

REFERENCE: I-2513AA

PROJECT: 34165.3.6

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION BRIDGE NO. 902 ON -Y5RPA-
OVER BLUE RIDGE SOUTHERN RAILROAD

STATE	TOWN OF HOLLY SPRINGS PROJECT NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	14

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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE MARCH 2023



DocuSigned by:

Stephen Crockett 3/29/2023

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SIGNATURE

DATE

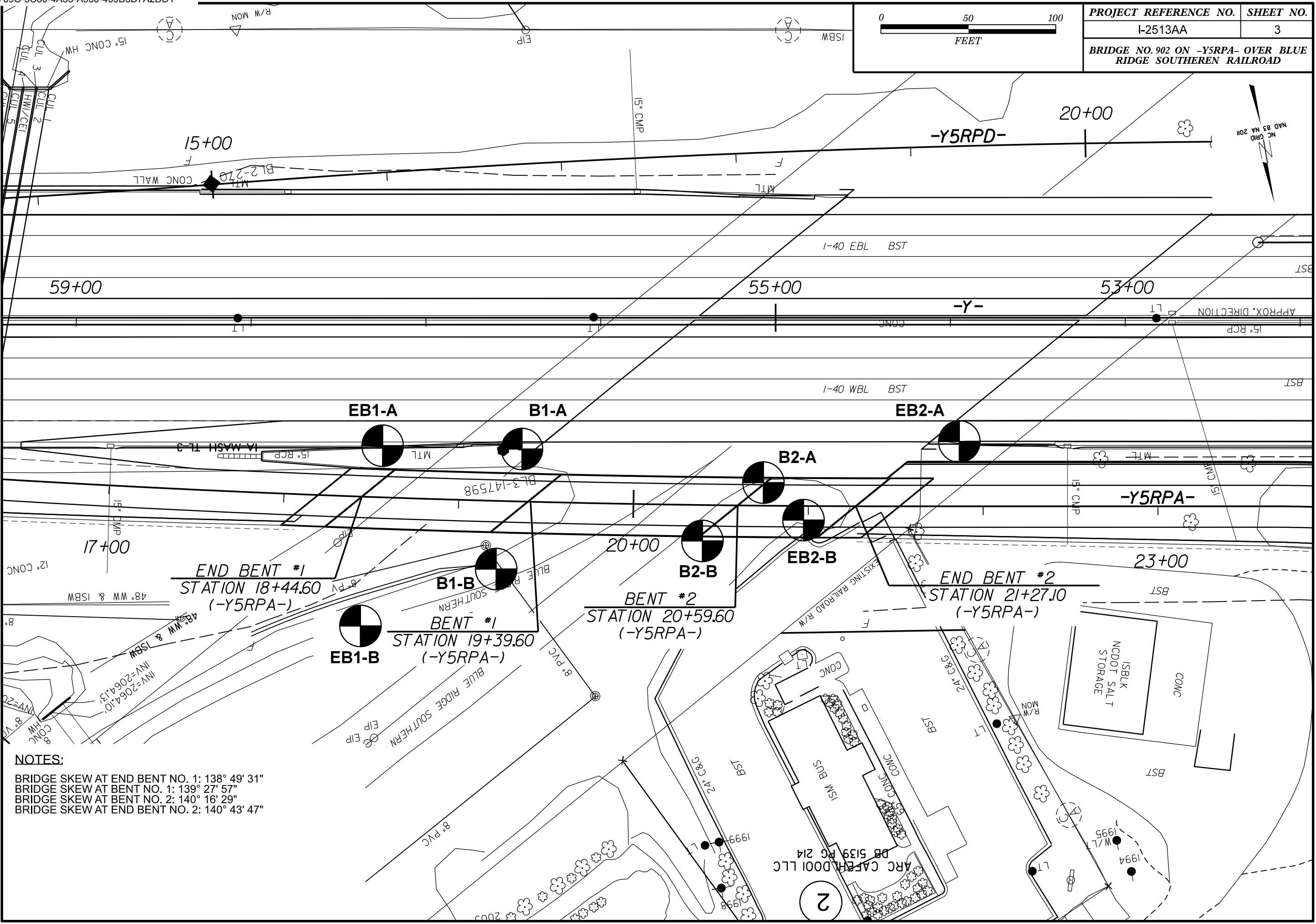
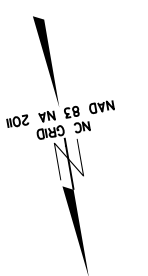
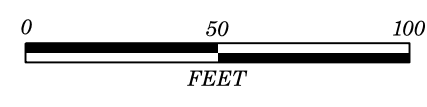
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
<p>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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>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.</p>										<p>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:</p>										<p>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 DISLOGGED 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 (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 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
<p>GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p>										<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>										<p>NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.</p>										<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>									
MINERALOGICAL COMPOSITION										COMPRESSION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)									
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>										<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>										<p>FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.</p>										<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>									
PERCENTAGE OF MATERIAL										GROUND WATER										WEATHERING										MISCELLANEOUS SYMBOLS									
<p>ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL</p> <p>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</p>										<p>▽ 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</p>										<p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) 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 (SL.) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i> 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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i> 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.</p>										<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY</p> <p>DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SPT N-VALUE</p> <p>SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE</p>									
CONSISTENCY OR DENSENESS										RECOMMENDATION SYMBOLS										ROCK HARDNESS										ABBREVIATIONS									
<p>PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</p>										<p>UNDERCUT EXCAVATION UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>										<p>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 GROUDED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROUDED 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 FINGER NAIL.</p>										<p>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</p> <p>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</p> <p>VST - VANE SHEAR TEST WEA. - WEATHERED UG - UNIT WEIGHT UG - DRY UNIT WEIGHT</p> <p>SAMPLE ABBREVIATIONS S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>									
TEXTURE OR GRAIN SIZE										SOIL MOISTURE - CORRELATION OF TERMS										EQUIPMENT USED ON SUBJECT PROJECT										FRACTURE SPACING									
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053</p> <p>BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F SD.) SILT (SL.) CLAY (CL.)</p> <p>GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3</p>										<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p> <p>LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>										<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p> <p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT</p> <p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p> <p>CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</p> <p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>										<p>TERM SPACING MORE THAN 10 FEET 3 TO 10 FEET 1 TO 3 FEET 0.16 TO 1 FOOT LESS THAN 0.16 FEET</p> <p>TERM THICKNESS 4 FEET 1.5 - 4 FEET 0.16 - 1.5 FEET 0.03 - 0.16 FEET 0.008 - 0.03 FEET < 0.008 FEET</p>									
PLASTICITY										INDURATION										NOTES:										FRAC. MARK: BL-3, -L- STA. I4+55, 29' RT									
<p>NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM HIGHLY PLASTIC 26 OR MORE HIGH</p>										<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>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.</p>										<p>FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>										<p>ELEVATION: 2039.89 FEET</p>									
COLOR										DATE: 8-15-14										DATE: 8-15-14										DATE: 8-15-14									
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>																																							

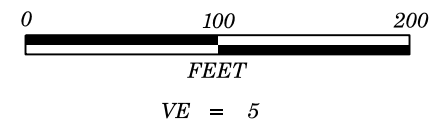
PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
BRIDGE NO. 902 ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD	



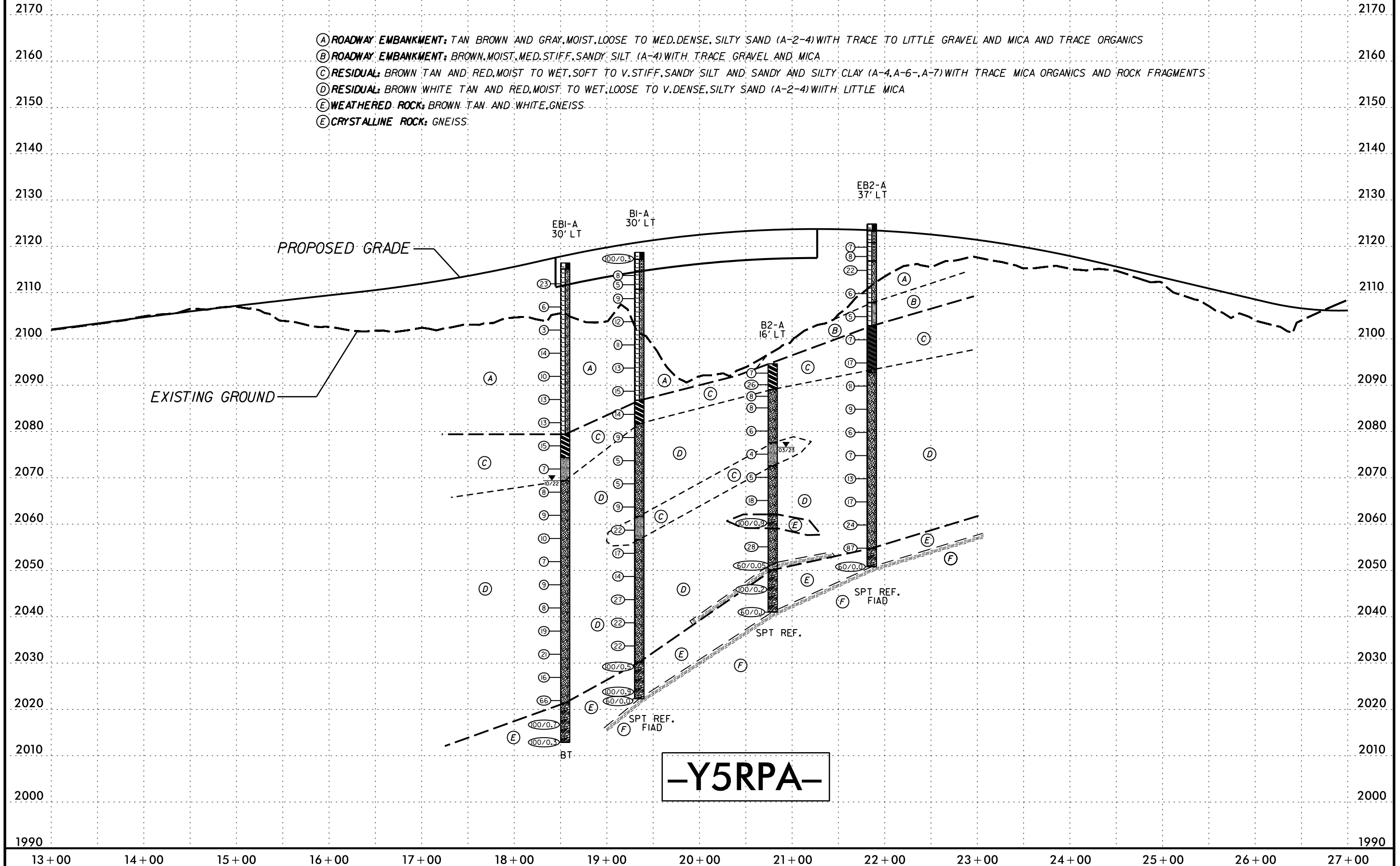
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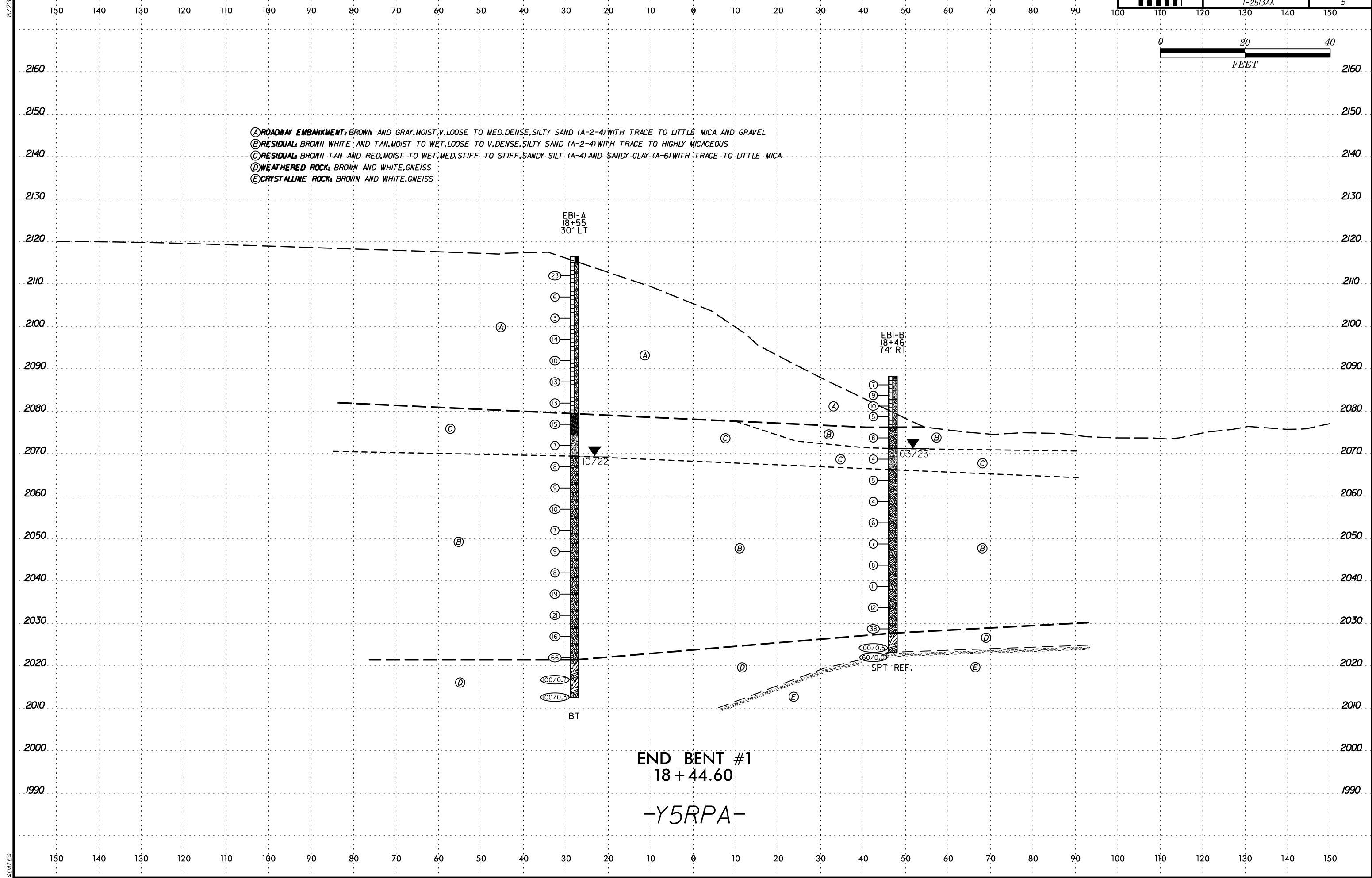
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- BRIDGE SKEW AT BENT NO. 1: 139° 27' 57"
- BRIDGE SKEW AT BENT NO. 2: 140° 16' 29"
- BRIDGE SKEW AT END BENT NO. 2: 140° 43' 47"

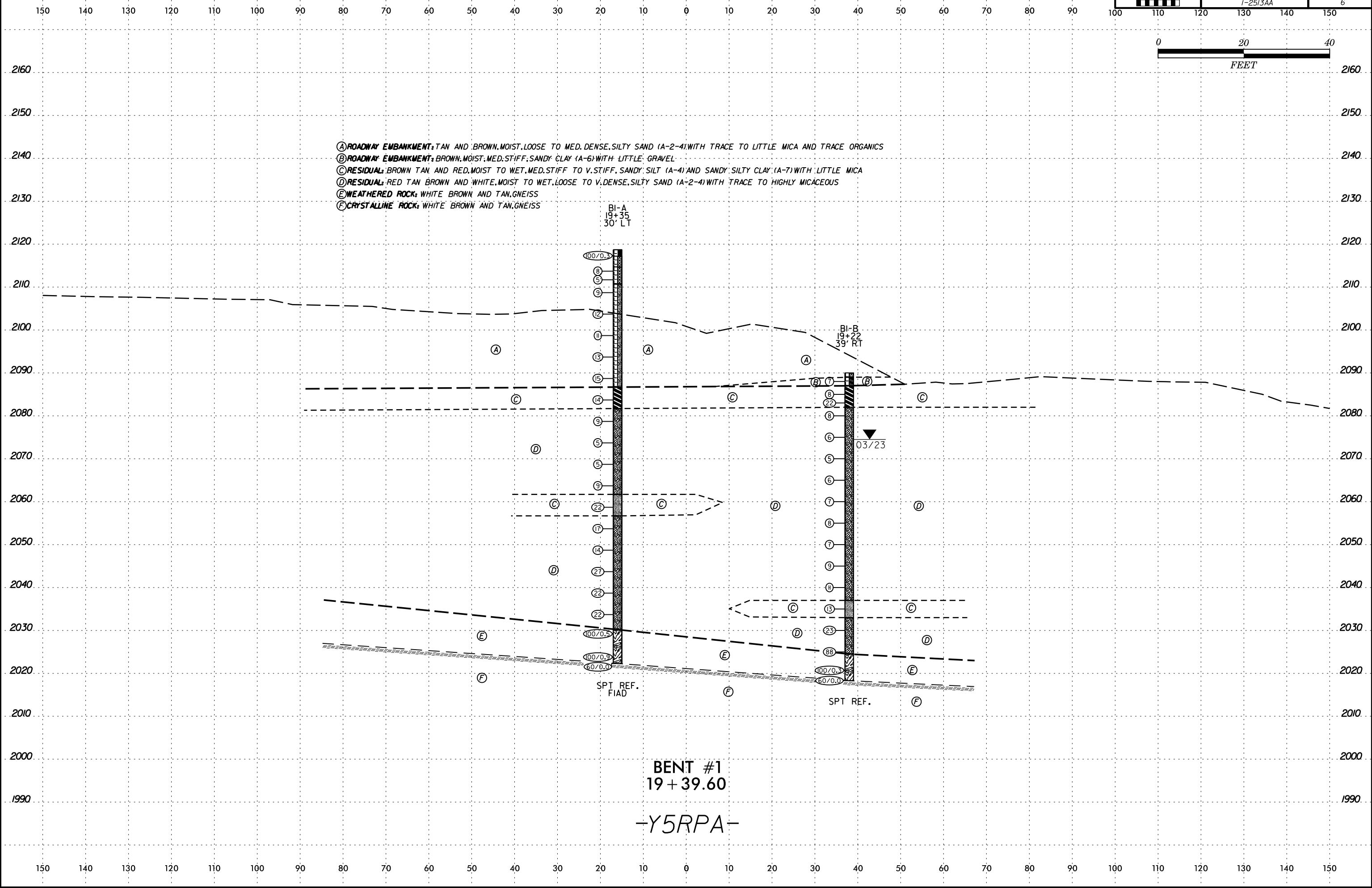
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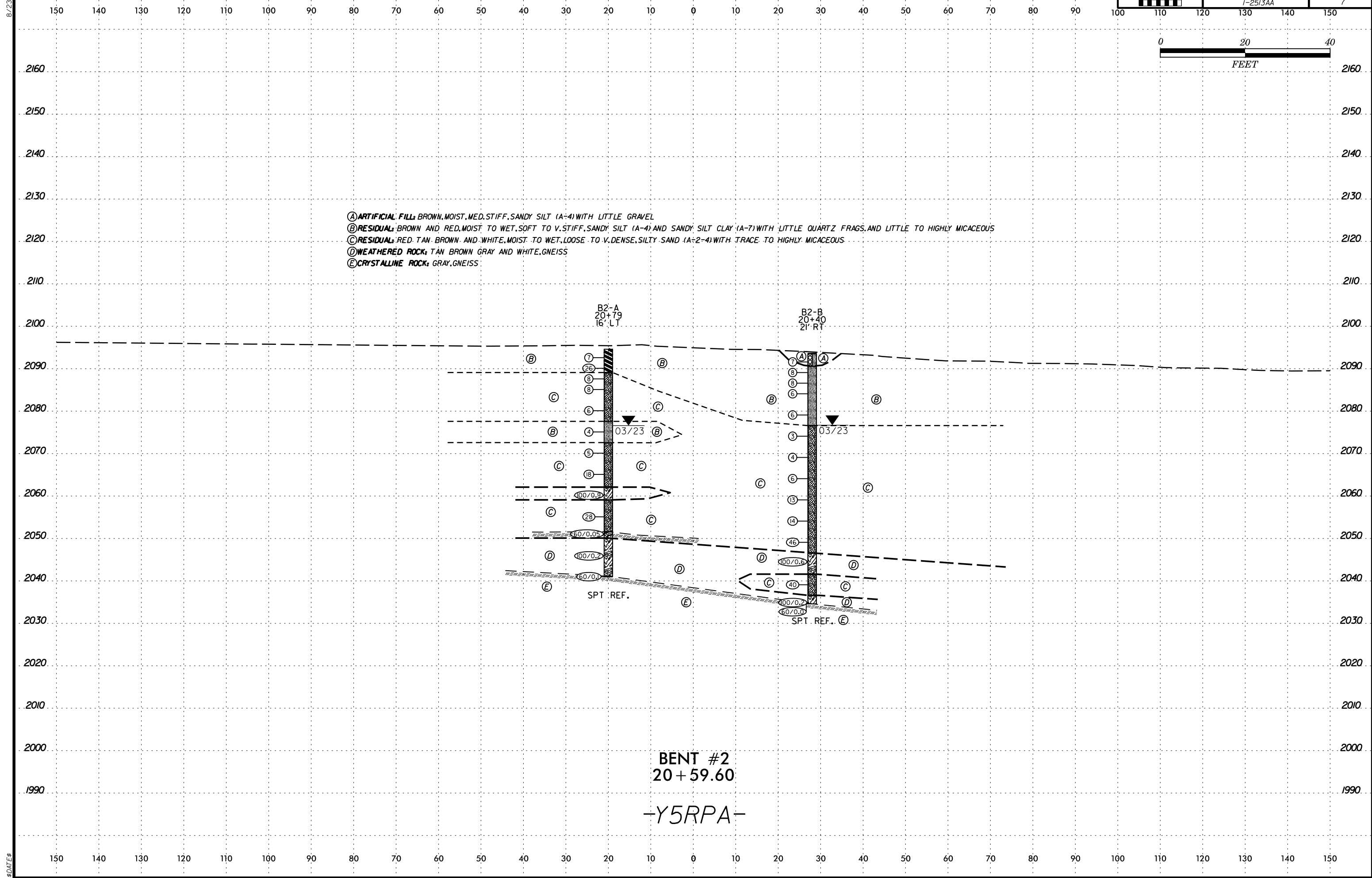


PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
BRIDGE NO. 902 ON -Y5RPA- OVER BLUE RIDGE SOUTHEREN RAILROAD	









- (A) ARTIFICIAL FILL: BROWN, MOIST, MED. STIFF, SANDY SILT (A-4) WITH LITTLE GRAVEL
- (B) RESIDUAL: BROWN AND RED, MOIST TO WET, SOFT TO V. STIFF, SANDY SILT (A-4) AND SANDY SILT CLAY (A-7) WITH LITTLE QUARTZ FRAGS. AND LITTLE TO HIGHLY MICACEOUS
- (C) RESIDUAL: RED, TAN, BROWN AND WHITE, MOIST TO WET, LOOSE TO V. DENSE, SILTY SAND (A-2-4) WITH TRACE TO HIGHLY MICACEOUS
- (D) WEATHERED ROCK: TAN BROWN GRAY AND WHITE, GNEISS
- (E) CRYSTALLINE ROCK: GRAY, GNEISS

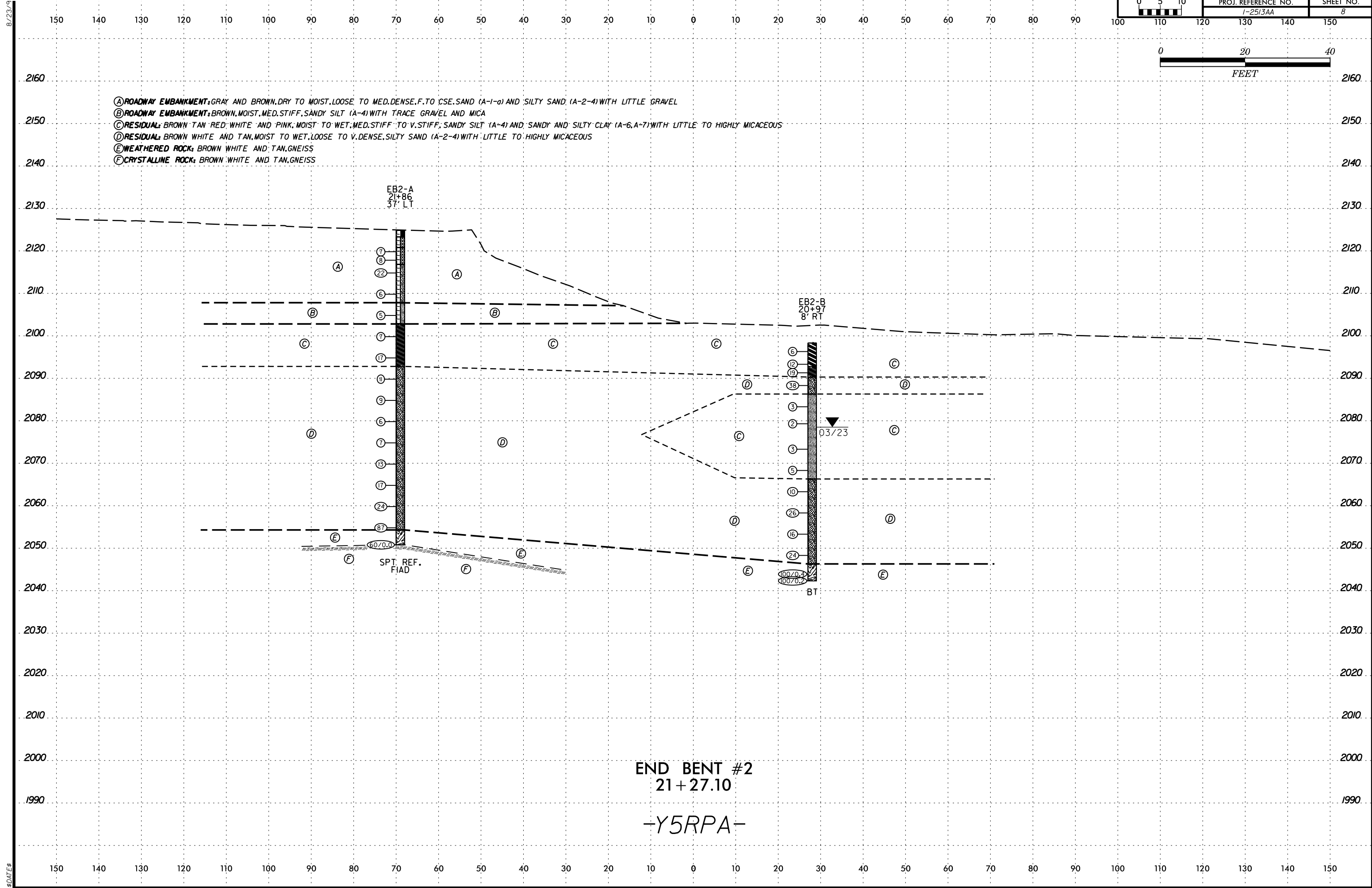
B2-A
20+79
16' LT

B2-B
20+40
21' RT

BENT #2
20+59.60
-Y5RPA-

8/23/9

8/23/9



END BENT #2
21+27.10
-Y5RPA-

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2	TIP 1-2513AA	COUNTY BUNCOMBE	GEOLOGIST Goodnight, D.J.
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+46	OFFSET 74 ft RT	ALIGNMENT -Y5RPA-
COLLAR ELEV. 2,088.2 ft	TOTAL DEPTH 65.0 ft	NORTHING 678,291	EASTING 919,217
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Odom, C.	START DATE 03/06/23	COMP. DATE 03/06/23	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2090															
	2,087.2	1.0	3	3	4									2,088.2	0.0
														2,087.2	1.0
2085	2,084.7	3.5	3	5	4										
	2,082.2	6.0	3	5	5									2,082.7	5.5
2080	2,079.7	8.5	1	2	3										
	2,076.2													2,076.2	12.0
2075	2,074.7	13.5	4	3	5										
	2,071.2													2,071.2	17.0
2070	2,069.7	18.5	1	2	2										
	2,066.2													2,066.2	22.0
2065	2,064.7	23.5	2	2	3										
	2,059.7	28.5	1	2	2										
2060	2,059.7	28.5	1	2	2										
	2,054.7	33.5	1	2	4										
2055	2,054.7	33.5	1	2	4										
	2,049.7	38.5	2	2	5										
2050	2,049.7	38.5	2	2	5										
	2,044.7	43.5	2	3	5										
2045	2,044.7	43.5	2	3	5										
	2,039.7	48.5	2	4	7										
2040	2,039.7	48.5	2	4	7										
	2,034.7	53.5	3	5	7										
2035	2,034.7	53.5	3	5	7										
	2,029.7	58.5	10	19	19										
2030	2,029.7	58.5	10	19	19										
	2,027.7													2,027.7	60.5
2025	2,024.7	63.5													
	2,023.2	65.0	100/0.5											2,023.2	65.0
			60/0.0												

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 3/28/23

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,023.2 ft on CR: GNEISS

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.	
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)
BORING NO. B1-A		STATION 19+35		OFFSET 30 ft LT		ALIGNMENT -Y5RPA-	
COLLAR ELEV. 2,118.7 ft		TOTAL DEPTH 96.4 ft		NORTHING 678,207		EASTING 919,109	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Odom, C.		START DATE 10/19/22		COMP. DATE 10/20/22		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2120														2,118.7 GROUND SURFACE 0.0	
	2,117.6	1.1												2,117.2 CONCRETE PAVEMENT 1.5	
			100/0.3											ABC STONE	
2115	2,114.7	4.0	2	3	5									2,114.7 ROADWAY EMBANKMENT 4.0	
	2,112.7	6.0	3	1	4									GRAY TAN AND BROWN, LOOSE, F. TO CSE. SAND (A-1-a) WITH LITTLE GRAVEL AND MICA	
2110	2,109.7	9.0	3	4	5									2,110.7 TAN AND BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE TO LITTLE MICA AND TRACE ORGANICS 8.0	
2105	2,104.7	14.0	3	6	6										
2100	2,099.7	19.0	2	5	6										
2095	2,094.7	24.0	4	6	7										
2090	2,089.7	29.0	3	6	9										
2085	2,084.7	34.0	3	6	8									2,086.7 RESIDUAL 32.0	
														BROWN, STIFF, SANDY SILTY CLAY (A-7)	
2080	2,079.7	39.0	3	4	5									2,081.7 RED TAN AND BROWN, LOOSE, SILTY SAND (A-2-4) WITH LITTLE MICA 37.0	
2075	2,074.7	44.0	2	2	3										
2070	2,069.7	49.0	2	2	3										
2065	2,064.7	54.0	3	3	6										
2060	2,059.7	59.0	3	9	13									2,061.7 TAN, V. STIFF, SANDY SILT (A-4) WITH LITTLE MICA 57.0	
2055	2,054.7	64.0	3	7	10									2,056.7 BROWN AND WHITE, MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA 62.0	
2050	2,049.7	69.0	2	5	9										
2045	2,044.7	74.0	6	11	16										
2040															

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.	
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)
BORING NO. B1-A		STATION 19+35		OFFSET 30 ft LT		ALIGNMENT -Y5RPA-	
COLLAR ELEV. 2,118.7 ft		TOTAL DEPTH 96.4 ft		NORTHING 678,207		EASTING 919,109	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Odom, C.		START DATE 10/19/22		COMP. DATE 10/20/22		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2040	2,039.7	79.0	4	9	13										
2035	2,034.7	84.0	9	10	12									2,030.2 BROWN AND WHITE, MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA (continued) 88.5	
2030	2,029.7	89.0	100/0.5											2,030.2 WEATHERED ROCK 88.5	
														BROWN, GNEISS	
2025	2,024.7	94.0	21	79/0.4											
	2,022.3	96.4	60/0.0											2,022.3 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,022.3 ft on CR: GNEISS 96.4	

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

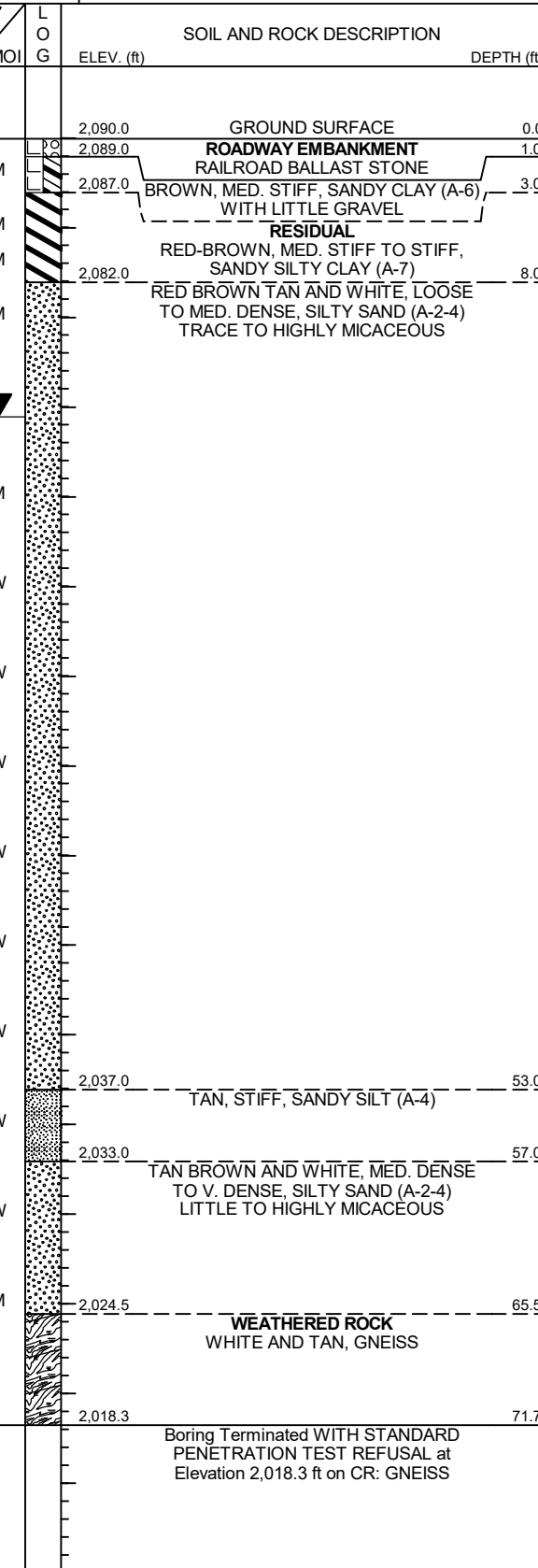
GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2	TIP 1-2513AA	COUNTY BUNCOMBE	GEOLOGIST Goodnight, D.J.
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74			GROUND WTR (ft)
BORING NO. B1-B	STATION 19+22	OFFSET 39 ft RT	ALIGNMENT -Y5RPA-
COLLAR ELEV. 2,090.0 ft	TOTAL DEPTH 71.7 ft	NORTHING 678,272	EASTING 919,135
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic
DRILLER Odom, C.	START DATE 03/06/23	COMP. DATE 03/06/23	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)
2090														2,090.0 GROUND SURFACE 0.0
	2,089.0	1.0	2	3	4									2,089.0 ROADWAY EMBANKMENT 1.0
	2,087.0	3.0												2,087.0 RAILROAD BALLAST STONE 3.0
2085	2,086.0	4.0	2	3	5									2,087.0 BROWN, MED. STIFF, SANDY CLAY (A-6) WITH LITTLE GRAVEL 3.9
	2,084.0	6.0	4	9	13									RESIDUAL
	2,082.0	8.0												2,082.0 RED-BROWN, MED. STIFF TO STIFF, SANDY SILTY CLAY (A-7) 8.0
2080	2,081.0	9.0	4	4	4									RED BROWN TAN AND WHITE, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) TRACE TO HIGHLY MICACEOUS
	2,076.0	14.0	2	3	3									
2075	2,071.0	19.0	2	2	3									
	2,066.0	24.0	2	3	3									
2065	2,061.0	29.0	2	2	5									
2060	2,056.0	34.0	2	3	5									
2055	2,051.0	39.0	2	2	5									
2050	2,046.0	44.0	2	3	6									
2045	2,041.0	49.0	3	4	7									
2040	2,036.0	54.0	5	5	8									
2035	2,031.0	59.0	6	10	13									
2030	2,026.0	64.0	10	30	58									
2025	2,021.0	69.0	100/0.3											
2020	2,018.3	71.7	60/0.0											

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 3/28/23



GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.												
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)											
BORING NO. B2-A		STATION 20+79		OFFSET 16 ft LT		ALIGNMENT -Y5RPA-												
COLLAR ELEV. 2,094.6 ft		TOTAL DEPTH 53.6 ft		NORTHING 678,249		EASTING 918,976												
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic														
DRILLER Odom, C.		START DATE 02/28/23		COMP. DATE 02/28/23		SURFACE WATER DEPTH N/A												
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION				
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)			
2095															2,094.6	GROUND SURFACE	0.0	
	2,093.6	1.0	2	2	5									M	RESIDUAL			
	2,091.1	3.5	6	11	15									M	RED-BROWN, MED. STIFF TO V. STIFF, SANDY SILTY CLAY (A-7) WITH LITTLE QUARTZ FRAGMENTS			
2090	2,088.6	6.0	2	4	4									M	2,089.1	RED-TAN AND BROWN, LOOSE, SILTY SAND (A-2-4) WITH LITTLE MICA	5.5	
	2,086.1	8.5	2	3	5									M				
2085	2,081.1	13.5	2	2	4									M				
2080	2,076.1	18.5	2	1	3									W	2,077.6	BROWN, SOFT TO MED. STIFF, SANDY SILT (A-4) HIGHLY MICACEOUS	17.0	
2075	2,071.1	23.5	2	2	3									W	2,072.6	TAN AND BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4)	22.0	
2070	2,066.1	28.5	4	6	12									W				
2065	2,061.1	33.5	33	67/0.4										W	2,062.1	WEATHERED ROCK	32.5	
2060	2,056.1	38.5	6	12	16									W	2,059.1	TAN AND BROWN, GNEISS	35.5	
2055	2,051.1	43.5	60/0.05											W		RESIDUAL		
	2,046.1	48.5	100/0.2												2,051.6	BROWN, MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	43.0	
2050	2,041.1	53.5	60/0.1												2,050.1	CRYSTALLINE ROCK	44.5	
																WEATHERED ROCK		
																GRAN AND TAN, GNEISS		
																2,041.1	CRYSTALLINE ROCK	53.5
																GRAY, GNEISS	53.6	
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,041.0 ft in CR: GNEISS		

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.											
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)										
BORING NO. B2-B		STATION 20+40		OFFSET 21 ft RT		ALIGNMENT -Y5RPA-											
COLLAR ELEV. 2,093.6 ft		TOTAL DEPTH 59.0 ft		NORTHING 678,276		EASTING 919,016											
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic													
DRILLER Odom, C.		START DATE 02/28/23		COMP. DATE 02/28/23		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)		
2095															2,093.6	GROUND SURFACE	0.0
	2,092.6	1.0	3	4	3									M	ARTIFICIAL FILL		
	2,090.1	3.5	2	3	5									M	BROWN, MED. STIFF, SANDY SILT (A-4) WITH LITTLE GRAVEL	3.0	
2090	2,087.6	6.0	3	3	5									M	RESIDUAL		
	2,085.1	8.5	2	3	3									M	BROWN, MED. STIFF, SANDY SILT (A-4) LITTLE TO HIGHLY MICACEOUS		
2085	2,080.1	13.5	2	3	3									M			
2080	2,075.1	18.5	1	1	2									W	2,076.6	TAN WHITE AND BROWN, V. LOOSE TO DENSE, SILTY SAND (A-2-4) LITTLE TO HIGHLY MICACEOUS	17.0
2075	2,070.1	23.5	1	2	2									W			
2070	2,065.1	28.5	2	2	4									W			
2065	2,060.1	33.5	2	5	8									W			
2060	2,055.1	38.5	5	6	8									W			
2055	2,050.1	43.5	11	20	26									W			
2050	2,045.1	48.5	65	35/0.1										W	2,046.6	WEATHERED ROCK	47.0
2045	2,040.1	53.5	16	18	22									W	2,041.6	TAN AND WHITE, GNEISS	52.0
2040	2,035.1	58.5	100/0.2											M	2,036.6	RESIDUAL	57.0
	2,034.6	59.0	60/0.0													TAN AND WHITE, DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	59.0
2035															2,034.6	WEATHERED ROCK	
																TAN AND WHITE, GNEISS	
																Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,034.6 ft on CR: GNEISS	

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 21+86		OFFSET 37 ft LT		ALIGNMENT -Y5RPA-	0 HR. 48.0									
COLLAR ELEV. 2,124.8 ft		TOTAL DEPTH 74.0 ft		NORTHING 678,245		EASTING 918,862	24 HR. FIAD									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/20/22		COMP. DATE 10/20/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2125														2,124.8	GROUND SURFACE	0.0
														2,123.3	CONCRETE PAVEMENT	1.5
														2,120.8	ABC STONE	4.0
2120	2,120.8	4.0	3	3	4									2,118.8	ROADWAY EMBANKMENT GRAY, LOOSE, F. TO CSE. SAND (A-1-a) WITH LITTLE GRAVEL	
	2,118.8	6.0	2	4	4									2,116.8	BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE GRAVEL	8.0
2115	2,115.8	9.0	5	7	15									2,110.8		
	2,110.8	14.0	3	2	4									2,107.8	BROWN, MED. STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL AND MICA	17.0
2105	2,105.8	19.0	2	2	3									2,102.8	RESIDUAL BROWN, MED. STIFF TO V. STIFF, SANDY CLAY (A-6)	22.0
2100	2,100.8	24.0	2	3	4									2,095.8		
2095	2,095.8	29.0	4	7	10									2,092.8	BROWN AND WHITE, LOOSE TO V. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	32.0
2090	2,090.8	34.0	4	5	6									2,085.8		
2085	2,085.8	39.0	2	4	5									2,080.8		
2080	2,080.8	44.0	2	3	3									2,075.8		
2075	2,075.8	49.0	2	2	5									2,070.8		
2070	2,070.8	54.0	3	5	8									2,065.8		
2065	2,065.8	59.0	5	7	10									2,060.8		
2060	2,060.8	64.0	8	10	14									2,055.8		
2055	2,055.8	69.0	8	11	76									2,050.8	WEATHERED ROCK BROWN AND WHITE, GNEISS	70.5
														2,050.8	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,050.8 ft on CR: GNEISS	74.0

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION BRIDGE ON -Y5RPA- OVER BLUE RIDGE SOUTHERN RAILROAD BETWEEN I-26 AND ALT. US-74							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 20+97		OFFSET 8 ft RT		ALIGNMENT -Y5RPA-	0 HR. 22.5									
COLLAR ELEV. 2,098.3 ft		TOTAL DEPTH 56.0 ft		NORTHING 678,274		EASTING 918,957	24 HR. 19.8									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 03/02/23		COMP. DATE 03/02/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2100														2,098.3	GROUND SURFACE	0.0
														2,094.3	RESIDUAL RED-BROWN, MED. STIFF TO STIFF, SANDY SILTY CLAY (A-7)	
2095	2,094.3	4.0	3	3	3									2,092.3	TAN, V. STIFF, SANDY CLAY (A-6)	5.5
	2,092.3	6.0	4	8	11									2,089.3	BROWN AND WHITE, DENSE SILTY SAND (A-2-4) WITH LITTLE QUARTZ FRAGMENTS	8.0
2090	2,089.3	9.0	8	14	24									2,084.3	PINK TAN BROWN AND WHITE, SOFT TO MED. STIFF, SANDY SILT (A-4) LITTLE TO HIGHLY MICACEOUS	12.0
2085	2,084.3	14.0	1	1	2									2,080.3		
2080	2,080.3	18.0	1	1	1									2,074.3		
2075	2,074.3	24.0	1	1	2									2,069.3		
2070	2,069.3	29.0	1	2	3									2,064.3	TAN AND BROWN, MED. DENSE, SILTY SAND (A-2-4) LITTLE TO HIGHLY MICACEOUS	32.0
2065	2,064.3	34.0	2	4	6									2,059.3		
2060	2,059.3	39.0	7	10	16									2,054.3		
2055	2,054.3	44.0	3	4	12									2,049.3		
2050	2,049.3	49.0	5	8	16									2,044.3		
2045	2,044.3	54.0												2,042.5	WEATHERED ROCK TAN AND BROWN, GNEISS	52.0
														2,042.3	Boring Terminated at Elevation 2,042.3 ft in WR: GNEISS	56.0

NCDOT BORE SINGLE I-213AA_GEO.GPJ_NC_DOT.GDT 3/28/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION CULVERT EXTENSION ON -Y-
(I-40) AT STATION 59+50 OVER RAGSDALE CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	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 1919 TOT-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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HAMM, J.R.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



DocuSigned by:

 C5CA5FED48E0435...
 SIGNATURE

1/9/2024
 DATE

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

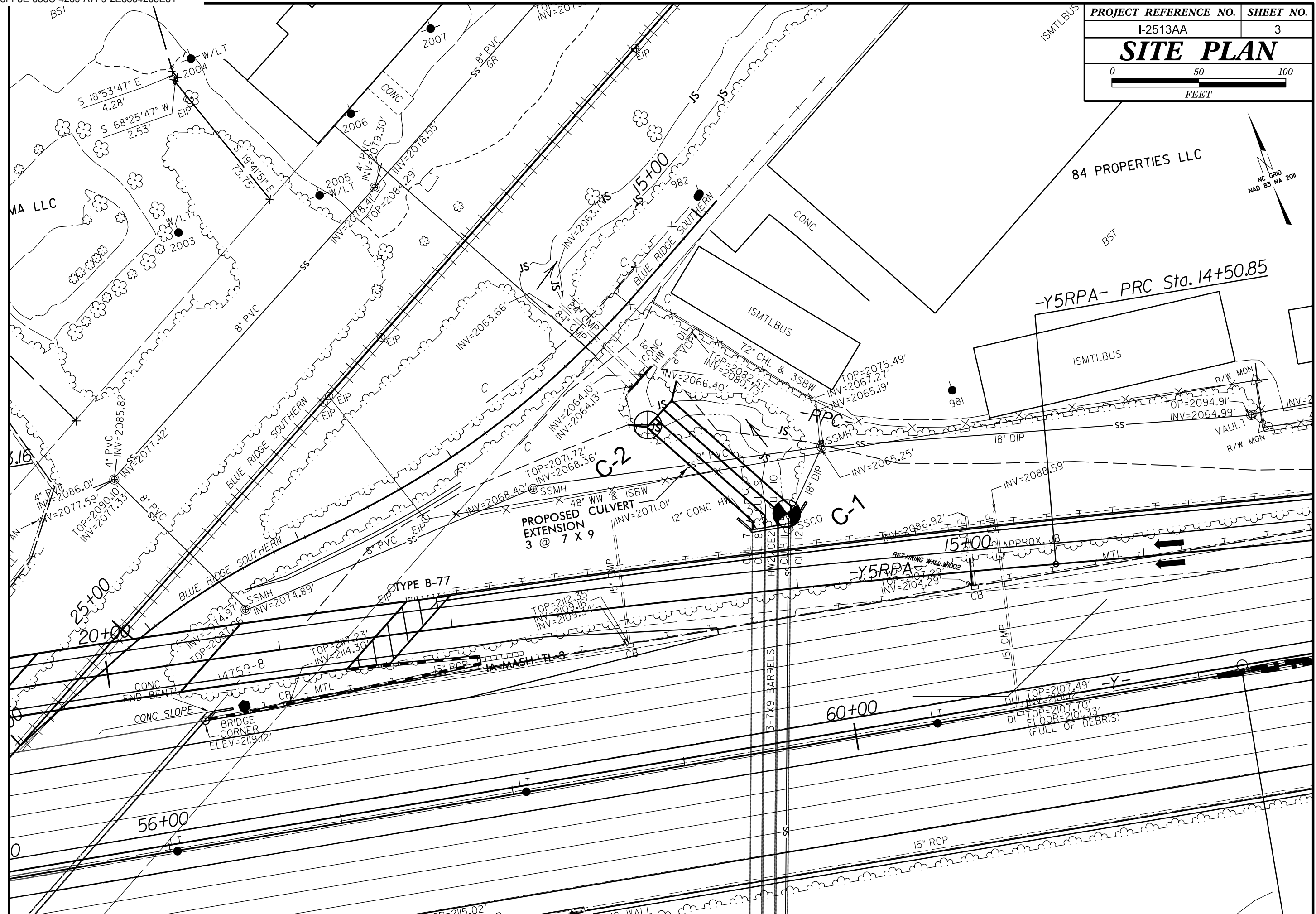
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION												GRADATION												ROCK DESCRIPTION												TERMS AND DEFINITIONS																							
<p>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 208, 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>												<p>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.</p>												<p>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:</p>												<p>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 DISLOADED 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																							
SOIL LEGEND AND AASHTO CLASSIFICATION												ANGULARITY OF GRAINS												WEATHERED ROCK (WR)												NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.																							
<p>GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS</p>												<p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>												<p>CRISTALLINE ROCK (CR)</p>												<p>FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.</p>																							
MINERALOGICAL COMPOSITION												COMPRESSION												NON-CRISTALLINE ROCK (NCR)												FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.																							
<p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.</p>												<p>SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50</p>												<p>COASTAL PLAIN SEDIMENTARY ROCK (CP)</p>												<p>COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.</p>																							
COMPRESSIBILITY												PERCENTAGE OF MATERIAL												WEATHERING												FRESH																							
<p>ORGANIC MATERIAL TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC > 10%</p>												<p>GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE 1 - 10% LITTLE 10 - 20% SOME 20 - 35% HIGHLY 35% AND ABOVE</p>												<p>ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.</p>												<p>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.</p>																							
GROUND WATER												MISCELLANEOUS SYMBOLS												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.																							
<p>WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p>												<p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</p>												<p>STATIC WATER LEVEL AFTER 24 HOURS</p>												<p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p>																							
<p>PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p>												<p>SOIL SYMBOL</p>												<p>SPRING OR SEEP</p>												<p>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. <i>IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF</i></p>																							
TEXTURE OR GRAIN SIZE												RECOMMENDATION SYMBOLS												SEVERE (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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>																							
<p>U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053</p>												<p>UNDERCUT EXCAVATION</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>Boulder (BLDR.) Cobble (COB.) Gravel (GR.) Coarse Sand (CSE, SD.) Fine Sand (F SD.) Silt (SL.) Clay (CL.)</p>												<p>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3</p>												<p>INFERRED SOIL BOUNDARY</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
SOIL MOISTURE - CORRELATION OF TERMS												ABBREVIATIONS												VERY SEVERE (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. <i>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</i>																							
<p>SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION</p>												<p>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</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>LL - LIQUID LIMIT PL - PLASTIC LIMIT OM - OPTIMUM MOISTURE SHRINKAGE LIMIT SL - SHRINKAGE LIMIT</p>												<p>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</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</p>												<p>VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT Wg - DRY UNIT WEIGHT</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</p>												<p>S - BULK SS - SPLIT SPOON ST - SHELBY TUBE RS - ROCK RT - RECOMPACTED TRIAXIAL CBR - CALIFORNIA BEARING RATIO</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>SOLID; AT OR NEAR OPTIMUM MOISTURE</p>												<p>SAMPLE ABBREVIATIONS</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</p>												<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
PLASTICITY												EQUIPMENT USED ON SUBJECT PROJECT												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.																							
<p>PLASTICITY INDEX (PI) DRY STRENGTH</p>												<p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>VERY LOW SLIGHT MEDIUM HIGH</p>												<p>HAMMER TYPE: <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>												<p>CORE SIZE: <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> -N</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
COLOR												FRACTURE SPACING												BEDDING												FRAGILE																							
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>												<p>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</p>												<p>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</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>											
EQUIPMENT USED ON SUBJECT PROJECT												INDURATION												MODERATELY INDURATED												GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.																							
<p>DRILL UNITS: <input type="checkbox"/> CME-45C <input type="checkbox"/> CME-55 <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> PORTABLE HOIST</p>												<p>ADVANCING TOOLS: <input type="checkbox"/> CLAY BITS <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input checked="" type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE * STEEL TEETH <input type="checkbox"/> TRICONE * TUNG-CARB. <input type="checkbox"/> CORE BIT</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>												<p>HAND TOOLS: <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> VANE SHEAR TEST</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
BENCH MARK ELEVATIONS TAKEN FROM I2513.ls.tbl.in												INDURATION												INDURATED												GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.																							
<p>BENCH MARK ELEVATIONS TAKEN FROM I2513.ls.tbl.in DATE: 04/15/2022</p>												<p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>ELEVATION: FEET</p>												<p>FRAGILE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>												<p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>DATE: 8-15-14</p>												<p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							
<p>DATE: 8-15-14</p>												<p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>												<p>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</p>												<p>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</p>																							

PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	



250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50

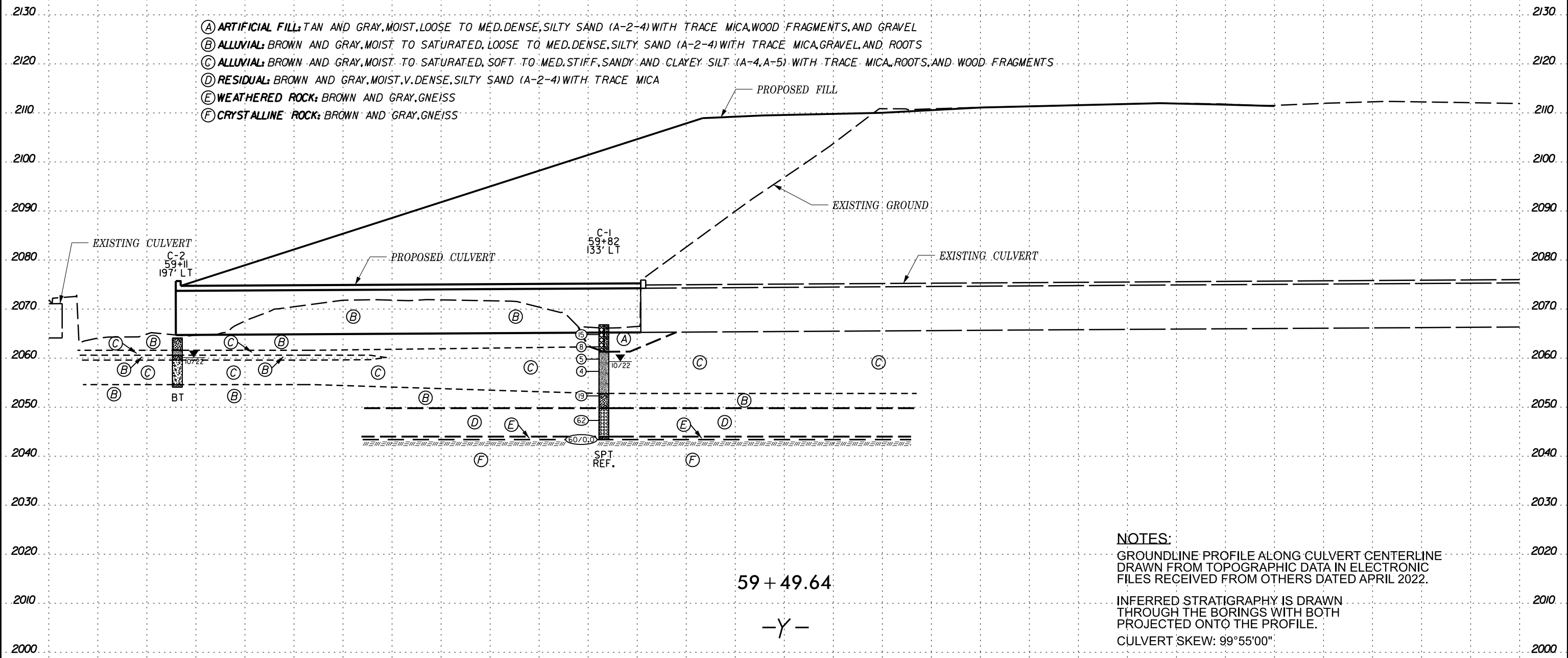
0 20 40
FEET

V.E. = 1

Y5RPA

Y

- (A) ARTIFICIAL FILL: TAN AND GRAY, MOIST, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA, WOOD FRAGMENTS, AND GRAVEL
- (B) ALLUVIAL: BROWN AND GRAY, MOIST TO SATURATED, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA, GRAVEL, AND ROOTS
- (C) ALLUVIAL: BROWN AND GRAY, MOIST TO SATURATED, SOFT TO MED. STIFF, SANDY AND CLAYEY SILT (A-4, A-5) WITH TRACE MICA, ROOTS, AND WOOD FRAGMENTS
- (D) RESIDUAL: BROWN AND GRAY, MOIST, V. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA
- (E) WEATHERED ROCK: BROWN AND GRAY, GNEISS
- (F) CRYSTALLINE ROCK: BROWN AND GRAY, GNEISS



59 + 49.64

Y

NOTES:
 GROUNDLINE PROFILE ALONG CULVERT CENTERLINE DRAWN FROM TOPOGRAPHIC DATA IN ELECTRONIC FILES RECEIVED FROM OTHERS DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
 CULVERT SKEW: 99°55'00"

8/23/23

250 240 230 220 210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP I-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION CULVERT EXTENSION ON -Y- (I-40) AT STATION 59+50 OVER RAGSDALE CREEK							GROUND WTR (ft)								
BORING NO. C-1		STATION 59+82		OFFSET 133 ft LT		ALIGNMENT -Y-									
COLLAR ELEV. 2,066.8 ft		TOTAL DEPTH 23.4 ft		NORTHING 678,218		EASTING 919,478									
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Odom, C.		START DATE 10/17/22		COMP. DATE 10/17/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2070															
2065	2,065.8	1.0	5	6	9								M	2,066.8 GROUND SURFACE 0.0	
	2,063.3	3.5	4	4	4								M	ARTIFICIAL FILL TAN AND GRAY, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA, WOOD FRAGMENTS AND GRAVEL	
2060	2,060.8	6.0	2	2	3								M	2,061.3 ALLUVIAL GRAY, SOFT TO MED. STIFF, SANDY SILT (A-4) WITH TRACE TO LITTLE WOOD FRAGMENTS AND TRACE MICA	5.5
	2,058.3	8.5	2	2	2								M		
2055	2,053.3	13.5	1	3	16								Sat.	2,052.8 GRAY, MED. DENSE, SILTY F. TO CSE. SAND (A-1-b) WITH SOME GRAVEL	14.0
2050	2,048.3	18.5	13	28	34								M	2,049.8 RESIDUAL BROWN AND GRAY, V. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA	17.0
2045	2,043.4	23.4												2,044.0 WEATHERED ROCK BROWN AND GRAY, GNEISS Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,043.4 ft on CR: GNEISS	22.8 23.4

WBS 34165.1.2		TIP I-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION CULVERT EXTENSION ON -Y- (I-40) AT STATION 59+50 OVER RAGSDALE CREEK							GROUND WTR (ft)								
BORING NO. C-2		STATION 59+11		OFFSET 197 ft LT		ALIGNMENT -Y-									
COLLAR ELEV. 2,064.1 ft		TOTAL DEPTH 10.0 ft		NORTHING 678,285		EASTING 919,391									
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD Hand Auger		HAMMER TYPE N/A									
DRILLER GOODNIGHT, D.J.		START DATE 10/13/22		COMP. DATE 10/13/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2065															
													M	2,064.1 GROUND SURFACE 0.0	
2060													W	2,061.6 ALLUVIAL BROWN, LOOSE, SILTY SAND (A-2-4) WITH TRACE ROOTS	2.5
													W	2,060.6 BROWN AND GRAY, SOFT, MOTTLED SANDY SILT (A-4) WITH TRACE ROOTS	3.5
													W	2,059.6 GRAY, LOOSE, SILTY SAND (A-2-4) WITH TRACE MICA	4.5
2055													Sat.	2,054.6 GRAY, SOFT, SANDY CLAYEY SILT (A-5) WITH TRACE ROOTLETS	9.5
														2,054.1 TANA ND GRAY, LOOSE, CSE SAND (A-1-a) WITH SOME GRAVEL	10.0
														Boring Terminated at Elevation 2,054.1 ft in ALLUVIAL: (A-1-a)	

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/21/23

REFERENCE: I-2513AA

PROJECT: 34165

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION CULVERT EXTENSION ON -RPC-
(I-40 EASTBOUND RAMP TO I-26 EASTBOUND) AT
STATION 24+64 OVER UNNAMED TRIBUTARY
TO HOMINY CREEK

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5	BORE LOGS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	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 1919 TOT-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:

- 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.
- BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HAMM, J.R.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



DocuSigned by:

Stephen Crockett

1/9/2024

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SIGNATURE

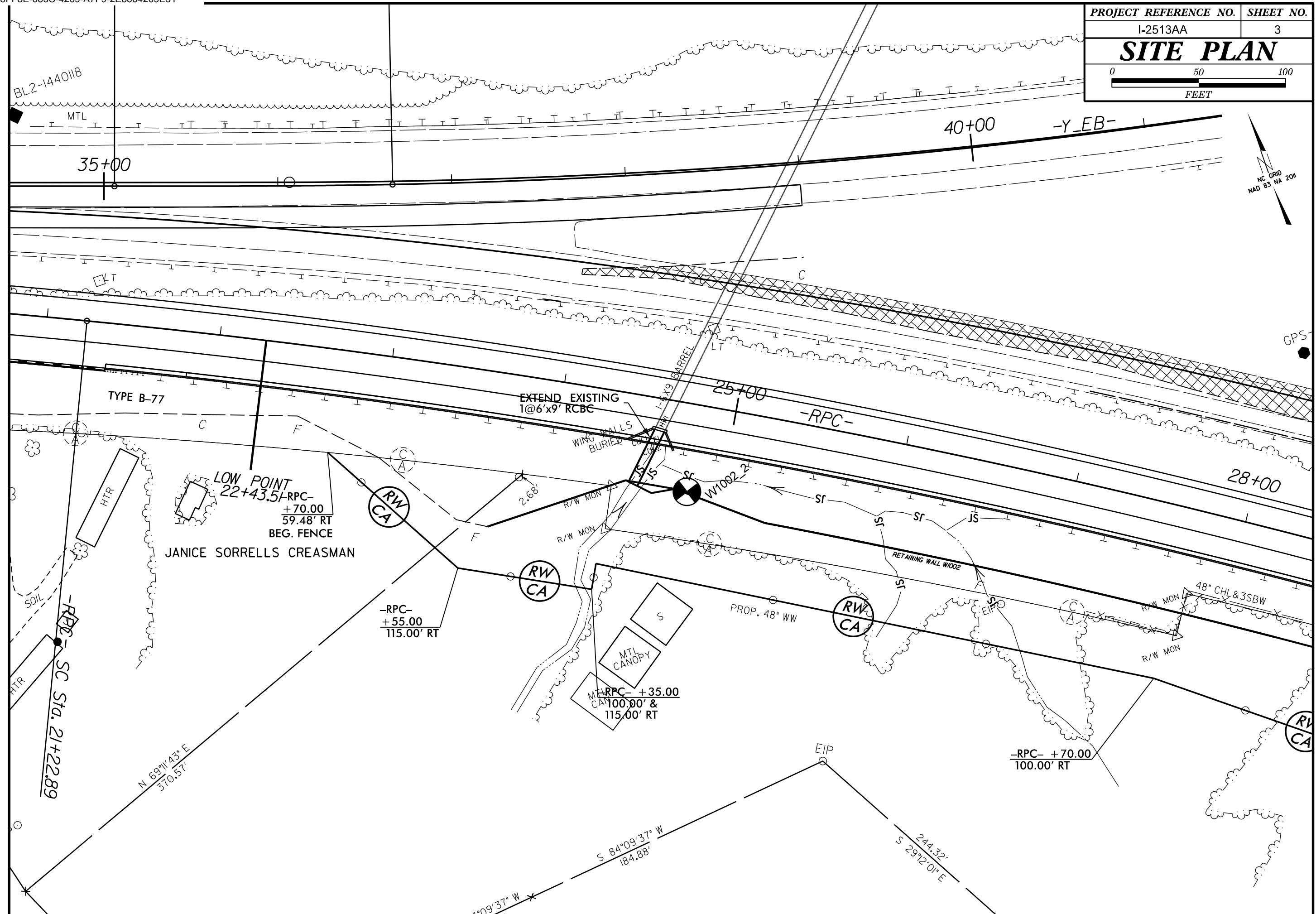
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DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with 4 main columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, and TERMS AND DEFINITIONS. Includes sub-sections like SOIL LEGEND AND AASHTO CLASSIFICATION, CONSISTENCY OR DENSENESS, TEXTURE OR GRAIN SIZE, SOIL MOISTURE - CORRELATION OF TERMS, PLASTICITY, COLOR, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, and INDURATION.

PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	
 0 50 100 FEET	



BL2-1440118

MTL

35+00

40+00

-Y_EB-

TYPE B-77

EXTEND EXISTING
1@6'x9' RCBC

25+00

-RPC-

LOW POINT
22+43.5 -RPC-
+70.00
59.48' RT
BEG. FENCE

JANICE SORRELLS CREASMAN

RW
CA

RW
CA

-RPC-
+55.00
115.00' RT

RW
CA

MTRPC +35.00
100.00' &
115.00' RT

-RPC- +70.00
100.00' RT

RW
CA

SC Sta. 21+22.89

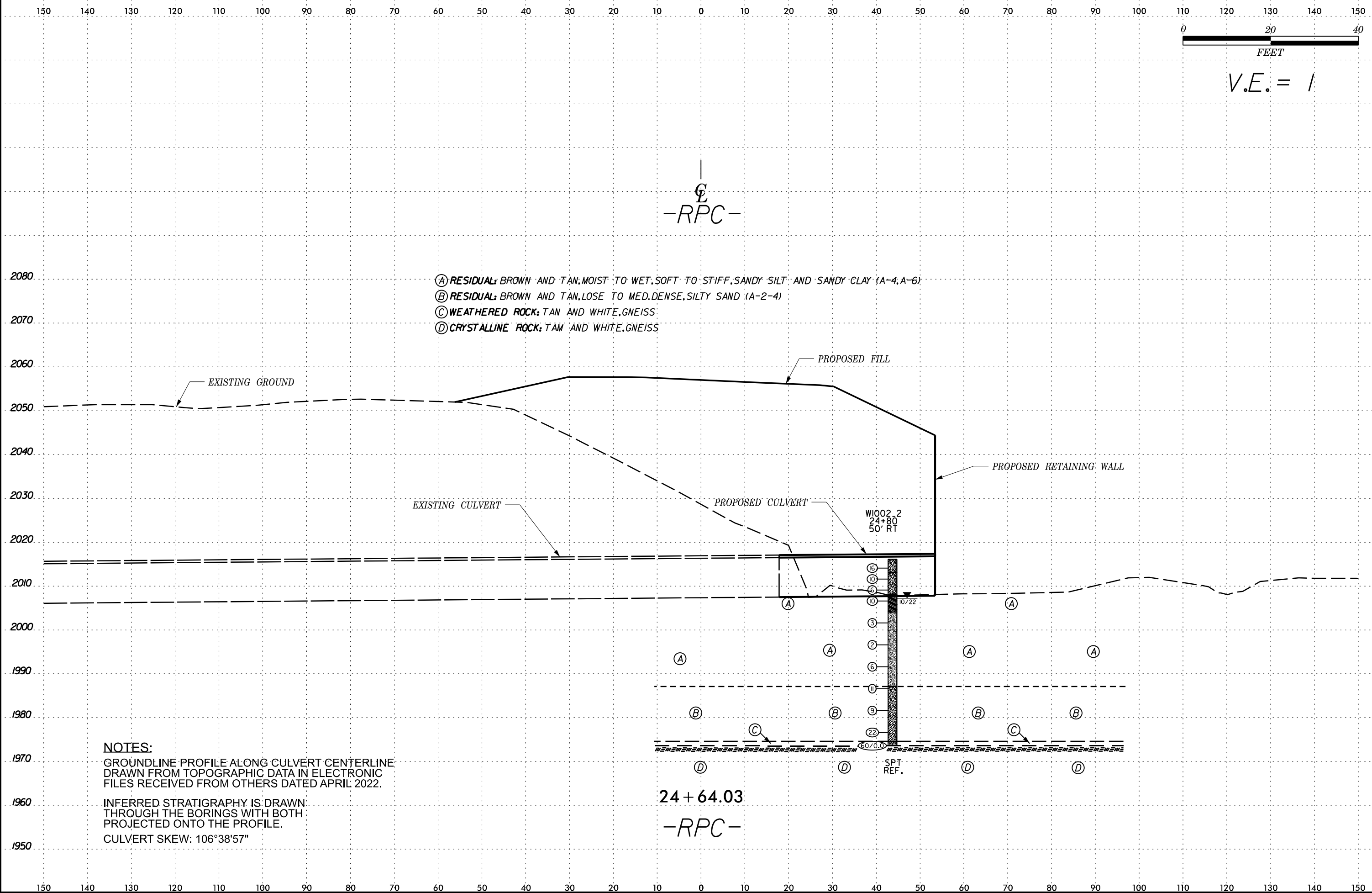
N 69°11'43" E
370.57'

S 84°09'37" W
184.88'

S 29°12'01" E
244.32'

EIP

GPS



—RPC—

V.E. = 1

- Ⓐ RESIDUAL: BROWN AND TAN, MOIST TO WET, SOFT TO STIFF, SANDY SILT AND SANDY CLAY (A-4, A-6)
- Ⓑ RESIDUAL: BROWN AND TAN, LOSE TO MED. DENSE, SILTY SAND (A-2-4)
- Ⓒ WEATHERED ROCK: TAN AND WHITE, GNEISS
- Ⓓ CRYSTALLINE ROCK: TAN AND WHITE, GNEISS

NOTES:
 GROUNDLINE PROFILE ALONG CULVERT CENTERLINE DRAWN FROM TOPOGRAPHIC DATA IN ELECTRONIC FILES RECEIVED FROM OTHERS DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
 CULVERT SKEW: 106°38'57"

24 + 64.03
—RPC—

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP I-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION CULVERT EXT. ON -RPC- (I-40 EB RAMP TO I-26 EB) AT STA. 24+64 OVER UT TO HOMINY CREEK							GROUND WTR (ft)									
BORING NO. W1002_2		STATION 24+80		OFFSET 50 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,016.1 ft		TOTAL DEPTH 42.5 ft		NORTHING 676,221		EASTING 925,176										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/10/22		COMP. DATE 10/10/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
2020																
2015	2,015.1	1.0	8	8	8									2,016.1	GROUND SURFACE	0.0
	2,012.6	3.5	5	5	5									2,013.1	RESIDUAL BROWN, MED. DENSE, SILTY SAND (A-2-4)	3.0
2010	2,010.1	6.0	3	2	4										TAN AND BROWN, LOOSE TO MED. DENSE, CLAYEY SILTY SAND (A-2-5)	
	2,007.6	8.5	3	4	6									2,008.1	TAN, STIFF, SANDY CLAY (A-6)	8.0
2005	2,002.6	13.5	3	2	1									2,004.1	BROWN-TAN, SOFT TO MED. STIFF, SANDY SILT (A-4)	12.0
2000	1,997.6	18.5	1	1	1											
1995	1,992.6	23.5	2	3	3											
1990	1,987.6	28.5	3	4	7									1,987.1	BROWN AND TAN-BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4)	29.0
1985	1,982.6	33.5	3	4	5											
1980	1,977.6	38.5	4	5	17											
1975	1,973.6	42.5	60/0.0											1,974.6	WEATHERED ROCK TAN AND WHITE, GNEISS	41.5
														1,973.6		42.5
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,973.6 ft on CR: GNEISS	

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/21/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5-7	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W601, FROM
-Y5RPA- STATION 22+00.00, 25.50' LT TO -Y5RPA-
STATION 26+60.00, 25.50' LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	7

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- NOTES:
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PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE SEPTEMBER 2023



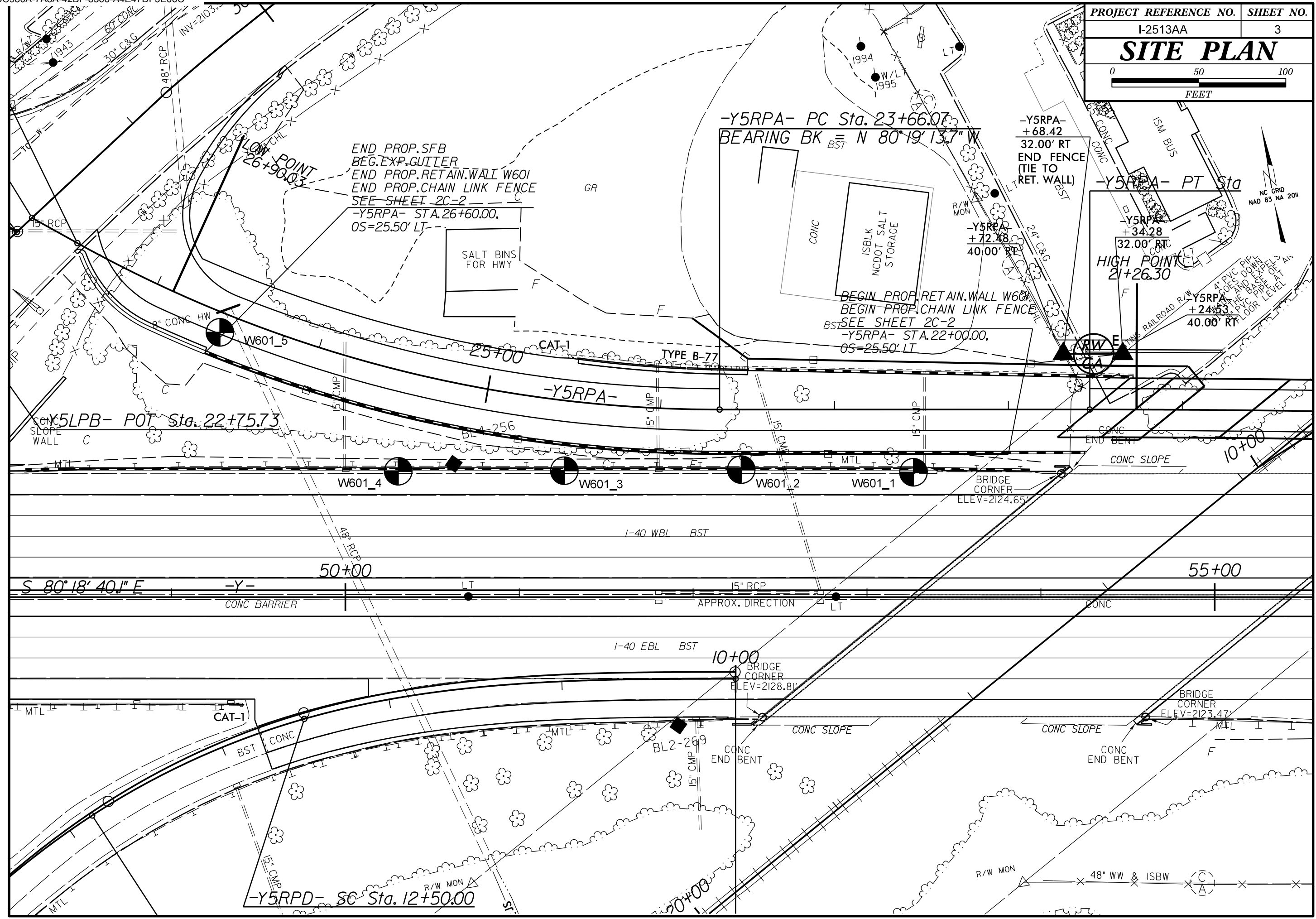
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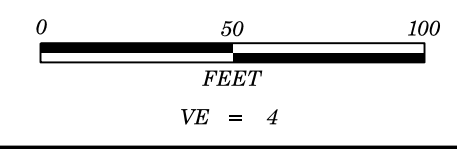
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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SUBSURFACE INVESTIGATION
 SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

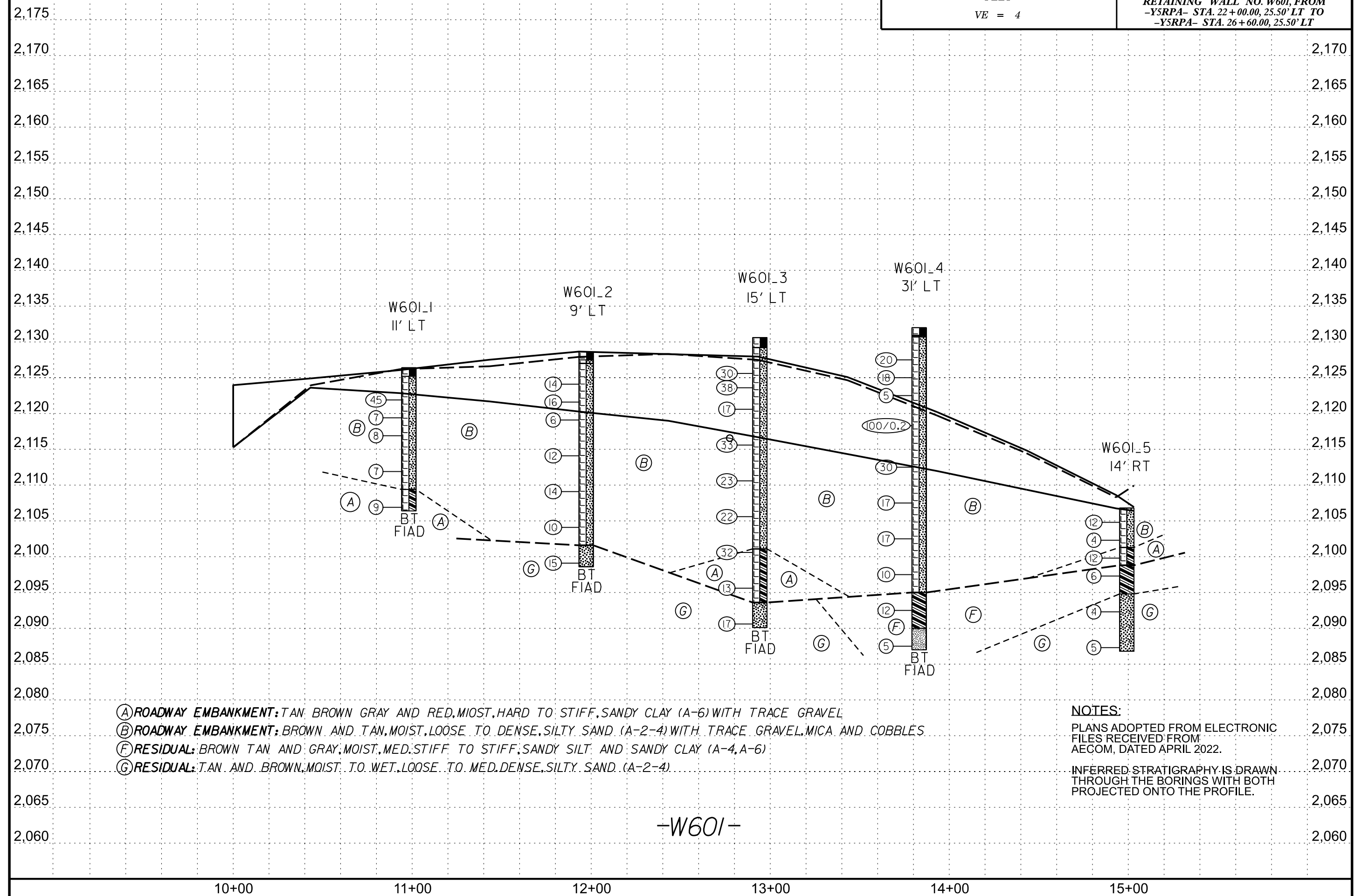
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS									
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 208, 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										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.										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 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:										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 DISLOADED 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 (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 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
MINERALOGICAL COMPOSITION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)										WEATHERING									
COMPRESSION										PERCENTAGE OF MATERIAL										GROUND WATER										MISCELLANEOUS SYMBOLS									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS										EQUIPMENT USED ON SUBJECT PROJECT									
CONSISTENCY OR DENSENESS										ROCK HARDNESS										FRACTURE SPACING										BEDDING									
PLASTICITY										INDURATION										NOTES:										INDURATION									
COLOR										INDURATION										INDURATION										INDURATION									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																							

PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	
0 50 100 FEET	





PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
RETAINING WALL NO. W601, FROM	
-YSRPA- STA. 22+00.00, 25.50' LT TO	
-YSRPA- STA. 26+60.00, 25.50' LT	



- (A) ROADWAY EMBANKMENT: TAN BROWN GRAY AND RED, MOST, HARD TO STIFF, SANDY CLAY (A-6) WITH TRACE GRAVEL
- (B) ROADWAY EMBANKMENT: BROWN AND TAN, MOIST, LOOSE TO DENSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL, MICA AND COBBLES
- (F) RESIDUAL: BROWN TAN AND GRAY, MOIST, MED: STIFF TO STIFF, SANDY SILT AND SANDY CLAY (A-4, A-6)
- (G) RESIDUAL: TAN AND BROWN, MOIST TO WET, LOOSE TO MED. DENSE, SILTY SAND (A-2-4)

NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM AECOM, DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

-W601-

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION RETAINING WALL NO. W601, FROM -Y5RPA- STA. 22+00.00, 25.50' LT TO -Y5RPA- STA. 26+60.00, 25.50' LT						GROUND WTR (ft)									
BORING NO. W601_1		STATION 22+55		OFFSET 36 ft LT		ALIGNMENT -Y5RPA-									
COLLAR ELEV. 2,126.4 ft		TOTAL DEPTH 20.0 ft		NORTHING 678,257		EASTING 918,795									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Odom, C.		START DATE 10/19/22		COMP. DATE 10/19/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2130															
2125															
2120	2,122.9	3.5	20	26	19										
2115	2,120.4	6.0	5	3	4										
2110	2,117.9	8.5	3	3	5										
	2,112.9	13.5	3	3	4										
	2,107.9	18.5	3	3	6										

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION RETAINING WALL NO. W601, FROM -Y5RPA- STA. 22+00.00, 25.50' LT TO -Y5RPA- STA. 26+60.00, 25.50' LT						GROUND WTR (ft)									
BORING NO. W601_2		STATION 23+54		OFFSET 35 ft LT		ALIGNMENT -Y5RPA-									
COLLAR ELEV. 2,128.6 ft		TOTAL DEPTH 30.0 ft		NORTHING 678,275		EASTING 918,697									
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER Odom, C.		START DATE 10/19/22		COMP. DATE 10/19/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2130															
2125	2,128.6														
2120	2,127.5														
2115	2,127.0														
2110	2,125.1	3.5	5	7	7										
2105	2,122.6	6.0	5	9	7										
2100	2,120.1	8.5	2	2	4										
	2,115.1	13.5	4	5	7										
	2,110.1	18.5	3	6	8										
	2,105.1	23.5	5	5	5										
	2,100.1	28.5	5	7	8										

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W601, FROM -Y5RPA- STA. 22+00.00, 25.50' LT TO -Y5RPA- STA. 26+60.00, 25.50' LT							GROUND WTR (ft)									
BORING NO. W601_3		STATION 24+51		OFFSET 40 ft LT		ALIGNMENT -Y5RPA-										
COLLAR ELEV. 2,130.6 ft		TOTAL DEPTH 40.5 ft		NORTHING 678,292		EASTING 918,597										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/21/22		COMP. DATE 10/21/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2135																
2130															2,130.6	GROUND SURFACE 0.0
															2,129.2	ASPHALT 1.4
	2,126.6	4.0	14	11	19											
2125	2,124.6	6.0	15	22	16											
	2,121.6	9.0	7	8	9											
2120																
	2,116.6	14.0	19	18	15											
2115																
	2,111.6	19.0	5	8	15											
2110																
	2,106.6	24.0	5	8	14											
2105																
	2,101.6	29.0	7	13	19											
2100															2,101.1	BROWN AND TAN-RED, STIFF TO HARD, SANDY CLAY (A-6) 29.5
	2,096.6	34.0	4	5	8											
2095															2,093.6	RESIDUAL 37.0
	2,091.6	39.0	7	8	9										2,090.1	TAN-BROWN, MED. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA 40.5
																Boring Terminated at Elevation 2,090.1 ft in RESIDUAL: (A-2-4)

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W601, FROM -Y5RPA- STA. 22+00.00, 25.50' LT TO -Y5RPA- STA. 26+60.00, 25.50' LT							GROUND WTR (ft)									
BORING NO. W601_4		STATION 25+40		OFFSET 57 ft LT		ALIGNMENT -Y5RPA-										
COLLAR ELEV. 2,132.0 ft		TOTAL DEPTH 45.0 ft		NORTHING 678,308		EASTING 918,503										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/19/22		COMP. DATE 10/19/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2135																
															2,132.0	GROUND SURFACE 0.0
															2,130.9	ASPHALT 1.1
															2,130.7	AGGREGATE BASE COURSE 1.3
	2,128.5	3.5	5	6	14											
2125	2,126.0	6.0	8	9	9											
	2,123.5	8.5	2	2	3											
2120																
	2,118.5	13.5	100/0.2												100/0.2	
2115																
	2,113.5	18.5	10	13	17											
2110																
	2,108.5	23.5	7	6	11											
2105																
	2,103.5	28.5	3	7	10											
2100																
	2,098.5	33.5	5	5	5											
2095															2,095.0	RESIDUAL 37.0
	2,093.5	38.5	3	4	8											
2090															2,090.0	RESIDUAL 42.0
	2,088.5	43.5	2	2	3										2,087.0	TAN-BROWN, MED. STIFF, SANDY SILT (A-4) WITH LITTLE MICA 45.0
																Boring Terminated at Elevation 2,087.0 ft in RESIDUAL: (A-4)

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W601, FROM -Y5RPA- STA. 22+00.00, 25.50' LT TO -Y5RPA- STA. 26+60.00, 25.50' LT							GROUND WTR (ft)									
BORING NO. W601_5		STATION 26+56		OFFSET 11 ft LT		ALIGNMENT -Y5RPA-										
COLLAR ELEV. 2,106.8 ft		TOTAL DEPTH 20.0 ft		NORTHING 678,404		EASTING 918,415										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
2110																
2105	2,105.8	1.0	3	4	8								M	2,106.8	0.0	GROUND SURFACE
	2,103.3	3.5	2	2	2								M			ROADWAY EMBANKMENT BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL
2100	2,100.8	6.0	4	4	8								M	2,101.3	5.5	BROWN AND GRAY, STIFF, SANDY CLAY (A-6) WITH TRACE GRAVEL
	2,098.3	8.5	3	3	3								M	2,098.8	8.0	RESIDUAL TAN, MED. STIFF, SANDY CLAY (A-6)
2095														2,094.8	12.0	TAN, LOOSE, SILTY SAND (A-2-4)
	2,093.3	13.5	2	2	2								W			
2090																
	2,088.3	18.5	2	2	3								W	2,086.8	20.0	Boring Terminated at Elevation 2,086.8 ft in RESIDUAL: (A-2-4)

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT_9/8/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W602, FROM
-Y5RPA- STATION 21 + 41.06, 17.63' LT TO -Y5RPA-
STATION 23 + 83.03, 52.43' RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	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.

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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE SEPTEMBER 2023



DocuSigned by:
Stephen Crockett 9/8/2023
 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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<p>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 208, 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>

 | | | | | | | | | | <p>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.</p> | | | | | | | | | | <p>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:</p> | | | | | | | | | | <p>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 DISLOGGED 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
 TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1"> <thead> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (<= 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>SYMBOL</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> <td>[Symbol]</td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN 35 MX 35 MX</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>GRANULAR SOILS</td> <td>SILT-CLAY SOILS</td> <td>MUCK, PEAT</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td> <td>-</td> <td>40 MX 41 MN NP</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 11 MN 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td>40 MX 41 MN 10 MX 11 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSUITABLE</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> <td colspan="10"></td> </tr> <tr> <td colspan="10"> <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE
LOOSE
MEDIUM DENSE
DENSE
VERY DENSE</td> <td>< 4
4 TO 10
10 TO 30
30 TO 50
> 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT
SOFT
MEDIUM STIFF
STIFF
VERY STIFF
HARD</td> <td>< 2
2 TO 4
4 TO 8
8 TO 15
15 TO 30
> 30</td> <td>< 0.25
0.25 TO 0.5
0.5 TO 1.0
1 TO 2
2 TO 4
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<tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> <td colspan="10"> <p align="center">INDURATION</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="10"> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). 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LOOSE
MEDIUM DENSE
DENSE
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30 TO 50
> 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT
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STIFF
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| GENERAL CLASS.

 | GRANULAR MATERIALS (<= 35% PASSING #200) | | | | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | | | | ORGANIC MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | A-1 | A-3 | A-2 | A-2-6 | A-2-7 | A-4 | A-5 | A-6 | A-7 | A-1, A-2 | A-3 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">CONSISTENCY OR DENSENESS</p> <table border="1"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESSIVE)</td> <td>VERY LOOSE
LOOSE
MEDIUM DENSE
DENSE
VERY DENSE</td> <td>< 4
4 TO 10
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> 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT
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 | | | | | | | | | | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | GENERALLY GRANULAR MATERIAL (NON-COHESSIVE) | VERY LOOSE
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30 TO 50
> 50 | N/A | GENERALLY SILT-CLAY MATERIAL (COHESIVE) | VERY SOFT
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VERY STIFF
HARD | < 2
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> 4 | <p align="center">MISCELLANEOUS SYMBOLS</p> <table border="1"> <tbody> <tr> <td>[Symbol]</td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td>[Symbol]</td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td>[Symbol]</td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td>[Symbol]</td> <td>SOIL SYMBOL</td> <td>[Symbol]</td> <td>SPT TEST BORING</td> <td>[Symbol]</td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td>[Symbol]</td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td>[Symbol]</td> <td>AUGER BORING</td> <td>[Symbol]</td> <td>SOUNDING ROD</td> </tr> <tr> <td>[Symbol]</td> <td>INFERRED SOIL BOUNDARY</td> <td>[Symbol]</td> <td>CORE BORING</td> <td>[Symbol]</td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td>[Symbol]</td> <td>INFERRED ROCK LINE</td> <td>[Symbol]</td> <td>MONITORING WELL</td> <td>[Symbol]</td> <td>SPT N-VALUE</td> </tr> <tr> <td>[Symbol]</td> <td>ALLUVIAL SOIL BOUNDARY</td> <td>[Symbol]</td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | [Symbol]
 | ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION | [Symbol] | DIP & DIP DIRECTION OF ROCK STRUCTURES | [Symbol] | SLOPE INDICATOR INSTALLATION | [Symbol] | SOIL SYMBOL | [Symbol] | SPT TEST BORING | [Symbol] | CONE PENETROMETER TEST | [Symbol] | ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT | [Symbol] | AUGER BORING | [Symbol] | SOUNDING ROD | [Symbol] | INFERRED SOIL BOUNDARY | [Symbol] | CORE BORING | [Symbol] | TEST BORING WITH CORE | [Symbol] | INFERRED ROCK LINE | [Symbol] | MONITORING WELL | [Symbol] | SPT N-VALUE | [Symbol] | ALLUVIAL SOIL BOUNDARY | [Symbol] | PIEZOMETER INSTALLATION | | | <p align="center">RECOMMENDATION SYMBOLS</p> <table border="1"> <tbody> <tr> <td>[Symbol]</td> <td>UNDERCUT EXCAVATION</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td>[Symbol]</td> <td>SHALLOW UNDERCUT</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | [Symbol] | UNDERCUT EXCAVATION | [Symbol] | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | [Symbol] | SHALLOW UNDERCUT | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | <p align="center">ABBREVIATIONS</p> <table border="1"> <tbody> <tr> <td>AR</td> <td>AUGER REFUSAL</td> <td>MD</td> <td>MEDIUM</td> <td>VST</td> <td>VANE SHEAR TEST</td> </tr> <tr> <td>BT</td> <td>BORING TERMINATED</td> <td>MICA</td> <td>MICACEOUS</td> <td>WEA.</td> <td>WEATHERED</td> </tr> <tr> <td>CL</td> <td>CLAY</td> <td>MOD.</td> <td>MODERATELY</td> <td>U</td> <td>UNIT WEIGHT</td> </tr> <tr> <td>CPT</td> <td>CLAY PENETRATION TEST</td> <td>NP</td> <td>NON PLASTIC</td> <td>U_G</td> <td>DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE</td> <td>COARSE</td> <td>ORG.</td> <td>ORGANIC</td> <td colspan="2">SAMPLE ABBREVIATIONS</td> </tr> <tr> <td>DMT</td> <td>DILATOMETER TEST</td> <td>PMT</td> <td>PRESSUREMETER TEST</td> <td>S</td> <td>BULK</td> </tr> <tr> <td>DPT</td> <td>DYNAMIC PENETRATION TEST</td> <td>SAP.</td> <td>SAPROLITE</td> <td>SS</td> <td>SPLIT SPOON</td> </tr> <tr> <td>e</td> <td>VOID RATIO</td> <td>SD.</td> <td>SAND, SANDY</td> <td>ST</td> <td>SHELBY TUBE</td> </tr> <tr> <td>F</td> <td>FINE</td> <td>SL.</td> <td>SILT, SILTY</td> <td>RS</td> <td>ROCK</td> </tr> <tr> <td>FOSS.</td> <td>FOSSILIFEROUS</td> <td>SLI.</td> <td>SLIGHTLY</td> <td>RT</td> <td>RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAC.</td> <td>FRACTURED, FRACTURES</td> <td>TCR</td> <td>TRICONE REFUSAL</td> <td>CBR</td> <td>CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>FRAGS.</td> <td>FRAGMENTS</td> <td>w</td> <td>MOISTURE CONTENT</td> <td></td> <td></td> </tr> <tr> <td>HI.</td> <td>HIGHLY</td> <td>V</td> <td>VERY</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | AR | AUGER REFUSAL | MD | MEDIUM | VST | VANE SHEAR TEST | BT | BORING TERMINATED | MICA | MICACEOUS | WEA. | WEATHERED | CL | CLAY | MOD. | MODERATELY | U | UNIT WEIGHT | CPT | CLAY PENETRATION TEST | NP | NON PLASTIC | U _G | DRY UNIT WEIGHT | CSE | COARSE | ORG. | ORGANIC | SAMPLE ABBREVIATIONS | | DMT | DILATOMETER TEST | PMT | PRESSUREMETER TEST | S | BULK | DPT | DYNAMIC PENETRATION TEST | SAP. | SAPROLITE | SS | SPLIT SPOON | e | VOID RATIO | SD. | SAND, SANDY | ST | SHELBY TUBE | F | FINE | SL.
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| PRIMARY SOIL TYPE

 | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | INFERRED ROCK LINE | [Symbol] | MONITORING WELL | [Symbol] | SPT N-VALUE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | ALLUVIAL SOIL BOUNDARY | [Symbol] | PIEZOMETER INSTALLATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | SHALLOW UNDERCUT | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">TEXTURE OR GRAIN SIZE</p> <table border="1"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>Boulder (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cobble (COB.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Gravel (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Coarse Sand (CSE, SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Fine Sand (F SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Silt (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Clay (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>

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| <p align="center">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PLASTIC RANGE (PI)</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>

 | | | | | | | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PLASTIC RANGE (PI) | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
 | | | 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 | <p align="center">BEDDING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> | | | | | | | | | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SOIL MOISTURE SCALE (ATTERBERG LIMITS)

 | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| LL - LIQUID LIMIT

 | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| PLASTIC RANGE (PI)

 | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| OM - OPTIMUM MOISTURE SHRINKAGE LIMIT

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| <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>

 | | | | | | | | | | NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | SLIGHTLY PLASTIC | 0-5 | VERY LOW | MODERATELY PLASTIC | 6-15 | SLIGHT | HIGHLY PLASTIC | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <p align="center">INDURATION</p> <table border="1"> <tbody> <tr> <td>FRIABLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>

 | | | | | | | | | | <p align="center">FRACTURE SPACING</p> <table border="1"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> | | | | | | | | | | 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 | <p align="center">BEDDING</p> <table border="1">
<thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> | | | | | | | | | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.</p>

 | | | | | | | | | | <p align="center">RECOMMENDATION SYMBOLS</p> <table border="1"> <tbody> <tr> <td>[Symbol]</td> <td>UNDERCUT EXCAVATION</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td>[Symbol]</td> <td>SHALLOW UNDERCUT</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | [Symbol] | UNDERCUT EXCAVATION | [Symbol] | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | [Symbol] | SHALLOW UNDERCUT | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | <p align="center">ABBREVIATIONS</p> <table
border="1"> <tbody> <tr> <td>AR</td> <td>AUGER REFUSAL</td> <td>MD</td> <td>MEDIUM</td> <td>VST</td> <td>VANE SHEAR TEST</td> </tr> <tr> <td>BT</td> <td>BORING TERMINATED</td> <td>MICA</td> <td>MICACEOUS</td> <td>WEA.</td> <td>WEATHERED</td> </tr> <tr> <td>CL</td> <td>CLAY</td> <td>MOD.</td> <td>MODERATELY</td> <td>U</td> <td>UNIT WEIGHT</td> </tr> <tr> <td>CPT</td> <td>CLAY PENETRATION TEST</td> <td>NP</td> <td>NON PLASTIC</td> <td>U_G</td> <td>DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE</td> <td>COARSE</td> <td>ORG.</td> <td>ORGANIC</td> <td colspan="2">SAMPLE ABBREVIATIONS</td> </tr> <tr> <td>DMT</td> <td>DILATOMETER TEST</td> <td>PMT</td> <td>PRESSUREMETER TEST</td> <td>S</td> <td>BULK</td> </tr> <tr> <td>DPT</td> <td>DYNAMIC PENETRATION TEST</td> <td>SAP.</td> <td>SAPROLITE</td> <td>SS</td> <td>SPLIT SPOON</td> </tr> <tr> <td>e</td> <td>VOID RATIO</td> <td>SD.</td> <td>SAND, SANDY</td> <td>ST</td> <td>SHELBY TUBE</td> </tr> <tr> <td>F</td> <td>FINE</td> <td>SL.</td> <td>SILT, SILTY</td> <td>RS</td> <td>ROCK</td> </tr> <tr> <td>FOSS.</td> <td>FOSSILIFEROUS</td> <td>SLI.</td> <td>SLIGHTLY</td> <td>RT</td> <td>RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAC.</td> <td>FRACTURED, FRACTURES</td> <td>TCR</td> <td>TRICONE REFUSAL</td> <td>CBR</td> <td>CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>FRAGS.</td> <td>FRAGMENTS</td> <td>w</td> <td>MOISTURE CONTENT</td> <td></td> <td></td> </tr> <tr> <td>HI.</td> <td>HIGHLY</td> <td>V</td> <td>VERY</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | AR | AUGER REFUSAL | MD | MEDIUM | VST | VANE SHEAR TEST | BT | BORING TERMINATED | MICA | MICACEOUS | WEA. | WEATHERED | CL | CLAY | MOD. | MODERATELY | U | UNIT WEIGHT | CPT | CLAY PENETRATION TEST | NP | NON PLASTIC | U _G | DRY UNIT WEIGHT | CSE | COARSE | ORG. | ORGANIC | SAMPLE ABBREVIATIONS | | DMT | DILATOMETER TEST | PMT | PRESSUREMETER TEST | S | BULK | DPT | DYNAMIC PENETRATION TEST | SAP. | SAPROLITE | SS | SPLIT SPOON | e | VOID RATIO | SD. | SAND, SANDY | ST | SHELBY TUBE | F | FINE | SL. | SILT, SILTY | RS | ROCK | FOSS. | FOSSILIFEROUS | SLI. | SLIGHTLY | RT | RECOMPACTED TRIAXIAL | FRAC. | FRACTURED, FRACTURES | TCR | TRICONE REFUSAL | CBR | CALIFORNIA BEARING RATIO | FRAGS. | FRAGMENTS | w | MOISTURE CONTENT | | | HI. | HIGHLY | V | VERY | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p align="center">PLASTICITY</p> <table border="1"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table>

 | | | | | | | | | | NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | SLIGHTLY PLASTIC | 0-5 | VERY LOW | MODERATELY PLASTIC | 6-15 | SLIGHT | HIGHLY PLASTIC | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <p align="center">RECOMMENDATION SYMBOLS</p> <table border="1"> <tbody> <tr> <td>[Symbol]</td> <td>UNDERCUT EXCAVATION</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td>[Symbol]</td> <td>SHALLOW UNDERCUT</td> <td>[Symbol]</td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
 | | | [Symbol] | UNDERCUT EXCAVATION | [Symbol] | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | [Symbol] | SHALLOW UNDERCUT | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | <p align="center">ABBREVIATIONS</p> <table border="1"> <tbody> <tr> <td>AR</td> <td>AUGER REFUSAL</td> <td>MD</td> <td>MEDIUM</td> <td>VST</td> <td>VANE SHEAR TEST</td> </tr> <tr> <td>BT</td> <td>BORING TERMINATED</td> <td>MICA</td> <td>MICACEOUS</td> <td>WEA.</td> <td>WEATHERED</td> </tr> <tr> <td>CL</td> <td>CLAY</td> <td>MOD.</td> <td>MODERATELY</td> <td>U</td> <td>UNIT WEIGHT</td> </tr> <tr> <td>CPT</td> <td>CLAY PENETRATION TEST</td> <td>NP</td> <td>NON PLASTIC</td> <td>U_G</td> <td>DRY UNIT WEIGHT</td> </tr> <tr> <td>CSE</td> <td>COARSE</td> <td>ORG.</td> <td>ORGANIC</td> <td colspan="2">SAMPLE ABBREVIATIONS</td> </tr> <tr> <td>DMT</td> <td>DILATOMETER TEST</td> <td>PMT</td> <td>PRESSUREMETER TEST</td> <td>S</td> <td>BULK</td> </tr> <tr> <td>DPT</td> <td>DYNAMIC PENETRATION TEST</td> <td>SAP.</td> <td>SAPROLITE</td> <td>SS</td> <td>SPLIT SPOON</td> </tr> <tr> <td>e</td> <td>VOID RATIO</td> <td>SD.</td> <td>SAND, SANDY</td> <td>ST</td> <td>SHELBY TUBE</td> </tr> <tr> <td>F</td> <td>FINE</td> <td>SL.</td> <td>SILT, SILTY</td> <td>RS</td> <td>ROCK</td> </tr> <tr> <td>FOSS.</td> <td>FOSSILIFEROUS</td> <td>SLI.</td> <td>SLIGHTLY</td> <td>RT</td> <td>RECOMPACTED TRIAXIAL</td> </tr> <tr> <td>FRAC.</td> <td>FRACTURED, FRACTURES</td> <td>TCR</td> <td>TRICONE REFUSAL</td> <td>CBR</td> <td>CALIFORNIA BEARING RATIO</td> </tr> <tr> <td>FRAGS.</td> <td>FRAGMENTS</td> <td>w</td> <td>MOISTURE CONTENT</td> <td></td> <td></td> </tr> <tr> <td>HI.</td> <td>HIGHLY</td> <td>V</td> <td>VERY</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | AR | AUGER REFUSAL | MD | MEDIUM | VST | VANE SHEAR TEST | BT | BORING TERMINATED | MICA | MICACEOUS | WEA. | WEATHERED | CL | CLAY | MOD. | MODERATELY | U | UNIT WEIGHT | CPT | CLAY PENETRATION TEST | NP | NON PLASTIC | U _G | DRY UNIT WEIGHT | CSE | COARSE | ORG. | ORGANIC | SAMPLE ABBREVIATIONS | | DMT | DILATOMETER TEST | PMT | PRESSUREMETER TEST | S | BULK | DPT | DYNAMIC PENETRATION TEST | SAP. | SAPROLITE | SS | SPLIT SPOON | e | VOID RATIO | SD. | SAND, SANDY | ST | SHELBY TUBE | F | FINE | SL. | SILT, SILTY | RS | ROCK | FOSS. | FOSSILIFEROUS | SLI. | SLIGHTLY | RT | RECOMPACTED TRIAXIAL | FRAC. | FRACTURED, FRACTURES | TCR | TRICONE REFUSAL | CBR | CALIFORNIA BEARING RATIO | FRAGS. | FRAGMENTS | w | MOISTURE CONTENT | | | HI. | HIGHLY | V | VERY | | | | | | | | | | | | | | |
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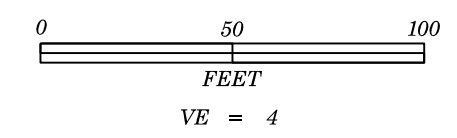
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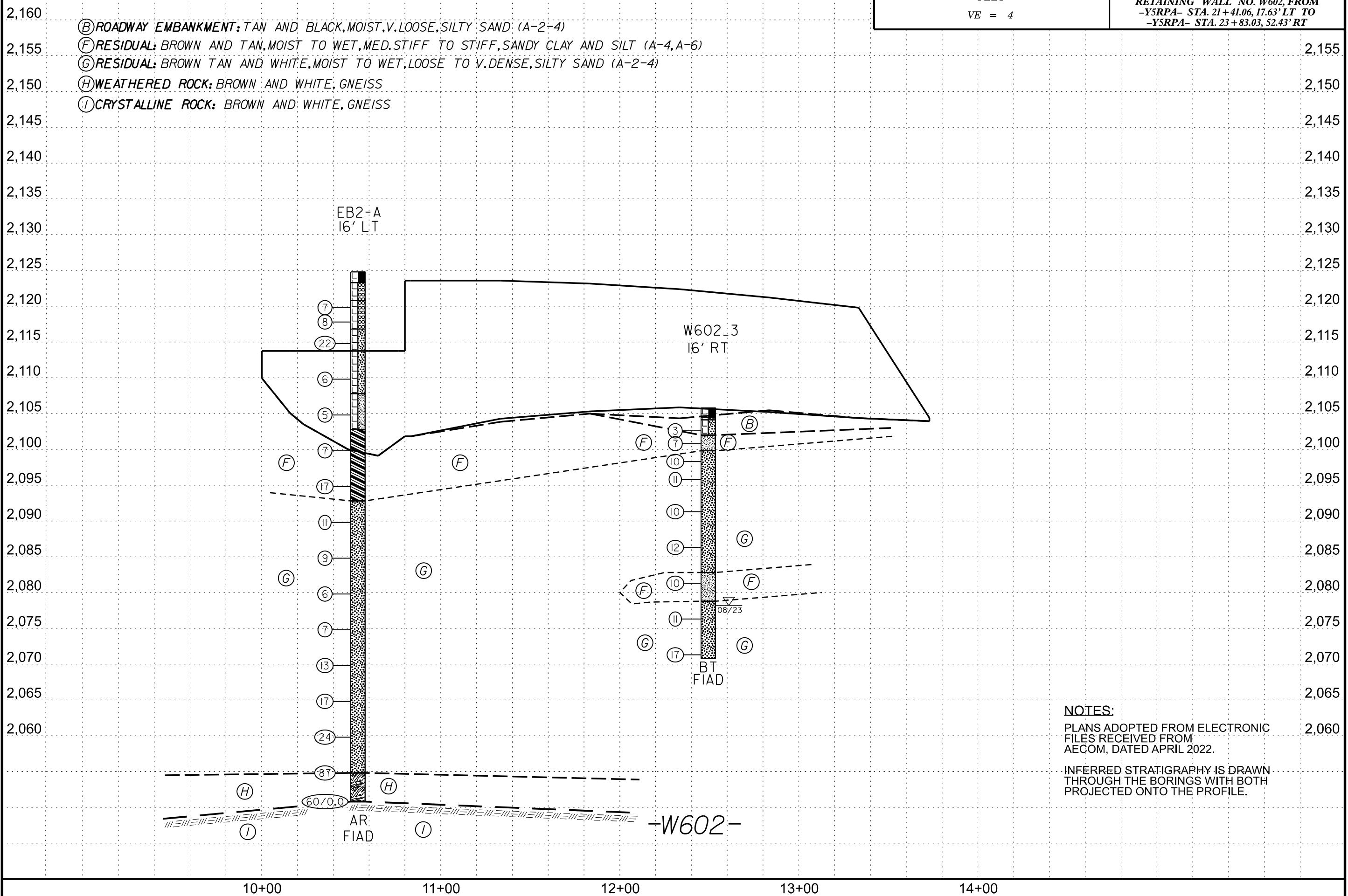
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| [Symbol]

 | SHALLOW UNDERCUT | [Symbol] | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
RETAINING WALL NO. W602, FROM -YSRPA- STA. 21+41.06, 17.63' LT TO -YSRPA- STA. 23+83.03, 52.43' RT	



NOTES:
 PLANS ADOPTED FROM ELECTRONIC
 FILES RECEIVED FROM
 AECOM, DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN
 THROUGH THE BORINGS WITH BOTH
 PROJECTED ONTO THE PROFILE.

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5-9	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W701, FROM
-Y- STATION 66 + 46.00, 129.00' LT TO -Y-
STATION 74 + 55.00, 129.00' LT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	9

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 1919 TOT-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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



DocuSigned by:
Stephen Crockett 1/30/2024
 C5CA5FED48E0435...
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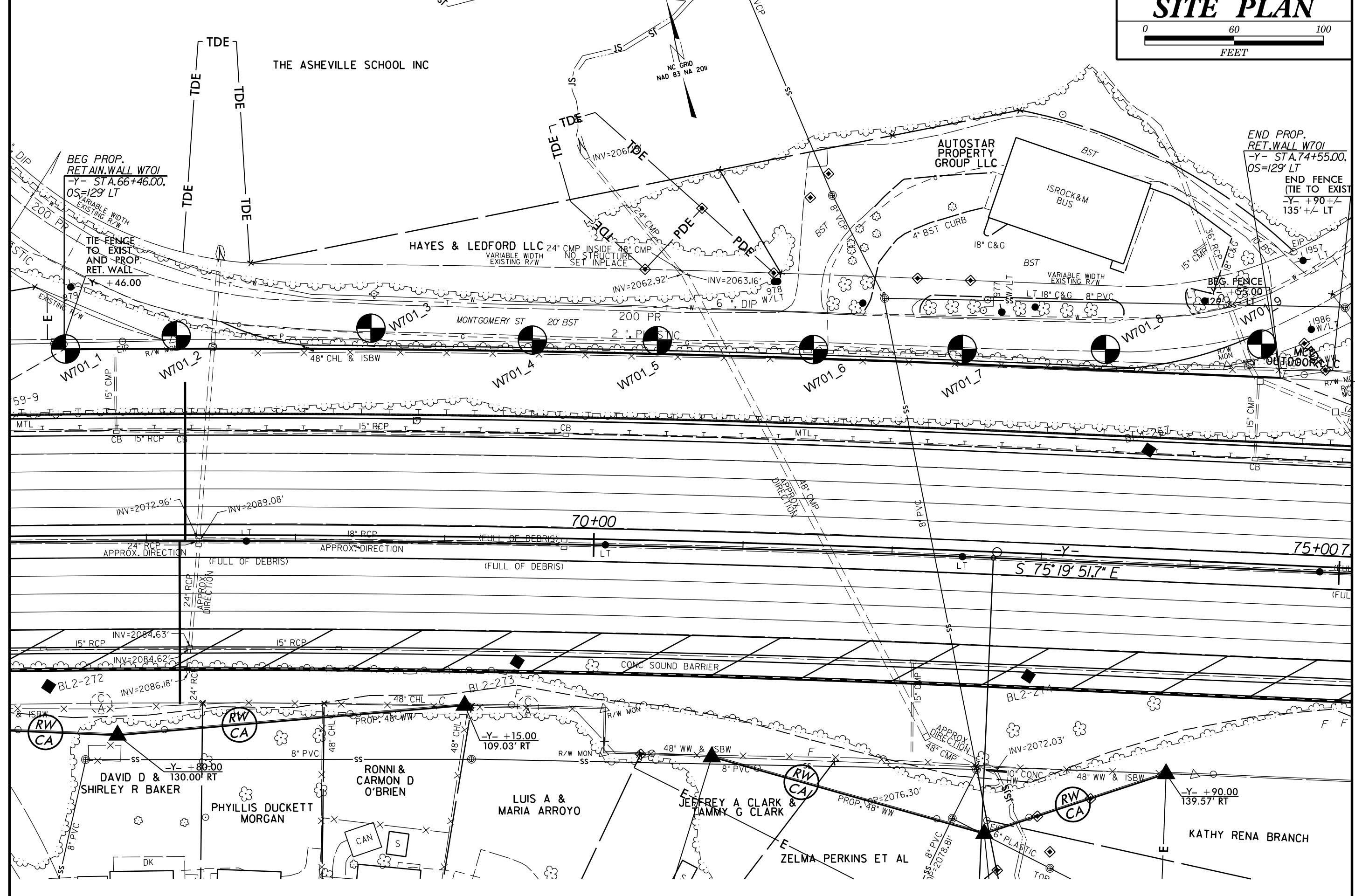
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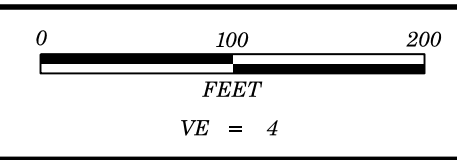
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION										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 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										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.										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:										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 DISLOGGED 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 (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 RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED 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 (IN 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.									
SOIL LEGEND AND AASHTO CLASSIFICATION										ANGULARITY OF GRAINS										WEATHERED ROCK (WR)										CRYSTALLINE ROCK (CR)									
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS										THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.										FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.										FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.									
MINERALOGICAL COMPOSITION										COMPRESSION										NON-CRYSTALLINE ROCK (NCR)										COASTAL PLAIN SEDIMENTARY ROCK (CP)									
MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.										SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50										ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:										ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:									
PERCENTAGE OF MATERIAL										GROUND WATER										WEATHERING										MISCELLANEOUS SYMBOLS									
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										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										FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (IV 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 (IV 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.										ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SPT DMT VST PMT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION CONE PENETROMETER TEST SOUNDING ROD TEST BORING WITH CORE SPT N-VALUE									
TEXTURE OR GRAIN SIZE										RECOMMENDATION SYMBOLS										ABBREVIATIONS										EQUIPMENT USED ON SUBJECT PROJECT									
U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053										UNDERCUT EXCAVATION UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE UNCLASSIFIED EXCAVATION - UNSUITABLE BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK										AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY UNIT WEIGHT CPT - CLAY PENETRATION TEST NP - NON PLASTIC DRY - DRY UNIT WEIGHT CSE - COARSE ORG. - ORGANIC PMT - PRESSUREMETER TEST DPT - DILATOMETER TEST SAP. - SAPROLITIC SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SD. - SAND, SANDY SL. - SILT, SILTY S - BULK e - VOID RATIO SO. - SAND, SANDY SS - SPLIT SPOON F - FINE SLI. - SLIGHTLY ST - SHELBY TUBE FOSS. - FOSSILIFEROUS TCR - TRICONE REFUSAL RS - ROCK FRAC. - FRACTURED, FRACTURES W - MOISTURE CONTENT RT - RECOMPACTED TRIAXIAL FRAG. - FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING RATIO HI. - HIGHLY V - VERY										DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: <input type="checkbox"/> CME-45C <input type="checkbox"/> CLAY BITS <input checked="" type="checkbox"/> AUTOMATIC <input type="checkbox"/> MANUAL <input type="checkbox"/> CME-55 <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER <input type="checkbox"/> CORE SIZE: <input checked="" type="checkbox"/> CME-550X <input type="checkbox"/> 8" HOLLOW AUGERS <input type="checkbox"/> -B <input type="checkbox"/> -H <input type="checkbox"/> HARD FACED FINGER BITS <input type="checkbox"/> -N <input type="checkbox"/> TUNG-CARBIDE INSERTS <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER <input type="checkbox"/> TRICONE *STEEL TEETH <input type="checkbox"/> TRICONE *TUNG-CARB. <input type="checkbox"/> CORE BIT <input type="checkbox"/> HANDED TOOLS: <input type="checkbox"/> PORTABLE HOIST <input type="checkbox"/> POST HOLE DIGGER <input type="checkbox"/> VANE SHEAR TEST <input type="checkbox"/> HAND AUGER <input type="checkbox"/> SOUNDING ROD <input type="checkbox"/> SPT N-VALUE									
SOIL MOISTURE - CORRELATION OF TERMS										ROCK HARDNESS										FRACTURE SPACING										BEDDING									
SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION LL - LIQUID LIMIT - SATURATED - (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT - WET - (W) SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE SHRINKAGE LIMIT - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL - - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE										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 PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROOVED 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 FINGER NAIL.										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										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									
PLASTICITY										INDURATION										FRACURE SPACING										BEDDING									
NON PLASTIC PLASTICITY INDEX (PI) DRY STRENGTH 0-5 VERY LOW 6-15 SLIGHT 16-25 MEDIUM 26 OR MORE HIGH										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.										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										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									
COLOR										FRACURE SPACING										BEDDING										FRACURE SPACING									
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.										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										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										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									
ELEVATION										BENCH MARK ELEVATIONS										DATE										ELEVATION									
ELEVATION: FEET										BENCH MARK ELEVATIONS TAKEN FROM I2513.ls_tnl.tin DATE: 04/15/2022										ELEVATION: FEET										ELEVATION: FEET									
NOTES										ELEVATION										DATE										ELEVATION									
FIAD - FILLED IMMEDIATELY AFTER DRILLING										ELEVATION: FEET										DATE: 8-15-14										ELEVATION: FEET									

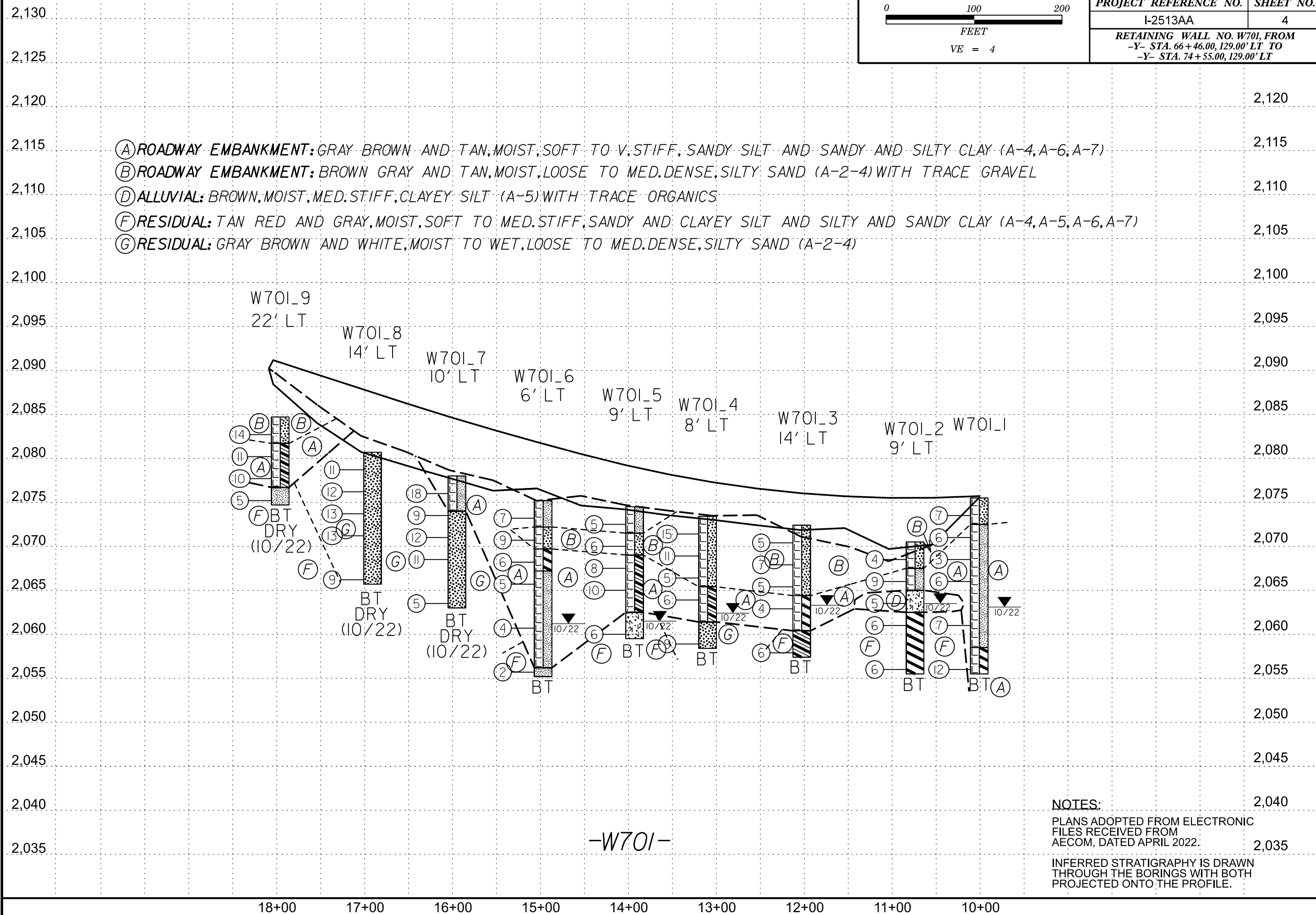
PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	
FEET	

A- PC Sta. 10+00.00=
 OC Sta. 65+78.08 (59' LT)





PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT	



- Ⓐ ROADWAY EMBANKMENT: GRAY BROWN AND TAN, MOIST, SOFT TO V. STIFF, SANDY SILT AND SANDY AND SILTY CLAY (A-4, A-6; A-7)
- Ⓑ ROADWAY EMBANKMENT: BROWN GRAY AND TAN, MOIST, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE GRAVEL
- Ⓓ ALLUVIAL: BROWN, MOIST, MED. STIFF, CLAYEY SILT (A-5) WITH TRACE ORGANICS
- Ⓕ RESIDUAL: TAN RED AND GRAY, MOIST, SOFT TO MED. STIFF, SANDY AND CLAYEY SILT AND SILTY AND SANDY CLAY (A-4, A-5; A-6, A-7)
- Ⓖ RESIDUAL: GRAY BROWN AND WHITE, MOIST TO WET, LOOSE TO MED. DENSE, SILTY SAND (A-2-4)

NOTES:

PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM AECOM, DATED APRIL 2022.

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

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)								
BORING NO. W701_1		STATION 66+47		OFFSET 129 ft LT		ALIGNMENT -Y-									
COLLAR ELEV. 2,075.5 ft		TOTAL DEPTH 20.0 ft		NORTHING 678,083		EASTING 920,109									
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2080															
2075	2,074.5	1.0	3	3	4									2,075.5	0.0
	2,072.0	3.5	3	3	3									2,072.5	3.0
2070	2,069.5	6.0	1	1	2										
	2,067.0	8.5	5	3	3										
2065	2,062.0	13.5	2	3	4										
2060	2,057.0	18.5	4	5	7										
														2,058.5	17.0
														2,055.5	20.0
Boring Terminated at Elevation 2,055.5 ft in RE: (A-7)															

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.									
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)								
BORING NO. W701_2		STATION 67+20		OFFSET 138 ft LT		ALIGNMENT -Y-									
COLLAR ELEV. 2,070.5 ft		TOTAL DEPTH 15.0 ft		NORTHING 678,076		EASTING 920,183									
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic									
DRILLER Odom, C.		START DATE 10/07/22		COMP. DATE 10/07/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2075															
2070	2,069.5	1.0	2	2	2									2,070.5	0.0
	2,067.0	3.5	3	4	5									2,067.5	3.0
2065	2,064.5	6.0	2	3	2									2,065.0	5.5
	2,062.0	8.5	2	2	4									2,062.5	8.0
2060	2,057.0	13.5	2	3	3									2,055.5	15.0
Boring Terminated at Elevation 2,055.5 ft in RESIDUAL: (A-7)															

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_3		STATION 68+49		OFFSET 143 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,072.4 ft		TOTAL DEPTH 15.0 ft		NORTHING 678,054		EASTING 920,312										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2075																
	2,071.4	1.0	4	3	2									2,072.4	GROUND SURFACE	0.0
2070	2,068.9	3.5	3	3	4										ROADWAY EMBANKMENT BROWN AND GRAY, LOOSE, SILTY SAND (A-2-4) WITH TRACE TO LITTLE MICA AND TRACE GRAVEL AND ORGANICS	
	2,066.4	6.0	2	2	3											
2065	2,063.9	8.5	2	2	2									2,064.4	BROWN, SOFT TO MED. STIFF, SILTY CLAY (A-7) WITH TRACE ORGANICS	8.0
	2,058.9	13.5	3	2	4									2,060.4	RESIDUAL RED-TAN, MED. STIFF, SANDY CLAY (A-6)	12.0
2060														2,057.4	Boring Terminated at Elevation 2,057.4 ft in RESIDUAL: (A-6)	15.0

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_4		STATION 69+56		OFFSET 137 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,073.4 ft		TOTAL DEPTH 15.0 ft		NORTHING 678,023		EASTING 920,416										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2075																
	2,072.4	1.0	8	7	8									2,073.4	GROUND SURFACE	0.0
2070	2,069.9	3.5	5	5	6										ROADWAY EMBANKMENT BROWN, LOOSE TO MED. DENSE SILTY SAND (A-2-4) WITH TRACE GRAVEL, TRACE MICA AND LITTLE ORGANICS	
	2,067.4	6.0	2	2	3											
2065	2,064.9	8.5	2	2	4									2,065.4	BROWN, MED. STIFF, SANDY CLAY (A-6)	8.0
	2,059.9	13.5	3	4	5									2,061.4	RESIDUAL TAN-BROWN, LOOSE, SILTY SAND (A-4)	12.0
2060														2,058.4	Boring Terminated at Elevation 2,058.4 ft in RESIDUAL: (A-2-4)	15.0

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_5		STATION 70+39		OFFSET 138 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,074.5 ft		TOTAL DEPTH 15.0 ft		NORTHING 678,005		EASTING 920,498										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2075														2,074.5	0.0	GROUND SURFACE
	2,073.5	1.0	1	1	4								M	2,071.5	3.0	ROADWAY EMBANKMENT TAN-BROWN, MED. STIFF, SANDY SILT (A-4) WITH LITTLE MICA AND TRACE GRAVEL
2070	2,071.0	3.5	3	3	3								M	2,069.0	5.5	TAN-BROWN, LOOSE, SILTY SAND (A-2-4) WITH LITTLE MICA
	2,068.5	6.0	3	3	5								M			BROWN, MED. STIFF TO STIFF, SANDY CLAY (A-6) WITH TRACE GRAVEL
2065	2,066.0	8.5	3	5	5								M	2,062.5	12.0	RESIDUAL
2060	2,061.0	13.5	3	2	4								M	2,059.5	15.0	TAN, MED. STIFF, SANDY CLAYEY SILT (A-5) WITH TRACE MICA
Boring Terminated at Elevation 2,059.5 ft in RESIDUAL: (A-5)																

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_6		STATION 71+43		OFFSET 135 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,075.2 ft		TOTAL DEPTH 20.0 ft		NORTHING 677,977		EASTING 920,599										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2080														2,075.2	0.0	GROUND SURFACE
2075	2,074.2	1.0	2	2	5								M	2,072.2	3.0	ROADWAY EMBANKMENT BROWN, MED. STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL
	2,071.7	3.5	4	4	5								M	2,069.7	5.5	TAN-BROWN, LOOSE, SILTY SAND (A-2-4) WITH TRACE ORGANICS AND GRAVEL
2070	2,069.2	6.0	2	3	3								M	2,067.2	8.0	BROWN, MED. STIFF, SILTY CLAY (A-7) WITH LITTLE MICA
2065	2,066.7	8.5	2	2	3								W			GRAY AND BROWN, SOFT TO MED. STIFF, SANDY SILT (A-4) WITH LITTLE MICA AND TRACE ORGANICS
2060	2,061.7	13.5	2	2	2								W			
	2,056.7	18.5	8	1	1								W	2,056.2	19.0	RESIDUAL
Boring Terminated at Elevation 2,055.2 ft in RESIDUAL: (A-4)																

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_7		STATION 72+41		OFFSET 139 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,078.0 ft		TOTAL DEPTH 15.0 ft		NORTHING 677,956		EASTING 920,696										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2080																
	2,077.0	1.0	8	8	10										2,078.0	0.0
2075	2,074.5	3.5	4	4	5										2,074.0	4.0
	2,072.0	6.0	4	6	6											
2070	2,069.5	8.5	4	4	7											
2065	2,064.5	13.5	4	2	3										2,063.0	15.0
Boring Terminated at Elevation 2,063.0 ft in RESIDUAL: (A-2-4)																

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_8		STATION 73+37		OFFSET 143 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,080.7 ft		TOTAL DEPTH 15.0 ft		NORTHING 677,936		EASTING 920,790										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2085																
															2,080.7	0.0
2080	2,079.7	1.0	5	5	6											
	2,077.2	3.5	5	6	6											
2075	2,074.7	6.0	5	6	7											
	2,072.2	8.5	5	6	7											
2070																
	2,067.2	13.5	3	5	4										2,065.7	15.0
Boring Terminated at Elevation 2,065.7 ft in RESIDUAL: (A-2-4)																

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W701, FROM -Y- STA. 66+46.00, 129.00' LT TO -Y- STA. 74+55.00, 129.00' LT							GROUND WTR (ft)									
BORING NO. W701_9		STATION 74+42		OFFSET 151 ft LT		ALIGNMENT -Y-										
COLLAR ELEV. 2,084.7 ft		TOTAL DEPTH 10.0 ft		NORTHING 677,917		EASTING 920,893										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/06/22		COMP. DATE 10/06/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100			ELEV. (ft)	DEPTH (ft)		
2085														2,084.7	0.0	GROUND SURFACE
	2,083.7	1.0	4	6	8								M	2,081.7	3.0	ROADWAY EMBANKMENT TAN-BROWN, MED. DENSE, SILTY SAND (A-2-4)
2080	2,081.2	3.5	5	5	6								M			BROWN AND RED, STIFF, SANDY CLAY (A-6) WITH TRACE ORGANICS AND GRAVEL
	2,078.7	6.0	3	4	6								M			
2075	2,076.2	8.5	2	2	3								M	2,076.7	8.0	RESIDUAL
														2,074.7	10.0	TAN-BROWN, MED. STIFF, SANDY SILT (A-4) WITH LITTLE MICA Boring Terminated at Elevation 2,074.7 ft in RESIDUAL: (A-4)

NCDOT BORE DOUBLE 1-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5-7	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W1001, FROM
-RPC- STATION 18+13.15, 27.50' RT TO -RPC-
STATION 21+36.15, 27.50' RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	7

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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



DocuSigned by:
Stephen Crockett 1/30/2024
 C5CA5FED48E0435...
 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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<p>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</p>

 | | | | <p>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.</p> | | | | <p>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 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:</p> | | | | <p>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 DISLOADED 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 (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 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 (IN 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="4">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>A-1</th> <th>A-1-b</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td>A-1-a</td> <td>A-1-b</td> <td>A-2-4</td> <td>A-2-5</td> <td>A-2-6</td> <td>A-2-7</td> <td>A-4</td> <td>A-5</td> <td>A-6</td> <td>A-7</td> <td>A-1, A-2</td> <td>A-3</td> <td>A-4, A-5</td> <td>A-6, A-7</td> <td></td> </tr> <tr> <td>SYMBOL</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING #10 #40 #200</td> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN 35 MX</td> <td>40 MX 35 MX</td> <td>41 MN 35 MX</td> <td>42 MN 35 MX</td> <td>43 MN 36 MN</td> <td>44 MN 36 MN</td> <td>45 MN 36 MN</td> <td>46 MN 36 MN</td> <td>47 MN 36 MN</td> <td>48 MN 36 MN</td> <td>49 MN 36 MN</td> <td>50 MN 36 MN</td> <td>51 MN 36 MN</td> </tr> <tr> <td>MATERIAL PASSING #40 LL PI</td> <td>-</td> <td>-</td> <td>NP</td> <td>40 MX 10 MX</td> <td>41 MN 10 MX</td> <td>42 MN 11 MN</td> <td>43 MN 11 MN</td> <td>44 MN 11 MN</td> <td>45 MN 11 MN</td> <td>46 MN 11 MN</td> <td>47 MN 11 MN</td> <td>48 MN 11 MN</td> <td>49 MN 11 MN</td> <td>50 MN 11 MN</td> <td>51 MN 11 MN</td> </tr> <tr> <td>GROUP INDEX</td> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>20 MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td>STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td>SILTY OR CLAYEY GRAVEL AND SAND</td> <td>SILTY SOILS</td> <td>CLAYEY SOILS</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS SUBGRADE</td> <td colspan="3">EXCELLENT TO GOOD</td> <td colspan="4">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td>UNSATURABLE</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="4"> <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p> </td> <td colspan="4"></td> <td colspan="4"></td> <td colspan="4"></td> </tr> <tr> <td colspan="4" style="text-align: center;"> <p>CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COESIVE)</td> <td>VERY LOOSE
LOOSE
MEDIUM DENSE
DENSE
VERY DENSE</td> <td>< 4
4 TO 10
10 TO 30
30 TO 50
> 50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COESIVE)</td> <td>VERY SOFT
SOFT
MEDIUM STIFF
STIFF
VERY STIFF
HARD</td> <td>< 2
2 TO 4
4 TO 8
8 TO 15
15 TO 30
> 30</td> <td>< 0.25
0.25 TO 0.5
0.5 TO 1.0
1 TO 2
2 TO 4
> 4</td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> <td></td> <td>MONITORING WELL</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>SPT N-VALUE</td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>ROCK HARDNESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>VERY HARD</td> <td>CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</td> </tr> <tr> <td>HARD</td> <td>CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</td> </tr> <tr> <td>MODERATELY HARD</td> <td>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.</td> </tr> <tr> <td>MEDIUM HARD</td> <td>CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</td> </tr> <tr> <td>SOFT</td> <td>CAN BE GROOVED 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.</td> </tr> <tr> <td>VERY SOFT</td> <td>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 FINGER NAIL.</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;"> <p>TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CS. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>RECOMMENDATION SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>UNDERCUT EXCAVATION</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>BT - BORING TERMINATED</td> <td>CL - CLAY</td> <td>CPT - CONE PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>UW - UNIT WEIGHT</td> <td>DW - DRY UNIT WEIGHT</td> </tr> <tr> <td colspan="2">SAMPLE ABBREVIATIONS</td> <td>S - BULK</td> <td>SS - SPLIT SPOON</td> <td>ST - SHELBY TUBE</td> <td>RS - ROCK</td> <td>RT - RECOMPACTED TRIAXIAL</td> <td>CBR - CALIFORNIA BEARING RATIO</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;"> <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM
MOISTURE</td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> ADVANCING TOOLS:</td> <td><input checked="" type="checkbox"/> AUTOMATIC</td> <td><input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> CLAY BITS</td> <td colspan="2">CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550X</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td><input type="checkbox"/> -B</td> <td><input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td colspan="2">HAND TOOLS:</td> </tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> SOUNDING ROD</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG-CARB.</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>FRACATURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>BEDDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;"> <p>PLASTICITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NON PLASTIC</th> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> </thead> <tbody> <tr> <td>SLIGHTLY PLASTIC</td> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>MODERATELY PLASTIC</td> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>HIGHLY PLASTIC</td> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td></td> <td>26 OR MORE</td> <td>HIGH</td> </tr> </tbody> </table> </td> <td colspan="4" style="text-align: center;"> <p>INDURATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>FRIBLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table> </td> </tr> <tr> <td colspan="4" style="text-align: center;"> <p>COLOR</p> <p>DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). 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 | A-1-b | A-2 | 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-3 | A-4, A-5 | A-6, A-7 | GROUP CLASS. | A-1-a | A-1-b | 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-3 | A-4, A-5 | A-6, A-7 | | SYMBOL | | | | | | | | | | | | | | | | % PASSING #10 #40 #200 | 50 MX 30 MX 15 MX | 50 MX 25 MX | 51 MN 35 MX | 40 MX 35 MX | 41 MN 35 MX | 42 MN 35 MX | 43 MN 36 MN | 44 MN 36 MN | 45 MN 36 MN | 46 MN 36 MN | 47 MN 36 MN | 48 MN 36 MN | 49 MN 36 MN | 50 MN 36 MN | 51 MN 36 MN | MATERIAL PASSING #40 LL PI | - | - | NP | 40 MX 10 MX | 41 MN 10 MX | 42 MN 11 MN | 43 MN 11 MN | 44 MN 11 MN | 45 MN 11 MN | 46 MN 11 MN | 47 MN 11 MN | 48 MN 11 MN | 49 MN 11 MN | 50 MN 11 MN | 51 MN 11 MN | GROUP INDEX | 0 | 0 | 0 | 4 MX | 8 MX | 12 MX | 16 MX | 20 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 | UNSATURABLE | | | | | | <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p> | | | | | | | | | | | | | | | | <p>CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COESIVE)</td> <td>VERY LOOSE
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MEDIUM DENSE
DENSE
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SOFT
MEDIUM STIFF
STIFF
VERY STIFF
HARD</td> <td>< 2
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8 TO 15
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SD.) | | | | | | | SILT (SL.) | | | | | | | CLAY (CL.) | | | | | | | GRAIN SIZE | 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005 | IN. | 12 | 3 | | | | | <p>RECOMMENDATION SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>UNDERCUT EXCAVATION</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | UNDERCUT EXCAVATION | | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | | UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | | SHALLOW UNDERCUT | | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | <p>ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>BT - BORING TERMINATED</td> <td>CL - CLAY</td> <td>CPT - CONE PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>UW - UNIT WEIGHT</td> <td>DW - DRY UNIT WEIGHT</td> </tr> <tr> <td colspan="2">SAMPLE ABBREVIATIONS</td> <td>S - BULK</td> <td>SS - SPLIT SPOON</td> <td>ST - SHELBY TUBE</td> <td>RS - ROCK</td> <td>RT - RECOMPACTED TRIAXIAL</td> <td>CBR - CALIFORNIA BEARING RATIO</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | 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 | UW - UNIT WEIGHT | DW - DRY UNIT WEIGHT | SAMPLE ABBREVIATIONS | | S - BULK | SS - SPLIT SPOON | ST - SHELBY TUBE | RS - ROCK | RT - RECOMPACTED TRIAXIAL | CBR - CALIFORNIA BEARING RATIO | | | | | | | | | | | | | | | | | | | | | | | | | <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table> | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE
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| GENERAL CLASS.

 | GRANULAR MATERIALS (≤ 35% PASSING #200) | | | | | | | SILT-CLAY MATERIALS (> 35% PASSING #200) | | | | ORGANIC MATERIALS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | A-1 | A-1-b | A-2 | 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-3 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GROUP CLASS.

 | A-1-a | A-1-b | 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-3 | A-4, A-5 | A-6, A-7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SYMBOL

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| % PASSING #10 #40 #200

 | 50 MX 30 MX 15 MX | 50 MX 25 MX | 51 MN 35 MX | 40 MX 35 MX | 41 MN 35 MX | 42 MN 35 MX | 43 MN 36 MN | 44 MN 36 MN | 45 MN 36 MN | 46 MN 36 MN | 47 MN 36 MN | 48 MN 36 MN | 49 MN 36 MN | 50 MN 36 MN | 51 MN 36 MN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| MATERIAL PASSING #40 LL PI

 | - | - | NP | 40 MX 10 MX | 41 MN 10 MX | 42 MN 11 MN | 43 MN 11 MN | 44 MN 11 MN | 45 MN 11 MN | 46 MN 11 MN | 47 MN 11 MN | 48 MN 11 MN | 49 MN 11 MN | 50 MN 11 MN | 51 MN 11 MN | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GROUP INDEX

 | 0 | 0 | 0 | 4 MX | 8 MX | 12 MX | 16 MX | 20 MX | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| USUAL TYPES OF MAJOR MATERIALS

 | STONE FRAGS. GRAVEL, AND SAND | FINE SAND | SILTY OR CLAYEY GRAVEL AND SAND | SILTY SOILS | CLAYEY SOILS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GEN. RATING AS SUBGRADE

 | EXCELLENT TO GOOD | | | FAIR TO POOR | | | | FAIR TO POOR | POOR | UNSATURABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>

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| <p>CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COESIVE)</td> <td>VERY LOOSE
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 | | | | PRIMARY SOIL TYPE | COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) | RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²) | GENERALLY GRANULAR MATERIAL (NON-COESIVE) | VERY LOOSE
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> 4 | <p>MISCELLANEOUS SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION</td> <td></td> <td>DIP & DIP DIRECTION OF ROCK STRUCTURES</td> <td></td> <td>SLOPE INDICATOR INSTALLATION</td> </tr> <tr> <td></td> <td>SOIL SYMBOL</td> <td></td> <td>TEST BORING</td> <td></td> <td>CONE PENETROMETER TEST</td> </tr> <tr> <td></td> <td>ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT</td> <td></td> <td>AUGER BORING</td> <td></td> <td>SOUNDING ROD</td> </tr> <tr> <td></td> <td>INFERRED SOIL BOUNDARY</td> <td></td> <td>CORE BORING</td> <td></td> <td>MONITORING WELL</td> </tr> <tr> <td></td> <td>INFERRED ROCK LINE</td> <td></td> <td>PIEZOMETER INSTALLATION</td> <td></td> <td>TEST BORING WITH CORE</td> </tr> <tr> <td></td> <td>ALLUVIAL SOIL BOUNDARY</td> <td></td> <td>SPT N-VALUE</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GENERALLY SILT-CLAY MATERIAL (COESIVE)

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| MODERATELY HARD

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| <p>TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td>BOULDER (BLDR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COBBLE (COB.)</td> <td>4.76</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> <tr> <td>GRAVEL (GR.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>COARSE SAND (CS. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>FINE SAND (F. SD.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>SILT (SL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CLAY (CL.)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GRAIN SIZE</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>

 | | | | U.S. STD. SIEVE SIZE OPENING (MM) | 4 | 10 | 40 | 60 | 200 | 270 | BOULDER (BLDR.) | | | | | | | COBBLE (COB.) | 4.76
 | 2.00 | 0.42 | 0.25 | 0.075 | 0.053 | GRAVEL (GR.) | | | | | | | COARSE SAND (CS. SD.) | | | | | | | FINE SAND (F. SD.) | | | | | | | SILT (SL.) | | | | | | | CLAY (CL.) | | | | | | | GRAIN SIZE | 305 | 75 | 2.0 | 0.25 | 0.05 | 0.005 | IN. | 12 | 3 | | | | | <p>RECOMMENDATION SYMBOLS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td></td> <td>UNDERCUT EXCAVATION</td> <td></td> <td>UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL</td> </tr> <tr> <td></td> <td>SHALLOW UNDERCUT</td> <td></td> <td>UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK</td> <td></td> <td></td> </tr> </tbody> </table> | | | | | UNDERCUT EXCAVATION | | UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE | | UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL | | SHALLOW UNDERCUT | | UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK | | | <p>ABBREVIATIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>AR - AUGER REFUSAL</td> <td>BT - BORING TERMINATED</td> <td>CL - CLAY</td> <td>CPT - CONE PENETRATION TEST</td> <td>CSE - COARSE</td> <td>DMT - DILATOMETER TEST</td> <td>DPT - DYNAMIC PENETRATION TEST</td> <td>e - VOID RATIO</td> <td>F - FINE</td> <td>FOSS. - FOSSILIFEROUS</td> <td>FRAC. - FRACTURED, FRACTURES</td> <td>FRAGS. - FRAGMENTS</td> <td>HI. - HIGHLY</td> <td>MED. - MEDIUM</td> <td>MICA. - MICACEOUS</td> <td>MOD. - MODERATELY</td> <td>NP - NON PLASTIC</td> <td>ORG. - ORGANIC</td> <td>PMT - PRESSUREMETER TEST</td> <td>SAP. - SAPROLITIC</td> <td>SD. - SAND, SANDY</td> <td>SL. - SILT, SILTY</td> <td>SLI. - SLIGHTLY</td> <td>TCR - TRICONE REFUSAL</td> <td>w - MOISTURE CONTENT</td> <td>V - VERY</td> <td>VST - VANE SHEAR TEST</td> <td>WEA. - WEATHERED</td> <td>UW - UNIT WEIGHT</td> <td>DW - DRY UNIT WEIGHT</td> </tr> <tr> <td colspan="2">SAMPLE ABBREVIATIONS</td> <td>S - BULK</td> <td>SS - SPLIT SPOON</td> <td>ST - SHELBY TUBE</td> <td>RS - ROCK</td> <td>RT - RECOMPACTED TRIAXIAL</td> <td>CBR - CALIFORNIA BEARING RATIO</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | 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 | UW - UNIT WEIGHT | DW - DRY UNIT WEIGHT | SAMPLE ABBREVIATIONS | | S - BULK | SS - SPLIT SPOON | ST - SHELBY TUBE | RS - ROCK | RT - RECOMPACTED TRIAXIAL | CBR - CALIFORNIA BEARING RATIO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| GRAVEL (GR.)

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| 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 | UW - UNIT WEIGHT | DW - DRY UNIT WEIGHT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SAMPLE ABBREVIATIONS

 | | S - BULK | SS - SPLIT SPOON | ST - SHELBY TUBE | RS - ROCK | RT - RECOMPACTED TRIAXIAL | CBR - CALIFORNIA BEARING RATIO | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>LL - LIQUID LIMIT</td> <td>- SATURATED - (SAT.)</td> <td>USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE</td> </tr> <tr> <td>PL - PLASTIC LIMIT</td> <td>- WET - (W)</td> <td>SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE</td> </tr> <tr> <td>OM - OPTIMUM MOISTURE SHRINKAGE LIMIT</td> <td>- MOIST - (M)</td> <td>SOLID; AT OR NEAR OPTIMUM MOISTURE</td> </tr> <tr> <td>SL - SHRINKAGE LIMIT</td> <td>- DRY - (D)</td> <td>REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE</td> </tr> </tbody> </table>

 | | | | SOIL MOISTURE SCALE (ATTERBERG LIMITS) | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | LL - LIQUID LIMIT | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | PL - PLASTIC LIMIT | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | OM - OPTIMUM MOISTURE SHRINKAGE LIMIT | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | SL - SHRINKAGE LIMIT | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | <p>EQUIPMENT USED ON SUBJECT PROJECT</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td><input type="checkbox"/> CME-45C</td> <td><input type="checkbox"/> ADVANCING TOOLS:</td> <td><input checked="" type="checkbox"/> AUTOMATIC</td> <td><input type="checkbox"/> MANUAL</td> </tr> <tr> <td><input type="checkbox"/> CME-55</td> <td><input type="checkbox"/> CLAY BITS</td> <td colspan="2">CORE SIZE:</td> </tr> <tr> <td><input type="checkbox"/> CME-550X</td> <td><input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER</td> <td><input type="checkbox"/> -B</td> <td><input type="checkbox"/> -H</td> </tr> <tr> <td><input type="checkbox"/> VANE SHEAR TEST</td> <td><input checked="" type="checkbox"/> 8" HOLLOW AUGERS</td> <td colspan="2">HAND TOOLS:</td>
</tr> <tr> <td><input type="checkbox"/> PORTABLE HOIST</td> <td><input type="checkbox"/> HARD FACED FINGER BITS</td> <td><input type="checkbox"/> POST HOLE DIGGER</td> <td><input type="checkbox"/> HAND AUGER</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TUNG-CARBIDE INSERTS</td> <td><input type="checkbox"/> SOUNDING ROD</td> <td><input type="checkbox"/> VANE SHEAR TEST</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG-CARB.</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/> CORE BIT</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | | | | <input type="checkbox"/> CME-45C | <input type="checkbox"/> ADVANCING TOOLS: | <input checked="" type="checkbox"/> AUTOMATIC | <input type="checkbox"/> MANUAL | <input type="checkbox"/> CME-55 | <input type="checkbox"/> CLAY BITS | CORE SIZE: | | <input type="checkbox"/> CME-550X | <input type="checkbox"/> 6" CONTINUOUS FLIGHT AUGER | <input type="checkbox"/> -B | <input type="checkbox"/> -H | <input type="checkbox"/> VANE SHEAR TEST | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | HAND TOOLS: | | <input type="checkbox"/> PORTABLE HOIST | <input type="checkbox"/> HARD FACED FINGER BITS | <input type="checkbox"/> POST HOLE DIGGER | <input type="checkbox"/> HAND AUGER | <input type="checkbox"/> | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> SOUNDING ROD | <input type="checkbox"/> VANE SHEAR TEST | <input type="checkbox"/> | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | | | <input type="checkbox"/> | <input type="checkbox"/> TRICONE <input type="checkbox"/> STEEL TEETH | | | <input type="checkbox"/> | <input type="checkbox"/> TRICONE <input type="checkbox"/> TUNG-CARB. | | | <input type="checkbox"/> | <input type="checkbox"/> CORE BIT | | | <input type="checkbox"/> | | | | <p>FRACATURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FOOT</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> </tr> </tbody> </table> | | | | 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 | <p>BEDDING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY THICKLY BEDDED</td> <td>4 FEET</td> </tr> <tr> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> | | | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SOIL MOISTURE SCALE (ATTERBERG LIMITS)

 | FIELD MOISTURE DESCRIPTION | GUIDE FOR FIELD MOISTURE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| LL - LIQUID LIMIT

 | - SATURATED - (SAT.) | USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| PL - PLASTIC LIMIT

 | - WET - (W) | SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| OM - OPTIMUM MOISTURE SHRINKAGE LIMIT

 | - MOIST - (M) | SOLID; AT OR NEAR OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| SL - SHRINKAGE LIMIT

 | - DRY - (D) | REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/> CME-45C

 | <input type="checkbox"/> ADVANCING TOOLS: | <input checked="" type="checkbox"/> AUTOMATIC | <input type="checkbox"/> MANUAL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/> CME-55

 | <input type="checkbox"/> CLAY BITS | CORE SIZE: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/> CME-550X

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| <input type="checkbox"/> VANE SHEAR TEST

 | <input checked="" type="checkbox"/> 8" HOLLOW AUGERS | HAND TOOLS: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/> PORTABLE HOIST

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 | <input type="checkbox"/> TUNG-CARBIDE INSERTS | <input type="checkbox"/> SOUNDING ROD | <input type="checkbox"/> VANE SHEAR TEST | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <input type="checkbox"/>

 | <input type="checkbox"/> CASING <input type="checkbox"/> W/ ADVANCER | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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 | | | | NON PLASTIC | PLASTICITY INDEX (PI) | DRY STRENGTH | SLIGHTLY PLASTIC | 0-5 | VERY LOW | MODERATELY PLASTIC | 6-15 | SLIGHT | HIGHLY PLASTIC | 16-25 | MEDIUM | | 26 OR MORE | HIGH | <p>INDURATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td>FRIBLE</td> <td>RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</td> </tr> <tr> <td>MODERATELY INDURATED</td> <td>GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</td> </tr> <tr> <td>INDURATED</td> <td>GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</td> </tr> <tr> <td>EXTREMELY INDURATED</td> <td>SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</td> </tr> </tbody> </table>
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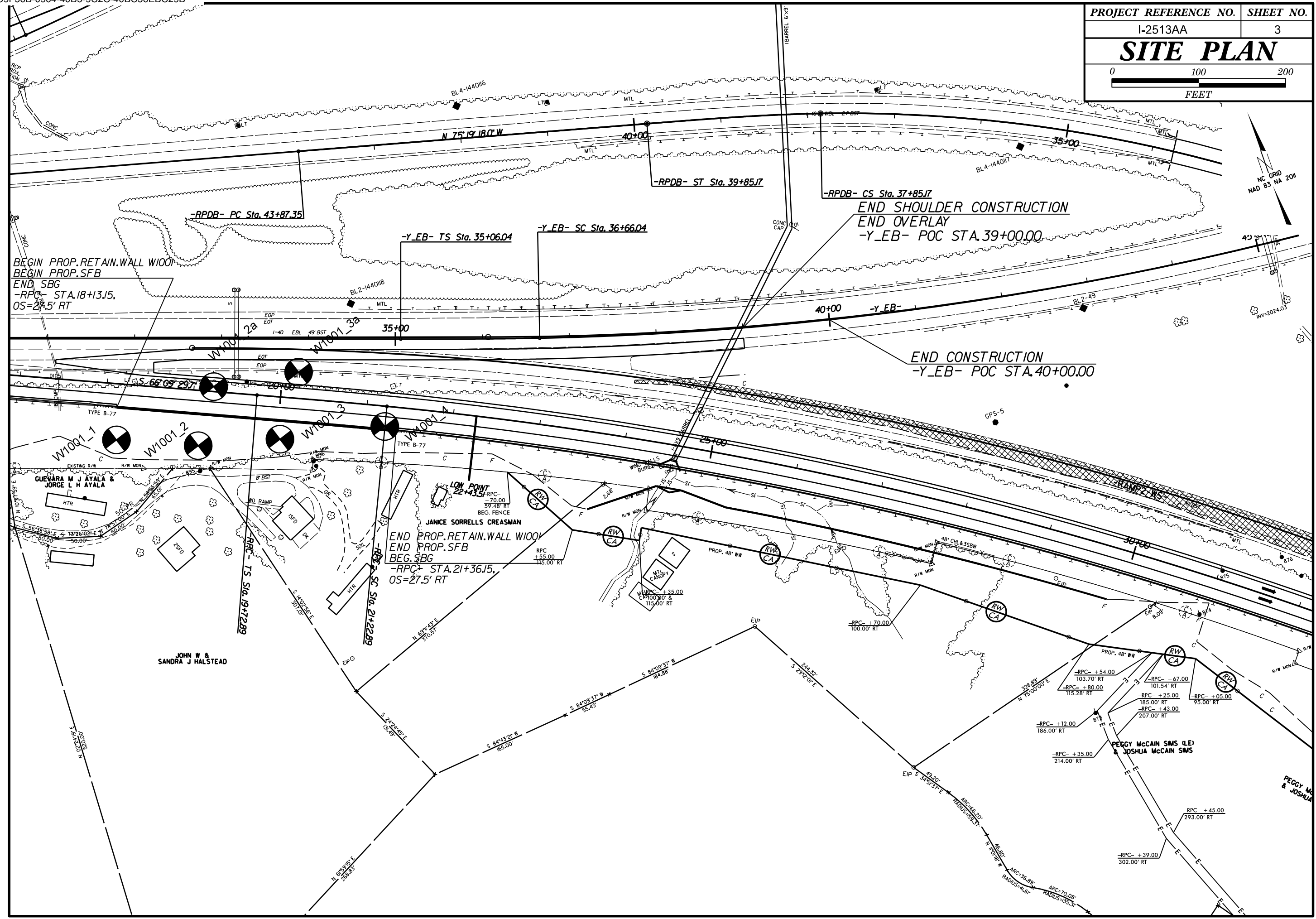
 | | | | <p>INDURATION</p> <p>FRIBLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| <p>PLASTICITY</p> <p>NON PLASTIC 0-5 VERY LOW</p> <p>SLIGHTLY PLASTIC 6</p>

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PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	
0 100 200 FEET	



GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1001, FROM -RPC- STA. 18+13.15, 27.50' RT TO -RPC- STA. 21+36.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1001_1		STATION 18+16		OFFSET 65 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,087.3 ft		TOTAL DEPTH 29.2 ft		NORTHING 676,494		EASTING 924,576										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/10/22		COMP. DATE 10/10/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2090																
														2,087.3	GROUND SURFACE	0.0
2085	2,086.3	1.0	5	6	10								M	RESIDUAL		
	2,083.8	3.5	12	14	14								M	RED-TAN AND TAN, MED. DENSE TO DENSE, SILTY SAND (A-2-4) WITH TRACE TO LITTLE MICA		
2080	2,081.3	6.0	11	11	33								D			
	2,078.8	8.5	41	28	15								D			
2075	2,073.8	13.5	7	10	14								D			
2070	2,068.8	18.5	4	6	9								M			
2065	2,063.8	23.5	6	9	7								M			
2060	2,058.8	28.5	60	40/0.2												
														2,059.3	WEATHERED ROCK	28.0
														2,058.1	TAN AND WHITE, GNEISS	29.2
															Boring Terminated at Elevation 2,058.1 ft in WR: GNEISS	

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1001, FROM -RPC- STA. 18+13.15, 27.50' RT TO -RPC- STA. 21+36.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1001_2		STATION 19+10		OFFSET 63 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,094.8 ft		TOTAL DEPTH 38.5 ft		NORTHING 676,457		EASTING 924,662										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/07/22		COMP. DATE 10/07/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2095																
	2,093.8	1.0	6	8	9								M	GROUND SURFACE	0.0	
2090	2,091.3	3.5	6	7	7								M	RESIDUAL		
	2,088.8	6.0	4	5	5								M	BROWN, V. STIFF, SANDY SILT (A-4) WITH LITTLE MICA	3.0	
2085	2,086.3	8.5	4	7	8								M	BROWN, MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	5.5	
	2,081.3	13.5	3	5	6								M	TAN, STIFF TO V. STIFF, SANDY SILT (A-4) WITH TRACE MICA		
2080	2,076.3	18.5	4	6	9								M			
2075	2,071.3	23.5	3	6	7								M	TAN-BROWN, MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA	12.0	
2070	2,066.3	28.5	14	33	21								M	TAN, STIFF, SANDY SILT (A-4) WITH TRACE MICA	22.0	
2065	2,061.3	33.5	100/0.3										M	TAN, STIFF, SANDY SILT (A-4) WITH TRACE MICA	27.0	
2060	2,056.3	38.5	60/0.0										M	TAN-BROWN, V. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA	31.0	
														2,067.8	WEATHERED ROCK	31.0
														2,063.8	GRAY AND WHITE, GNEISS	
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,056.3 ft on CR: GNEISS	

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1001, FROM -RPC- STA. 18+13.15, 27.50' RT TO -RPC- STA. 21+36.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1001_2A		STATION 19+22		OFFSET 6 ft LT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,061.8 ft		TOTAL DEPTH 2.0 ft		NORTHING 676,515		EASTING 924,701										
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD Hand Auger		HAMMER TYPE N/A												
DRILLER GOODNIGHT, D.		START DATE 10/28/22		COMP. DATE 10/28/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2065																
2060												M		GROUND SURFACE 0.0 TOPSOIL 0.9 RESIDUAL 2.0 TAN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE ROCK FRAGMENTS WEATHERED ROCK CR/BOULDER: GNEISS Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 2,059.8 ft on CR/BOULDER: GNEISS	2.0	

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1001, FROM -RPC- STA. 18+13.15, 27.50' RT TO -RPC- STA. 21+36.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1001_3		STATION 20+03		OFFSET 48 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,089.4 ft		TOTAL DEPTH 36.7 ft		NORTHING 676,433		EASTING 924,754										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/07/22		COMP. DATE 10/07/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2090																
2085	2,088.4	1.0	11	11	10											
2080	2,085.9	3.5	6	9	8											
2075	2,083.4	6.0	6	5	8											
2070	2,080.9	8.5	4	6	8											
2065	2,075.9	13.5	6	7	6											
2060	2,070.9	18.5	10	11	12											
2055	2,065.9	23.5	4	6	7											
	2,060.9	28.5	4	5	8											
	2,055.9	33.5	12	18	60											
	2,052.7	36.7	60/0.0													

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5-7	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W1002, FROM
-RPC- STATION 23 + 68.60, 88.85' RT TO -RPC-
STATION 29 + 85.00, 60.00' RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	7

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 1919 TOT-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:
- 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.
 - BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



DocuSigned by:
Stephen Crockett 1/30/2024
 C5CA5FED48E0435...
 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

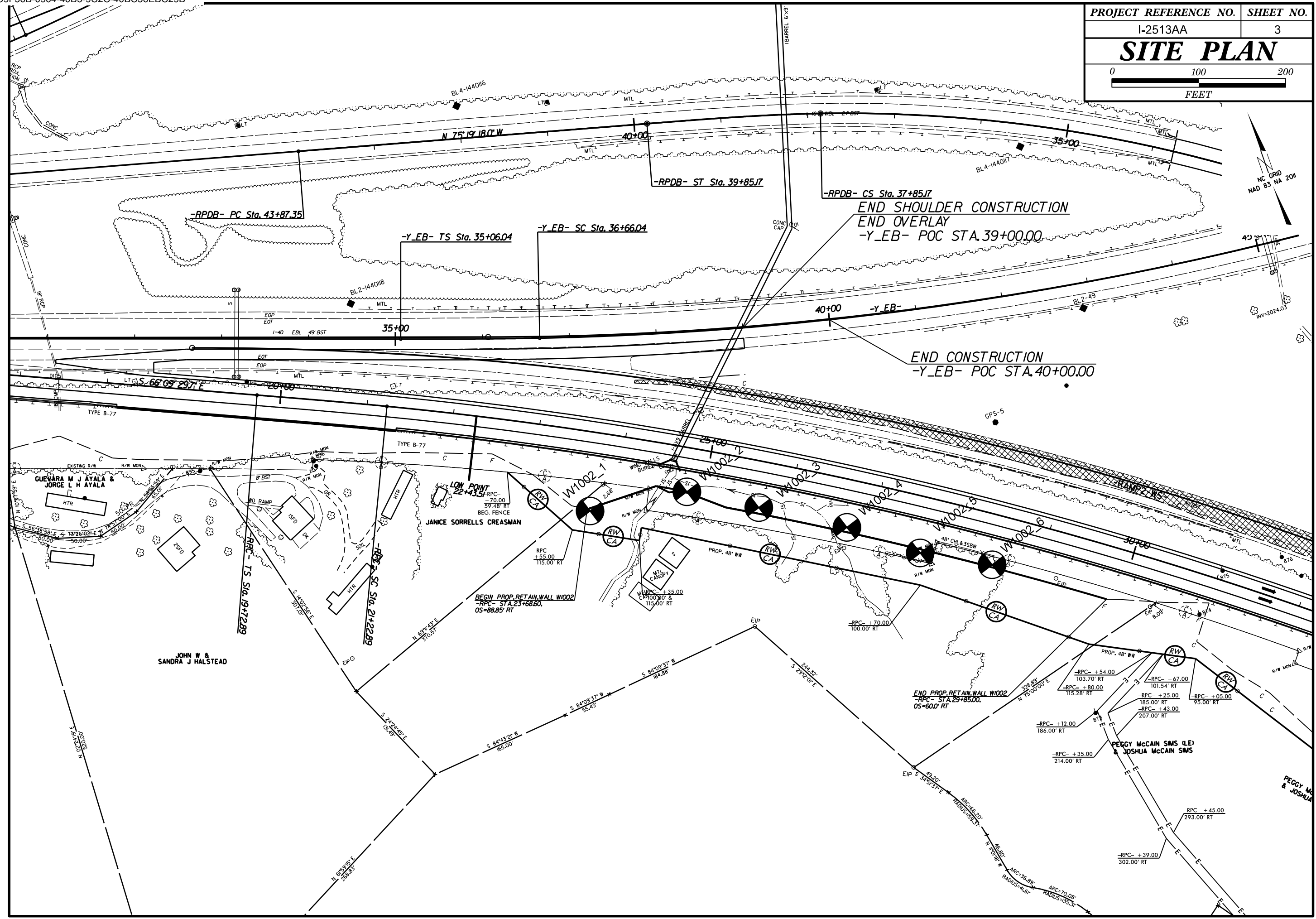
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

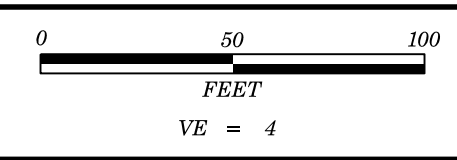
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

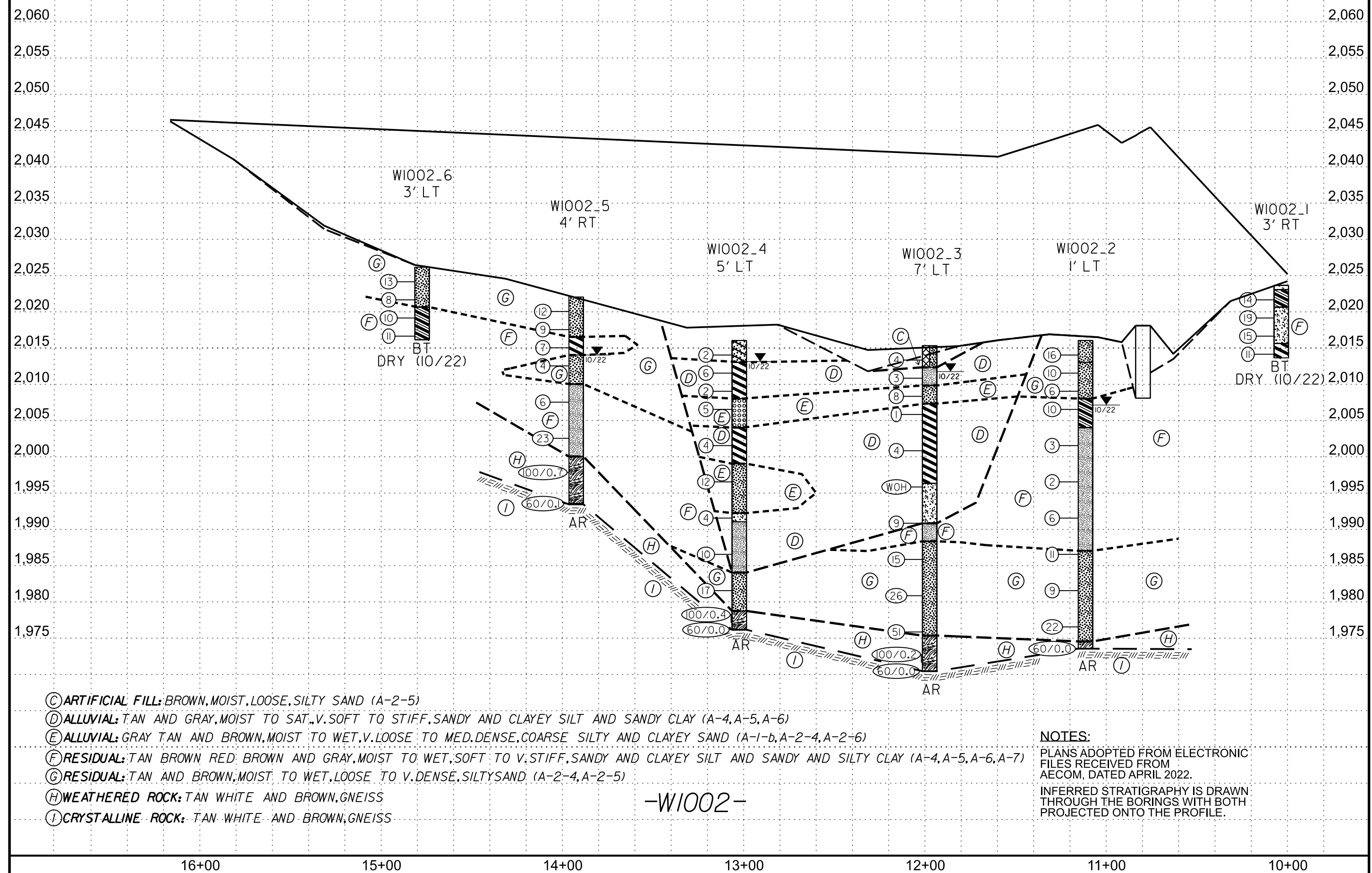
SOIL DESCRIPTION										GRADATION										ROCK DESCRIPTION										TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
<p>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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i></p>										<p>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.</p>										<p>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:</p>										<p>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 DISLOADED 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 (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 RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS. SLICKENISES - 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</td> </tr> <tr> <th>SOFT</th> <td>CAN BE GROUDED 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.</td> </tr> <tr> <th>VERY SOFT</th> <td>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. 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MARK: ELEVATIONS TAKEN FROM I2513.ls.tbl.in DATE: 04/15/2022</p> <p style="text-align: right;">ELEVATION: FEET</p> <p>NOTES: FIAD - FILLED IMMEDIATELY AFTER DRILLING</p> </td> </tr> </table>										GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS						A-1	A-2	A-3	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-2	A-3	A-4, A-5	A-6, A-7	GROUP CLASS.	A-1-a	A-1-b	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-3	A-4, A-5	A-6, A-7							SYMBOL	[Pattern]							[Pattern]							[Pattern]						% 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	36 MN	36 MN	36 MN							MATERIAL PASSING #40 LL PI	-							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							GROUP INDEX	0							0	4 MX	8 MX	12 MX	16 MX	NO MX							USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. 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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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	
0 100 200 FEET	





PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT	



- Ⓒ **ARTIFICIAL FILL:** BROWN, MOIST, LOOSE, SILTY SAND (A-2-5)
- Ⓓ **ALLUVIAL:** TAN AND GRAY, MOIST TO SAT., V. SOFT TO STIFF, SANDY AND CLAYEY SILT AND SANDY CLAY (A-4, A-5, A-6)
- Ⓔ **ALLUVIAL:** GRAY TAN AND BROWN, MOIST TO WET, V. LOOSE TO MED. DENSE, COARSE SILTY AND CLAYEY SAND (A-1-b, A-2-4, A-2-6)
- Ⓕ **RESIDUAL:** TAN BROWN, RED, BROWN AND GRAY, MOIST TO WET, SOFT TO V. STIFF, SANDY AND CLAYEY SILT AND SANDY AND SILTY CLAY (A-4, A-5, A-6, A-7)
- Ⓖ **RESIDUAL:** TAN AND BROWN, MOIST TO WET, LOOSE TO V. DENSE, SILTY SAND (A-2-4, A-2-5)
- Ⓗ **WEATHERED ROCK:** TAN WHITE AND BROWN, GNEISS
- Ⓘ **CRYSTALLINE ROCK:** TAN WHITE AND BROWN, GNEISS

NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM AECOM, DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

-W1002-

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)									
BORING NO. W1002_1		STATION 23+72		OFFSET 90 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,023.7 ft		TOTAL DEPTH 10.0 ft		NORTHING 676,237		EASTING 925,063										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/07/22		COMP. DATE 10/07/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2025															2,023.7 GROUND SURFACE 0.0	
	2,022.7	1.0	6	6	8										2,023.1 TOPSOIL 0.9	
2020	2,020.2	3.5	5	7	12										2,020.7 RESIDUAL BROWN, STIFF, SANDY CLAY (A-6) 3.0	
	2,017.7	6.0	4	7	8										TAN-BROWN AND RED-TAN, STIFF TO V. STIFF, SANDY CLAYEY SILT (A-5)	
2015	2,015.2	8.5	3	5	6										2,015.7 TAN-GRAY, STIFF, SANDY SILTY CLAY (A-7) 8.0	
															2,013.7 Boring Terminated at Elevation 2,013.7 ft in RESIDUAL: (A-7) 10.0	

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)									
BORING NO. W1002_2		STATION 24+80		OFFSET 50 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,016.1 ft		TOTAL DEPTH 42.5 ft		NORTHING 676,221		EASTING 925,176										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/10/22		COMP. DATE 10/10/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2020															2,016.1 GROUND SURFACE 0.0	
2015	2,015.1	1.0	8	8	8										2,013.1 RESIDUAL BROWN, MED. DENSE, SILTY SAND (A-2-4) 3.0	
	2,012.6	3.5	5	5	5										TAN AND BROWN, LOOSE TO MED. DENSE, CLAYEY SILTY SAND (A-2-5)	
2010	2,010.1	6.0	3	2	4										2,008.1 TAN, STIFF, SANDY CLAY (A-6) 8.0	
	2,007.6	8.5	3	4	6										2,004.1 BROWN-TAN, SOFT TO MED. STIFF, SANDY SILT (A-4) 12.0	
2005	2,002.6	13.5	3	2	1											
2000	1,997.6	18.5	1	1	1											
1995	1,992.6	23.5	2	3	3											
1990	1,987.6	28.5	3	4	7											
1985	1,982.6	33.5	3	4	5											
1980	1,977.6	38.5	4	5	17											
1975	1,973.6	42.5	60	0	0											
															1,974.6 WEATHERED ROCK 41.5	
															1,973.6 TAN AND WHITE, GNEISS 42.5	
															Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,973.6 ft on CR: GNEISS	

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.	
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)
BORING NO. W1002_3		STATION 25+66		OFFSET 53 ft RT		ALIGNMENT -RPC-	
COLLAR ELEV. 2,015.4 ft		TOTAL DEPTH 44.9 ft		NORTHING 676,177		EASTING 925,248	
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Odom, C.		START DATE 10/11/22		COMP. DATE 10/11/22		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2020																
2015	2,014.4	1.0		2	2	2								2,015.4	GROUND SURFACE	0.0
	2,011.9	3.5	WOH	1	2									2,012.4	ARTIFICIAL FILL BROWN, LOOSE, CLAYEY SILTY SAND (A-2-5)	3.0
2010	2,009.4	6.0		3	3	5								2,009.9	ALLUVIAL BROWN, SOFT, SANDY SILT (A-4) WITH TRACE ORGANICS	5.5
	2,006.9	8.5	WOH	WOH	1									2,007.4	GRAY, LOOSE, SILTY SAND (A-2-4) WITH SOME GRAVEL	8.0
2005	2,001.9	13.5		1	2	2									GRAY, V. SOFT TO SOFT, SILTY CLAY (A-7)	
2000	1,996.9	18.5	WOH	WOH	WOH									1,996.4	RESIDUAL GRAY AND WHITE, STIFF, CLAYEY SILT (A-5) WITH TRACE ROCK FRAGMENTS	19.0
1995	1,991.9	23.5		3	4	5								1,990.9	GRAY AND WHITE, STIFF, SANDY SILT (A-4) WITH TRACE ROCK FRAGMENTS	24.5
1990	1,986.9	28.5		3	6	9								1,988.4	WHITE AND GRAY, MED. DENSE TO V. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA	27.0
1985	1,981.9	33.5		8	13	13								1,975.4	WEATHERED ROCK WHITE AND GRAY, GNEISS	40.0
1980	1,976.9	38.5		8	15	36								1,970.5	Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,970.5 ft on CR: GNEISS	44.9
1975	1,971.9	43.5		100/0.2												
	1,970.5	44.9		60/0.0												

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.	
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)
BORING NO. W1002_4		STATION 26+71		OFFSET 55 ft RT		ALIGNMENT -RPC-	
COLLAR ELEV. 2,016.1 ft		TOTAL DEPTH 39.9 ft		NORTHING 676,122		EASTING 925,336	
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic	
DRILLER Odom, C.		START DATE 10/11/22		COMP. DATE 10/11/22		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2020																
2015	2,015.1	1.0		2	1	1								2,016.1	GROUND SURFACE	0.0
	2,012.6	3.5		2	3	3								2,013.1	ALLUVIAL TAN-BROWN, V. LOOSE, CLAYEY SAND (A-2-6)	3.0
2010	2,010.1	6.0	WOH	WOH	2									2,008.1	TAN AND GRAY, SOFT TO MED. STIFF, SANDY SILTY CLAY (A-7)	8.0
	2,007.6	8.5		3	2	3								2,004.1	LIGHT GRAY, LOOSE, SILTY F. TO CSE. SAND (A-1-b)	12.0
2005	2,002.6	13.5	WOH	1	3									2,004.1	GRAY, SOFT TO MED. STIFF, SANDY SILTY CLAY (A-7) WITH LENSES OF CSE. SAND	12.0
2000	1,997.6	18.5		6	7	5								1,999.1	GRAY, MED. DENSE, SILTY SAND (A-2-4)	17.0
1995	1,992.6	23.5		3	2	2								1,992.3	DARK GRAY, SOFT TO MED. STIFF, SANDY CLAYEY SILT (A-5) WITH LITTLE MICA	23.8
1990	1,987.6	28.5		3	4	6								1,984.1	RESIDUAL TAN, STIFF, SANDY SILT (A-4) WITH TRACE MICA	32.0
1985	1,982.6	33.5		3	5	12								1,978.8	TAN AND BROWN, MED. DENSE, SILTY SAND (A-2-4)	37.3
1980	1,977.6	38.5		100/0.4										1,976.2	WEATHERED ROCK TAN AND WHITE, GNEISS	39.9
	1,976.2	39.9		60/0.0											Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 1,976.2 ft on CR: GNEISS	

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)									
BORING NO. W1002_5		STATION 27+61		OFFSET 64 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,022.1 ft		TOTAL DEPTH 28.6 ft		NORTHING 676,067		EASTING 925,406										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/12/22		COMP. DATE 10/12/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2025																
2020	2,021.1	1.0	8	6	6											
	2,018.6	3.5	5	4	5											
2015	2,016.1	6.0	2	3	4											
	2,013.6	8.5	2	2	2											
2010	2,008.6	13.5	2	3	3											
2005	2,003.6	18.5	2	8	15											
2000	1,998.6	23.5	40	60/0.2												
1995	1,993.6	28.5	60/0.1													

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1002, FROM -RPC- STA. 23+68.60, 88.85' RT TO -RPC- STA. 29+85.00, 60.00' RT							GROUND WTR (ft)									
BORING NO. W1002_6		STATION 28+46		OFFSET 57 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,026.2 ft		TOTAL DEPTH 10.0 ft		NORTHING 676,027		EASTING 925,480										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/10/22		COMP. DATE 10/10/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2030																
2025	2,025.2	1.0	6	6	7											
	2,022.7	3.5	5	4	4											
2020	2,020.2	6.0	10	5	5											
	2,017.7	8.5	3	5	6											

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

REFERENCE: I-2513AA

PROJECT: 34165

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGENDS
3	SITE PLAN
4	PROFILE
5-8	BORE LOGS

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION RETAINING WALL NO. W1101, FROM
-RPC- STATION 33 + 78.15, 27.50' RT TO -RPC-
STATION 39 + 95.15, 27.50' RT

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	8

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:

- 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.
- BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HUNSBERGER, W.S.

SUBMITTED BY FALCON ENG.

DATE JANUARY 2024



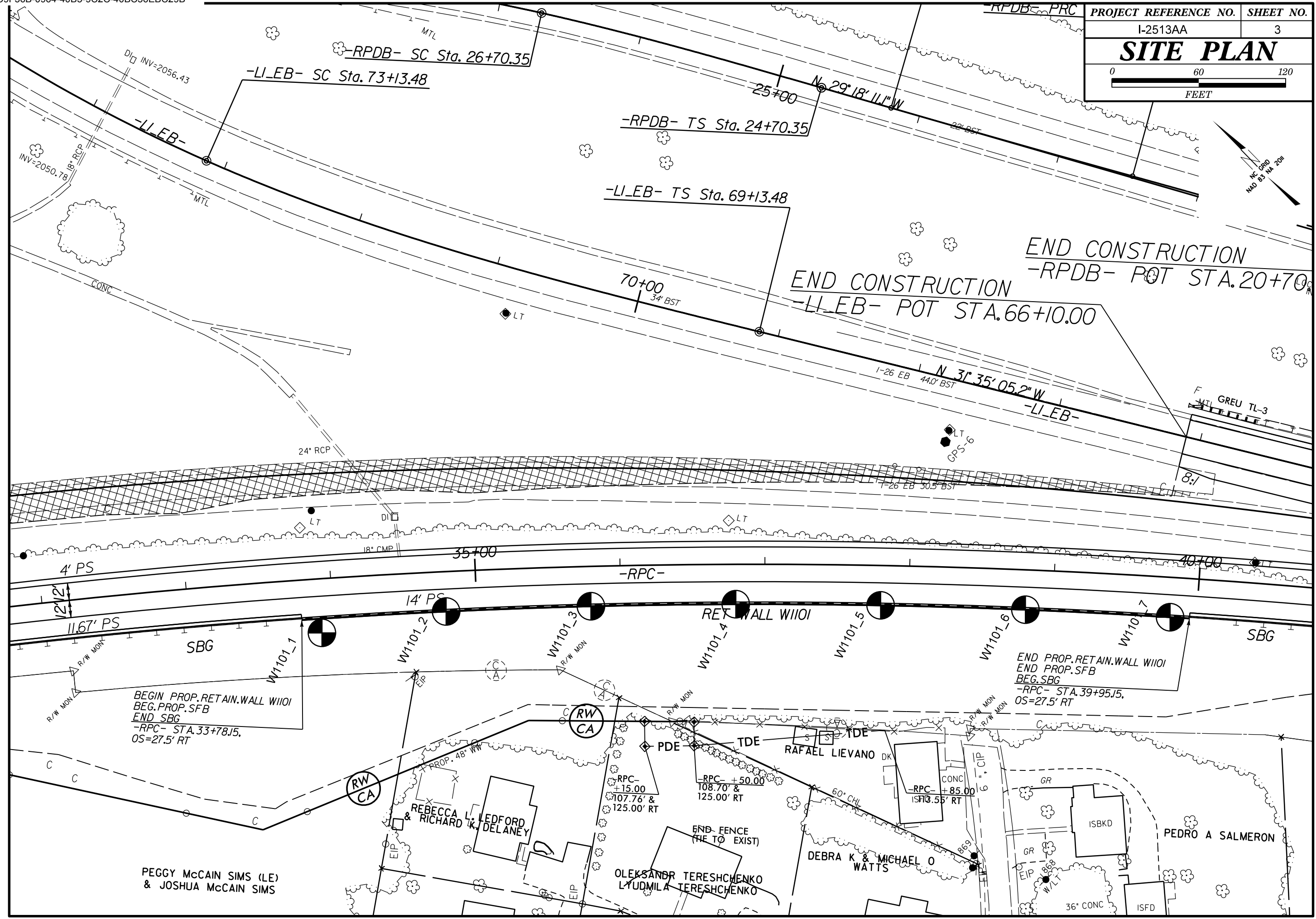
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Stephen Crockett 1/30/2024
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 SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

Table with multiple columns: SOIL DESCRIPTION, GRADATION, ROCK DESCRIPTION, TERMS AND DEFINITIONS, SOIL LEGEND AND AASHTO CLASSIFICATION, MINERALOGICAL COMPOSITION, COMPRESSIBILITY, PERCENTAGE OF MATERIAL, GROUND WATER, MISCELLANEOUS SYMBOLS, RECOMMENDATION SYMBOLS, ABBREVIATIONS, EQUIPMENT USED ON SUBJECT PROJECT, FRACTURE SPACING, BEDDING, PLASTICITY, COLOR, and INDURATION.

PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	3
SITE PLAN	



BEGIN PROP. RETAIN. WALL W1101
 BEG. PROP. SFB
 END SBG
 -RPC- STA. 33+78.15,
 OS=27.5' RT

END PROP. RETAIN. WALL W1101
 END PROP. SFB
 BEG. SBG
 -RPC- STA. 39+95.15,
 OS=27.5' RT

PEGGY McCAIN SIMS (LE)
 & JOSHUA McCAIN SIMS

REBECCA L LEDFORD
 & RICHARD J DELANEY

OLEKSANDR TERESHCHENKO
 LYUDMILA TERESHCHENKO

DEBRA K & MICHAEL O
 WATTS

PEDRO A SALMERON

RAFAEL LIEVANO DK

ISBKD

ISFD

END FENCE
 (TIE TO EXIST)

RW
 CA

RW
 CA

RW
 CA

RW
 CA

RW
 CA

RW
 CA

RET. WALL W1101

-RPC-

35+00

70+00

25+00

4' PS

11.67' PS

14' PS

40+00

SBG

SBG

12' PS

4' PS

18" CMP

24" RCP

CONC

MTL

INV=2050.78

18" RCP

INV=2056.43

MTL

CONC

MTL

MTL

MTL

MTL

MTL

MTL

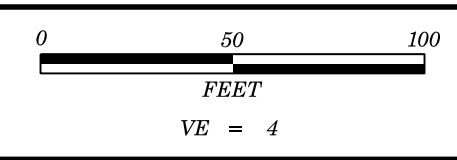
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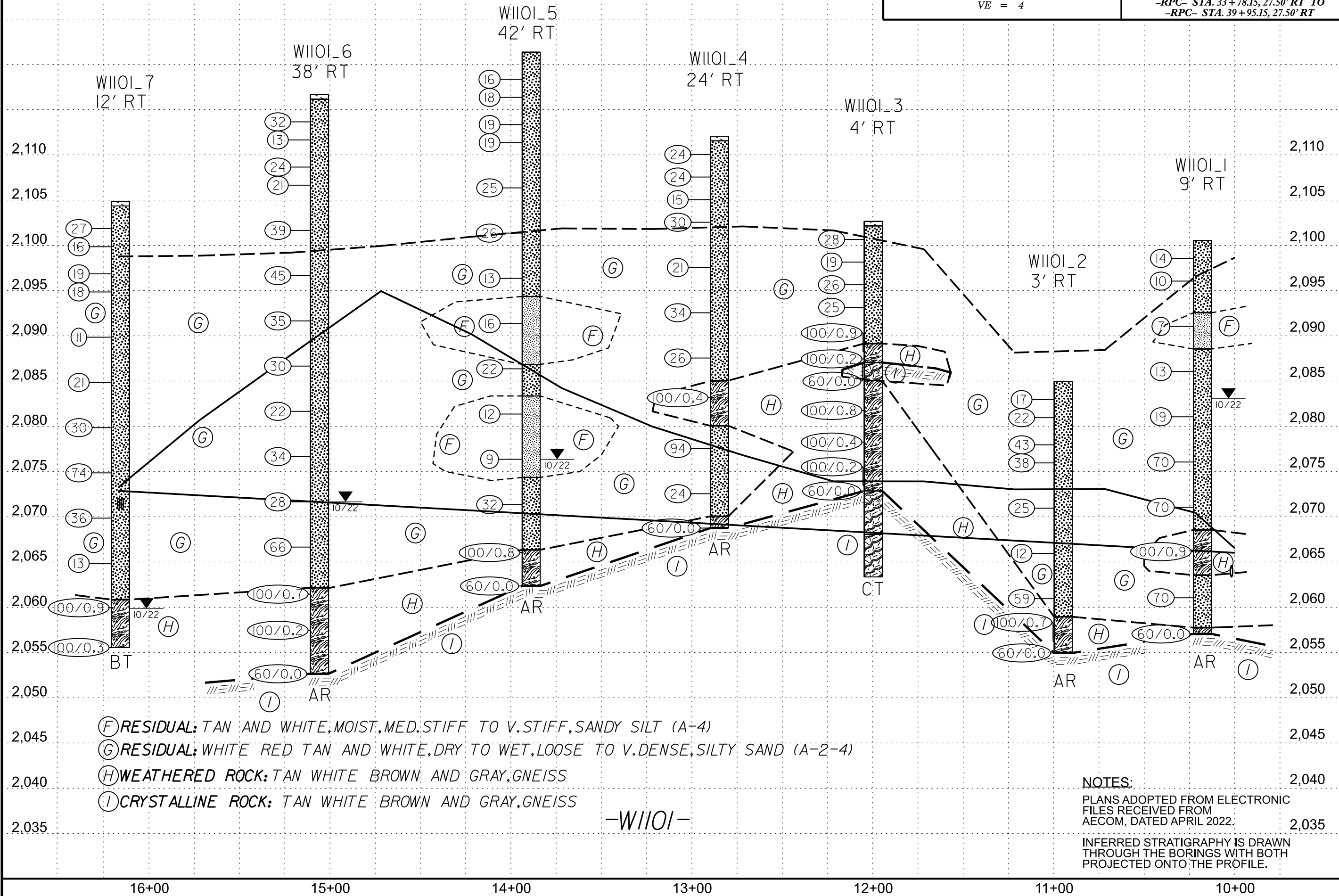
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PROJECT REFERENCE NO.	SHEET NO.
I-2513AA	4
RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT	



- (F) RESIDUAL: TAN AND WHITE, MOIST, MED. STIFF TO V. STIFF, SANDY SILT (A-4)
- (G) RESIDUAL: WHITE RED TAN AND WHITE, DRY TO WET, LOOSE TO V. DENSE, SILTY SAND (A-2-4)
- (H) WEATHERED ROCK: TAN WHITE BROWN AND GRAY, GNEISS
- (I) CRYSTALLINE ROCK: TAN WHITE BROWN AND GRAY, GNEISS

-W1101-

NOTES:
 PLANS ADOPTED FROM ELECTRONIC FILES RECEIVED FROM AECOM, DATED APRIL 2022.
 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_1		STATION 33+96		OFFSET 37 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,100.6 ft		TOTAL DEPTH 43.5 ft		NORTHING 675,712		EASTING 925,925										
DRILL RIG/HAMMER EFF./DATE CG24113 CME-550X 74% 04/08/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/12/22		COMP. DATE 10/12/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2105																
2100	2,099.6	1.0	6	6	8											
	2,097.1	3.5	5	5	5											
2095																
	2,092.1	8.5	2	3	4											
2090																
	2,087.1	13.5	6	6	7											
2085																
	2,082.1	18.5	5	9	10											
2080																
	2,077.1	23.5	16	10	60											
2075																
	2,072.1	28.5	35	46	24											
2070																
	2,067.1	33.5	30	70/0.4												
2065																
	2,062.1	38.5	37	25	45											
2060																
	2,057.1	43.5	60/0.0													

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_2		STATION 34+73		OFFSET 31 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,085.0 ft		TOTAL DEPTH 30.0 ft		NORTHING 675,666		EASTING 925,986										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 10/24/22		COMP. DATE 10/24/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2085																
	2,084.0	1.0	5	8	9											
	2,082.0	3.0	9	10	12											
2080																
	2,079.0	6.0	23	18	25											
	2,077.0	8.0	12	18	20											
2075																
	2,072.0	13.0	8	10	15											
2070																
	2,067.0	18.0	5	4	8											
2065																
	2,062.0	23.0	14	31	28											
2060																
	2,057.0	28.0	50	50/0.2												
2055																
	2,055.0	30.0	60/0.0													

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT BORE LOG

GEOTECHNICAL BORING REPORT CORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_3		STATION 35+78		OFFSET 31 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,102.7 ft		TOTAL DEPTH 39.3 ft		NORTHING 675,596		EASTING 926,063										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic											
DRILLER Odom, C.		START DATE 10/27/22		COMP. DATE 10/27/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION			
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)	DEPTH (ft)
2105																
	2,101.7	1.0	8	15	13											
2100	2,099.2	3.5	6	12	7											
	2,096.7	6.0	25	12	14											
2095	2,094.2	8.5	8	9	16											
	2,089.2	13.5	20	80/0.4												
	2,087.7	15.0	100/0.2													
2085	2,087.1	15.6	60/0.0													
	2,083.1	19.6	10	57	43/0.3											
2080	2,078.7	24.0	100/0.4													
	2,073.7	29.0	100/0.2													
	2,072.9	29.8	60/0.0													
2070																
2065																

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.						
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)					
BORING NO. W1101_3		STATION 35+78		OFFSET 31 ft RT		ALIGNMENT -RPC-						
COLLAR ELEV. 2,102.7 ft		TOTAL DEPTH 39.3 ft		NORTHING 675,596		EASTING 926,063						
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic							
DRILLER Odom, C.		START DATE 10/27/22		COMP. DATE 10/27/22		SURFACE WATER DEPTH N/A						
CORE SIZE NQ		TOTAL RUN 13.5 ft										
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
2087.1	2,087.1	15.6	4.0	N=60/0.0 1:31/1.0 1:15/1.0 0:51/1.0 0:39/1.0 N=100/0.8	(0.5)	(0.0)		(0.5)	(0.0)			
2085	2,085.1	17.6										
2080	2,083.1	19.6										
2075	2,072.9	29.8										
2070	2,068.4	34.3	5.0	N=60/0.0 2:00/1.0 2:32/1.0 2:31/1.0 1:07/0.5 3:11/1.0 4:19/1.0 5:14/1.0 3:28/1.0 5:45/1.0	(2.6)	(1.0)		(2.6)	(1.0)			
2065	2,063.4	39.3										

NCDOT BORE SINGLE I-1213AA_GEO.GPJ_NC_DOT.GDT 9/8/23

NCDOT CORE SINGLE I-1213AA_GEO.GPJ_NC_DOT.GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_4		STATION 36+63		OFFSET 52 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,112.1 ft		TOTAL DEPTH 43.3 ft		NORTHING 675,523		EASTING 926,110										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/25/22		COMP. DATE 10/25/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2115																
2110	2,111.1	1.0	11	10	14											
	2,108.6	3.5	8	10	14											
2105	2,106.1	6.0	6	7	8											
	2,103.6	8.5	8	12	18											
2100	2,098.6	13.5	5	9	12											
2095	2,093.6	18.5	7	15	19											
2090	2,088.6	23.5	6	10	16											
2085	2,083.6	28.5	100/0.4													
2080	2,078.6	33.5	16	25	69											
2075	2,073.6	38.5	11	8	16											
2070	2,068.8	43.3	60/0.0													

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_5		STATION 37+67		OFFSET 70 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,121.4 ft		TOTAL DEPTH 59.0 ft		NORTHING 675,438		EASTING 926,170										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/25/22		COMP. DATE 10/25/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2125																
2120	2,119.4	2.0	6	7	9											
	2,117.4	4.0	6	7	11											
2115	2,114.4	7.0	7	9	10											
	2,112.4	9.0	6	9	10											
2110	2,107.4	14.0	8	11	14											
2105	2,102.4	19.0	7	11	15											
2100	2,097.4	24.0	3	5	8											
2095	2,092.4	29.0	5	7	9											
2090	2,087.4	34.0	8	11	11											
2085	2,082.4	39.0	2	4	8											
2080	2,077.4	44.0	2	3	6											
2075	2,072.4	49.0	3	13	19											
2070	2,067.4	54.0	7	8	92/0.3											
2065	2,062.4	59.0	60/0.0													

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT_GDT 9/8/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_6		STATION 38+84		OFFSET 66 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,116.7 ft		TOTAL DEPTH 64.0 ft		NORTHING 675,358		EASTING 926,252										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/25/22		COMP. DATE 10/25/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2120																
2115	2,114.7	2.0	13	16	16											
	2,112.7	4.0	7	7	6											
2110	2,109.7	7.0	6	12	12											
	2,107.7	9.0	7	11	10											
2105																
	2,102.7	14.0	13	17	22											
2100																
	2,097.7	19.0	12	18	27											
2095																
	2,092.7	24.0	14	14	21											
2090																
	2,087.7	29.0	11	14	16											
2085																
	2,082.7	34.0	10	9	13											
2080																
	2,077.7	39.0	14	15	19											
2075																
	2,072.7	44.0	7	12	16											
2070																
	2,067.7	49.0	8	26	40											
2065																
	2,062.7	54.0	17	40	60/0.2											
2060																
	2,057.7	59.0	100/0.2													
2055																
	2,052.7	64.0	60/0.0													

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION RETAINING WALL NO. W1101, FROM -RPC- STA. 33+78.15, 27.50' RT TO -RPC- STA. 39+95.15, 27.50' RT							GROUND WTR (ft)									
BORING NO. W1101_7		STATION 39+94		OFFSET 40 ft RT		ALIGNMENT -RPC-										
COLLAR ELEV. 2,104.9 ft		TOTAL DEPTH 49.3 ft		NORTHING 675,295		EASTING 926,345										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 10/26/22		COMP. DATE 10/26/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2105																
	2,102.9	2.0	10	12	15											
2100																
	2,100.9	4.0	8	8	8											
	2,097.9	7.0	8	9	10											
2095																
	2,095.9	9.0	7	8	10											
2090																
	2,090.9	14.0	4	5	6											
2085																
	2,085.9	19.0	8	10	11											
2080																
	2,080.9	24.0	18	13	17											
2075																
	2,075.9	29.0	20	30	44											
2070																
	2,070.9	34.0	14	17	19											
2065																
	2,065.9	39.0	5	5	8											
2060																
	2,060.9	44.0	26	74/0.4												
	2,055.9	49.0	100/0.3													

NCDOT BORE DOUBLE I-1213AA_GEO.GPJ NC_DOT.GDT 9/8/23

REFERENCE: I-2513AA

PROJECT: 34165

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

STRUCTURE
SUBSURFACE INVESTIGATION

COUNTY BUNCOMBE
 PROJECT DESCRIPTION I-40 FROM EAST OF SR 1224
(MONTE VISTA RD) TO PAVEMENT JOINT WEST
OF SR 3412 (SAND HILL RD). INCLUDES INITIAL
IMPROVEMENTS AT I-40EB TO I-26EB AT US 19/23
(SMOKEY PARK HIGHWAY)
 SITE DESCRIPTION NOISEWALL 5A, FROM -Y- STA.
63+46.57, 86.50' RT TO -Y- STA. 77+80.27, 86.50' RT
NOISEWALL 5B, FROM -Y- STA. 77+14.17, 99.00' RT
TO -Y EB- STA. 13+66.36, 51.50' RT
NOISEWALL 5C, FROM -Y EB- STA. 13+39.81, 57.30' RT
TO -Y EB- STA. 14+13.75, 65.92' RT

CONTENTS

<u>SHEET NO.</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3-5	SITE PLAN
3-5	PROFILE
6-15	BORE LOGS

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	I-2513AA	1	15

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 1919 T07-6850. 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:

- 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.
- BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

CG2

GOODNIGHT, D.J.

ECS

NCDOT

INVESTIGATED BY FALCON ENG.

DRAWN BY CROCKETT, S.C.

CHECKED BY HAMM, J.R.

SUBMITTED BY FALCON ENG.

DATE SEPTEMBER 2023



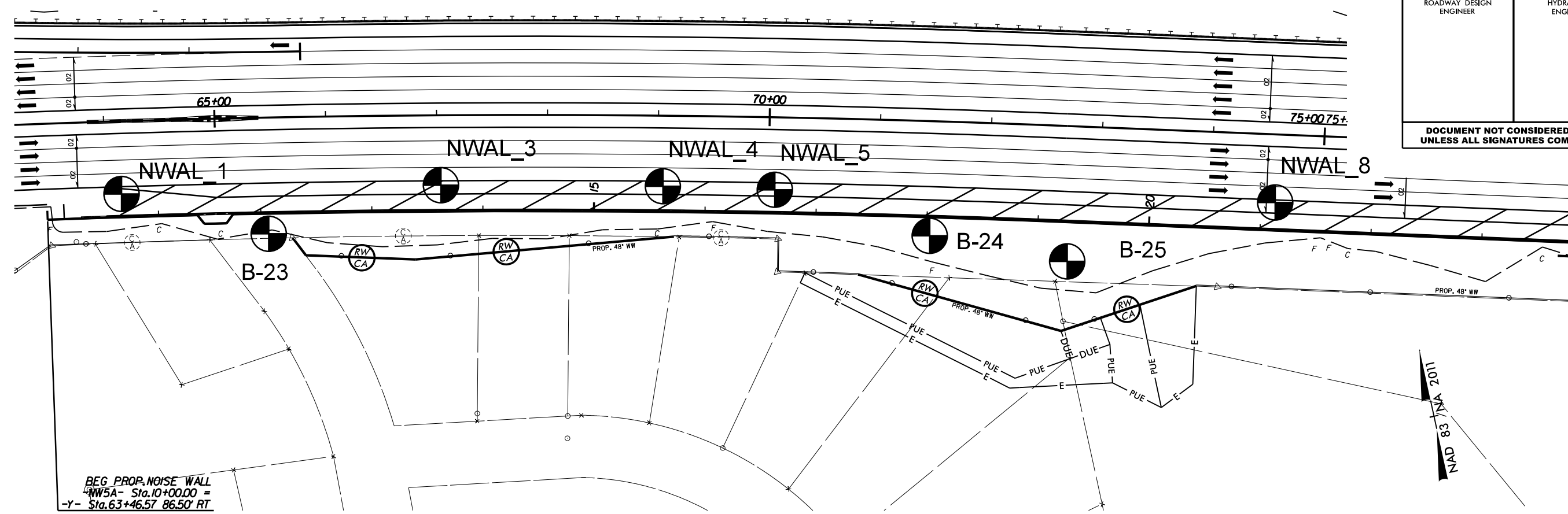
DocuSigned by:
Stephen Crockett 9/15/2023
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DOCUMENT NOT CONSIDERED FINAL
 UNLESS ALL SIGNATURES COMPLETED

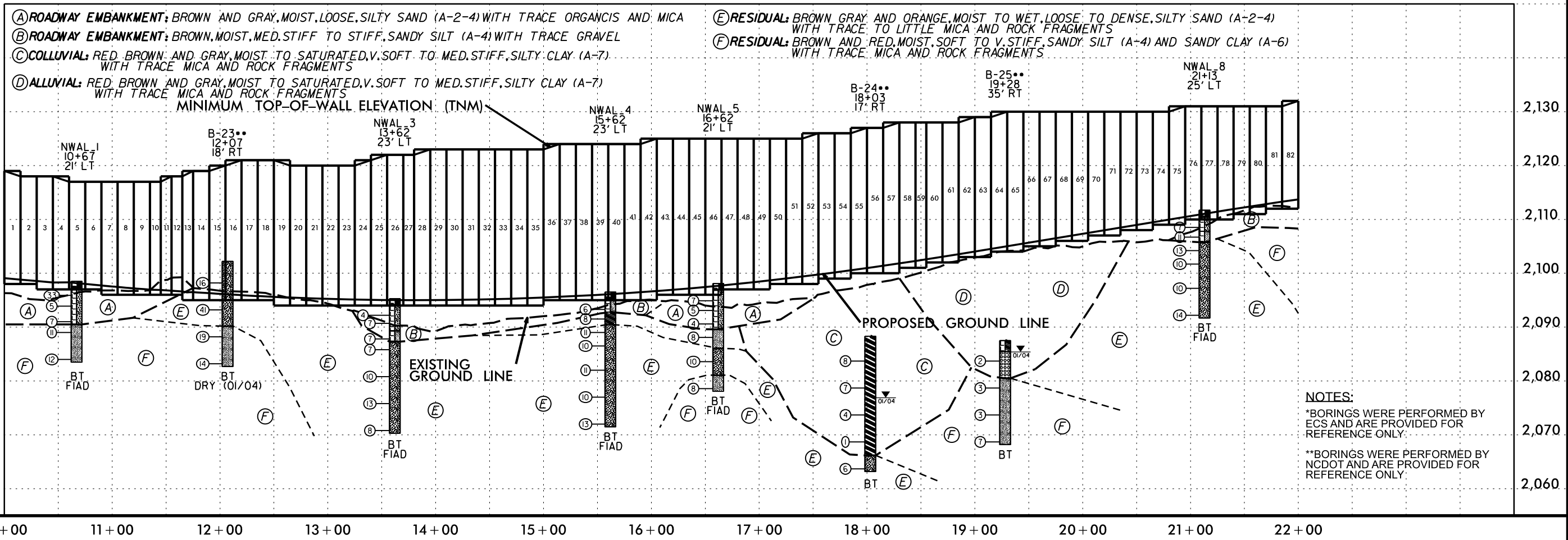
**NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT
SUBSURFACE INVESTIGATION
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS**

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 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, <i>VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6</i>										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.										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:										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 DISLOGGED 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 (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 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 (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 THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
<table border="1"> <tr> <th colspan="10">SOIL LEGEND AND AASHTO CLASSIFICATION</th> </tr> <tr> <th>GENERAL CLASS.</th> <th colspan="5">GRANULAR MATERIALS (≤ 35% PASSING #200)</th> <th colspan="5">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="5">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th>A-1</th> <th>A-3</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> <tr> <th>SYMBOL</th> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td colspan="5">[Pattern]</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>% PASSING #10 #40 #200</th> <td>50 MX 30 MX 15 MX</td> <td>50 MX 25 MX</td> <td>51 MN</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>35 MX</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td>36 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>MATERIAL PASSING #40 LL PI</th> <td colspan="5">-</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td>40 MX</td> <td>41 MN</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>GROUP INDEX</th> <td>0</td> <td>0</td> <td>0</td> <td>4 MX</td> <td>8 MX</td> <td>12 MX</td> <td>16 MX</td> <td>NO MX</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td>FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="5">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="5">HIGHLY ORGANIC SOILS</td> </tr> <tr> <th>GEN. RATING AS SUBGRADE</th> <td colspan="5">EXCELLENT TO GOOD</td> <td colspan="5">FAIR TO POOR</td> <td>FAIR TO POOR</td> <td>POOR</td> <td colspan="4">UNSUITABLE</td> </tr> <tr> <td colspan="10">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</td> <td colspan="10"></td> </tr> </table>										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-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7						SYMBOL	[Pattern]					[Pattern]					[Pattern]											% PASSING #10 #40 #200	50 MX 30 MX 15 MX	50 MX 25 MX	51 MN	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN										MATERIAL PASSING #40 LL PI	-					40 MX	41 MN	40 MX	41 MN	40 MX	41 MN	40 MX	41 MN								GROUP INDEX	0	0	0	4 MX	8 MX	12 MX	16 MX	NO MX													USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS		SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER					HIGHLY ORGANIC 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																				<table border="1"> <tr> <th colspan="10">MINERALOGICAL COMPOSITION</th> </tr> <tr> <td colspan="10">MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. 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DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-BROWN). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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PROJECT REFERENCE NO. 1-2513AA/AB	SHEET NO. 3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



NOISE WALL -NW5A- STA 10+00.00 TO -NW5A- STA 22+00.00



- (A) ROADWAY EMBANKMENT: BROWN AND GRAY, MOIST, LOOSE, SILTY SAND (A-2-4) WITH TRACE ORGANICS AND MICA
- (B) ROADWAY EMBANKMENT: BROWN, MOIST, MED. STIFF TO STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL
- (C) COLLUVIAL: RED, BROWN AND GRAY, MOIST TO SATURATED, V. SOFT TO MED. STIFF, SILTY CLAY (A-7) WITH TRACE MICA AND ROCK FRAGMENTS
- (D) ALLUVIAL: RED, BROWN AND GRAY, MOIST TO SATURATED, V. SOFT TO MED. STIFF, SILTY CLAY (A-7) WITH TRACE MICA AND ROCK FRAGMENTS

- (E) RESIDUAL: BROWN, GRAY AND ORANGE, MOIST TO WET, LOOSE TO DENSE, SILTY SAND (A-2-4) WITH TRACE TO LITTLE MICA AND ROCK FRAGMENTS
- (F) RESIDUAL: BROWN AND RED, MOIST, SOFT TO V. STIFF, SANDY SILT (A-4) AND SANDY CLAY (A-6) WITH TRACE MICA AND ROCK FRAGMENTS

MINIMUM TOP-OF-WALL ELEVATION (TNM)

NWAL_1 10+67 21' LT
 B-23 12+07 18' RT
 NWAL_3 13+62 23' LT
 NWAL_4 15+62 23' LT
 NWAL_5 16+62 21' LT
 B-24 18+03 17' RT
 B-25 19+28 35' RT
 NWAL_8 21+13 25' LT

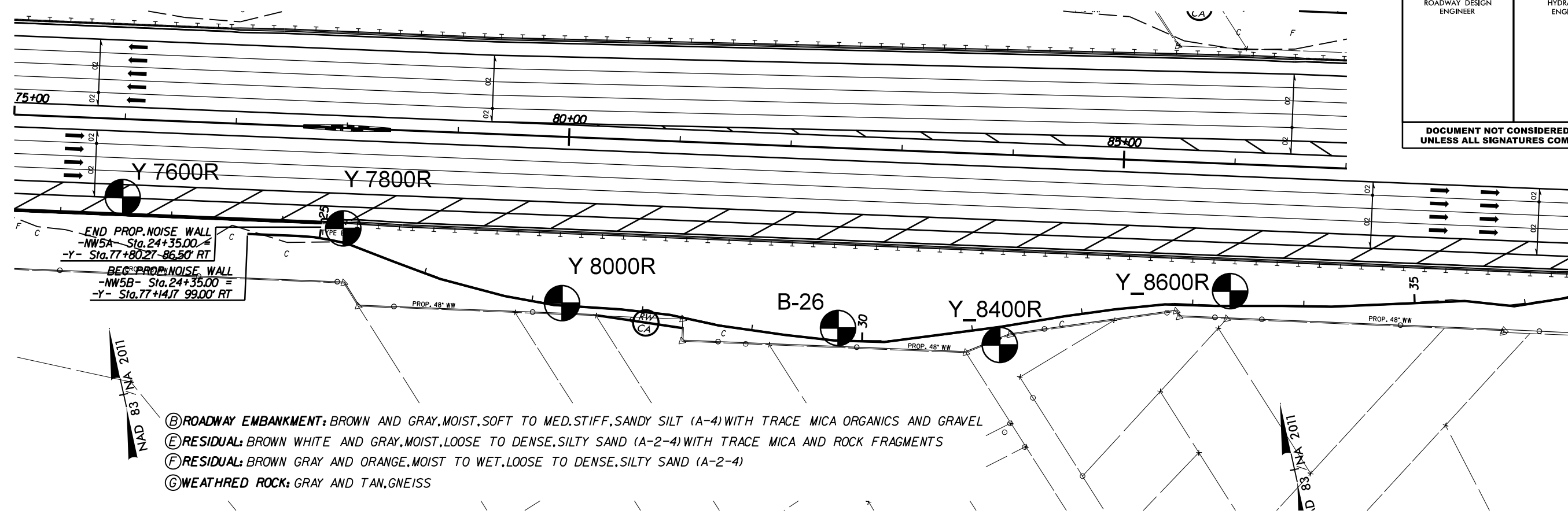
BT FIAD, BT DRY (01/04), BT

NOTES:
 *BORINGS WERE PERFORMED BY ECS AND ARE PROVIDED FOR REFERENCE ONLY.
 **BORINGS WERE PERFORMED BY NCDOT AND ARE PROVIDED FOR REFERENCE ONLY.

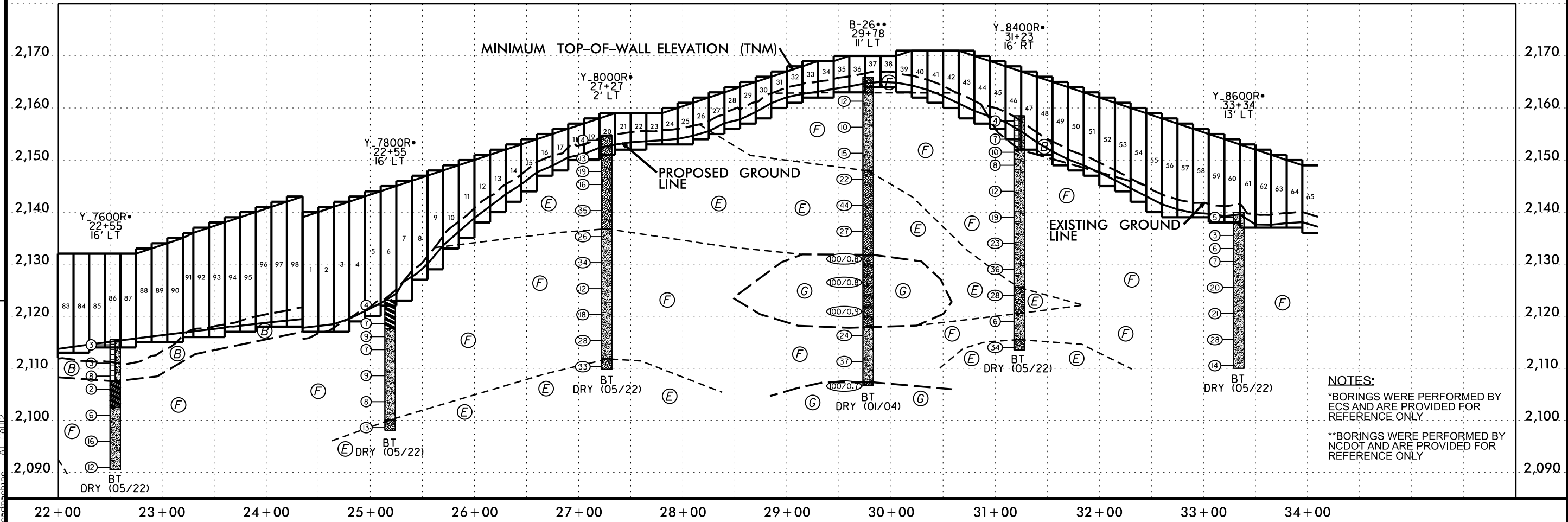
REVISIONS

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PROJECT REFERENCE NO. I-25/3AA/AB	SHEET NO. 4
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



NOISE WALL -NW5A- STA 22+00.00 TO 24+35.00 AND -NW5B- STA 24+35.00 TO 34+10.00

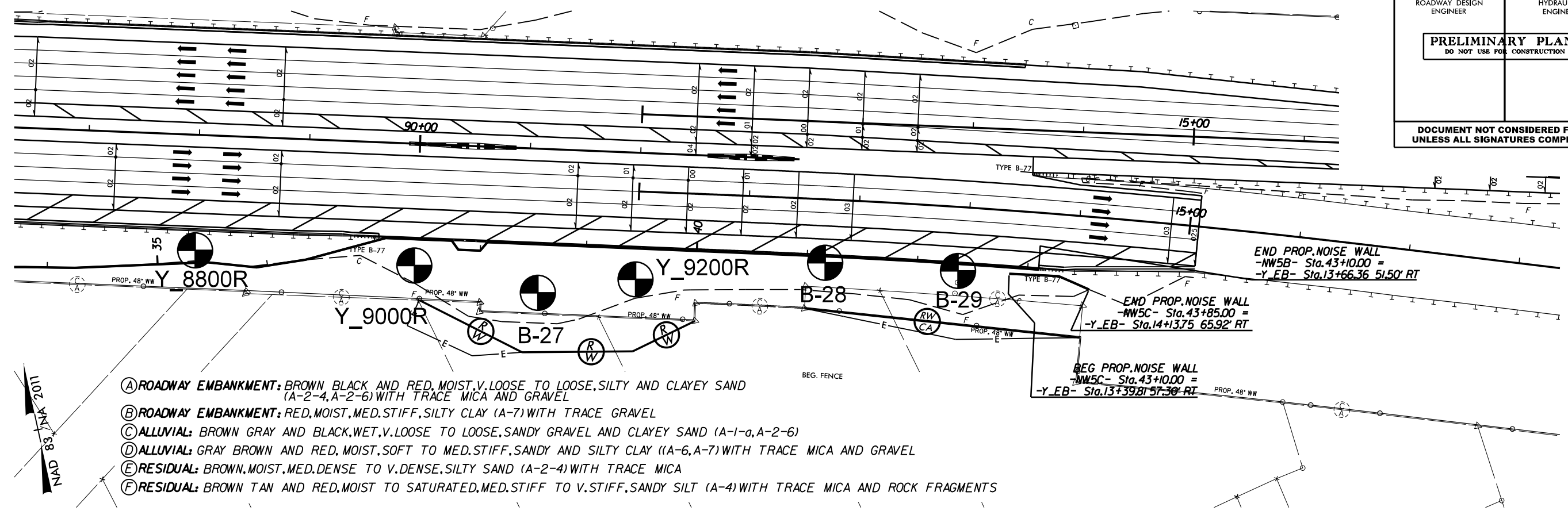


NOTES:
 *BORINGS WERE PERFORMED BY EGS AND ARE PROVIDED FOR REFERENCE ONLY
 **BORINGS WERE PERFORMED BY NCDOT AND ARE PROVIDED FOR REFERENCE ONLY

REVISIONS

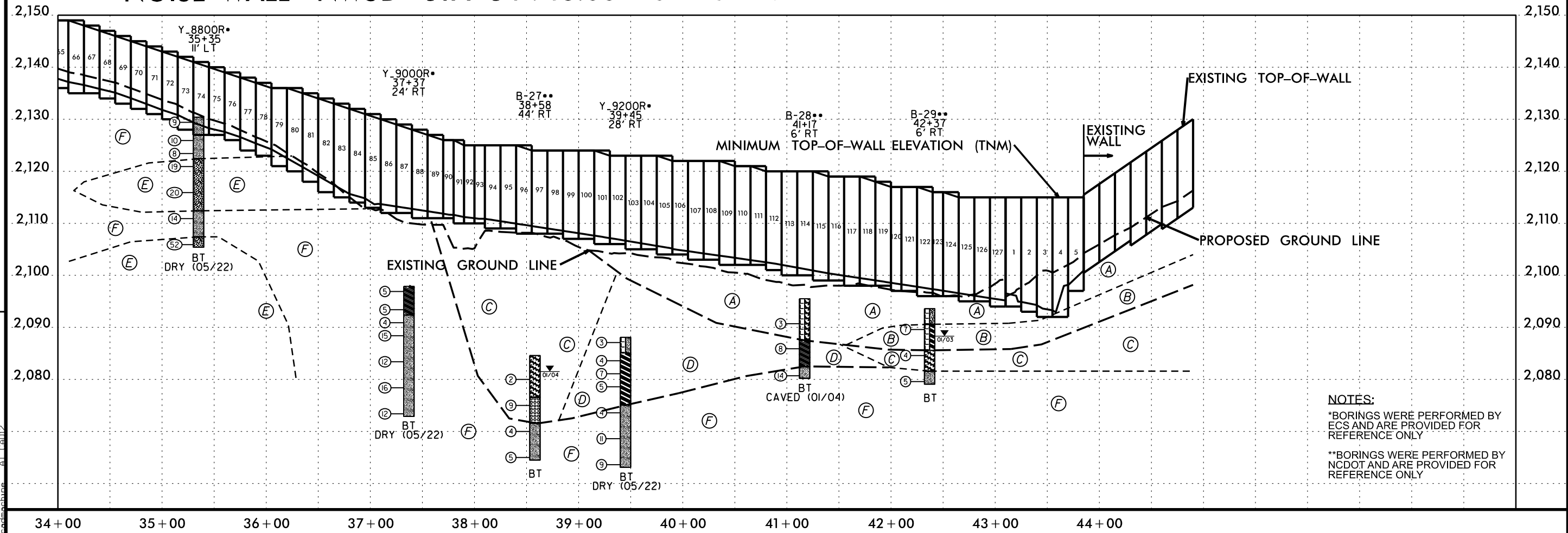
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PROJECT REFERENCE NO. 1-2513AA/AB	SHEET NO. 5
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
PRELIMINARY PLANS DO NOT USE FOR CONSTRUCTION	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



- (A) ROADWAY EMBANKMENT: BROWN BLACK AND RED, MOIST, V. LOOSE TO LOOSE, SILTY AND CLAYEY SAND (A-2-4, A-2-6) WITH TRACE MICA AND GRAVEL
- (B) ROADWAY EMBANKMENT: RED, MOIST, MED. STIFF, SILTY CLAY (A-7) WITH TRACE GRAVEL
- (C) ALLUVIAL: BROWN GRAY AND BLACK, WET, V. LOOSE TO LOOSE, SANDY GRAVEL AND CLAYEY SAND (A-1-a, A-2-6)
- (D) ALLUVIAL: GRAY BROWN AND RED, MOIST, SOFT TO MED. STIFF, SANDY AND SILTY CLAY ((A-6, A-7) WITH TRACE MICA AND GRAVEL
- (E) RESIDUAL: BROWN, MOIST, MED. DENSE TO V. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA
- (F) RESIDUAL: BROWN TAN AND RED, MOIST TO SATURATED, MED. STIFF TO V. STIFF, SANDY SILT (A-4) WITH TRACE MICA AND ROCK FRAGMENTS

NOISE WALL -NW5B- STA 34+10.00 TO 43+10.00 AND -NW5C- STA 43+10.00 TO 43+85.00



NOTES:
 *BORINGS WERE PERFORMED BY ECS AND ARE PROVIDED FOR REFERENCE ONLY
 **BORINGS WERE PERFORMED BY NCDOT AND ARE PROVIDED FOR REFERENCE ONLY

REVISIONS

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. NWAL_1		STATION 10+67		OFFSET 21 ft LT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,098.5 ft		TOTAL DEPTH 15.0 ft		NORTHING 677,937		EASTING 919,842										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Odom, C.		START DATE 08/16/23		COMP. DATE 08/16/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2100																
	2,096.9	1.6	7	19	14											
2095	2,094.9	3.6	7	3	2											
	2,092.0	6.5	2	3	4											
2090	2,090.0	8.5	4	5	6											
2085	2,085.0	13.5	4	5	7											
Boring Terminated at Elevation 2,083.5 ft In Residual Sandy SILT (A-4)																

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. B-23		STATION 12+07		OFFSET 18 ft RT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,102.2 ft		TOTAL DEPTH 19.5 ft		NORTHING 677,874		EASTING 919,964										
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER N/A		START DATE 01/06/04		COMP. DATE 01/06/04		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2105																
	2,102.2															
2100	2,099.2	3.0	3	6	10											
2095	2,094.2	8.0	16	21	20											
2090	2,089.2	13.0	6	9	10											
2085	2,084.2	18.0	5	6	8											
Boring Terminated at Elevation 2,082.7 ft In Residual Sandy SILT (A-4)																
Boring Drilled by NCDOT and provided for reference only.																

NCDOT BORE DOUBLE 12513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. NVAL_3		STATION 13+62		OFFSET 23 ft LT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,095.3 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,884		EASTING 920,125										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 08/17/23		COMP. DATE 08/17/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2100																
2095																
	2,093.2	2.1	4	2	2								M	GROUND SURFACE	0.0	
	2,091.7	3.6	2	3	4								M	ASPHALT	1.1	
	2,088.8	6.5	2	3	4								M	AGGREGATE BASE COURSE	1.3	
	2,086.8	8.5	2	3	4								M	ROADWAY EMBANKMENT BROWN, LOOSE, SILTY SAND (A-2-4) WITH SOME GRAVEL	6.0	
	2,081.8	13.5	4	4	6								M	ROADWAY EMBANKMENT BROWN, MED. STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL	8.0	
	2,076.8	18.5	5	6	7								M	RESIDUAL BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA		
	2,071.8	23.5	2	4	4								W	Boring Terminated at Elevation 2,070.3 ft In Residual Silty SAND (A-2-4)	25.0	

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. NVAL_4		STATION 15+62		OFFSET 23 ft LT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,096.5 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,840		EASTING 920,320										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 08/17/23		COMP. DATE 08/17/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2100																
2095																
	2,094.3	2.2	2	2	4								M	GROUND SURFACE	0.0	
	2,092.5	4.0	4	4	4								M	ASPHALT	1.0	
	2,090.0	6.5	5	6	5								M	AGGREGATE BASE COURSE	1.3	
	2,087.5	9.0	3	5	5								M	ROADWAY EMBANKMENT BROWN, MED. STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL	3.7	
	2,083.0	13.5	4	5	6								M	RESIDUAL RED-BROWN, MED. STIFF TO STIFF, SANDY CLAY (A-6)	6.0	
	2,078.0	18.5	3	5	5								M	RESIDUAL RED-TAN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH LITTLE MICA		
	2,073.0	23.5	3	6	7								M	Boring Terminated at Elevation 2,071.5 ft In Residual Silty SAND (A-2-4)	25.0	

NCDOT BORE DOUBLE 12513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.	
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)
BORING NO. NVAL_5		STATION 16+62		OFFSET 21 ft LT		ALIGNMENT -NW5A-	
COLLAR ELEV. 2,098.1 ft		TOTAL DEPTH 20.0 ft		NORTHING 677,815		EASTING 920,418	
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER Odom, C.		START DATE 08/17/23		COMP. DATE 08/17/23		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
2100																GROUND SURFACE 0.0
2095	2,095.9	2.2														ASPHALT 1.1
	2,094.1	4.0	3	3	4											AGGREGATE BASE COURSE 1.3
	2,091.6	6.5	2	2	3											ROADWAY EMBANKMENT TAN-BROWN, LOOSE, SILTY SAND (A-2-4) WITH TRACE ORGANICS AND TRACE MICA
2090	2,089.1	9.0	1	2	2											RESIDUAL TAN-BROWN, MED. STIFF TO STIFF, SANDY SILT (A-4) 8.5
	2,084.6	13.5	2	4	6											BROWN, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH TRACE MICA 12.0
2085	2,079.6	18.5	2	3	5											BROWN, MED. STIFF TO STIFF, SANDY SILT (A-4) WITH LITTLE MICA 17.0
2080																Boring Terminated at Elevation 2,078.1 ft In Residual Sandy SILT (A-4) 20.0

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek	
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)
BORING NO. B-24		STATION 18+03		OFFSET 17 ft RT		ALIGNMENT -NW5A-	
COLLAR ELEV. 2,088.3 ft		TOTAL DEPTH 25.1 ft		NORTHING 677,745		EASTING 920,545	
DRILL RIG/HAMMER EFF./DATE N/A		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic			
DRILLER N/A		START DATE 01/12/04		COMP. DATE 01/12/04		SURFACE WATER DEPTH N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG G	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100				ELEV. (ft)	DEPTH (ft)	
2090																GROUND SURFACE 0.0
	2,084.7	3.6	3	4	4											COLLUVIAL Very Soft to Medium Stiff, Red-Brown-Gray, Silty CLAY (A-7-5), with trace mica and rock fragments
2085																
2080	2,079.7	8.6	2	3	4											
2075	2,074.7	13.6	1	2	2											
2070	2,069.7	18.6	WOH	WOH	1											
2065	2,064.7	23.6	3	2	4											
																RESIDUAL Loose, Gray-White-Orange-Brown, Silty Fine to Coarse SAND (A-2-4), with trace mica and rock fragments 22.1
																Boring Terminated at Elevation 2,063.2 ft In Residual Silty SAND (A-2-4) 25.1
Boring Drilled by NCDOT and provided for reference only.																

NCDOT BORE DOUBLE I2513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. B-25		STATION 19+28		OFFSET 35 ft RT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,087.5 ft		TOTAL DEPTH 19.3 ft		NORTHING 677,696		EASTING 920,661										
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER N/A		START DATE 01/12/04		COMP. DATE 01/12/04		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2090														2,087.5	0.0	GROUND SURFACE
2085	2,084.7	2.8	WOH	1	1								M	2,085.5	2.0	ROADWAY EMBANKMENT Very Soft, Brown, Fine to Coarse Sandy CLAY (A-6), with trace rock fragments
2080	2,079.7	7.8	WOH	1	2								M	2,080.5	7.0	ALLUVIAL Very Loose, Gray, Clayey, Fine to Coarse Sandy Gravel (A-1-a), with trace mica
2075	2,074.7	12.8		1	2								M			RESIDUAL Soft to Medium Stiff, Brown-Black-Orange, Fine Sandy SILT (A-4), with trace mica and rock fragments
2070	2,069.7	17.8		1	4								M	2,068.2	19.3	Boring Terminated at Elevation 2,068.2 ft In Residual Sandy SILT (A-4)
Boring Drilled by NCDOT and provided for reference only.																

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST Goodnight, D.J.										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. NWAL_8		STATION 21+13		OFFSET 25 ft LT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,111.7 ft		TOTAL DEPTH 20.0 ft		NORTHING 677,708		EASTING 920,855										
DRILL RIG/HAMMER EFF./DATE CG20446 Diedrich D50 87% 05/10/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER Odom, C.		START DATE 08/17/23		COMP. DATE 08/17/23		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2115														2,111.7	0.0	GROUND SURFACE
2110	2,109.5	2.2											M	2,110.5	1.2	ASPHALT
													M	2,110.4	1.3	AGGREGATE BASE COURSE
													M	2,107.8	3.9	ROADWAY EMBANKMENT TAN, LOOSE, SILTY SAND (A-2-4) WITH TRACE MICA AND GRAVEL
2105	2,105.2	6.5											M	2,105.7	6.0	BROWN STIFF, SANDY SILT (A-4) WITH TRACE GRAVEL
													M			RESIDUAL TAN AND BROWN AND WHITE, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) WITH SOME MICA
2100	2,102.7	9.0											M			
													M			
													M			
2095	2,093.2	18.5											M	2,091.7	20.0	Boring Terminated at Elevation 2,091.7 ft In Residual Silty SAND (A-2-4)

NCDOT BORE DOUBLE 12513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore										
SITE DESCRIPTION Noisewall 5A from -Y- Sta. 63+46.57, 86.50' RT to -Y- Sta. 77+80.27, 86.50' RT							GROUND WTR (ft)									
BORING NO. Y_7600R		STATION 22+55		OFFSET 16 ft LT		ALIGNMENT -NW5A-										
COLLAR ELEV. 2,115.5 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,663		EASTING 920,991										
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER B. Lumpkin		START DATE 05/16/22		COMP. DATE 05/16/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2120																
2115	2,115.5	0.0	1	1	2										2,115.5	0.0
	2,112.0	3.5	1	1	2											
2110	2,109.5	6.0	1	1	7											
	2,107.0	8.5	1	1	1											
2105	2,102.0	13.5	3	2	4											
2100	2,097.0	18.5	4	7	9											
2095	2,092.0	23.5	4	5	7											

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore										
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)									
BORING NO. Y_7800R		STATION 25+19		OFFSET 13 ft LT		ALIGNMENT -NW5B-										
COLLAR ELEV. 2,123.1 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,593		EASTING 921,179										
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic										
DRILLER B. Lumpkin		START DATE 05/16/22		COMP. DATE 05/16/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2125																
	2,123.1	0.0	1	1	3										2,123.1	0.0
2120	2,119.6	3.5	3	3	4											
	2,117.1	6.0	4	4	5											
2115	2,114.6	8.5	2	3	4											
2110	2,109.6	13.5	4	4	5											
2105	2,104.6	18.5	3	3	5											
2100	2,099.6	23.5	5	6	7											

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore											
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)										
BORING NO. Y_8000R		STATION 27+27		OFFSET 2 ft LT		ALIGNMENT -NW5B-											
COLLAR ELEV. 2,154.8 ft		TOTAL DEPTH 45.0 ft		NORTHING 677,485		EASTING 921,357											
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER B. Lumpkin		START DATE 05/13/22		COMP. DATE 05/13/22		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2155	2,154.8	0.0	3	3	1							M		2,154.8	0.0		
2150	2,151.3	3.5	1	5	8						SS-300	12%					
	2,148.8	6.0	8	10	9												
2145	2,146.3	8.5	4	8	8												
	2,141.3	13.5															
2140	2,141.3	13.5	25	18	17						SS-303	14%					
	2,136.3	18.5	9	13	13												
2135	2,136.3	18.5												2,136.8	18.0		
	2,131.3	23.5	15	16	18												
2130	2,131.3	23.5															
	2,126.3	28.5	6	5	7												
2125	2,126.3	28.5															
	2,121.3	33.5	8	9	9												
2120	2,121.3	33.5															
	2,116.3	38.5	9	13	15												
2115	2,116.3	38.5															
	2,111.3	43.5	13	17	16												
2110	2,111.3	43.5															

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek											
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)										
BORING NO. B-26		STATION 29+78		OFFSET 11 ft LT		ALIGNMENT -NW5B-											
COLLAR ELEV. 2,165.9 ft		TOTAL DEPTH 59.3 ft		NORTHING 677,410		EASTING 921,595											
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic											
DRILLER N/A		START DATE 01/12/04		COMP. DATE 01/12/04		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	L O G	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2170																	
2165															2,165.9	0.0	
2160	2,162.3	3.6	3	5	7									2,162.9	3.0		
2155	2,157.3	8.6	4	4	6												
2150	2,152.3	13.6	4	6	9												
2145	2,147.3	18.6	7	8	14									2,147.9	18.0		
2140	2,142.3	23.6	12	18	26												
2135	2,137.3	28.6	10	11	16												
2130	2,132.3	33.6	41	65	35/0.3									2,131.8	34.1		
2125	2,127.3	38.6	56	44/0.3													
2120	2,122.3	43.6	29	45	55/0.4												
2115	2,117.3	48.6	6	9	15												
2110	2,112.3	53.6	11	15	22												
	2,107.3	58.6	50	50/0.2													

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore										
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)									
BORING NO. Y_8400R		STATION 31+23		OFFSET 16 ft RT		ALIGNMENT -NW5B-										
COLLAR ELEV. 2,158.5 ft		TOTAL DEPTH 45.0 ft		NORTHING 677,364		EASTING 921,734										
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER B. Lumpkin		START DATE 05/12/22		COMP. DATE 05/13/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2160																
	2,158.5	0.0	2	2	2										2,158.5	0.0
2155	2,155.0	3.5	2	2	5											
	2,152.5	6.0	5	5	5											
2150	2,150.0	8.5	3	3	5											
2145	2,145.0	13.5	4	5	7											
2140	2,140.0	18.5	6	9	10											
2135	2,135.0	23.5	5	10	13											
2130	2,130.0	28.5	10	17	19											
2125	2,125.0	33.5	13	14	14											
2120	2,120.0	38.5	4	3	3											
2115	2,115.0	43.5	11	16	18											

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore										
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)									
BORING NO. Y_8600R		STATION 33+34		OFFSET 13 ft LT		ALIGNMENT -NW5B-										
COLLAR ELEV. 2,140.0 ft		TOTAL DEPTH 30.0 ft		NORTHING 677,367		EASTING 921,947										
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER B. Lumpkin		START DATE 05/12/22		COMP. DATE 05/12/22		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
2140	2,140.0	0.0	3	2	3										2,140.0	0.0
	2,136.5	3.5	5	2	1											
2135	2,134.0	6.0	3	2	4											
	2,131.5	8.5	3	4	3											
2130																
	2,126.5	13.5	6	9	11											
2125																
	2,121.5	18.5	7	9	12											
2120																
	2,116.5	23.5	6	11	17											
2115																
	2,111.5	28.5	6	6	8											
2110															2,110.0	30.0

NCDOT BORE DOUBLE I2513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore									
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)								
BORING NO. Y_8800R		STATION 35+35		OFFSET 11 ft LT		ALIGNMENT -NW5B-									
COLLAR ELEV. 2,130.4 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,326		EASTING 922,143									
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER B. Lumpkin		START DATE 05/12/22		COMP. DATE 05/12/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2135															
2130	2,130.4	0.0	2	4	5									2,130.4	GROUND SURFACE 0.0
2125	2,126.9	3.5	4	4	6										
	2,124.4	6.0	3	3	5										
2120	2,121.9	8.5	6	10	9									2,122.4	8.0
	2,116.9	13.5	9	9	11										
2115	2,111.9	18.5	7	7	7									2,112.4	18.0
2110	2,106.9	23.5	16	26	26									2,107.4	23.0
														2,105.4	25.0

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore									
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)								
BORING NO. Y_9000R		STATION 37+37		OFFSET 24 ft RT		ALIGNMENT -NW5B-									
COLLAR ELEV. 2,097.9 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,270		EASTING 922,334									
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER B. Lumpkin		START DATE 05/12/22		COMP. DATE 05/12/22		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2100															
	2,097.9	0.0	2	2	3									2,097.9	GROUND SURFACE 0.0
2095	2,094.4	3.5	2	3	2										
	2,091.9	6.0	3	2	2										
2090	2,089.4	8.5	4	7	8										
	2,084.4	13.5	2	5	7										
2085	2,079.4	18.5	3	5	11										
2080	2,074.4	23.5	8	6	6										
2075															

NCDOT BORE DOUBLE I2513 NOISEWALLS.GPJ NC_DOT.GDT 9/15/23

GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek											
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)										
BORING NO. B-27		STATION 38+58		OFFSET 44 ft RT		ALIGNMENT -NW5B-											
COLLAR ELEV. 2,084.6 ft		TOTAL DEPTH 20.1 ft		NORTHING 677,222		EASTING 922,438											
DRILL RIG/HAMMER EFF./DATE N/A				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER N/A		START DATE 01/13/04		COMP. DATE 01/13/04		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2085															2,084.6	GROUND SURFACE	0.0
																ALLUVIAL	
																Very Loose, Brown-Gray-Black, Clayey Fine to Coarse SAND (A-2-6), with trace organics and rock fragments	
2080	2,081.0	3.6				WOH		1	1								
2075	2,076.0	8.6						1	5	4							
2070	2,071.0	13.6						2	2	2						RESIDUAL	
																Soft to Medium Stiff, Red-Brown-Orange-Black, Fine Sandy SILT (A-4), with trace mica	
2065	2,066.0	18.6						1	2	3							

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST A. Blackmore											
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)										
BORING NO. Y_9200R		STATION 39+45		OFFSET 28 ft RT		ALIGNMENT -NW5B-											
COLLAR ELEV. 2,088.1 ft		TOTAL DEPTH 25.0 ft		NORTHING 677,215		EASTING 922,527											
DRILL RIG/HAMMER EFF./DATE M&W1032 GeoProbe 7822 DT 88% 04/18/2022				DRILL METHOD H.S. Augers		HAMMER TYPE Automatic											
DRILLER B. Lumpkin		START DATE 05/12/22		COMP. DATE 05/12/22		SURFACE WATER DEPTH N/A											
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100							
2090															2,088.1	GROUND SURFACE	0.0
2085	2,088.1	0.0						2	2	1						ROADWAY EMBANKMENT	
																Soft, Brown, Fine to Coarse Sandy SILT (A-4)	
																ALLUVIAL	
																Soft to Medium Stiff, Gray-Brown, Moderately Plastic Silty CLAY (A-7-6(9)), with trace mica	
2080	2,084.6	3.5						3	1	3							
2080	2,082.1	6.0						4	3	4							
2080	2,079.6	8.5						3	2	3							
2075	2,074.6	13.5						2	1	3						RESIDUAL	
																Soft to Stiff, Gray-Brown, Fine to Coarse Sandy SILT (A-4), with trace to little mica	
2070	2,069.6	18.5						2	5	6							
2065	2,064.6	23.5						3	3	6							

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GEOTECHNICAL BORING REPORT

BORE LOG

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek									
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)								
BORING NO. B-28		STATION 41+17		OFFSET 6 ft RT		ALIGNMENT -NW5B-									
COLLAR ELEV. 2,095.5 ft		TOTAL DEPTH 15.3 ft		NORTHING 677,193		EASTING 922,698									
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER N/A		START DATE 01/13/04		COMP. DATE 01/13/04		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2100															
2095															
2090	2,091.7	3.8	1	2	1								M	2,095.5	0.0
2085	2,086.9	8.6	3	3	5								M	2,087.5	8.0
	2,081.7	13.8	3	7	7								W	2,082.5	13.0
														2,080.2	15.3

WBS 34165.1.2		TIP 1-2513AA		COUNTY BUNCOMBE		GEOLOGIST D. Cheek									
SITE DESCRIPTION Noisewall 5B from -Y- Sta. 77+14.17, 99.00' RT to -Y_EB- Sta. 13+66.36, 51.50' RT							GROUND WTR (ft)								
BORING NO. B-29		STATION 42+37		OFFSET 6 ft RT		ALIGNMENT -NW5B-									
COLLAR ELEV. 2,093.6 ft		TOTAL DEPTH 14.5 ft		NORTHING 677,160		EASTING 922,814									
DRILL RIG/HAMMER EFF./DATE N/A			DRILL METHOD H.S. Augers			HAMMER TYPE Automatic									
DRILLER N/A		START DATE 01/13/03		COMP. DATE 01/13/03		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	LOG MOI	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					
2095															
2090	2,090.6	3.0	2	3	4								M	2,093.6	0.0
2085	2,085.6	8.0	2	1	3								M	2,085.6	8.0
2080	2,080.6	13.0	2	3	2								W	2,081.6	12.0
														2,079.1	14.5

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