJECT REFERENCE NO.	SHEET
B-5639	7

GEOTECHNICAL BORING REPORT
BORE LOG

CATLIN Engineers and Scientists
220 Old Dairy Road
Wilmington, NC 28405
Corporate Licensure No. for Engineering Services C-0585
219077

PROJECT REFERENCE NO.	SHEET
B-5639	8

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL	
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**
BORING NO.: B1-A	**STATION:** 23+22	**OFFSET:** 8 ft LT	**ALIGNMENT:** -L-	**0 HR.** -4.0
COLLAR ELEV.: 50.9 ft	**TOTAL DEPTH:** 82.7 ft	**NORTHING:** 408,435	**EASTING:** 2,309,914	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC	
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/28/19	**COMP. DATE:** 08/28/19	**SURFACE WATER DEPTH:** 5.0ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. #	RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
55											WATER SURFACE (08/28/19)
	50.9	0.0	1	1	2	3					50.9 GROUND SURFACE 0.0
50											**ALLUVIAL**
	46.9	4.0	3	11	22	33			W		GRAY, F. SAND WITH WELL ROUNDED GRAVEL
45											48.4 2.5
											UNDIVIDED COASTAL PLAIN
											DARK GRAY, SILTY AND CLAYEY, F. SAND
40	39.7	11.2	3	6	6	12			W		43.4 7.5
											COASTAL PLAIN
											DARK GRAY, CLAY WITH TR. MICA AND HIGH SHELL FRAG. CONTENT AT BASE OF STRATUM (PEEDEE FORMATION)
35	34.7	16.2	2	2	2	4			W		
30	29.7	21.2	13	22	25	47			Sat.		31.4 19.5
											BLUISH-GRAY, F. SAND
25	24.7	26.2	3	4	6	10			Sat.		26.4 24.5
											GRAY, SANDY SILT WITH HIGH SHELL FRAG. CONTENT
20	19.7	31.2	4	6	8	14			W		20.9 30.0
											GRAY, CLAYEY AND SILTY, F. SAND WITH SHELL FRAGS.
15	14.7	36.2	8	14	23	37			W		15.9 35.0
											BLUISH GRAY, SILTY, F. SAND WITH SHELL FRAGS.
10	9.7	41.2	9	14	15	29			Sat.		11.4 39.5
											GRAY, F. AND CSE. SAND WITH HIGH SHELL FRAG. CONTENT
5	4.7	46.2	15	13	20	33			Sat.		6.4 44.5
											LIGHT GRAY, SANDY CLAY WITH HIGH SHELL FRAG. CONTENT AND TR. WEATHERED LIMESTONE AT BASE OF STRATUM
0	-0.3	51.2	4	5	6	11			W		1.4 49.5
											DARK GRAY, SANDY CLAY WITH SOME SHELL FRAG. AND TR. MICA AT BASE OF STRATUM
-5	-5.3	56.2	11	15	13	28			Sat.		
-10	-10.3	61.2	5	7	12	19			M		-8.6 59.5
											DARK GRAY, CLAYEY SAND WITH HIGH SHELL FRAG. CONTENT
-15	-15.3	66.2	17	33	51	84			Sat.		-14.1 65.0
											GRAY, F. SAND WITH TR. SHELL FRAG.
-20	-20.3	71.2	10	18	22	40			Sat.		-19.1 70.0
											GRAY, SILTY SAND WITH SOME SHELL FRAG.
-25											-24.1 75.0

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL	
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**
BORING NO.: B1-A	**STATION:** 23+22	**OFFSET:** 8 ft LT	**ALIGNMENT:** -L-	**0 HR.** -4.0
COLLAR ELEV.: 50.9 ft	**TOTAL DEPTH:** 82.7 ft	**NORTHING:** 408,435	**EASTING:** 2,309,914	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC	
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/28/19	**COMP. DATE:** 08/28/19	**SURFACE WATER DEPTH:** 5.0ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. #	RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line					
	-25.3	76.2	21	29	33	62			Sat.		BLUISH-GRAY, SILTY, F. SAND *(continued)*
-30											-28.6 79.5
	-30.3	81.2	36	45	45	90			Sat.		BLUISH-GRAY, F. AND CSE. SAND
											-31.8 82.7
											BORING TERMINATED AT ELEVATION -31.8 ft IN V. DENSE F. AND CSE. SAND (PEEDEE FORMATION)

NCDOT BORE DOUBLE B5639_GEO_BRDG_MAXWELL_CATLIN.GPJ NCDOT_CATLIN.GDT 10/24/19

GEOTECHNICAL BORING REPORT
BORE LOG

CATLIN Engineers and Scientists
220 Old Dairy Road
Wilmington, NC 28405
Corporate Licensure No. for Engineering Services C-0585
219077

PROJECT REFERENCE NO.	SHEET
B-5639	9

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** K. SWAIN	
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**
BORING NO.: B1-B	**STATION:** 23+24	**OFFSET:** 9 ft RT	**ALIGNMENT:** -L-	**0 HR.** FIAD
COLLAR ELEV.: 49.8 ft	**TOTAL DEPTH:** 61.8 ft	**NORTHING:** 408,440	**EASTING:** 2,309,931	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT4425 CME-55 87% 01/16/2019		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC	
DRILLER: J. EDMONDSON	**START DATE:** 10/03/19	**COMP. DATE:** 10/03/19	**SURFACE WATER DEPTH:** 5.7ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
										WATER SURFACE (10/03/19)	
55											
50	49.8	0.0	2	3	3	6		Sat.		49.8 GROUND SURFACE	0.0
										48.5 **ALLUVIAL** GRAVEL FRAGMENTS	1.3
	45.8	4.0	12	14	18	32		W		47.3 BLACK, F. SAND WITH TR. ORG.	2.5
45										**UNDIVIDED COASTAL PLAIN** DARK GRAY, SILTY, F. SAND	
	41.8	8.0								41.3	8.5
40			3	3	5	8		W		**COASTAL PLAIN** BLACK, F. SANDY SILT WITH TR. WHITE SAND GRAINS (PEEDEE FORMATION)	
	39.5	10.3	7	8	8	16		M			
35										36.3 BLACK, SILTY, F. SAND WITH SHELLS AND TR. CSE. SAND	13.5
	34.5	15.3	4	10	17	27		W		33.6	16.2
										33.0 GRAY, WHITE, AND BLACK, CALCARENITE. FRESH AND FRIABLE.	16.8
30										32.1 DRILLER NOTE "HARD DRILLING"	17.7
	29.5	20.3	10	17	73	90		W		GREENISH GRAY, BLACK, AND WHITE, F. SAND. GLAUCONITIC	
25										26.3 GRAY, F. SANDY SILT WITH SOME SHELL FRAGS.	23.5
	24.5	25.3	5	6	10	16		W			
										21.5 DRILLER NOTE "HARD DRILLING"	28.3
20										20.0 GRAY, SILTY, F. SAND WITH SOME SHELL FRAGS.	29.8
	19.5	30.3	4	5	9	14		W			
15	14.5	35.3	22	29	35	64		W		16.3 GREENISH GRAY WITH BLACK AND WHITE SPECKLES, F. SAND WITH CLAY LAMINATIONS AND TR. WOOD. GLAUCONITIC	33.5
	9.5	40.3	10	15	19	34		W			
10										7.6 DRILLER NOTE "HARD DRILLING"	42.2
	4.5	45.3	10	9	14	23		W		6.5 DARK GRAY, F. SANDY SILT WITH HIGH SHELL FRAGMENT CONTENT GRADING TO TR. SHELL FRAGS.	43.3
5											
0	-0.5	50.3	4	5	7	12		W			
-5	-5.5	55.3	100/0.5			100/0.5		W		-8.7 DARK GRAY, SILTY, F. SAND WITH LITTLE SHELL CONTENT	58.5
-10	-10.5	60.3	6	8	16	24		W		-12.0 BORING TERMINATED AT ELEVATION -12.0 ft IN MED. DENSE SILTY SAND	61.8

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** K. SWAIN	
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**
BORING NO.: B2-A	**STATION:** 23+87	**OFFSET:** 10 ft LT	**ALIGNMENT:** -L-	**0 HR.** FIAD
COLLAR ELEV.: 51.4 ft	**TOTAL DEPTH:** 63.5 ft	**NORTHING:** 408,498	**EASTING:** 2,309,899	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT4425 CME-55 87% 01/16/2019		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC	
DRILLER: J. EDMONDSON	**START DATE:** 10/02/19	**COMP. DATE:** 10/02/19	**SURFACE WATER DEPTH:** 4.1ft	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION
										WATER SURFACE (10/02/19)
55										
50	51.4	0.0	WOR	WOR	WOH	0		Sat.		51.4 GROUND SURFACE 0.0
										ALLUVIAL TAN, F. SAND (NO RETURN FROM SURFACE DRIVE)
	47.0	4.4	1	6	5	11				46.0 5.4
45										**UNDIVIDED COASTAL PLAIN** DARK GRAY, SILTY, F. SAND WITH TR. CLAY AND ORG.
	39.4	12.0								42.4 9.0
40			10	12	11	23		M		**COASTAL PLAIN** BLACK, F. SANDY SILT AND F. SANDY CLAY WITH TR. ORG. (PEEDEE FORMATION)
	34.4	17.0								38.0 13.4
35										36.4 15.0
			2	3	7	10		W		33.7 17.7
	29.4	22.0								GREENISH GRAY, SILTY, F. SAND
30			13	19	20	39		Sat.		31.4 20.0
										GREENISH BLACK AND WHITE, F. SAND WITH TR. SILT
25	24.4	27.0	5	7	11	18		Sat.		26.4 25.0
										GRAY, F. SANDY SILT WITH LITTLE SHELLS
	19.4	32.0	4	5	9	14		Sat.		23.9 27.5
20										GRAY, SILTY F. SAND WITH SILT LAMINATIONS AND LITTLE SHELL CONTENT
15	14.4	37.0	16	26	29	55		Sat.		16.4 35.0
										GREENISH GRAY, F. SAND WITH CLAY LAMINATIONS AND TR. SHELLS
10	9.4	42.0	18	17	15	32		Sat.		7.2 44.2
										5.9 DRILLER NOTE "HARD" DRILLING 45.5
5	4.4	47.0	13	16	20	36		W		3.7 GRAY, SILTY, F. SAND WITH LITTLE SHELL FRAGS. 47.7
										GRAY, SILT WITH TR. F. SAND AND LITTLE SHELLS
0	-0.6	52.0	4	5	6	11		M		-3.0 54.4
										-4.1 DRILLER NOTE "HARD" DRILLING 55.5
-5	-5.6	57.0	62	54	31	85		M		GRAY, SILT WITH TR. F. SAND AND LITTLE SHELLS
-10	-10.6	62.0	5	9	14	23		W		-8.6 GRAY, SILTY, F. SAND WITH LITTLE SHELL FRAGS. 60.0
										-12.1 BORING TERMINATED AT ELEVATION -12.1 ft IN MED. DENSE SILTY SAND 63.5

GEOTECHNICAL BORING REPORT
BORE LOG

CATLIN Engineers and Scientists
220 Old Dairy Road
Wilmington, NC 28405
Corporate Licensure No. for Engineering Services C-0585
219077

PROJECT REFERENCE NO.	SHEET
B-5639	10

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55			**GROUND WTR (ft)**
BORING NO.: B2-B	**STATION:** 23+86	**OFFSET:** 8 ft RT	**ALIGNMENT:** -L-	**0 HR.** -2.2
COLLAR ELEV.: 52.4 ft	**TOTAL DEPTH:** 78.9 ft	**NORTHING:** 408,501	**EASTING:** 2,309,917	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/29/19	**COMP. DATE:** 08/29/19	**SURFACE WATER DEPTH:** 3.5ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. #	RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
55											WATER SURFACE (08/29/19)	
	52.4	0.0	1	1	1	2			Sat.		52.4 GROUND SURFACE	0.0
50	49.1	3.3	6	3	2	5			Sat.		**ALLUVIAL** LIGHT GRAY, F. SAND WITH WELL ROUNDED GRAVEL	
45	45.0	7.4	5	11	15	26			Sat.		46.4 **UNDIVIDED COASTAL PLAIN** DARK GRAY, SILTY, F. SAND	6.0
40	40.0	12.4	2	5	10	15			W		42.4 **COASTAL PLAIN** DARK GRAY, CLAY WITH TR. SHELL FRAGS. AT BASE OF STRATUM (PEEDEE FORMATION)	10.0
35	35.0	17.4	2	2	3	5			W			
30	30.0	22.4	19	28	29	57			Sat.		31.9 BLUISH-GRAY, F. AND CSE. SAND	20.5
25	25.0	27.4	4	5	7	12			W		26.9 GRAY, SANDY CLAY WITH HIGH SHELL FRAG. CONTENT	25.5
20	20.0	32.4	60/0.1			60/0.1			Sat.		22.4 GRAY, LIMESTONE	30.0
15	15.0	37.4	7	22	25	47			Sat.		16.4 GRAY, F. AND CSE. SAND WITH TR. CLAY AND WOOD FRAGS. AT BASE OF STRATUM	36.0
10	10.0	42.4	2	8	8	16			Sat.		7.4 GRAY, CLAY WITH MOD. TO HIGH SHELL FRAG. CONTENT AND TR. F. SAND	45.0
5	5.0	47.4	9	16	18	34			W			
0	0.0	52.4	5	4	6	10			W			
-5	-5.0	57.4	48	34	46	80			W			
-10	-10.0	62.4	6	6	11	17			W		-8.6 GRAY, CLAYEY, F. SAND	61.0
-15	-15.0	67.4	26	30	32	62			W		-13.1 GRAY, SILTY AND CLAYEY F. SAND	65.5
-20	-20.0	72.4	18	15	23	38			Sat.		-23.6 BLUISH-GRAY, F. AND CSE. SAND	76.0
-25	-25.0	77.4										

NCDOT BORE DOUBLE B5639_GEO_BRDG_MAXWELL_CATLIN.GPJ NCDOT_CATLIN.GDT 10/24/19

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55			**GROUND WTR (ft)**
BORING NO.: B2-B	**STATION:** 23+86	**OFFSET:** 8 ft RT	**ALIGNMENT:** -L-	**0 HR.** -2.2
COLLAR ELEV.: 52.4 ft	**TOTAL DEPTH:** 78.9 ft	**NORTHING:** 408,501	**EASTING:** 2,309,917	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/29/19	**COMP. DATE:** 08/29/19	**SURFACE WATER DEPTH:** 3.5ft

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. #	RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line					
			16	26	32	58			Sat.		-26.5 BLUISH-GRAY, F. AND CSE. SAND *(continued)* 78.9
											BORING TERMINATED AT ELEVATION -26.5 ft IN V. DENSE F. AND CSE. SAND (PEEDEE FORMATION)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS: 45594.1.1	**TIP:** B-5639	**COUNTY:** DUPLIN	**GEOLOGIST:** C. FUTRAL	
SITE DESCRIPTION: BRIDGE NO. 36 ON -L- (US HWY 11) OVER MAXWELL CREEK AT -L- STATION 23+55				**GROUND WTR (ft)**
BORING NO.: EB2-A	**STATION:** 24+40	**OFFSET:** 16 ft LT	**ALIGNMENT:** -L-	**0 HR.** 10.0
COLLAR ELEV.: 67.4 ft	**TOTAL DEPTH:** 69.8 ft	**NORTHING:** 408,548	**EASTING:** 2,309,882	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE: CAT1303 CME-550 94% 09/26/2018		**DRILL METHOD:** Mud Rotary	**HAMMER TYPE:** AUTOMATIC	
DRILLER: D.T. Chalmers, Jr.	**START DATE:** 08/27/19	**COMP. DATE:** 08/27/19	**SURFACE WATER DEPTH:** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. # RESULT	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
70											
	67.4	0.0								67.4 GROUND SURFACE	0.0
65	63.3	4.1	1	3	2	5		D		**ROADWAY EMBANKMENT** BROWN GRADING TO GRAY WITH ORANGE MOTTLING, SANDY CLAY	
60	59.2	8.2	2	2	3	5		M		60.9 DARK GRAY, SILTY, F. SAND	6.5
55	54.1	13.3	1	0	1	1		M		56.4 **ALLUVIAL** GRAY, CLAY WITH TRACE WOOD FRAGMENTS.	11.0
50	49.1	18.3	WOH	WOH	WOH	0		W		50.9 **UNDIVIDED COASTAL PLAIN** GRAY, F. SAND	16.5
45	44.1	23.3	8	12	9	21		W		45.9 **COASTAL PLAIN** DARK GRAY, SANDY CLAY WITH HIGH SHELL FRAG. CONTENT AT BASE OF STRATUM (PEEDEE FORMATION)	21.5
40	39.1	28.3	11	14	14	28		W			
35	34.1	33.3	5	6	6	12		W			
30	29.1	38.3	2	3	4	7		Sat.		32.9 DARK GRAY, CLAYEY, F. AND CSE. SAND WITH SHELL FRAGMENTS	34.5
25	24.1	43.3	7	9	15	24		W		30.9 GRAY, F. AND CSE. SAND	36.5
20	19.1	48.3	4	7	11	18		Sat.		25.9 GRAY, F. SAND WITH SILT AND HIGH SHELL FRAG. CONTENT	41.5
15	14.1	53.3	4	10	90/0.1	100/0.6		Sat.		20.9 GRAY, LIMESTONE CONSISTING OF CALCITE CEMENTED SILTY AND CLAYEY, F. SAND WITH HIGH SHELL FRAG. CONTENT	46.5
10	9.1	58.3	15	14	17	31		Sat.		15.9 GRAY,F. AND CSE. SAND WITH HIGH SHELL FRAG. CONTENT	51.5
5	4.1	63.3	13	17	23	40		Sat.			
0	-0.9	68.3	13	22	22	44		W		3.4 GRAY, SANDY CLAY WITH HIGH SHELL FRAG. CONTENT	64.0
			4	5	7	12		W		-2.4 BORING TERMINATED AT ELEVATION -2.4 ft IN STIFF SANDY CLAY (PEEDEE FORMATION)	69.8

NCDOT BORE DOUBLE B5639_GEO_BRDG_MAXWELL_CATLIN.GPJ NCDOT_CATLIN.GDT 10/24/19

CATLIN Engineers and Scientists
219077 220 Old Dairy Road Wilmington, NC 28405
Corporate Licensure No. for Engineering Services C-0585

PROJECT REFERENCE NO.	SHEET
B-5639	11

BRIDGE NO. 36 ON US 11 OVER MAXWELL CREEK

BRIDGE NO. 36 DETOUR OVER MAXWELL CREEK

NOTES: SITE PHOTOS OBTAINED FROM BRIDGE SCOUR REPORTS 300036_2019_B5639_MaxwellCreek_US11.pdf AND 300036_2019_B5639DET_MaxwellCreek_US11.pdf PROVIDED BY NCDOT