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3833

X

REFERENCE

34.

CONTENTS

SHEET NO. **DESCRIPTION** TITLE SHEET LEGEND (SOIL & ROCK) SITE PLAN PROFILE BORE LOGS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _IREDELL

PROJECT DESCRIPTION SR 1100 (BRAWLEY SCHOOL ROAD) FROM SR 1116 (TALBERT ROAD) TO 1000' EAST OF US 21

SITE DESCRIPTION CULVERT ON -L- (BRAWLEY SCHOOL ROAD) STATION 36+00.33 OVER UNNAMED TRIBUTARY TO REEDS CREEK

STATE PROJECT REFERENCE NO. 5 R-3833C

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 (1991) 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 SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. 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 METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR 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 SATISTY 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 BY 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.

	LANE, R.W.
INVESTIGATED	BY FALCON ENG.
DRAWN BY _C	CROCKETT, S.C.
CHECKED BY	HAMM, J. R.
SUBMITTED BY	
DATE MAY	

HPC

PERSONNEL



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

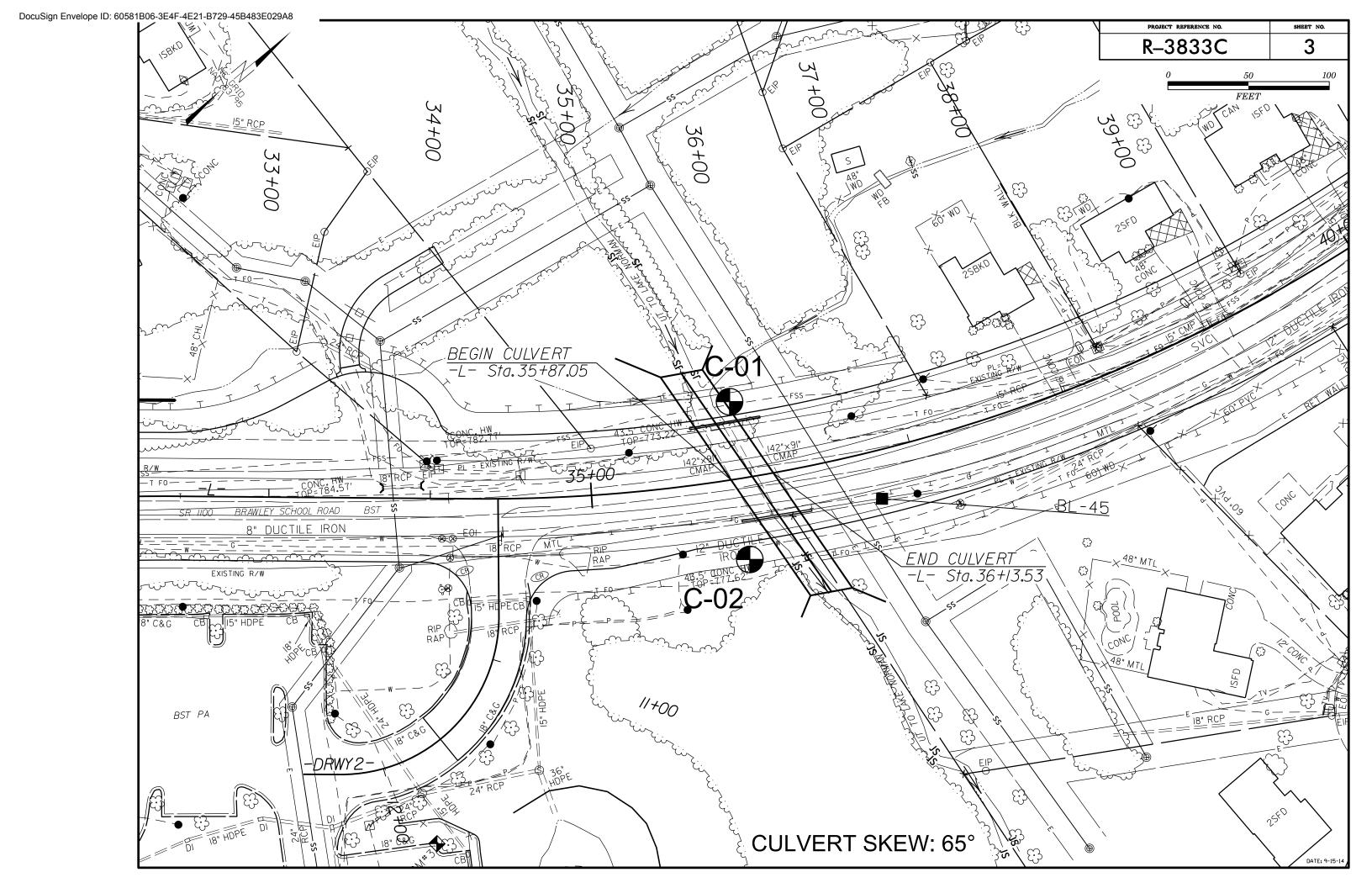
PROJECT REFERENCE NO. SHEET NO. 2

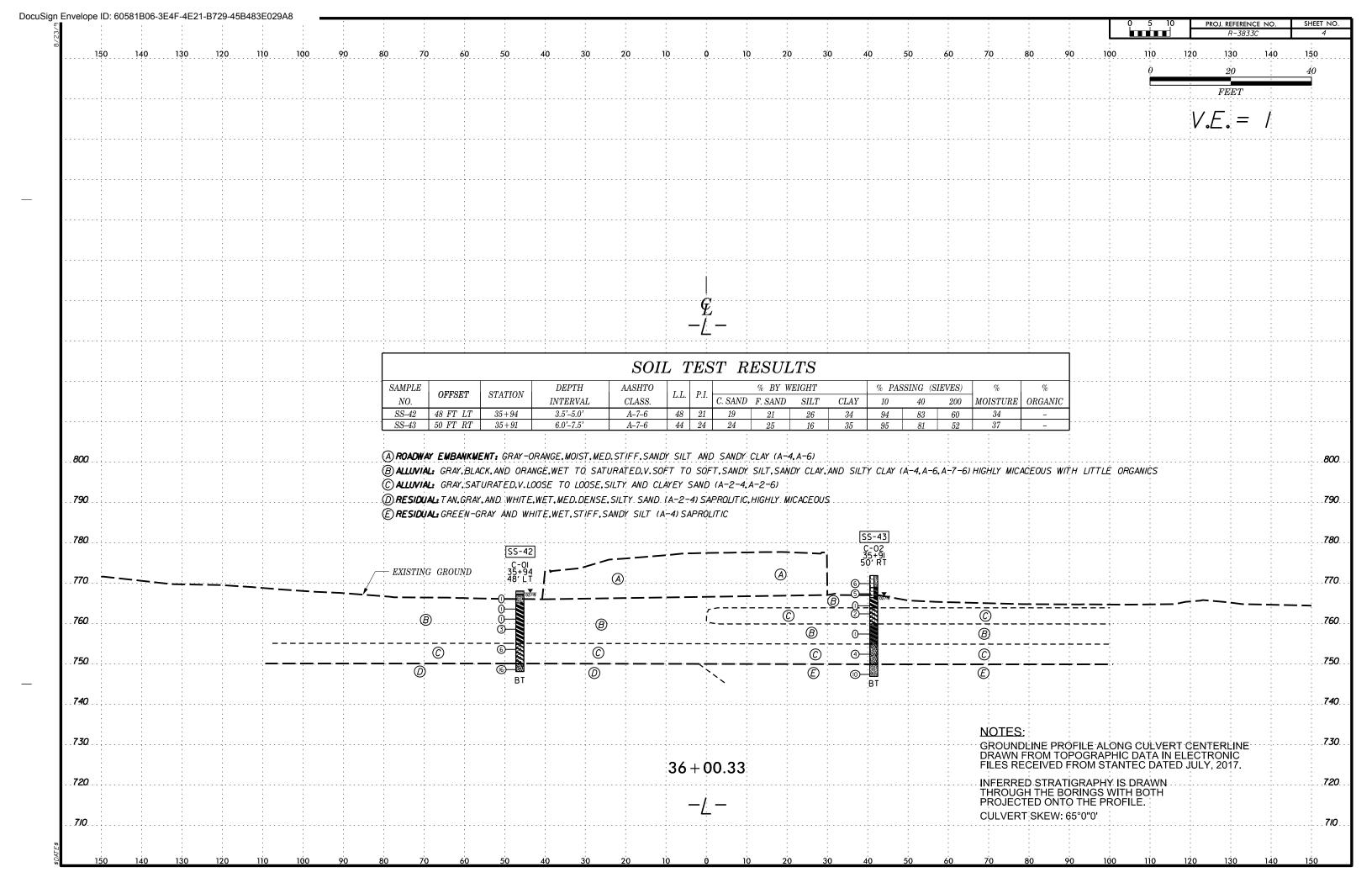
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL 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 ASHTO SYSTEM, BASIC DESCRIPTIONS CENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANDULARITY, STRUCTURE, PLASTICITY, ETC. PER EXAMPLE, VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6 SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL CLASS. (\$35%, PASSING "2000) (>35% PASSING "2000) GRANULAR MATERIALS CLASS. A-1-0 A-1-5 A-2-4 A-2-5 A-2-6 A-2-7 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-6 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-4 A-5 A-6 A-7 A-6, A-7	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, KADLIN, ETC, ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY	HABD 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 NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED. CRYSTALLINE ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED, ROCK TYPE INCLUDES GRANITE, ONE SS, GABBRO, SCHIST, ETC. NON-CRYSTALLINE SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED.	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
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL \ 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) SPT REFUSAL, ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED (CP) WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, (V SLI.) CRYSTALLS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	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.
GROUP INDEX 0 0 0 0 4 MX 8 MX 12 MX 16 MX ND MX USUAL TYPES STONE FRAGS. OF MAJOR MATERIALS GRAVEL AND SAND SOLUTION GRAVEL AND SAND SOLUTION FAIR TO POOR P1 OF A-7-5 SUBGROUP IS ≤ LL - 38 :P1 OF A-7-6 SUBGROUP IS > LL - 38 MULHAIT AMULHAIT AMULHAIT AMULHAIT OF ORANIC OF ORANIC MATTER ORGANIC MATTER ORGANIC MATTER ORGANIC MATTER ORGANIC POOR MATTER ORGANIC NATITE ORGANIC SOLLS OF ORANIC MATTER ORGANIC MATTER ORGANIC POOR MATTER ORGANIC NATITE ORGANIC SOLLS ORGANIC MATTER ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC NATITE ORGANIC SOLLS ORGANIC NATITE ORGAN	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP	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 ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO DNE 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.
CONSISTENCY OR DENSENESS	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY WITH SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING SOUNDING ROD TEST BORING TEST BORING TEST BORING TEST BORING TEST BORING	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION, ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK, IF TESTED, MOULD YIELD SPT REFUSAL SEVERE 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 ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE 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	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. LEGGE - 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.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL WITH CORE WITH CORE WITH CORE WITH CORE WITH CORE INSTALLATION SPT N-VALUE RECOMMENDATION SYMBOLS UNCLASSIFIED EXCAVATION - WOULD ASSTER WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	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. PROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK QUALITY DESIGNATION (ROD) - 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
DPENING (MM)	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL ABBREVIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY 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 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.	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 DIMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE (ATTERBERG LIMITS) - SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) - WET - (W) SEMISOLID; REQUIRES DRYING TO	CSE COARSE OMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK OVID RATIO F - FINE FOSS FOSSILIFEROUS SLI SILT, SILTY FRACTURED, FRACTURES TCR - TRICONE REFUSAL FRACS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	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 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 BEDDING	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 TAKEN FROM R3833C_LS_TNL_ITO727.TIN
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	HI HIGHLY	TERM	DATED 07/2017 ELEVATION: FEET NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI) NON PLASTIC 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.	X CME-550	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. 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 SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14





		BURE LUG				IEM IDEDE::	
WBS 34554.1.1			GIST Lane, R. W.	WBS 34554.1.1		NTY IREDELL	GEOLOGIST Lane, R. W.
	<u> </u>	STATION 36+00.33 OVER UT TO REEDS	. '	SITE DESCRIPTION CULVERT			
BORING NO. C-01	STATION 35+94			BORING NO. C-02	STATION 35+91	OFFSET 50 ft RT	ALIGNMENT -L- 0 HR. 7.5
COLLAR ELEV. 768.1 ft	TOTAL DEPTH 20.0 ft		,,	COLLAR ELEV. 771.9 ft	TOTAL DEPTH 25.0 ft	NORTHING 670,121	EASTING 1,450,534 24 HR. 5.1
DRILL RIG/HAMMER EFF./DATE HPC	1	DRILL METHOD H.S. Augers		DRILL RIG/HAMMER EFF./DATE HPC		DRILL METHOD	
DRILLER Odom, C.	START DATE 02/05/19		CE WATER DEPTH N/A	DRILLER Odom, C.	START DATE 02/04/19	COMP. DATE 02/04/19	SURFACE WATER DEPTH N/A
ELEV (ft) DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0		75 100 NO. MOI G ELEV. (ft)	SOIL AND ROCK DESCRIPTION DEPTH (ft)	ELEV CHYPTE BLOW COULD BLOW COULD CHYPTE BLOW CHYPTE BLOW COULD CHYPTE BLOW COULD CHYPTE BLOW CHYPTE BLOW COULD CHYPTE BLOW CH	 	OT SAMP. CONTROL SAMP. NO. NO. MOI G	SOIL AND ROCK DESCRIPTION
770		768.1 767.1	0.0 ALLUVIAL	775			
T WOH WOH	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Sat. Sat.	BLACK, SANDY SILT WITH LITTLE	770.9 1.0 4 2			ROADWAY EMBANKMENT
765 764.6 + 3.5 WOH WOH	1	SS-42 34%	ORGANICS ORANGE, SANDY SILT (A-4) HIGHLY	770 4 2	4	M	GRAY-ORANGE, SANDY SILT(A-4)
762.1 6.0 WOH WOH			MICACEOUS GRAY, CLAY (A-7-6) MICACEOUS	700.4 3.3 2	3 •5		TAN-ORANGE, SANDY CLAY (A-6)
760 759.6 8.5 WOH WOH	1 1	<u> </u>	GIVII, GEXI (XX O) IVIIG/ICEGGG	765 765.4 6.5 WOH WOH			ALLUVIAL
739.0 8.3 2 2	1 3	: :::: w 😝		763.4 T 8.5 WOH WOH	$\frac{1}{2}$ $\left[\begin{array}{c} \bullet_1 \\ \bullet_2 \\ \bullet_3 \\ \bullet \end{array}\right]$ $\left[\begin{array}{c} \bullet_1 \\ \bullet_2 \\ \bullet \end{array}\right]$ $\left[\begin{array}{c} \bullet_1 \\ \bullet_2 \\ \bullet \end{array}\right]$		763.9 — — GRAY, SILTY CLAY (A-7-6) — — 8
, {		· · · · ·				Sat.	, , , , , , , , , , , , , , , , , , ,
755 754.6 13.5 WOH 3	2 1	755.1	BRAY, CSE. TO F. CLAYEY SAND (A-2-6)	760			759.9
	3 •6	· · · · ·		758.4 † 13.5 WOH WOH		I I I Sat I	S.O.I., S.WIET SERT (A-0)
750 740.6 149.5		750.1	18.0	755			754.9
749.0 T 10.5 1	9 1. 16		RESIDUAL TAN GRAY AND WHITE, SILTY SAND 20.0	753 4 T 18 5	<u> </u>		GRAY, SILTY SAND (A-2-4)
+	<u>▼10</u>	(/	-2-4) SAPROLITIC, HIGHLY MICACEOUS	2 1	3 4	Sat.	; -
			Boring Terminated at Elevation 748.1 ft IN RESIDUAL: SILTY SAND	750			749.9
				748.4 - 23.5 4 4	6		RESIDUAL GREEN-GRAY AND WHITE, SANDY SILT
					6 10		746.9 (A-4) SAPROLITIC 25.
		+					Boring Terminated at Elevation 746.9 ft IN RESIDUAL: SANDY SILT
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August 25, 2021

Mindy B. Isenhour, PE

Stantec

801 Jones Franklin Road, Suite 300

Raleigh, NC 27606

Project: 34554.1.3 (R-3383C)

County: Iredell

Description: Culvert on -L- (Brawley School Road) Station 36+00.33 Over Unnamed Tributary to Reeds Creek

Subject: Culvert Foundation Recommendations

Dear Ms. Isenhour,

As authorized, Falcon Engineering Inc. (Falcon) has completed the Culvert Foundation Recommendations for the above referenced project based on current NCDOT LRFD design policy and procedures.

Foundation recommendations and notes on plans are presented in the attachments. These recommendations are based on subsurface data obtained by Falcon as presented in the Subsurface Investigation Report submitted under separate cover. Culvert geometry used in our analysis were obtained from the approved Culvert Survey and Hydraulic Design Report (CSR).

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

Respectfully submitted:

FALCON ENGINEERING, INC.

Stephen C. Crockett, PE

Geotechnical Engineer

Jeremy R. Hamm, PE

Geotechnical Engineering Manager

Attachments: Foundation Recommendations and Notes on Plans

FOUNDATION RECOMMENDATIONS

WBS # 34554.1.3 DESCRIPTION Culvert on -L- (Brawley School Road)

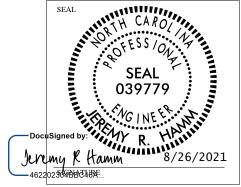
T.I.P. NO. R-3383C Station 36+00.33 over Unnamed Tributary to Reeds Creek

COUNTY Iredell

DESIGN SCC 04/30/21
CHECK JRH 08/25/21
APPROVAL

STATION

36+00.33 -L-



CULVERT SIZE	STATION	FOUNDATION TYPE	EXCAVATION DEPTH	MISCELLANEOUS DETAILS
2 @ 12' x 9' Reinforced Concrete Box Culvert with Beveled Inlet, 1.0' Sill in Left (East) Barrel, 2.0' Sill in Right (West) Barrel	-L- 36+00.33	Full Concrete Invert on 3.0' Class VI Foundation Conditioning Material w/ Geotextile	3.0' below bottom of culvert	Approximate Culvert Length = 164 ft Culvert Skew = 65 degrees Culvert Invert Elevation at CL = 767.4 ft Slope = 0.854%

FOUNDATION RECOMMENDATION SPECIAL NOTES ON PLANS

- 1. EXCAVATE FOUNDATION A MINIMUM OF 3.0 FEET BELOW CULVERT BEARING ELEVATION. PLACE 3.0 FEET OF CLASS VI FOUNDATION CONDITIONING MATERIAL IN ACCORDANCE WITH SECTION 414 OF THE STANDARD SPECIFICATIONS. ENCAPSULATE FOUNDATION CONDITIONING MATERIAL WITH TYPE 2 GEOTEXTILE.
- 2. CONSTRUCT THE REINFORCED CONCRETE BOX CULVERT AT -L- STATION 36+00.33 WITH 4" OF CAMBER TO ACCOUNT FOR ANTICIPATED SETTLEMENT.

FOUNDATION RECOMMENDATION COMMENTS

- 1. Unfactored bearing pressure of culvert foundation is 2.260 ksf.
- 2. Total culvert settlement of 8 inches is anticipated.

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CONTENTS

DESCRIPTION

LEGEND (SOIL & ROCK)

SITE PLAN AND PROFILE

TITLE SHEET

BORE LOGS

SHEET NO.

3833 K REFERENCE

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY _IREDELL

PROJECT DESCRIPTION NORTH OF BRAWLEY SCHOOL ROAD BETWEEN CITATION DRIVE AND

ROUNDKEEP LANE

SITE DESCRIPTION NOISE WALL 2 ON (BRAWLEY SCHOOL ROAD) STATION -L- 36+00.33 -63.08'LT /

-NW2-10+00.00 TO -L-52+99.95 -54.50'LT /

-NW2-20+05.00

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	SHEETS	ı
N.C.	R-3833C	1	6	

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 (1991) 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 SUBSUFFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BORCHOLE. 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 METHOL. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE OR 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 INTERRETATIONS 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 BY 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.

HPC GOODNIGHT, D.J. INVESTIGATED BY <u>FALCON</u> ENG. DRAWN BY HILL, M.J. CHECKED BY HUNSGERGER, W.S. SUBMITTED BY FALCON

DATE _SEPTEMBER 2021



DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

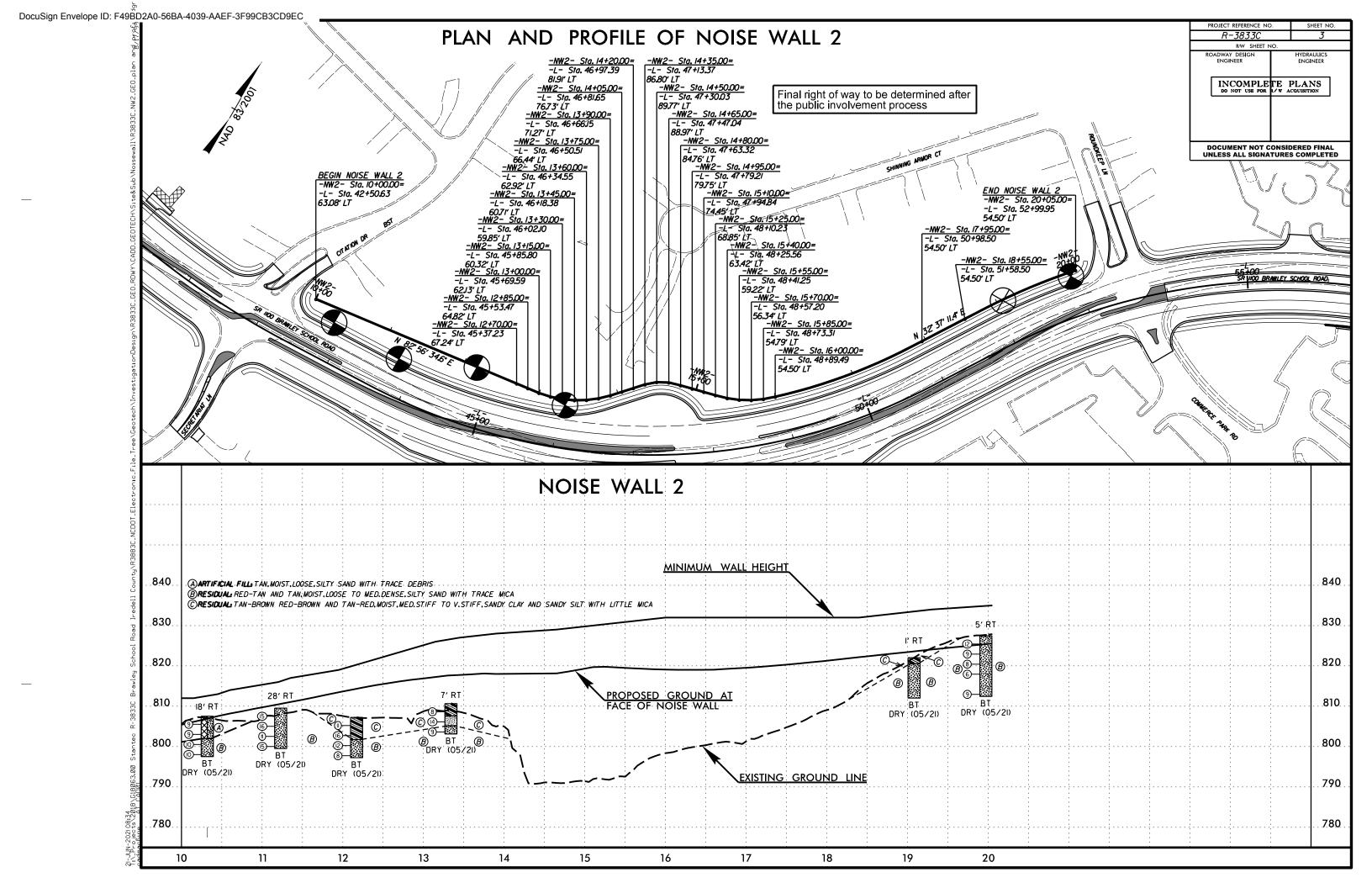
PROJECT REPERENCE NO. SHEET NO. 2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

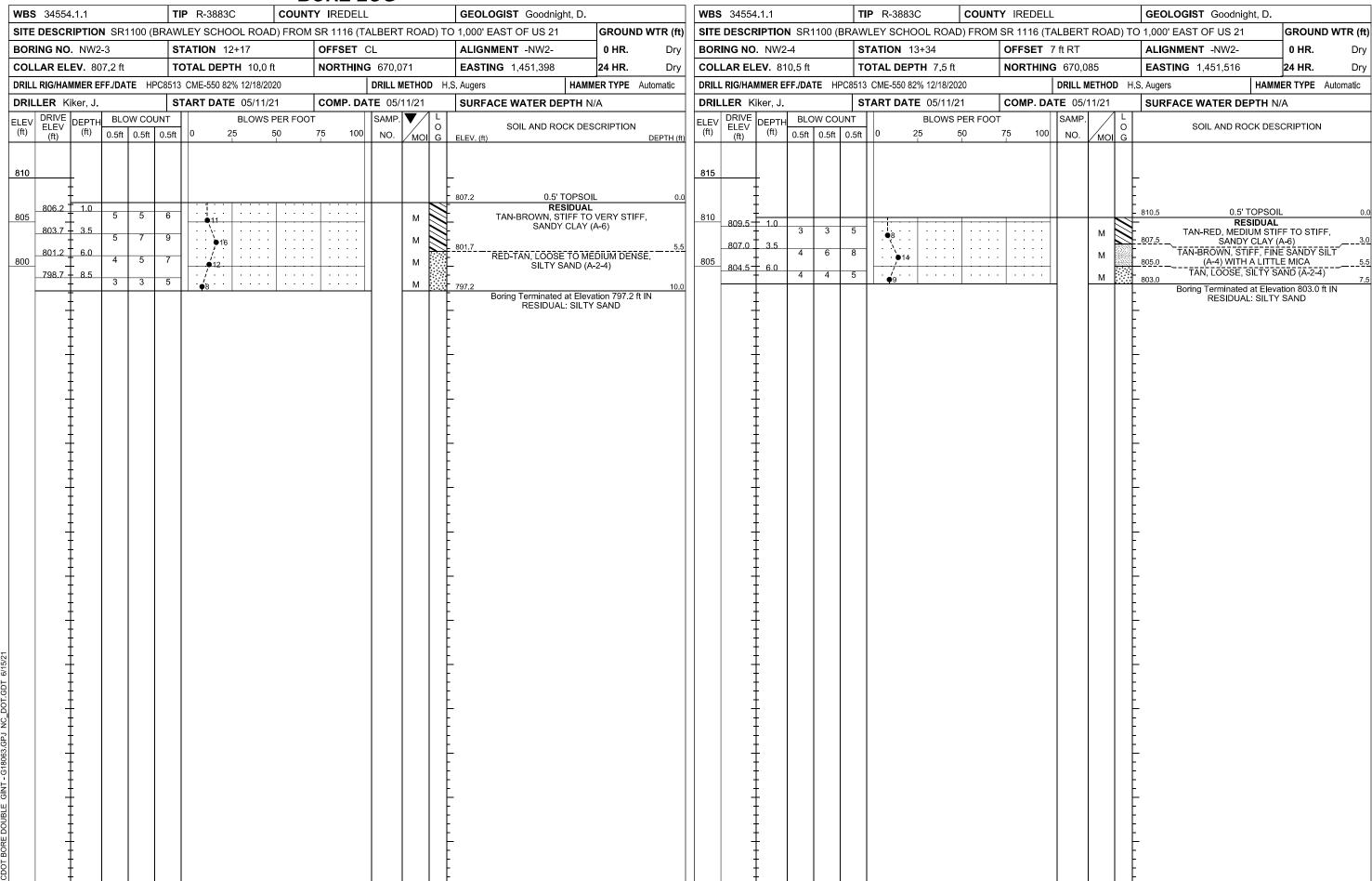
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤35% PASSING *200) (>35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE CRYSTALLINE WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE,	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YELLD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC. COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SANDSTONE, CEMENTED	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.
■10 50 MX GRANULAR SILI- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL		ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL 40 MX 41 MN LITTLE OR HIGHLY PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN 11 MN 10 MX 10 MX 11 MN 1	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF	GROUND WATER	OF A CRYSTALLINE NATURE.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
ORGANIC SUILS		SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO (SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER OF MAJOR GRAVEL, AND CAND CRAYEL AND CAND COLIC	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND GRAVEL AND SAND SOILS SOILS	STATIC WATER LEVEL AFTER 24 HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR PAIR TO POOR UNSUITABLE	PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(MOD.) 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	I
AS SUBBRADE PUUR	→ O→MING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	MICCELL ANEQUE CAMBOL C	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK,	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTATION PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
(IONS/FI-)	☐ WITH SOIL DESCRIPTION ☐ OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE	SOIL SYMBOL SOIL SYMBOL SUPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
MATERIAL MEDIUM DENSE 10 TO 30 N/A	I 的	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
(NON-COHESIVE) DENSE 30 TO 50 VERY DENSE > 50	THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	☐ ☐ INFERRED SOIL BOUNDARY ☐ CORE BORING ■ SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	MW - TEST DODING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INFERRED ROCK LINE MONITORING WELL WITH CORE	COMPLETE ROCK REDUCED TO SOIL, ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4		SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
HARD > 30 > 4	INSTRICTUTION	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION -	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW SIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	UNDERCUT ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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 EDUAL
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7- UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN Ø.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION ODDE FOR FIELD HOLSTONE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; YERY WET, USUALLY	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES 1 INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC CEMICOLID DEGLIDES DOVING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE - WEI - (W) ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: ELEVATIONS TAKEN FROM R3833C_LS_TNL_I70727.TIN
" PL L + PLASTIC LIMIT -	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: FEET
SL SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING
ATTAIN OPTIMUM MOISTURE	CME-55 G* CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	1
PLASTICITY	X 8*HOLLOW AUGERS L-B L-H	INDURATION	1
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
	CASING W/ ADVANCER —	CRAING CAN BE CERARATED FROM CAMPLE WITH CIFFL PROPE.	
MODERATELY PLASTIC 16-25 MEDIUM			
	POST HOLE DIGGER	MODERATELY INDURATED MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
MODERATELY PLASTIC 16-25 MEDIUM	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH COLOR	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER TRICONE TRICONE SOUNDING ROD	BREAKS EASILY WHEN HIT WITH HAMMER.	
MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MUDERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER. INDUBATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE:	DATE: 8-15-14



Dry

GROUND WTR (ft)

[1	OURE LUG				
WBS 34554.1.1		NTY IREDELL	GEOLOGIST Goodnight, D.	WBS 34554.1.1 TIP R-3883C	COUNTY IREDELL	GEOLOGIST Goodnight, D.
SITE DESCRIPTION SR1100 (BR	,	<u> </u>			<u> </u>	·
BORING NO. NW2-1	STATION 10+32	OFFSET 18 ft RT	ALIGNMENT -NW2- 0 HR. Dry	BORING NO. NW2-2 STATION 11+23	OFFSET 28 ft RT	ALIGNMENT -NW2- 0 HR.
COLLAR ELEV. 807.0 ft	TOTAL DEPTH 10.0 ft	NORTHING 670,031	EASTING 1,451,217 24 HR. Dry	COLLAR ELEV. 809.5 ft TOTAL DEPTH 10.		EASTING 1,451,309 24 HR .
DRILL RIG/HAMMER EFF./DATE HPC	B513 CME-550 82% 12/18/2020	DRILL METHOD	H.S. Augers HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 82% 12/18	7/2020 DRILL METHOD	H.S. Augers HAMMER TYPE Automati
DRILLER Kiker, J.	START DATE 05/11/21	COMP DATE 05/11/21	SURFACE WATER DEPTH N/A	DRILLER Kiker, J. START DATE 05/1		SURFACE WATER DEPTH N/A
ELEV CHIP CHIP CHIP CHIP CHIP CHIP CHIP CHIP		OT SAMP. V L C C NO. MOI C	O I SOIL AND ROCK DESCRIPTION	(ft) ELEV (ft) 0.5% 0.5% 0.5%	/S PER FOOT SAMP. 50 75 100 NO. MOI	C SOIL AND ROCK DESCRIPTION G
810 805 806.0 1.0 5 5 803.5 - 3.5 5 801.0 6.0 3 5 798.5 - 8.5	4	75 100 NO. MOI C	BOT-0	810 808.5	50 75 100 NO. MOI	G Bosin Residual RESIDUAL TAN, MEDIUM DENSE, SILTY SAND (A-2-4) Boring Terminated at Elevation 799.5 ft IN RESIDUAL: SILTY SAND RESIDUAL: SILTY SAND



WBS 34554.1.1		TY IREDELL	GEOLOGIST Goodnight, D.	WBS 34554.1.1	TIP R-3883C COUN	NTY IREDELL	GEOLOGIST Goodnight, D.
SITE DESCRIPTION SR1100 (BF				SITE DESCRIPTION SR1100 (BI			
BORING NO. NW2-5	STATION 19+08	OFFSET 1 ft RT	ALIGNMENT -NW2- 0 HR. Dry	BORING NO. NW2-6	STATION 19+97	OFFSET 5 ft RT	ALIGNMENT -NW2- 0 HR. Dry
COLLAR ELEV. 821.9 ft	TOTAL DEPTH 10.0 ft	NORTHING 670,468	EASTING 1,451,922 24 HR. Dry	COLLAR ELEV. 827.1 ft	TOTAL DEPTH 15.0 ft	NORTHING 670,536	EASTING 1,451,980 24 HR. Dry
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD Ha		DRILL RIG/HAMMER EFF./DATE HPC		DRILL METHOD	
DRILLER Goodnight, D.	START DATE 05/11/21	COMP. DATE 05/11/21	SURFACE WATER DEPTH N/A	DRILLER Kiker, J.	START DATE 05/11/21	COMP. DATE 05/11/21	SURFACE WATER DEPTH N/A
			SURFACE WATER DEFTH N/A		<u> </u>		L
ELEV (ft)		75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV (ft) DEPTH BLOW COUNTY (ft) 0.5ft 0.5ft (75 100 NO. MOI	O SOIL AND ROCK DESCRIPTION G
825			821.9 0.5' TOPSOIL 0.0 820.4 RESIDUAL 1.5	826.1 1.0			827.1 0.4' TOPSOIL 0.0
820		М	RED-BROWN, MEDIUM STIFF, SANDY CLAY (A-6) RED-TAN, LOOSE TO MEDIUM DENSE, SILTY SAND (A-2-4) WITH TRACE MICA	823.6 + 3.5 4 4	5 9	M	RED-TAN, MEDIUM DENSE TO LOOSE, SILTY SAND (A-2-4)
815		M		818 6 + 8 5	3		<u>-</u>
			Boring Terminated at Elevation 811.9 ft IN RESIDUAL: SILTY SAND	815 813.6 + 13.5			- - - -
				3 4	5 9	M	812.1 15.0 Boring Terminated at Elevation 812.1 ft IN RESIDUAL: SILTY SAND
NCDOT BORE DOUBLE GINT-G18063.GPU NC_DOT.GDT 6/15/21							RESIDUAL: SILTY SAND



9/7/2021

MEMORANDUM TO: Tommy Dudeck, P.E.

Stantec, Inc.

FROM: Jeremy R. Hamm, P.E.

Geotechnical Department Manager

Falcon Engineering, Inc.

STATE PROJECT: 34554.1.3 TIP: R-3833C COUNTY: Iredell

DESCRIPTION: Brawley School Road (SR 1100) from Talbert Road (SR 1116)

to 1000' East of US 21

SUBJECT: Foundation Recommendations for Noise Wall No. 2

Falcon Engineering has received the proposed Noise Wall No. 2 for the referenced project, completed the subsurface investigation, and recommends the following noise wall foundation table:

Pile Excavation Depths for Sound Barrier Wall No. 2

Begin Wall	End Wall Station	Max. Front	Wall Height	Pile Excavation Depths, "D" (ft)			
Station	End Wan Station	Slope	(ft)	S = 10 ft	S = 15 ft	S = 20 ft	
-NW2- 10+00	-NW2- 12+25	6:1	7	8	9	10	
-NW2- 12+25	-NW2- 12+85	3:1	8	8	10	11	
-NW2- 12+85	-NW2- 13+00	3:1	9	9	12	11	
-NW2- 13+00	-NW2- 14+65	2:1	10-11	10	12	13	
-NW2- 14+65	-NW2- 14+95	2:1	12	11	12	13	
-NW2- 14+95	-NW2- 15+10	2:1	11	10	12	13	
-NW2- 15+10	-NW2- 15+55	2:1	12	11	12	13	
-NW2- 15+55	-NW2- 17+35	2:1	13	11	12	14	
-NW2- 17+35	-NW2- 17+95	3:1	12	9	10	12	
-NW2- 17+95	-NW2- 18+40	4:1	11	9	10	11	
-NW2- 18+40	-NW2- 20+05	None	10-11	8	9	10	

R-3833C Noisewall 2 9/7/2021 Iredell County, NC

Notes: 1. Pile Excavation Depths, "D" are based on 36" dia. holes shown on STD. NO. SBW1.

2. S = Pile Spacing

Please include the standard SMU PSP028, Sound Barrier Wall provision in the contract.

Please contact us at 919-871-0800 if there are any questions concerning this memorandum.

Prepared by,

W. Scott Hunsberger, P.E.

Falcon Engineering, Inc.

Geotechnical Engineer

9/7/2021

-- DocuSigned by:

Jeremy R. Hamm, PE

Geotechnical Services Manager

Falcon Engineering, Inc.

