| REFERENCE: R-5703 | SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION CONTENTS <u>SHEET</u> <u>DESCRIPTION</u> 1 TITLE SHEET 2 LEGEND 3 PLAN SHEET 4 - 5 PROFILES 6 - 13 BORING LOOS 14 - 33 LABORATORY TEST RESULTS | STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT STRUCTOR STRUCTOR PROJECT DESCRIPTION <u>C.F. HARVEY PARKWAY AND NC 58 TO</u> INTERSECTION OF NC 11 AND GRANGER STATION ROAD GRADING, PAVING, DRAINAGE, STRUCTURES AND SIGNALS SITE DESCRIPTION <u>BRIDGE NO. 220 AND NO. 221 ON -L-</u> (FELIX HARVEY PARKWAY) OVER _Y8- (NC HWY II) NOVENDEN |
|-----------------------|--|---|
| PROJECT: 46375 | | |

| STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|-----------------------------|---------------------------------------|--|
| R-5703 | 1 | 33 |
| | state project reference no. R-5703 | state project reference no. Sheet no. R-5703 |

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL, THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEICH BY CONTACTING THE N.C. DEPARTMENT OF TRANSFORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919 TOT-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOLI TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE. INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNGS. THE LABORATION SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STROADRO TEST MATHONAR AND ENSTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION, THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERALY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING THMFEADURATURES, 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 OEDRATIMENT DOES NOT MARANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPHIONO OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONSTRUCTIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FOR MATER ACTUAL CONDENSATION FOR OF AN THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- NOTES: I. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT. 2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAINS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE. PERSONNEL

PERSONNEL





NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

| | SOIL DE | ESCRIPTION | | GRADATION | ROCK DESCRIPTION |
|---|--|---|---|---|---|
| SOIL IS CONSIDE BE PENETRATED ACCORDING TO IS BASED O CONSISTENCY, CO | ERED UNCONSOLIDATED, SEMI-CONS WITH A CONTINUOUS FLIGHT POW THE STANDARD PENETRATION TES DN THE AASHTO SYSTEM. BASIC DI DLOR, TEXTURE, MOISTURE, AASHTO DAU ODICAL COMPOSITION, ANCH ADD | OLIDATED, OR WEATHERED E ER AUGER AND YIELD LESS T (AASHTO T 206, ASTM DI ESCRIPTIONS GENERALLY IN CLASSIFICATION, AND OTHER TY, STRUCTURE DI ASTICITY | ARTH MATERIALS THAT CAN THAN 100 BLOWS PER FOOT 586). SOIL CLASSIFICATION CLUDE THE FOLLOWING: R PERTINENT FACTORS SUCH | WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM F UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR M ANGULARITY OF GRAINS | INE TO COARSE. THE SAME SIZE. SAME SIZE. SAME SIZE. HARD ROCK LIS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTE 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 BLOWS IN NON-COASTAL PLAIN MATERIAL. THE TRANSITION BETWEEN SOIL AND ROCK REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS: |
| VERY ST | TIFF,GRAY,SILTY CLAY,MOIST WITH INTE | RBEDDED FINE SAND LAYERS, | ,ETC. FUR EXAMPLE, HIGHLY PLASTIC, A-7-6 | THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. | TERMS: WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPI |
| GENERAL | SOIL LEGEND AND A | ASHTO CLASSIFIC | CATION | MINERALOGICAL COMPOSITION | ROCK (WR) 100 BLOWS PER FOOT IF TESTED. |
| CLASS. | (≤ 35% PASSING *200) | (> 35% PASSING *200) | ORGANIC MATERIALS | MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. | CRYSTALLINE ROCK (CR) CRYSTALLINE ROCK (CR) CRYSTALLINE ROCK (CR) |
| GROUP A-1 CLASS. A-1-a A- | A-3 A-2 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-4, A-5 A-3 A-6, A-7 | COMPRESSIBILITY | NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTA |
| SYMBOL | | | | SLIGHTLY COMPRESSIBLE LL < 31 | ROCK (NCR) ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETI |
| % PASSING | | | SILT- | HIGHLY COMPRESSIBLE LL > 50 | SEDIMENTARY ROCK SANDS |
| *10 50 MX *40 30 MX 50 | 0 MX 51 MN | | SOILS SOILS PEA | GRANULAR SILT - CLAY | WEATHERING |
| *200 15 MX 25 MATERIAL PASSING *40 LL — | 5 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX | (36 MN 36 MN 36 MN 36 MN 40 MX 41 MN 40 MX 41 MN | SOILS WITH | ORGANIC MATERIAL SOILS OTHER MAT TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 1 MODERATELY ORGANIC 5 - 10% 12 - 28% SOME 2 UNCLEY ORGANIC 5 - 10% 12 - 28% SOME 2 | CRIAL FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK 1 - 10% HAMMER IF CRYSTALLINE. HAMMER IF CRYSTALLINE. 0 - 20% VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY C 0 - 35% (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER H |
| PI 6 MX GROUP INDEX 0 USUAL TYPES STONE FR | K NP 10 MX 10 MX 11 MN 11 MN 0 0 0 4 MX RAGS- FINE SILTY OR CLAYEY 0 CLAYEY | 10 MX 10 MX 11 MN 11 MN 8 MX 12 MX 16 MX N0 MX SILTY CLAYEY | MODERATE ORGAN AMOUNTS OF ORGAN ORGANIC SOIL MATTER | GROUND WATER | OF A CRYSTALLINE NATURE. OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO RO INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONA CRYSTAL SAME DUIL JAND DISCOLORESTALINE ROCKS RIVE INDER HAMMEF |
| MATERIALS SAND | AND SAND GRAVEL AND SAND | SOILS SOILS | | STATIC WATER LEVEL AFTER HOURS | MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECT |
| GEN. RATING AS SUBGRADE | EXCELLENT TO GOOD | FAIR TO POOR | FAIR TO POOR UNSUIT | E VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING | STRATA (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED. SOME SHOW CLA DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH WITH FRESH ROCK. |
| | | OR DENSENESS | | MISCELLANEOUS SYMBOLS | MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL F SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE L |
| PRIMARY SOIL TY | YPE COMPACTNESS OR CONSISTENCY | RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE) | RANGE OF UNCONFINE COMPRESSIVE STRENGT (TONS/FT ²) | ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES | (MDD.SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND IF TESTED, WOULD YIELD SPT REFUSAL SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND E |
| GENERALLY GRANULAR | VERY LOOSE LOOSE MEDIUM DENSE | < 4 4 TO 10 10 TO 30 | N/A | | OPE INDICATOR (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS (STALLATION TO SOME EXTENT. SOME FRAMENTS OF STRONG ROCK USUALLY REMAIN. IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF |
| (NON-COHESIVE) | DENSE VERY DENSE VERY SOFT SOFT | 30 TO 50 > 50 < 2 2 TO 4 | < 0.25 0.25 ID 0.5 | THAN ROADWAY EMBANKMENT THAN ROADWAY EMBANKMENT THAN ROADWAY EMBANKMENT THAN ROADWAY TE | ST VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS AF SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OI UNDING ROD (V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N.</u> |
| SILT-CLAY MATERIAL (COHESIVE) | MEDIUM STIFF STIFF VERY STIFF | 4 TO 8 8 TO 15 15 TO 30 | 0.5 TO 1.0 1 TO 2 2 TO 4 | TT=TT= TT= INFERRED ROCK LINE MONITORING WELL MI TT=TT=TT= ALLUVIAL SOIL BOUNDARY ALLUVIAL SOIL BOUNDARY | ST BORING TH CORE COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS ALSO AN EXAMPLE. |
| | |)R GRAIN SIZE | > 4 | RECOMMENDATION SYMBOLS | ROCK HARDNESS |
| U.S. STD. SIEVE SIZ | ZE 4 10 | 40 60 200 | 270 | | VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMEN EXCAVATION - SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. |
| OPENING (MM) BOULDER | 4.76 2.00 COBBLE GRAVEL | 0.42 0.25 0.075 COARSE FINE | 0.053 SILT CLAY | UNSUITABLE WASTE LA ACCEPTABLE, SHALLOW UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - EMBANKMENT | BUT NOT TO BE TOP 3 FEET OF OR BACKFILL TO DETACH HAND SPECIMEN. |
| (BLDR.) GRAIN MM 305 | (COB.) (GR.) 15 75 2.0 | (CSE. SD.) (F SD.) 0.25 |) (SL.) (CL.) 0.05 0.005 | ABBRE VIATIONS AR - AUGER REFUSAL MED MEDIUM VST - VANU | MODERATELY LAN BE SURAICHED BY KNIFE OF PICK, GUDDES OF ORDUVES TO 2.25 INCHES DE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE D SHEAR TEST BY MODERATE BLOWS. |
| SIZE IN. 12 | SOIL MOISTURE - C | ORRELATION OF | TERMS | BI - BUHING IERMINATED MICA MICACLUUS WEA WEA CL CLAY MODE - MODERATELY γ - UNIT CPT - CONE PENETRATION TEST NP - NON PLASTIC γ_d - DRY L | HEHEU MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE C VEIGHT HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD NIT WEIGHT POINT OF A GEOLOGIST'S PICK. |
| ATTERBERC | G LIMITS) FIELD MUI | GUIDE FOR F | | DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK | ABBREVIATIONS SOFT CAN BE GROVED OR GOUGED READLY BY KNIFE OR PICK. CAN BE EXCAVATED IN FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POIN PIECES CAN BE BROKEN BY FINGER PRESSURE. |
| | (SAT.) | FROM BELOW | THE GROUND WATER TABL | E - VOLD HATLU SUL SHILL, SHLAN SS - SSCII F - FINE SL SIL, SILTY ST - SHEL - FOSS FOSSLIFEROUS SLI SLIGHTLY RS - ROCK ERAC - ERACTIPEE ERACTIPES TEP TRICINE PERISAL | VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCH FINGERNALL. |
| RANGE < | - WET - (| W) ATTAIN OPTIM | MUM MOISTURE | FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALL | FORNIA BEARING FRACTURE SPACING BEDDING |
| | TIMUM MOISTURE - MOIST - RINKAGE LIMIT | (M) SOLID; AT OR | NEAR OPTIMUM MOISTURE | EQUIPMENT USED SUBJECT PROJECT DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE: | D IERM SPACING IERM VERY WIDE MORE THAN 10 FEET VERY WIDE VERY WIDE WIDE 3 TO 10 FEET THICKLY BEDDED 1 MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0. |
| | - DRY - ([| D) REQUIRES AD | DITIONAL WATER TO MUM MOISTURE | CME-45C CLAY BITS X AUTOMATI | VERY CLOSE 0.16 TO 1 FUDI VERY THINLY BEDDED 0.0 VERY CLOSE LESS THAN 0.16 FEET THICKY LAMINATED 0.00 THICKY LAMINATED 0.00 |
| i | PLA | STICITY | | | |
| NON PLAST SLIGHTLY I | PLASTIC PLASTIC | 0-5 6-15 | DRY STRENGTH VERY LOW SLIGHT | VANE SHEAR TEST | FOR SEDIMENTART ROCKS, INDURNIUM IS THE HARDENING OF MATERIAL BY DEMENTING, HE RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. |
| MODERATEL HIGHLY PL | LY PLASTIC ASTIC 26 | 16-25 OR MORE | MEDIUM HIGH | | E DIGGER MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH ST BREAKS EASILY WHEN HIT WITH HAMMER. |
| | | | | | ROD INDURATED UHAINS ARE DIFFICULT TO SEPARATE WITH STEEL DIFFICULT TO BREAK WITH HAMMER. |
| MODIFIERS | S SUCH AS LIGHT, DARK, STREAK | ED, ETC. ARE USED TO DE | SCRIBE APPEARANCE. | | EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE SAMPLE BREAKS ACROSS GRAINS. |





| O AN INCODED | TERMS AND DEFINITIONS |
|---------------------------------|---|
| SPT REFUSAL. | ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. |
| FOOT PER 60 IS OFTEN | <u>AQUIFER</u> - A WATER BEARING FORMATION OR STRATA. |
| | ARENALEUUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. |
| N VALUES > | ANUILALEUUS - APPLIED ID ALL RUCKS ON 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. |
| LODES ORHNITE, | CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. |
| L PLAIN IF TESTED. | COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. |
| MAY NOT YIELD TONE, CEMENTED | CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. |
| | $\underline{\text{DIKE}}$ - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. |
| | $\overline{\text{DIP}}$ - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. |
| AMMER BLOWS IF | DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. |
| CK UP TO _ FELDSPAR | FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. |
| BLOWS. | FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. |
| 5. IN Y. ROCK HAS | FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL. |
| AS LUMPARED | FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. |
| ELDSPARS DULL | FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. |
| WHEN STRUCK. | JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED. |
| VIDENT BUT | LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT. |
| RE KAOLINIZED | 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 |
| E DISCERNIBLE | USUMELI INDICHTES FUUR MERHIIUN HNU EMER UF GUUU UKAINAGE. PERCHEN WATER - WATER MAINTAINEN ARNYE THE NORMAL GROUNN WATER LEVEL RY THE PRECEMPE |
| ONLY MINOR | OF AN INTERVENING IMPERVIOUS STRATUM. |
| ALUES (100 BPF | RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. |
| SAPROLITE IS | 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. |
| 5 REQUIRES | SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. |
| LOWS REQUIRED | 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. |
| EP CAN BE ETACHED | $\underline{\text{SLICKENSIDE}}$ - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. |
| R PICK POINT. BLOWS OF THE | 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 SOLL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. |
| FRAGMENTS T. SMALL, THIN | STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. |
| PIECES 1 INCH | STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. |
| ED KEADILY BY | TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER. |
| | RENCH MARK BM #18 RR SPIKE IN RASE OF 24" PINE 317' RT OF |
| THICKNESS | STA. 40+06 -Y8- |
| 4 FEET 5 - 4 FEET | N 577,312 E 2,449,300 ELEVATION: 56.27 FEET |
| 6 - 1.5 FEET | NOTES: |
| 8 - 0.03 FEET | FIAD - FILLED IMMEDIATLEY AFTER DRILLING |
| 0.008 FEET | |
| | |
| HI, PRESSURE, EIC. | |
| | |
| EEL PROBE: | |
| PROBE; | |
| | |
| | DATE: 8-15-14 |





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| WBS | 46375 | 5.1.1 | | | TI | P R-5703 | COUNT | Y LENOIR | 1 | | | GE | OLOGIST Wright, | F.K. | | | WBS | 4637 | 5.1.1 | | | TI | P R-57 |)3 | COUNT |
|---------------------------------------|---------------|--------------------|---------|--------|----------|---|-----------|---------------|---------------|------------|--|---------------|--------------------------|--------------------------|---------------|----------------------|-------|---------------|--------------|----------|----------|----------|------------------|-----------------|-------------|
| SITE | DESCR | RIPTION | Bric | dge No | . 220 | on -L- (Felix Harvey | ⊃kwy) ove | er -Y8- (NC | 11) | | | | | G | ROUND WTR | (ft) | SITE | DESCR | RIPTIO | N Brid | dge No | . 220 | on -L- (F | elix Harve | y Pkwy) ove |
| BORI | NG NO | . EB1 | -A Lt L | .n. | S | TATION 363+50 | | OFFSET | 23 ft LT | | | AL | IGNMENT -L- | 0 | HR. N | I/A | BOR | ING NO | . EB1 | -A Lt L | _n. | S | TATION | 363+50 | |
| COLL | AR EL | EV. 68 | 3.7 ft | | т | DTAL DEPTH 99.5 | t | NORTHING | G 577, | 737 | | EA | STING 2,449,219 | 24 | HR. 2 | 2.7 | COL | LAR EL | EV. 6 | 8.7 ft | | т | DTAL DE | PTH 99. | 5 ft |
| DRILL | RIG/HAI | MMER E | FF./DA | TE BF | RI9103 E | K-51 89% 05/04/2016 | | | DRILL | METHO | DD N | Mud Rota | ary | HAMMER | TYPE Automati | с | DRILI | RIG/HA | MMER E | FF./DA | TE BR | RI9103 E | K-51 89% | 05/04/2016 | |
| DRILL | .ER E | ister, C |). | | S | ART DATE 08/31/ | 6 | COMP. DA | TE 08 | /31/16 | 6 | SU | RFACE WATER DE | PTH N/A | | | DRIL | LER E | Eister, C | <u>.</u> | | S | | TE 08/31 | 1/16 |
| ELEV | DRIVE ELEV | DEPTH | BLC | | JNT | BLOWS | PER FOO | Т | SAMP | . 🔨 | | | SOIL AND RC | OCK DESCRI | PTION | | ELEV | DRIVE ELEV | DEPTH | | SW COL | UNT | | BLOW | S PER FOOT |
| (11) | (ft) | (ii) | 0.5ft | 0.5ft | 0.5ft | 0 25 | 50 | 75 100 | NO. | /мо | I G | ELEV | ′. (ft) | | DEPTH | H (ft) | (11) | (ft) | (ii) | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | | + | | | | | | | | | | 68 7 | GROUN | | = | 0.0 | -10 | -10.3 | 79.0 | | <u> </u> | | | Ma | atch Line |
| | 68.7 - | <u>+ 0.0</u> | 2 | 2 | 2 | 4 · · · · · · · · · · · · · · · · · · · | • • • • | | | М | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | 67.2 | UNDIVIDED | COASTAL P | | 1.5 | | | ŧ | 9 | 10 | 15 | | • • | |
| 65 | 66.7 - | <u>= 2.0</u> | 2 | 2 | 3 | | | | | -M- | | | Tan Gray C | ine Sandy C | | | -15 | 150 | ‡ | | | | | | |
| | <u>64.7</u> | + 4.0 5.6 | 2 | 4 | 4 | • | | | | м | | F | | | | | | -15.3 - | + 84.0 + | 9 | 10 | 13 | | · • 23 · · · | |
| | | - 0.0 | 2 | 3 | 5 | $\begin{vmatrix} \cdot & \cdot & \cdot \\ \cdot & \bullet_8 & \cdot & \cdot \\ \cdot & \bullet_8 & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot$ | | · · · · · · | | w | | Ļ | | | | | | | ŧ | | | | | i Ni i i | · · · · · · |
| 60 | 60.0 | 8.7 | 2 | 4 | 4 | | | · · · · · | | | | Ļ | | | | | -20 | -20.3 - | + 89.0 | | 40 | | | · \ <u>`</u> | |
| | - | ŧ | | - | - | $\begin{vmatrix} \cdot \bullet 8 & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot \\ \cdot & \cdot & \cdot & \cdot$ | | | | | | • | | | | | | | ŧ | | 13 | 20 | | | |
| 55 | - | ŧ | | | | ; : : : : : : : | | · · · · · · | | | | <u>56.7</u> | Brown Black | Fine clayey | SAND | <u>12.0</u> | 25 | | ŧ | | | | · · · · · · | · · · · · | |
| | 54.7 - | + 14.0 + | WOH | 1 | 3 | | | | | l w | | | | | | | -23 | -25.3 - | + 94.0 + | 30 | 70/0.4 | | | | |
| | | ŧ | | | | | | . . | | | | <u>51.7</u> | | | | 17.0 | | | ‡ | | | | · · · · | · · · · · | |
| 50 | 49.7 - | + 19.0 | | | | | | · · · · · | | | | 49.5 | COAS Black Gray Silty | TAL PLAIN CLAY with N | ludstone | 19.2 | -30 | -30.3 - | + 99.0 | | | | | | |
| | - | t | 29 | 15 | 9 | 24 | | | | W | | 49.4 49.1 | [Beauto | Layers | 1 | 19.3 19.6 | | | + | 100/0. | 5 | | | | |
| | | ŧ | | | | | | | | | | 49.0 | [200000 | | 1 | 19.7 | | | ŧ | | | | | | |
| 45 | 44.7 - | 24.0 | 37 | 26 | 21 | | | | | | 1 | 44.7 | | | | 24.0 24.1 | | - | ŧ | | | | | | |
| | - | Ł | | | | | | | | v v | | 44.3 44.2 | | | | 24.4 24.5 | | | ŧ | | | | | | |
| 40 | 30.7 _ | 1 20 0 | | | | | | | | | | £ | | | | | | | ŧ | | | | | | |
| | -39.7 - | - 29.0 | 100/0.4 | 4 | | | | • 100/0.4 | | W | | 39.3 39.2 | | | | 29.4 29.5 | | | Ŧ | | | | | | |
| | - | Ŧ | | | | | | • • • • • • | | | | F | | | | | | | Ŧ | | | | | | |
| 35 | 34.7 - | - 34.0 | 58 | 12/0 3 | | | | | | | | 34.7 | | | | 34.0 34.2 | | - | Ŧ | | | | | | |
| | - | ŧ | 50 | 42/0.3 | | | | 100/0.8 | • | | | 34.0 | | | | 34.7 34.8 | | | Ŧ | | | | | | |
| 30 | | ŧ | | | | | | · · · · · · | | | | | | | | 00.0 | | | ŧ | | | | | | |
| | | + 39.0 + | 100/0.1 | 1 | | | | 100/0.1 | | W | R | 29.7 | | | | 39.0 39.1 | | - | ŧ | | | | | | |
| | - | ŧ | | | | | | . . | | | | ļ | | | | | | | ŧ | | | | | | |
| 25 | - 24.7 – | 44.0 | | 10/0.0 | | · · · · · · · · · · · · · · · · · · · | | · · · · · | | | | 24.7 | | | | 44.0 | | - | ‡ | | | | | | |
| | - | ŧ | 82 | 18/0.3 | | | | 100/0.8 | | | | 24.5 24_2_ | | | | 44.2 4 <u>4.5</u> | | | ‡ | | | | | | |
| 20 | - | ŧ | | | | | | | | | | | and T | Trace Mica | | | | | ‡ | | | | | | |
| 20 | 19.7 - | + 49.0 + | 5 | 7 | 9 | | | | | м | | + | [Heede | e Formation] | | | 1 | - | ‡ | | | | | | |
| | - | ‡ | | | | $\left \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | · · · · · · | | | | \$ | | | | | 1 | | ‡ | | | | | | |
| 15 | 14.7 – | - 54.0 | | | | | | | | | | | | | | | | - | ŧ | | | | | | |
| 3/9/17 | - | ļ | 7 | 9 | 10 | | | . | | м | | | | | | | | | ŧ | | | | | | |
| DI | - | ŧ | | | | $ \cdot\cdot\cdot,\dot{j} \cdot\cdot\cdot\cdot$ | | | | | | | | | | | | | ŧ | | | | | | |
| 0 10 | 9.7 - | - 59.0 | 11 | 11 | 13 | | | | | | | | | | | | | - | ŧ | | | | | | |
| NC | - | ŧ | | | | $\begin{array}{c} \cdot \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \cdot \cdot \end{array} = \begin{array}{c} \P^{24} \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \cdot \cdot \end{array}$ | | | | 111 | | 1 | | | | | | | ŧ | | | | | | |
| I I I I I I I I I I I I I I I I I I I | 4 7 | | | | | | | | | | | F | | | | | | | Ŧ | | | | | | |
| INT.O | 4./ - | - 04.0 | 7 | 13 | 25 | · · · · · · · • • • • • • • • • • • • • | | | | м | | F | | | | | | - | Ŧ | | | | | | |
| E 7 G | - | Í | | | | | | | | | | F | | | | | 1 | | Ŧ | | | | | | |
| | -0.3 - | 69.0 | 7 | 8 | 10 | | | | | | | F | | | | | 1 | - | Ŧ | | | | | | |
| JBLE | - | Ŧ | ' | Ô | 10 | 1 | | | | M | | Ŧ | | | | | | | Ŧ | | | | | | |
| ба | | ŧ | | | | | | | | | | Ŧ | | | | | 1 | | Ŧ | | | | | | |
| BORE | -5.3 - | <u>+ 74.0</u> + | 7 | 13 | 21 | · · · · · · · · · · · · · · · · · · · | | | 11 | м | | Ŧ | | | | | | - | Ŧ | | | | | | |
| DOT | - | ŧ | | | | | | · · · · · · | | | | ţ | | | | | | | ‡ | | | | | | |
| 迈 고 -10 | - | t | | | | / | • • • • | . | | | N | 1 | | | | | | | † | | | | | | |

SHEET 6 OF 33



| WBS | 3 4637 | 5.1.1 | | | Т | IP R-57 | 703 | | COUN | TY LENO | R | | | GI | EOLOGIST Wright, F | =.K. | | WE | 8S 4637 | 5.1.1 | | | TI | I P R-570 | 3 | (| COUNT |
|----------------|---------------|-------------------|---------|--------|----------|--------------------|------------------|--------------------|------------------|---------------------------------------|---------------|--------------|------------|---------------|-----------------------------|----------------------|----------------------|--------------|----------------|---------------|--------|--------|----------|------------------|---------------|--------|-----------|
| SITE | DESCR | RIPTION | Bric | lge No | o. 220 | on -L- (F | Felix I | Harvey I | Pkwy) ov | /er -Y8- (N | C 11) | | | | | | GROUND WTR (ff |) SIT | E DESCR | RIPTION | Bri | dge No | . 220 | on -L- (Fe | lix Harv | ey Pk | wy) ove |
| BOR | ING NO | . B1-A | | ١ | S | TATION | 364 | 1+33 | | OFFSET | 23 ft L | Т | | AL | IGNMENT -L- | | 0 HR. N/A | во | RING NO | . B1-А | LT L | N | S | TATION | 364+33 | | |
| COL | LAR EL | EV . 68 | 3.4 ft | | Т | OTAL D | EPTH | I 99.31 | ft | NORTHI | NG 577 | ,670 | | E | STING 2,449,270 | | 24 HR. 5.3 | s co | LLAR EL | EV. 68 | 3.4 ft | | т | OTAL DE | 7H 99 | 9.3 ft | |
| DRIL | L RIG/HA | MMER E | FF./DA | TE B | RI9103 I | BK-51 89% | 6 05/04 | 4/2016 | | | DRILL | . METH | HOD | Mud Ro | ary | HAMM | ER TYPE Automatic | DRI | LL RIG/HA | MMER E | FF./DA | TE BF | RI9103 E | BK-51 89% (| 5/04/2016 | 6 | |
| DRI | LER E | ister, C | Э. | | S | TART D | ATE | 08/31/1 | 16 | COMP. I | DATE 0 | 8/31/1 | 16 | รเ | IRFACE WATER DEF | PTH N/ | /A | DR | ILLER E | Eister, G | Э. | | S | TART DA | E 08/3 | 31/16 | |
| ELEV | DRIVE | DEPTH | BLC | w co | UNT | | l | BLOWS | PER FOC | ОТ | SAM | ₽. 🔻 | | | SOIL AND ROO | CK DES | CRIPTION | ELE | | DEPTH | BLC | ow co | UNT | | BLOV | NS PE | ER FOOT |
| (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | | 50 | 75 10 | 00 NO. | _/м | OI G | ELE | V. (ft) | | DEPTH (| ft) (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | | ł | | | | | | | | | | | | + | | | | -10 | -10.2 | 78.6 | | | | | N | latch | Line |
| | 68.4 | <u>† 0.0</u> † | 2 | 2 | 2 | | ••• | | | • • • • | · | | | - 68.4 | | D SURFA | ACE 0 IL PLAIN | .0 | | Ŧ | | 15 | 15 | | , 9 30 | | · · · · · |
| 65 | 66.4 | <u>† 2.0</u> † | 1 | 0 | 1 | | | · · · · · | | · · · · · | | w | , | | Brown Gray Tar | n Fine Sa | andy CLAY | -15 | 150 | ‡ | | | | | . i | | · · · · · |
| | 64.4 | + 4.0 + | 2 | 1 | 2 | | | | | | | | 7 | | | | | | 15.2 - | + 83.6 | 10 | 11 | 16 | | . 627 . | | |
| | 62.5 | + <u>5.9</u> + | WOH | 1 | 1 | | ••• | · · · · · · · · | | · · · · · | | | | | | | | | | ŧ | | | | | . <u>\</u> | · · | · · · · · |
| 60 | 60.0 | 8.4 | 2 | 2 | 3 | 1 · · · | ••• | | | | | | | | | | | -20 | -20.2 - | 88.6 | 10 | 14 | 24 | | <u> </u> | ••• | · · · · · |
| | | ŧ | | - | Ŭ | | | · · · · · | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | | ŧ | | 14 | 24 | | . • | 38. | · · · · · |
| 55 | | ŧ | | | | | | · · · · · | · · · · | · · · · · | | | | 56.4 | Olive Black Find | e SAND, | <u>12</u> | 0 | | ‡ | | | | | | ••• | |
| - 55 | 54.3 | 14.1 | WOH | 1 | 1 | | | | | | | 6 | + | | | , | ,, ,, , | -23 | -25.2 - | + 93.6 + | 18 | 82/0.4 | | | | | · · · · |
| | | ŧ | | | | | ••• | · · · · · | · · · · | · · · · · | | | II. | - 51.4 | | | 17 | 0 | | ‡ | | | | | | · · | · · · · |
| 50 | 49.8 - | 18.6 | | | | | | | | | | | | 49.6 | Grav Black Silty (| | IN th Mudstone 18 | 8 -30 | -30.2 - | 98.6 | | | | | · · · | ••• | · · · · |
| | | ŧ | 34 | 11 | 7 | | •18 | · · · · | · · · · | · · · · · · · · · · · · · · · · · · · | | \ | $' \sim$ | 49.5 | La IBeaufor | ayers | tion] | 9 | | ŧ | 33 | 67/0.2 | | | | | |
| | | ŧ | | | | | | | | · · · · · | | | | | [Deauloi | i i unnai | lonj | | | ŧ | | | | | | | |
| 45 | 44.8 - | 23.6 | 8 | 10 | 90/0.1 | | | | | | | l w | | 43.8 | | | 24 | 6 | - | ŧ | | | | | | | |
| | | ł | | | | | | · · · · | · · · | . 100/0 | 6 | | | 43.7 | | | 24 | 7 | | ŧ | | | | | | | |
| 40 | 39.8 - | 28.6 | | | | | | | | | | <u>,</u> | | | | | 28 | 6 | _ | ŧ | | | | | | | |
| | | t | 100/0.1 | | | | | | | . 100/0 | 1 | | | 39.7 | | | 28 | 7 | | ŧ | | | | | | | |
| | | ł | | | | | | | | | | | | | | | | | | ŧ | | | | | | | |
| 35 | 34.8 - | 33.6 | 8 | 14 | 86/0.1 | | | | | | | _w | $, \Sigma$ | 33.8 | | | 34 | 6 | - | Ŧ | | | | | | | |
| | | Ŧ | | | | | | | | 100/0 | 6 | | | 33.7 | | | 34 | 7 | | Ŧ | | | | | | | |
| 30 | 20.8 | | | | | | | | | | | | | 29.8 | | | 38 | 6 | | Ŧ | | | | | | | |
| | 29.0 _ | - 30.0 | 100/0.1 | | | | | | | . 100/0 | 1 | ^ | 15 | 29.7 | | | 38 | 7 | - | Ŧ | | | | | | | |
| | | Ŧ | | | | | | | | | | | | | | | | | | Ŧ | | | | | | | |
| 25 | 24.8 - | 43.6 | 25 | 13 | 57/0 1 | | | | | | | _\ | | | | | 44 | 6 | - | ŧ | | | | | | | |
| | | ŧ | | -10 | 0//0.1 | | | | | <u>100/0</u> | 6 | | ĺŻ | 23.7 | | | 44 | 7 | | ŧ | | | | | | | |
| 20 | 10.0 | ‡ | | | | | ••• | | بسبيسا. | | | | | <u>- 21.4</u> | | | <u> </u> | 0 | | ŧ | | | | | | | |
| | - 19.8 - | + 48.6 + | 6 | 7 | 9 | | •16 ⁻ | | | | | M | | 5 | Olive Gray Fine Sa and T | andy CLA race Mic | AY with Shells a | | - | ŧ | | | | | | | |
| | | ŧ | | | | | 1 · 1 · | · · · · · | | · · · · · | | | | 5 | [Peedee | e Formati | ion] | | | ŧ | | | | | | | |
| ▶ 15 | 14.8 - | 53.6 | 7 | | | | <u>.</u> | | | · · · · | | | | }_ | | | | | - | ‡ | | | | | | | |
| 3/9/1 | | ŧ | ' | 9 | 9 | | . 18 | · · · · · | · · · · · · | · · · · · | | M | | | | | | | | ŧ | | | | | | | |
| L 10 | | ‡ | | | | | :: `` | XIII | · · · · · · | · · · · · | | | | | | | | | | ŧ | | | | | | | |
| 10 | 9.8 - | <u> </u> | 22 | 22 | 18 | | | | | | | M | | | | | | | - | ŧ | | | | | | | |
| NC | | ŧ | | | | | ••• | Ţ, | · · · · | · · · · · | | | | | | | | | | ‡ | | | | | | | |
| G 5 | 4.8 - | 63.6 | | | | | ••• | | | · · · · | | | | | | | | | - | ‡ | | | | | | | |
| SINT. | | ŧ | 7 | 15 | 19 | | | , ³⁴ . | · · · · | · · · · · | | M | | | | | | | | ŧ | | | | | | | |
| LΕ 7, | | ‡ | | | | | / | / | · · · · | · · · · · · · · | | | | | | | | | | ‡ | | | | | | | |
| | -0.2 - | - 68.6 - | 6 | 8 | 10 | | | | + | | | м | | | | | | | - | ŧ | | | | | | | |
| DUBL | | t | | | | | | | · · · | | | | | | | | | | | t | | | | | | | |
| ы Ш -5 | -5.2 | 73.6 | | | | | | | · · · | · · · · | | | | Ł | | | | | - | ŧ | | | | | | | |
| BOF | | t | 9 | 18 | 33 | | | | 51 | | | M | | | | | | | | ŧ | | | | | | | |
| LOQC | | t | | | | | | | | | | | | | | | | | | ŧ | | | | | | | |
| ĭ <u></u> ∠-10 | | | | | | | | | | | | 1 | | | | | | | | | | 1 | | | | | |

SHEET 7 OF 33



| WB | S 4637 | 5.1.1 | | | Т | IP R | R-5703 | | (| COUNT | Y LEI | NOIR | | | | G | EOLOGIST Wrig | ght, F.K. | | | WBS | 3 46375 | 5.1.1 | | | TI | P R-57 | 03 | COUNT |
|---------|---------------|-------------------|---------|--------|--------|--------------------------|--|---------------|----------|---------|--------------------|-----------------|---------------|--------|---|----------------|-----------------------|----------------------------|-----------------------|--------------|------|----------------|---|--------|--------|----------|-----------|---------------------------------------|---------------|
| SIT | E DESCR | RIPTION | Bric | lge No | o. 220 | on -L | (Feli | x Harve | ey Pk | wy) ove | er -Y8- | (NC | 11) | | | | | | GROUND | WTR (ft) | SITE | DESCR | RIPTION | Bric | dge No | . 220 | on -L- (F | elix Harvey | Pkwy) ove |
| BO | ring no | . В-1 | | | S | TATI | ON 3 | 64+89 | | | OFFS | ΕT | 23 ft LT | | | A | LIGNMENT -L- | | 0 HR. | N/A | BOR | RING NO | . B-1 | | | S | TATION | 364+89 | |
| CO | LAR EL | EV. 68 | 3.7 ft | | Т | OTAL | DEP | TH 99. | .6 ft | | NOR | THING | G 577, | 626 | | E | ASTING 2,449,3 | 304 | 24 HR. | FIAD | COL | LAR EL | EV. 68 | 3.7 ft | | т | OTAL DE | . PTH 99.6 | ft |
| DRIL | .L RIG/HA | MMER E | FF./DA | TE BI | RI9103 | BK-51 | 89% 05 | /04/2016 | | | | | DRILL | METHO | DD N | Mud Ro | tary | HAN | MMER TYPE A | utomatic | DRIL | L RIG/HA | MMER E | FF./DA | TE BF | RI9103 E | 3K-51 89% | 05/04/2016 | |
| DRI | LLER E | Eister, C | i. | | S | TAR | T DATI | E 09/0 | 1/16 | | СОМ | P. DA | TE 09 | /01/16 | 6 | S | JRFACE WATER | DEPTH | N/A | | DRII | LER E | ister, G | i. | | S | TART DA | TE 09/01 | /16 |
| ELE | / DRIVE | DEPTH | BLC | w co | UNT | | | BLOW | /S PE | R FOO | Т | | SAMP | . 🔻 | | | SOIL AN | D ROCK DI | ESCRIPTION | | ELEV | DRIVE | DEPTH | BLC | | UNT | | BLOWS | PER FOOT |
| (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 | | 25 | 50 | | 75 | 100 | NO. | /мс |) G | ELE | V. (ft) | | | DEPTH (ft) | (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | | + | | | | | | | | | | | | | | L. | | | | | -10 | -10.0 | 78.7 / | 12 | 12 | 18 | | Ma | tch Line |
| | 68.7 | <u>+ 0.0</u> + | 1 | 2 | 1 | 43 | | | • | | | ••• | | м | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | - 08. - | | DED COAS | TAL PLAIN | 0.0 | | | t in the second | 12 | 12 | 10 | | · • • 30 · | · · · · · · |
| 65 | 66.7 | + 2.0 + | 1 | 4 | 3 | | · · · | | : | | . | · · · · | | м | | <u>- 66.</u> / | Ian Brov Gray T | an Fine Sa | oarse SAND | | -15 | 15.0 | + | | | | | | · · · · · · |
| | 64.6 | + 4.1 | 1 | 1 | 3 | | · · · · | | | | | | | м | | F | | | | | | - 15.0 _ | + 03./ | 11 | 11 | 18 | | · • • 29 · | |
| | 62.9 | + 5.8 + | 3 | 5 | 6 | | •••••••••••••••••••••••••••••••••••••• | | : | · · · · | · · · · | · · · · | | м | | ļ | | | | | | | ŧ | | | | | | · · · · · · |
| 60 | 59.8 - | 8.9 | | | | $ _{i}$ | /: | | · | | · · · | • • | | | | F | | | | | -20 | -20.0 | 88.7 | 20 | 27 | 32 | | · · · · · | |
| | | ŧ | | 2 | 3 | Í | 5 | | : | | · · · · · · | · · · · | | W | | <u></u> | _ | | | | | - | ŧ | | | 52 | | · · · · · · · · · · · · · · · · · · · | |
| 55 | | ‡ | | | | | · · · · · · | | : | | : : : | · · · · | | | | <u>}_56.</u> 7 | Black Gra | y Fine SAN | ND, Little Clay | <u>12.0</u> | 25 | | ‡ | | | | | · · · · · | · / · · · · · |
| - 55 | - 54.8 - | + 13.9 + | wон | WOH | 1 | | | | | | | | | w | | , , | | | | | -23 | -25.0 _ | 93.7 | 15 | 23 | 19 | | | 42 |
| | | ‡ | | | | [`` | · · · | · · · | : | | · · · · | · · · · | | | | 51.7 | , | | | 17.0 | | | ‡ | | | | | · · · · · · · · | |
| 50 | 50.0 | 18.7 | 00 | 10 | 11 | | · \ . | · · · · | • | | | • • | | | | 49. | 5 Black Gray | Silty CLAY | LAIN with Mudstone | 19.2 | -30 | -30.0 | 98.7 | 00 | 00/0 4 | | | · · · · | |
| | | ŧ | 23 | 12 | 11 | : | · · · · | 23 | • | | . . | · · · · | | W | Z | 49.4 49.1 | l [Be | Layers | mation1 | 19.3 19.6 | | | <u>+</u> | 38 | 62/0.4 | | | | |
| 45 | | ŧ | | | | : | · · · | · · · | - | | | · · · · | | | | 49.0 |) [20 | | ilation] | 19.7 | | | ŧ | | | | | | |
| 45 | 45.0 | 23.7 | 8 | 92/0.2 | - | | | | | | · · 10 | 0/0 7 | | w | | | 3 | | | 24.4 | | - | ŧ | | | | | | |
| | | ŧ | | | | : | · · · | · · · | : | | . | ••• | | | | | - | | | 24.0 | | | ŧ | | | | | | |
| 40 | 40.0 | 28.7 | | | | | | | • | | | | | | | 40.0 |) | | | 28.7 | | | Ł | | | | | | |
| | | ŧ | 100/0.2 | | | | | · · · | : | | 10 | 00/0 <u>.</u> 2 | I | | | 39.8 | 3 | | | 28.9 | | | ł | | | | | | |
| | | Ŧ | | | | · | | | • | | . | ••• | | | | Ł | | | | | | | Ł | | | | | | |
| 35 | 35.0 | 33.7 | 45 | 32 | 68/0.3 | | | + | | | | | | l w | 1 | 34.9 34.8 | 3 | | | 33.8 33.9 | | - | ł | | | | | | |
| | | Ŧ | | | | . | | | | | 10 | 8.0/00 | • | | | 34.4 34.3 | 4 3 | | | 34.3 34.4 | | | Ŧ | | | | | | |
| 30 | 30.0 | T 38 7 | | | | : | | | | | | ••• | | | | 33.8 33.7 | 3 | | | 34.9 35.0 | | | Ŧ | | | | | | |
| - | 00.0 - | + | 100/0.1 | | | 1. | | | | | 10 | 00/0.1 | P | | | 29.9 |) | | | 38.7 38.8 | | - | Ŧ | | | | | | |
| | | ŧ | | | | | · · · | | : | | | ••• | | | | ŧ | | | | | | | Ŧ | | | | | | |
| 25 | 25.0 | 43.7 | 100/0 - | | | | | | · | | · · · · | 00/0.1 | • | w | | 25.0 |) | | | 43.7 43.8 | | - | ŧ | | | | | | |
| | | ŧ | | | | : | · · · · | | : | | | | | | | F | | | | 17.0 | | | ŧ | | | | | | |
| 20 | 20.0 | + | | | | : | · · · · · · | · · · · | | | . | · · · · | | | R | <u>- 21.</u> | c | | | <u> </u> | | | ŧ | | | | | | |
| | 20.0 | + +0./ | 3 | 10 | 8 | 1 . | · ·• | 8 | | | | | 11 | М | | F | Olive Gray F | ine Sandy (and Trace I | ULAY with Shell | IS | | - | ŧ | | | | | | |
| | | ŧ | | | | : | · · [· · · [· | | : | · · · · | • • • | · · · · | | | | F | [P | eedee Forn | nation] | | | | ŧ | | | | | | |
| ▶ 15 | 15.0 | 53.7 | 7 | 0 | 11 | | · · ŀ | · · · | • | | · · · | | | | | F | | | | | | - | ‡ | | | | | | |
| 3/9/1 | | ‡ | ' | 9 | | : | · · • | | | | . | · · · · | | M | | | | | | | | | ŧ | | | | | | |
| L 10 | | ‡ | | | | : | · · · · · · | | | | · · · · | · · · · | | | | Ì | | | | | | | ŧ | | | | | | |
| | 10.0 | - <u>58.7</u> | 7 | 45 | 55/0.1 | 1- | | <u> </u> | | | · · · . | | | м | | | | | | | | - | ŧ | | | | | | |
| NC_ | | ŧ | | | | : | · · · | · · · | : | | · | JU/U.0 | Ĩ | | | | | | | | | | ŧ | | | | | | |
| G 5 | 5.0 | 63.7 | | | | Ŀ | | · · · · | <u>_</u> | | | • • | | | | Ł | | | | | | · - | ŧ | | | | | | |
| ULL. | | ŧ | 7 | 11 | 13 | : | | 24 . | | | . | · · | | M | | ł | | | | | | | ŧ | | | | | | |
| TE 7 (| | ŧ | | | | : | ::: | · · · | : | | · · · | · · · · | | | | ł | | | | | | | ŧ | | | | | | |
| | 0.0 | 68.7 | 9 | 9 | 9 | $\left \right _{\cdot}$ | 6 4 | 8 | -+ | | | | | м | | F | | | | | | - | ŧ | | | | | | |
| OUBLE | | ŧ | | | | $\left \right $ | · · · · | | : | | . | ••• | | | | Ł | | | | | | | ŧ | | | | | | |
| о ш5 | -5.0 | + 73.7 | | | | | | <u>\.</u> | • | | | • • | | | | Ł | | | | | | . | Ł | | | | | | |
| BOR | | ŧ | 10 | 10 | 24 | $\left \right $ | | ●34 | : [| | . | | | М | | Ł | | | | | | | ŧ | | | | | | |
| DOT | | £ | | | | | | | · | | | | | | | E | | | | | | . | £ | | | | | | |
| ≚10 | | ſ | | | | | | \Box | - | | | ••• | | | | ſ | | | | | | | Ľ | | [| | | | |

SHEET 8 OF 33

| LENOIR | | | | GEOLOGIST Wright, F | .K. | | |
|---------------|------------------------|--------------------------------|-------------|----------------------------------|--------|-------------------|---|
| r -Y8- (NC 11 | 1) | | | | | GROUN | ID WTR (ft) |
| OFFSET 2 | 3 ft LT | | | ALIGNMENT -L- | | 0 HR. | N/A |
| NORTHING | 577,6 | 26 | | EASTING 2,449,304 | | 24 HR. | FIAD |
| | DRILL M | IETHO | D Mu | d Rotary | HAMME | ER TYPE | Automatic |
| COMP. DAT | E 09/0 | 01/16 | | SURFACE WATER DEP | TH N/ | A | |
| 75 100 | SAMP. NO. | моі | L O G | SOIL AND ROC | K DESC | CRIPTION | |
| COMP. DAT | E 09/0 SAMP. NO. | MOI MOI M M M M | | SOIL AND ROC SOIL AND ROC | TH N/ | A CRIPTION | 82.0 Day 82.0 ND 87.0 99.6 ft in ith |
| | | | | - - - - | | | |

| WB | 3 4637 | 5.1.1 | | | T | P R-5703 | C | COUNT | LENOIR | | | | GEO | LOGIST Wrigh | t, F.K. | | WB | S 4637 | 5.1.1 | | | TI | P R-5703 | | COUNT |
|------------|----------------|--------------------|------------|--------|----------|---|------------|--------------------|--------------|---------------|---------------|-------------------|------------------|----------------------|-------------------------|--------------------------|--------|----------------|---------------|---------------|--------|----------|-----------------|----------------|-------------|
| SITE | DESCR | RIPTION | Bric | lge No | o. 220 | on -L- (Felix H | Harvey Pk | wy) ove | r -Y8- (NC ′ | 11) | | | | | | GROUND WTR (ft |) SITE | E DESCF | RIPTION | I Brio | dge No | . 220 c | on -L- (Felix | < Harvey I | Pkwy) ove |
| BOF | RING NO | . EB2 | -A Lt. I | Ln. | S | TATION 365 | 5+32 | | OFFSET | 20 ft LT | | | ALIG | INMENT -L- | | 0 HR. N/A | BOF | ring no | . EB2- | -A Lt. | Ln. | ST | ATION 36 | 35+32 | |
| COL | LAR EL | EV. 68 | 3.4 ft | | Т | OTAL DEPTH | l 100.2 ft | | NORTHING | G 577, | 590 | | EAS | TING 2,449,32 | 3 | 24 HR. FIAD | COL | LAR EL | EV. 68 | 3.4 ft | | тс | TAL DEPT | H 100.2 | ft |
| DRIL | L RIG/HA | MMER E | FF./DA | TE BF | RI9103 I | 3K-51 89% 05/04 | 4/2016 | | | DRILL I | METHO | DD N | /lud Rotary | 1 | HAM | MER TYPE Automatic | DRIL | L RIG/HA | MMER E | FF./DA | TE BR | RI9103 B | K-51 89% 05/ | 04/2016 | |
| DRI | LER E | lister, C |) . | | S | TART DATE | 09/01/16 | | COMP. DA | TE 09/ | /01/16 | i | SUR | FACE WATER D | EPTH N | N/A | DRI | L LER E | ister, G |) . | | ST | ART DATE | 09/01/1 | 16 |
| ELEV | DRIVE FL FV | DEPTH | BLC | w co | UNT | E | BLOWS PE | R FOOT | | SAMP. | . 🔻 | | | SOIL AND F | ROCK DES | SCRIPTION | ELEV | , DRIVE | DEPTH | BLC | ow col | JNT | | BLOWS | PER FOOT |
| (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 25 | 50 | | 75 100 | NO. | Имо | I G | ELEV. (| ft) | | DEPTH (1 | t) (π) | (ft) | (π) | 0.5ft | 0.5ft | 0.5ft | 0 2 | .5 | 50 |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | | ł | | | | | | | | | | | F | | | | -10 | -10.4 | 78.8 | | | | | Mato | h Line |
| | 68.4 | <u>† 0.0 </u> | 3 | 2 | 3 | | • • • • | • • • • | | SS-91 | 19% | 8000 | - 68.4 - | GRO UNDIVIDE | JND SURF D COAST | ACE 0 AL PLAIN | 0 | | ļ. | 10 | 1/ | 14 | | Ø 31 | |
| 65 | 66.6 | + 1.8 + | 2 | 3 | 4 | $\left \begin{array}{c} \mathbf{q}^{3} \cdot \cdot \cdot \\ \mathbf{b}^{7} \cdot \cdot \end{array}\right $ | · · · · · | · · · · · | | | м | | - | Brown Tan Fin | e Sandy S Organics | ILT with Trace | -15 | | ŧ | | | | | <i>.</i> | |
| | 64.6 - | + 3.8 + | 2 | 4 | 6 | | | | | | м | | - 64.4 - | Brown Ta | n Fine Sar | 4. hdy CLAY | | -15.4 - | + 83.8 T | 11 | 12 | 12 | | 24 • • • | · · · · |
| | 62.7 | + 5./ + | 2 | 3 | 4 | | | · · · · · | | | w | | 60.9 | | | 7 | 5 | | ŧ | | | | | | |
| 60 | 59.7 - | 8.7 | | 2 | 1 | | | | | | | | - <u></u> | Tan Gray Fine t | o Coarse S | SAND with Clay | -20 | -20.4 - | 88.8 | | 45/0.4 | | | | _ · · · · · |
| | | ŧ | 4 | 2 | | 4 3 · · · · | | · · · · · | | | Sat. | | - - | | Seams | | | | ŧ | 55 | 45/0.4 | | | | |
| 55 | | ŧ | | | | | | · · · · · | | | | | <u>56.4</u> | Gray Black | ine SAND | D, Little Clay 12. | -25 | | ŧ | | | | | | |
| | - 54.6 - | + 13.8 + | WOH | 1 | 2 | | | | | | Sat. | | <u></u> | - | | - | | -25.4 - | + 93.8 + | 15 | 20 | 31 | | | 51 |
| | | ŧ | | | | | · · · · | · · · · · · · · | | | | | - 51.4 | | | 17. | 0 | | ŧ | | | | | · · · · · | |
| 50 | 49.6 - | + - 18.8 | | | | | ··· | · · · · | | | | | 49.6 | Grav Black Si | ASTAL PL | AIN vith Mudstone | 8 -30 | -30.4 - | - 98.8 | | | | | · · · · | |
| | | ŧ | 19 | 10 | 22 | | •32 | · · · · · · · · | | | W | R | 49.5 | , [Beau | Layers | 18. 20. ation] 20. | 9 | - | ŧ | 20 | 34 | 66/0.4 | | <u> </u> | · · · · |
| 45 | | ŧ | | | | | | · · · · · | | | | | 40.2 | [| | 20. | 2 | | ŧ | | | | | | |
| 40 | 44.6 - | + 23.8 + | 8 | 41 | 18 | | | 59 | | | W | | 43.9 | | | 24. | 5 | - | ŧ | | | | | | |
| | | ŧ | | | | | · · · · · | | \cdot | | | | | | | 27. | | | ŧ | | | | | | |
| 40 | 39.6 - | - 28.8 | | | | · · · · | | · · · · | | | | | | | | 29. | 0 | - | ‡ | | | | | | |
| | | ŧ | 100/0.2 | 2 | | | | · · · · · | · 100/0.2 | | ^{vv} | $\mathbf{\Sigma}$ | 39.3 | | | 29. | 1 | | ŧ | | | | | | |
| 35 | | ŧ | | | | | | · · · · · | | | | | ţ. | | | | | | ŧ | | | | | | |
| 00 | 34.6 - | + 33.8 + | 9 | 47 | 53/0.1 | | | | | | w | | 34.0 | | | 34. 34 | 4 | - | ŧ | | | | | | |
| | | ŧ | | | | | · · · · · | · · · · · · · · | . 100/0.6 | | | | - 33.5 - 33.4 | | | 34. 35. | 9 | | ŧ | | | | | | |
| 30 | 29.6 - | - 38.8 | 100/0 | | | | | | | | | | 29.6 | | | 38. | 8 | - | ŧ | | | | | | |
| | | ŧ | 100/0.1 | | | | | · · · · · | . 100/0.1 | | | | - 29.5 - | | | 38. | 9 | | ŧ | | | | | | |
| 25 | | ŧ | | | | | | · · · · · | | | | | - | | | | | | ŧ | | | | | | |
| 20 | 24.6 - | + 43.8 + | 90 | 10/0.1 | | | | | 100/0.6 | | w | | - 24.6 - 24.5 | | | 43. 43. | 8 | - | ŧ | | | | | | |
| | | ŧ | | | | | · · · · | · · · · · · · · | | | | | 24.4 | | | 44. 44. 44. | 1 | | ŧ | | | | | | |
| 20 | 19.6 - | + + 48.8 | | | | - · · · F· – · | | | | | | | 24.0 | Olive Grav Fine | Sandy CL | AIN 44 | 4 | - | ŧ | | | | | | |
| | | ŧ | 4 | | 11 | | | · · · · · · · · | | | M | | | an [Pee | d Trace Mi dee Forma | ica ation1 | | | ŧ | | | | | | |
| 15 | | ŧ | | | | | | · · · · · | | | | | - | 1.11 | | | | | ŧ | | | | | | |
| 9/17 | 14.6 - | + 53.8 + | 5 | 8 | 11 | | | | | | м | | - | | | | | - | ŧ | | | | | | |
| 0T 3/ | | ‡ | | | | | | · · · · · | | | | | - | | | | | | ŧ | | | | | | |
| <u>10</u> | 9.6 - | - 58.8 | | | | ' | | | | | | | - | | | | | - | ŧ | | | | | | |
| о С | | ŧ | 6 | 10 | 15 | · · · · · • • • • • • • • • • • • • • • | 25 | · · · · · · · · | | | M | | - | | | | | | ŧ | | | | | | |
| Z Z | | ŧ | | | | | | · · · · · | | | | | - | | | | | | ŧ | | | | | | |
| D.TN | 4.6 - | + 63.8 + | 6 | 11 | 13 | | | | | | м | | - | | | | | - | ŧ | | | | | | |
| 1 GI | | ŧ | | | | $\left \left \begin{array}{c} \cdot \cdot \cdot \cdot \cdot f \\ \cdot \cdot \cdot \cdot f \right ^{2} \right $ | •••• | · · · · · | | | | |] | | | | | | ŧ | | | | | | |
| O SIT | -0.4 - | 68.8 | | | | / | · · · · | | + • • • • | | | | Ļ | | | | | - | ‡ | | | | | | |
| JBLE | | ‡ | | 8 | 9 | | | · · · · · | | | М | |] | | | | | | ‡ | | | | | | |
| DOL | | ‡ | | | | ::::`` | | · · · · · | | | | | - | | | | | | ‡ | | | | | | |
| SORE -2 | -5.4 - | + 73.8 + | 8 | 23 | 22 | | | | · · · · | | м | | - | | | | | - | ŧ | | | | | | |
| 20T E | | ‡ | | | | | | · · · · · | | | | | - | | | | | | ‡ | | | | | | |
| ට 2 -10 | | † | | | | | / | | • • • • | | | N | | | | | | | t | | | | | | |

SHEET 9 OF 33

| LENOIR | | | | GEOLOGIST W | right, F.K. | | |
|--------------|----------------|-------|--------------|----------------------------|----------------------------------|-----------------|---------------------|
| r -Y8- (NC 1 | 1) | | | | | GROUN | ID WTR (ft) |
| OFFSET 2 | 20 ft LT | | | ALIGNMENT -L | - | 0 HR. | N/A |
| NORTHING | 577,5 | 90 | | EASTING 2,449 | 9,328 | 24 HR. | FIAD |
| | DRILL N | IETHO | D Mu | d Rotary | HAMME | ER TYPE | Automatic |
| COMP. DAT | FE 09/0 | 01/16 | | SURFACE WATE | R DEPTH N/ | A | |
| 75 400 | SAMP. | | L O | SOIL A | ND ROCK DESC | RIPTION | |
| 75 100 | NO. | /моі | G | | | | |
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| T | | – – – | | | COASTAL PLA | N | |
| | | 111 | \mathbf{N} | Olive Gray | Fine Sandy CLA and Trace Mica | .Y with Sh a | ells |
| | | | | [Peed | ee Formation] (co | ontinued) | |
| · · · · · | | М | | | | | |
| | | | | <u>-18.6</u> Gray Black | Fine to Coarse S | AND with | <u>87.0</u> Clay |
| 100/0 9 | | w | - | | Seams | | |
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| | | w | | -31.8 | win stad at Elsua | Ham. 04.0 | 100.2 |
| | | | F | Very Den | se Fine to Coarse Clay Seams | e SAND w | ith |
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| WBS 46375.1.1 TIP R-5703 | COUNTY LENOIR | GEOLOGIST Wright, F.K. | | WBS 46375.1.1 | | TIP R-5703 COUNTY |
|---|--|---|----------------------------|----------------------|-----------------|-----------------------------------|
| SITE DESCRIPTION Bridge No. 221 on -L- (Felix Harvey | Pkwy) over -Y8- (NC 11) | | GROUND WTR (ft) | SITE DESCRIPTIO | N Bridge No. 22 | 1 on -L- (Felix Harvey Pkwy) over |
| BORING NO. EB1-B Rt. Ln. STATION 363+47 | OFFSET 31 ft RT | ALIGNMENT -L- | 0 HR. N/A | BORING NO. EB1 | -B Rt. Ln. | STATION 363+47 |
| COLLAR ELEV. 69.1 ft TOTAL DEPTH 99.2 f | t NORTHING 577,705 | EASTING 2,449,175 | 24 HR. 5.3 | COLLAR ELEV. 6 | 9.1 ft | TOTAL DEPTH 99.2 ft |
| DRILL RIG/HAMMER EFF./DATE BRI9103 BK-51 89% 05/04/2016 | DRILL METHOD | Mud Rotary HAN | IMER TYPE Automatic | DRILL RIG/HAMMER | FF./DATE BRI910 | 3 BK-51 89% 05/04/2016 |
| DRILLER Eister, G. START DATE 08/30/ | 6 COMP. DATE 08/31/16 | SURFACE WATER DEPTH | N/A | DRILLER Eister, C | G. | START DATE 08/30/16 |
| ELEV DRIVE DEPTH BLOW COUNT BLOWS | PER FOOT | L SOIL AND ROCK DE | ESCRIPTION | | BLOW COUNT | BLOWS PER FOOT |
| (it) (it) 0.5ft 0.5ft 0.5ft 0 25 | 50 75 100 NO. MOI | G ELEV. (ft) | DEPTH (ft) | (it) (ft) (it) | 0.5ft 0.5ft 0.5 | ft 0 25 50 7 |
| | | | | | | |
| | | 69.1 GROUND SUF | RFACE 0.0 | -10 | 9-+ 1115 | Match Line |
| 67.1 2.0 4 4 | M | 67.6 Tan Gray Clayey F | TAL PLAIN Fine SAND | I I I | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | M | Tan Gray Fine Sa | ndy CLAY | -15 -14.6 83.7 | | |
| | <u></u> | S. | | I I | | , |
| | W | Tan Brown Clayey Fine | 7.0 SAND with Clay | | | |
| | · · · · · · · · · · · · · · · · · · · | Seams | | -20 -19.6 88.7 | 22 25 32 | 9 1 1 1 1 1 1 1 1 1 1 |
| | | | | | | |
| 55 55.4 13.7 2 1 2 | | 55.1 | 14.0 | -25 -24.6 93.7 | 25 28 20 | |
| | W •••••••••••••••••••••••••••••••••••• | Brown Black Clayey | Fine SAND | | | ´ |
| | | COASTAL P | LAIN | | | |
| | 100/0.6 • W | 49.9 Gray Black Silty CLAY 49.8 Layers | with Mudstone 19.2 19.3 | -30 -29.6 98.7 | 100/0.5 | |
| | | [Beaufort Form | nation] | | | |
| 45 45.4 23.7 22 88/0 4 | | 44.6 | 24.5 | | | |
| | · · · · · · · · · · · · · · · · · · · | 44.5 | 24.6 | | | |
| | | | 28.7 | | | |
| | ₩ 100/0.6 | 40.3 | 28.8 29.2 | | | |
| | | 39.8 | 29.3 | | | |
| 35 35.4 33.7 | 100/0.1 W | 35.4 | 33.7 33.8 | | | |
| | | 8 | | | | |
| | | 30.4 | 38.7 | | | |
| | | 30.3 | 38.8 | | | |
| | | 3 | | | | |
| 25 25.4 43.7 | | 25.4 | 43.7 43.8 | | | |
| | | 25.2 25.1 | 43.9 44.0 | | | |
| | | COASTAL P | LAIN | | | |
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| Ğ2 -10 -9.6 78.7 · · · · · · · · · · · · · · · · · · | | 8 | | | | |

| ידאנ | Y LE | NOIR | 2 | | | | GEOLO | GIST | Wright, F | .K. | | |
|------------|-------|----------------|------------------|---------|-------|--------------|----------------|--------------|-----------------------|---------------------|-----------------------|-----------------|
| ove | r -Y8 | - (NC | 11 |) | | | | | | | GROUN | ID WTR (ft) |
| | OFF | SET | 3 | 1 ft RT | | | ALIGNM | ENT | -L- | | 0 HR. | N/A |
| | NOR | THIN | G | 577,7 | 05 | | EASTIN | G 2,4 | 149,175 | | 24 HR. | 5.3 |
| | | | | DRILL M | IETHO | D Mu | Id Rotary | | | НАММ | R TYPE | Automatic |
| | CON | IP. DA | \T | E 08/3 | 31/16 | - | SURFAC | E WA | TER DEP | TH N/ | A | |
| | | . 21 | | SAMP. | 7 | L | 1-2-11/10 | / | | | | |
| | 75 | 100 | | NO. | мо | 0 G | | SOI | L AND ROC | CK DESC | RIPTION | |
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| e | | | | | | | | | | | | |
| <u> </u> | Ţ. | | † † | | _ M | \mathbf{N} | | | COAST | | N | |
| ••• | · | | | | | \mathbf{N} | C | live G | ray Fine Sa and Tr | ndy CLA ace Mica | AY with Sh a | ells |
| ••• | • | | | | | \mathbf{N} | _ | [Pe | edee Form | ation] (co | ontinued) | |
| ••• | | | | | VV | N | - | | | | | |
| | | | | | | N | <u>17.9</u> | Black | Gray Silty C | LAY wit | h Fine Sa | nd <u>87</u> .0 |
| 7 | + | | $\left \right $ | | w | N | - | | Se | eams | | |
| · | . | · · · | | | | N | | | | | | |
| · · · · | | · · · · · · | | | | N | | | | | | |
| 7 | +. | | | | W | N | - | | | | | |
| | | | | | | N | - <u>-27.9</u> | | | | | 97.0 |
| | . | | | | \٨/ | F | -30.1 | Bl | ack Gray Fi | ne claye | y SAND | 99.2 |
| | | 100/0.5 | | | | F | B | oring T | Ferminated | at Eleva | tion -30.1 Sand Se | ft in ams |
| | | | | | | | v | Siy De | | | | |
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| WB | S 4637 | 5.1.1 | | | TI | P R-570 | 3 | COUNT | Y LENOIR | 1 | | | GE | OLOGIST Wright, F | . К . | | WB | S 4637 | 5.1.1 | | | ТІ | P R-57(|)3 | (| COUNT |
|-------------|-----------------|--------------------|---------|--------|----------|--|-------------------|-----------|------------------|----------------|-------|--------------|--------------------------------|--|------------------|---|--|-----------------|-------------|--------|----------------|---------------------|----------------|--------------|-------|---------|
| SIT | E DESCF | RIPTION | Brid | lge No | . 221 | on -L- (Fe | elix Harvey | Pkwy) ov | er -Y8- (NC | 11) | | | | | | GROUND WTR (ft) | SITE | DESCR | RIPTION | Brio | dge No | . 221 0 | on -L- (Fe | elix Harve | ey Pk | wy) ove |
| BO | ring no | . B1-E | BRT LI | N | S | TATION | 364+28 | | OFFSET | 36 ft RT | Г | | ALI | GNMENT -L- | | 0 HR. N/A | BOF | ring no | . B1-E | B RT L | .N | SI | ATION | 364+28 | | |
| CO | LAR EL | EV. 68 | 3.6 ft | | Т | OTAL DEP | PTH 99.4 | ft | NORTHING | G 577,0 | 638 | | EAS | EASTING 2,449,219 24 HR. 5.5 | | | COLLAR ELEV. 68.6 ft TOTAL DEPTH 99.4 ft | | | | | | | | | |
| DRIL | L RIG/HA | MMER E | FF./DA | TE BF | RI9103 E | 3K-51 89% 0 | 05/04/2016 | | DRILL METHOD Mud | | | Nud Rota | d Rotary HAMMER TYPE Automatic | | | DRILL RIG/HAMMER EFF./DATE BRI9103 BK-51 89% 05/04/2016 | | | | | | | | | | |
| DRI | LLER E | Eister, G |). | | S | TART DAT | TE 08/30/ | 16 | COMP. DATE 08/30 | | | 6 | SURFACE WATER DEPTH | | | /A | DRILLER Eister, G. | | | | ST | START DATE 08/30/16 | | | | |
| ELE | / DRIVE ELEV | DEPTH | BLC | w co | | | BLOWS | PER FOO | Т | SAMP | P. ▼/ | | | SOIL AND ROO | CK DES | CRIPTION | ELEV | , DRIVE ELEV | DEPTH | BLC | | UNT | | BLOV | VS PE | ER FOOT |
| (11) | (ft) | | 0.5ft | 0.5ft | 0.5ft | 0 | 25 | 50 | /5 100 | NO. | /м | OI G | ELEV. | . (ft) | | DEPTH (f | t) (11) | (ft) | (ii) | 0.5ft | 0.5ft | 0.5ft | | 25 | 50 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 70 | <u> </u> | + | | | | | | | | | | | 68.6 | GROUNE | | | -10 | -10.4 | 79.0 | | $\frac{1}{11}$ | | _ | - <u></u> N | latch | Line |
| | 66.6 | | 1 | 2 | 1 | • 3 · · · | • • • • • | ••• | • • • • • | | M | ,, | <u>}</u> | | | | | | Ŧ | | | | | • <u>26</u> | | |
| 65 | 64.6 | | 1 | 1 | 2 | • 3 | | | | | w | | 5 64.9 | Tan Gray Cla | ауеу гіп | e SAND 3.1 | -15 | 15.4 | Ŧ. | | | | | | | |
| | 62.8 | <u> </u> | WOH | 1 | 1 | 4 2 · · · | | | | SS-85 | 5 239 | % | | Tan Gray Brown | Fine Sa | andy CLAY | | - 15.4 - | - 04.0 [| 8 | 10 | 15 | | • 2 5 | | |
| | 02.0 | I | 1 | 2 | 2 | •4 · · | | | | | w | | £ | | | | | | Ŧ | | | | | | | |
| 60 | 60.3 | <u> 8.3 </u> | 2 | 3 | 4 | •7 | | | | | м | | - | | | | -20 | -20.4 - | 89.0 | 10 | 13 | 25 | | | | |
| | | Ŧ | | | | | | | | | | | 56.6 | | | 12 (| | | Ŧ | | | | | | 38 | |
| 55 | 54.6 | I 14 0 | | | | | | | | | | | Ē | Brown Black C | layey Fi | ine SAND | -25 | 25.4 | | | | | | | ••• | |
| | | T 14.0 | 1 | 2 | 1 | \$ 3 · · · | | | | | w | | | | | | | -25.4 | - 94.0 - | 19 | 39 | 61/0.3 | | | ••• | |
| | | Ŧ | | | | I <u></u> _ | | _ <u></u> | | | | | <u>51.6</u> | | | <u> </u> | 2 | | Ŧ | | | | | | | |
| 50 | 49.6 - | 19.0 | 85 | 15/0 5 | - | | | + | | | | | 49.6 | Gray Black Silty (| CLAY wi | th Mudstone 19.0 | -30 | -30.4 - | 99.0 | 100/04 | | | | | | |
| | | Ŧ | | 10/0.0 | | | | | . 100/1.0 | • | | | E | [Beaufor | t Format | tion] | | | Ŧ | 100/0. | 1 | | | | | |
| 45 | 116 | | | | | | | | | | | | £ | | | | | | E | | | | | | | |
| | 44.0 | 1 24.0 | 25 | 75/0.1 | | | | | 100/0.6 | • | W | \mathbf{R} | 44.1 44.0 | | | 24. 24. | 5 | | ł | | | | | | | |
| | | ŧ | | | | | | | | | | | ł | | | | | | Ł | | | | | | | |
| 40 | 39.6 - | 29.0 | 50 | 37 | 63/0 1 | | | <u> </u> | | | | | 39.4 | | | 29.2 | 2 | - | ł | | | | | | | |
| | | Ŧ | | 0. | 00/011 | | | | 100/0.6 | • | | | 38.9 | | | 29. 29. | 7 | | l | | | | | | | |
| 35 | - 34.6 - | 34.0 | | | | | | | | | | | | | | 34.1 | | | L | | | | | | | |
| | | | 35 | 65/0.5 | | | | | | | W | | - 34.5 33.7 | | | 34. 34. | 1 | | ł | | | | | | | |
| | | ŧ | | | | | | | | | | | 33.6 | | | 35.0 | | | ŧ | | | | | | | |
| 30 | 29.6 - | - 39.0 | 100/0.1 | | | | · · · · · · | <u> </u> | 100/0.1 | | w | | 29.6 | Grav Black Silty S | | 39.1 39.1 39.1 | <u>)</u> | - | ŧ | | | | | | | |
| | | ŧ | | | | | . . | | | | | | | La | ayers | | | | ŧ | | | | | | | |
| 25 | 24.6 - | | | | | | | | | | | | Ļ | | | | | | Ł | | | | | | | |
| | 27.0 | + | 31 | 69/0.2 | 1 | | . | · · · | 100/0.7 | SS-86 | 5 129 | % | 23.9 23.8 | | | 44. 44. | 7 | | ŧ | | | | | | | |
| | | ŧ | | | | : : : | : <u>+</u> : | <u> </u> | | | | | 21.6 | | | <u> </u> | 2 | | ŧ | | | | | | | |
| 20 | 19.6 - | + 49.0 | 5 | 8 | 8 | | · · · · · | + | | | N/ | | + | Olive Gray Sandy Cl | LAY, wit dica | h Shells, Trace | | - | ŧ | | | | | | | |
| | | ‡ | | | | $\left \left \begin{array}{c} \cdot \cdot \cdot \P^{1} \\ \cdot \cdot \cdot \cdot \end{array} \right \right $ | · · · · · · | | | | | | 1 | [Peedee | Format | ion] | | | ŧ | | | | | | | |
| 15 | 14 6 - | + 54 0 | | | | · · · İ | · · · · · | · · · | | | | | Ł | | | | | - | ‡ | | | | | | | |
| 3/9/1 | | + | 6 | 9 | 11 | | | | | | M | | 1 | | | | | | ţ | | | | | | | |
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| NC | | ŧ | | | | | . . | · · · · | | | | | | | | | | | ŧ | | | | | | | |
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| OUBL | | ‡ | | | | | X · · · · | | . | | | | 1 | | | | | | ‡ | | | | | | | |
| й ш -5 | -5.4 - | + + 74.0 | | | | | · <u> </u> | · · · | · · · · · | | | | Ł | | | | | · · | ŧ | | | | | | | |
| T BOI | | ‡ | 7 | 11 | 21 | | : 3 2: : | | · · · · · · | | M | | 1 | | | | | | ‡ | | | | | | | |
| | | ‡ | | | | | : /. : : : | · · · · | · · · · · · | | | | ‡ | | | | | | ‡ | | | | | | | |
| < <u>10</u> | 1 | 1 | I | I | 1 | i 1 | | | | | 1 | | 1 | | | | | 1 | 1 | 1 | 1 | | | | | |



| WBS 46375.1.1 | TIP R-5703 COUNTY LENOI | २ | GEOLOGIST Wright, F.K. | | WBS 46375.1.1 | | TIP R-5703 COUNTY | | | | |
|--|--|---------------------------------|---|--------------------------|---|----------------------------|---|--|--|--|--|
| SITE DESCRIPTION Bridge No. 22 | 21 on -L- (Felix Harvey Pkwy) over -Y8- (NC | 11) | | GROUND WTR (ft) | SITE DESCRIPTION | Bridge No. 22 | 21 on -L- (Felix Harvey Pkwy) ove | | | | |
| BORING NO. B-2 | STATION 364+85 OFFSET | 31 ft RT | ALIGNMENT -L- | 0 HR. N/A | BORING NO. B-2 | | STATION 364+85 | | | | |
| COLLAR ELEV. 69.0 ft | TOTAL DEPTH 99.5 ft NORTHIN | G 577,596 | EASTING 2,449,258 | 24 HR. 6.2 | COLLAR ELEV. 69 | .0 ft | TOTAL DEPTH 99.5 ft | | | | |
| DRILL RIG/HAMMER EFF./DATE BRI91 | 103 BK-51 89% 05/04/2016 | DRILL METHOD Mud | Rotary HAMM | ER TYPE Automatic | DRILL RIG/HAMMER EFF./DATE BRI9103 BK-51 89% 05/04/2016 | | | | | | |
| DRILLER Eister, G. | START DATE 08/29/16 COMP. D | ATE 08/30/16 | SURFACE WATER DEPTH N | DRILLER Eister, G | <u>.</u> | START DATE 08/29/16 | | | | | |
| ELEV DRIVE DEPTH BLOW COUNT | T BLOWS PER FOOT | SAMP. | SOIL AND ROCK DES | CRIPTION | ELEV DRIVE DEPTH | BLOW COUNT | BLOWS PER FOOT | | | | |
| (π) (ft) (π) 0.5ft 0.5ft 0. | .5ft 0 25 50 75 10 | NO. MOI G E | ELEV. (ft) | DEPTH (ft) | (π) (ft) ^(π) | 0.5ft 0.5ft 0.5 | ift 0 25 50 | | | | |
| | | | | | | | | | | | |
| 70 0.0 | | | 69.0 GROUND SURF | ACE 0.0 | -10 | | Match Line | | | | |
| | 2 | М 🚺 е | 67.5 UNDIVIDED COASTA | L PLAIN | | | $\begin{bmatrix} \cdot \cdot \cdot \cdot \cdot \\ \cdot \cdot \cdot \cdot \end{bmatrix} \begin{bmatrix} \bullet^{(1)} \cdot \cdot \cdot \\ \bullet & \bullet \end{bmatrix} \begin{bmatrix} \bullet^{(1)} \cdot \cdot \cdot \\ \cdot \cdot \cdot \end{bmatrix} \begin{bmatrix} \bullet^{(1)} \cdot \cdot \\ \cdot \cdot \cdot \end{bmatrix}$ | | | | |
| 65 650 40 | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | Gray Tan Fine Sand | y CLAY | -15 -14.8 + 83.8 | | | | | | |
| | 2 4 | 1 ₩ ₹ | | | | 10 12 13 | 3 | | | | |
| | $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | | | | | | | | | | |
| <u>60</u> <u>60.3</u> <u>7</u> <u>8.7</u> <u>3</u> <u>1</u> <u>4</u> | 4 4 4 | | | | -20 -19.3 = 00.3 | 21 28 18 | 3 | | | | |
| | | | 57.0 | 12.0 | | | | | | | |
| 55 55.2 13.8 | | | Brown Gray Clayey Fi | ne SAND | -25 -24.8 93.8 | | | | | | |
| | $2 \qquad | W 👯 | | | Ŧ | 13 30 40 | | | | | |
| | | | 52.0 COASTAL PLA | JN <u>17.0</u> | | | | | | | |
| 50 50.2 18.8 100/0.4 | 100/0.4 | | 50.0 Black Gray Silty CLAY wit 49.8 Lavers | th Mudstone 19.0 19.2 | -30 -29.8 98.8 | 32 68/0.2 | | | | | |
| | | | [Beaufort Format | tion] | | | | | | | |
| 45 45.2 23.8 | | | 45.2 | 23.8 | I I I | | | | | | |
| | · · · · · · · · · · · · · · · · · · · | | 45.0 44.7 | 24.0 24.3 | | | | | | | |
| | | | 44.4 | 24.0 | | | | | | | |
| 40 40.2 28.8 100/0.4 | 100/0.4 | ♦ v \ | 39.9 39.8 | 29.1 29.2 | | | | | | | |
| | | | | | | | | | | | |
| 35 35.2 33.8 | | | 35.2 | 33.8 | | | | | | | |
| 90 10/0.1 | | | 35.1 | 33.9 | | | | | | | |
| | | | | | I I I | | | | | | |
| 30 30.2 38.8 100/0.1 | 100/0. | • • N | 30.2 30.1 | 38.8 38.9 | 1 1 | | | | | | |
| | | | 28.9 28.8 | 40.1 40.2 | I I I | | | | | | |
| 25 25.2 43.8 | | | 25.2 | 43.8 | I I I | | | | | | |
| 100/0.2 | 100/0.1 | \mathbf{I} " \mathbf{N}^2 | 25.0 | 44.0 | III | | | | | | |
| | | | 22.0 COASTAL PLA | <u> </u> | I I I | | | | | | |
| | 9 | | Olive Gray Fine Sandy CLA Peedee Formati | AY with Shells ion] | | | | | | | |
| | | | • | | | | | | | | |
| 15 15.2 53.8 | | | | | | | | | | | |
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| | - : : : <u>1</u> : : : : : : : : : : : : | | | | | | | | | | |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$ | 14 | | | | | | | | | | |
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| <u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u> | <i>i</i> | | | | | | | | | | |
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| | $ \begin{array}{ } \downarrow $ | | | | | | | | | | |
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| ž -10 -9.8 /8.8 | | | | | | | 1 | | | | |



| v | VBS | 46375 | 5.1.1 | | | Т | P R-5703 | COUN | ry Lenoir | | | | GEOLOGIST Wright, F.ł | K. | | WBS | 3 4637 | 5.1.1 | | | Т | P R-5703 | J | COUNT | |
|--------|------|---------------|---------------|---------|--------|----------|---|-------------|---------------|---------------|--------|------------|---|----------------------|------------------------|------|---------------|---------------|---------------|--------|----------|----------------------------|----------------|-----------|--|
| S | ITE | DESCR | RIPTION | Brio | dge No | . 221 | on -L- (Felix Harve | / Pkwy) ov | er -Y8- (NC | 11) | | | | G | GROUND WTR (ft) | SITE | DESCR | RIPTION | I Brio | dge No | . 221 (| on -L- (Feli | x Harvey | Pkwy) ove | |
| В | ORI | NG NO | . EB2 | -B Rt. | Ln. | S | TATION 365+32 | | OFFSET | 37 ft RT | Г | | ALIGNMENT -L- | 0 | 0 HR. N/A | BOF | RING NO | . EB2 | -B Rt. | Ln. | S | STATION 365+32 | | | |
| С | OLL | AR EL | EV. 68 | 3.7 ft | | Т | OTAL DEPTH 99.9 | 9 ft | NORTHIN | G 577, | 556 | | EASTING 2,449,282 | 24 | 4 HR. 6.3 | COL | LAR EL | EV. 68 | 3.7 ft | | т | DTAL DEP | TH 99.9 | ft | |
| D | RILL | RIG/HA | MMER E | FF./DA | TE BF | RI9103 E | 3K-51 89% 05/04/2016 | | | DRILL | METHO | DD N | lud Rotary | HAMMER | R TYPE Automatic | DRIL | L RIG/HA | MMER E | FF./DA | TE BR | RI9103 E | K-51 89% 05 | /04/2016 | | |
| D | RILI | .er E | ister, G |). | | S | TART DATE 08/20 | /16 | COMP. DA | TE 08 | /26/16 | 5 | SURFACE WATER DEPT | Ή N/A | | DRI | LER E | ister, C |). | | S | START DATE 08/26/16 | | 16 | |
| EL | EV | DRIVE ELEV | DEPTH | BLC | | | BLOW | S PER FOO | T | SAMP | . ▼∕ | | SOIL AND ROCK | C DESCR | RIPTION | ELEV | DRIVE ELEV | DEPTH | BLC | | JNT | | BLOWS | PER FOOT | |
| _ | 11) | (ft) | (ii) | 0.5ft | 0.5ft | 0.5ft | 0 25 | 50 | 75 100 | NO. | /мс | DI G | ELEV. (ft) | | DEPTH (ft) | (it) | (ft) | (it) | 0.5ft | 0.5ft | 0.5ft | 0 | <u></u> | 50 | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 70 | 69.7 | + | | | | | | | | | | | SURFAC | E 0.0 | -10 | + | + | | + 11- | -14 | _ | Mate | ch Line | |
| | F | | | 2 | 3 | 1 | • 4 · · · · · · · | | | | D | | - UNDIVIDED CO | DASTAL P | PLAIN | | | Ŧ | | | | | 25 | | |
| 6 | 35 | 64.6 | | 1 | 0 | 1 | 4 1 | | | | w | | - | e oundy e | 02/1 | -15 | -15.0 | 83.7 | | | | | | | |
| | | 62.8 | 5.9 | 1 | 1 | 2 | | | | | - w | | - | | | | | ł | 8 | 11 | 15 | | | | |
| | | | | 2 | 4 | 6 | | | | | Ŵ | | | | | | | ł | | | | | | + | |
| | 50 | 59.7 - | 9.0 | 3 | 4 | 6 | | | | | W | | _ 58.7 | | 10.0 | -20 | -20.0 | 88.7 | 22 | 43 | 57/0.2 | | + | | |
| | | - | ŧ | | | | | | | | | <i>%</i> ? | - Tan Gray Clay | ey Fine S | SAND | | | ł | | | | | | | |
| ę | 55 | 545- | - 14.2 | | | | | | | | | ~~~ | - | | | -25 | -25.0 | 93.7 | | | | | | | |
| | | | 14.2 | 1 | 1 | 3 | | | | | w | / | - 53.6 Olive Brown Fine SA | AND with | 15.1 | | | ŧ | 54 | 46/0.5 | | | | | |
| | - | | ŧ | | | | ││└ <u>└</u> ╌╌┥÷÷∶ | · | <u>-</u> | | | | <u>_ 51.7</u> COASTA | | <u>17.0</u> | | | ŧ | | | | | · · · · · | | |
| | 50 | 50.0 | 18.7 | 17 | 67 | 20 | | | | | м | | - 49.3 Olive Gray Silty CL | AY with N | Mudstone 19.4 | -30 | -30.0 | 98.7 | 25 | 47 | 53/0.2 | | <u> </u> | <u> </u> | |
| | | | ŧ | | | | | | | | | | - - | 0111 01110 | | | | ŧ | | | | | | | |
| 4 | 45 | 45.0 | 23.7 | | | 00/0.0 | | | · · · · \ | | | | _ 44.7 | | 24.0 | | | ŧ | | | | | | | |
| | | - | ŧ | 14 | 14 | 83/0.2 | | · · · · · | | | W | N | 44.6 43.8 | | 24.1 24.9 | | | ŧ | | | | | | | |
| | | - | ŧ | | | | | · · · · · | · · · · · · | | | | - 43.7 | | 25.0 | | | ŧ | | | | | | | |
| | +0 | 40.0 | 28.7 | 83 | 27/0.3 | - | | | | | w | | 39.9 39.8 20.4 | | 28.8 28.9 20.2 | | - | ŧ | | | | | | | |
| | | - | ŧ | | | | | | | | | | - 39.2 - | | 29.5 29.5 | | | ŧ | | | | | | | |
| 3 | 35 | 35.0 | 33.7 | 100/0 | | | | | · · · · · | | | | 35.0 | | 33.7 | | - | ŧ | | | | | | | |
| | | - | ŧ | 100/0.4 | | | | · · · · · | : 100/0.4 | • | W | | 34.9 - 34.7 - 34.6 | | 33.8 34.0 34.1 | | | ŧ | | | | | | | |
| | 20 | | ÷ | | | | | · · · · · | · · · · · · | | | | | | 00.7 | | | ŧ | | | | | | | |
| | 30 | | 38.7 | 100/0.4 | 1 | | | | · · 100/0 1 | i | w | N | | | 38.7 38.8 | | - | ŧ | | | | | | | |
| | | - | ŧ | | | | | · · · · · | | | | | - | | | | | + | | | | | | | |
| 2 | 25 | 25.0 | 43.7 | 100/0 / | - | | | · · · · | · · · · · | | | | 24.9 | | 43.8 | | - | ŧ | | | | | | | |
| | | - | ŧ | 100/0.2 | 1 | | | | : 100/0.2 | | W | | - 24.0 | | 43.9 | | | ŧ | | | | | | | |
| | 20 | - | ‡ | | | | ││∶∶∶ŗ:┽÷÷: | ·: | <u>-</u> | | | R | <u></u> COASTA | | <u> </u> | | | ŧ | | | | | | | |
| | | 20.0 | + 48./ - | 6 | 8 | 9 | · · • • 17 · · · | | | SS-88 | 29% | | Fine Sandy Silty CLA and Clayey Fine | AY with Mile Sand Se | lica, Shells, Seams | | - | ŧ | | | | | | | |
| | | - | ŧ | | | | | · · · · · | · · · · · · | | | | - [Peedee F | Formation] | 1] | | | ŧ | | | | | | | |
| 2 | 15 | 15.0 | 53.7 | 6 | 9 | 10 | | · · · · · | | | | | - - | | | | - | ‡ | | | | | | | |
| 3/9/1 | | - | ŧ | ľ | Ű | | $\left \begin{array}{cccccccccccccccccccccccccccccccccccc$ | · · · · · | · · · · · · | | | | - | | | | | ŧ | | | | | | | |
| GDT | 10 | 10.0 | + + | | | | ::: : : :::: | | · · · · · · | | | | - | | | | | ŧ | | | | | | | |
| D | | 10.0 | - 30.7 | 6 | 8 | 10 | · · · • 18 · · · | | | | м | | - | | | | - | ŧ | | | | | | | |
| Ŋ | | - | ŧ | | | | | · · · · · | · · · · · · | | | | - | | | | | ŧ | | | | | | | |
| -GPJ | 5 | 5.0 | 63.7 | 7 | 9 | 9 | | | | | | | - | | | | - | ŧ | | | | | | | |
| GINT | | - | ŧ | | | | $\left \begin{array}{cccccccccccccccccccccccccccccccccccc$ | · · · · · | · · · · · · | | | | - | | | | | ŧ | | | | | | | |
| ITE 7 | 0 | 0.0 | 1 68 7 | | | | | | | | | | - | | | | | Ŧ | | | | | | | |
| LE S | - | 0.0 | - 00.7 | 8 | 7 | 7 | 14 | | | 11 | м | | - | | | | - | ŧ | | | | | | | |
| DOUB | | - | Ŧ | | | | :::X ::: | | | | | | - | | | | | Ŧ | | | | | | | |
| JRE [| -5 | -5.0 | 73.7 | 7 | 8 | 20 | | | | | м | | - | | | | - | Ŧ | | | | | | | |
| DT BC | | - | Ŧ | | | | $\left \begin{array}{cccccccccccccccccccccccccccccccccccc$ | | | | | | | | | | | Ŧ | | | | | | | |
| - NCD(| 10 | -10.0 | T 78.7 | | | | | | | | | | - | | | | | Ŧ | | | | | | | |

| LENOIR | | | GEOLOGIST Wright, F | Ē.K. | | |
|---------------------------------------|---------------|-------------|--|---|-------------------------------------|---------------|
| r -Y8- (NC 11) | | | | | GROUN | ID WTR (ft) |
| OFFSET 37 ft F | RT | | ALIGNMENT -L- | | 0 HR. | N/A |
| NORTHING 57 | 7,556 | | EASTING 2,449,282 | | 24 HR. | 6.3 |
| DRIL | L METHOD | Mud | Rotary | HAMME | ER TYPE | Automatic |
| COMP. DATE | 08/26/16 | | SURFACE WATER DEP | PTH N/ | A | |
| 75 100 NC | иР.). мон | L O G | SOIL AND RO | CK DESC | CRIPTION | |
| | | | | | | |
| · · · · · · · · · · · · · · · · · · · | м | | COAS Fine Sandy Silty C and Clayey F [Peedee Form | TAL PLAI LAY with ine Sand nation] (co | N Mica, Sh Seams ontinued) | ells, |
| | w | | -18.3 | | | 87.0 |
| 100/0.7 | W | | Olive Grey Fine S | AND with | Clay Sea | ims |
| 100/1.0 | W | | | | | |
| | W | E. | -31.2 | | | 99.9 |
| 100/0.7 | | | Boring Terminated Very Dense Olive Clay | at Eleva Grey Fin / Seams | tion -31.2 e SAND v | ft in vith |

10%

0%

Particla Siza Analysis of Soils



12/27/16 12/24 - 12/27/16

8/31/16

5.0 - 7.0 ft.

| Revision No. 0 | | Farticle Size Analysis of So | | |
|------------------------|--------------------|---------------------------------------|-----------------------|---------------------|
| Revision Date: 12/20/0 | 9 | AASHTO T88 as Modified by NCD | OT | |
| | | | | Quality Assurance |
| S& | ME, Inc. Raleigh, | 3201 Spring Forest Road, Ralei | gh, North Carolina | 27616 |
| S&ME Project #: | 6235-16-010 | | Report Date: | 12/27/16 |
| Project Name: | C.F. Harvey Park | way Extension R-5703 | Test Date(s): | 12/24 - 12/27/ |
| State Project #: | 46375.1.1 | F.A. Project No: N/A | TIP NO: | R-5703 |
| Client Name: | Michael Baker Er | ngineering | | |
| Address: | Raleigh, NC | | | |
| Boring #: | B1-A LT LN | Sample #: ST-12 | Sample | Date: 8/31/16 |
| Location: | 364+33 | Offset: 26' LT | Dept | h (ft): 5.0 - 7.0 f |
| Sample Description: | | Gray Coarse | to Fine Sandy Silty C | CLAY A-6 (8) |
| 1.5" | 1"2/4" 1/2"2/8" #4 | #10 #20 #40 #60 #100 | #200 #270 | |
| 100% | • • • • • • • • | | #200 #270 | |
| | | | | |
| 90% | | | | |
| 80% | | | | |
| | | ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ | | |
| 70% | | + + + \ + | | |
| 50 E 60% | | | | |
| assi | | | | |
| 1 50% | | | | |
| erce | | | | |
| ₽ 40% | | | | ~~ |
| 30% | | | | |
| | | | | |
| 20% | | | | |

| 100 | 10 | 1 | | 0.1 | 0.01 | 0.001 |
|-----------------------------------|---------------|-------------------|--------------|--------------|------------------|------------------|
| | | Particle S | Size (mm) | | | |
| As Define | ed by NCDOT | | F | Fine Sand | < 0.25 mm an | d > 0.05 mm |
| Gravel | < 75 mm a | and > 2.00 mm | | Silt | < 0.05 and > | • 0.005 mm |
| Coarse Sand | < 2.00 mm | and >0.25 mm | | Clay | < 0.00 | 5 mm |
| Maximum Particle Size | #4 | Coarse | Sand | 8% | Silt | 11% |
| Gravel | 0% | Fine Sa | nd | 46% | Clay | 35% |
| Apparent Relative Density | ND | Moistur | re Content | 22% | % Passing #200 | 49.9% |
| Liquid Limit | 37 | Plastic 1 | Limit | 13 | Plastic Index | 24 |
| | | Soil Morta | r (-#10 Siev | e) | | |
| Coarse Sand | 8% | Fine Sand | 46% | Silt | 11% Cla | ay 35% |
| Description of Sand & Grav | el Particles: | Rounded | | | Angular | X |
| Hard & Durable | X | Soft | | Wea | thered & Friable | |
| References / Comments / Deviation | ons: ND=N | lot Determined. | | | | |
| <u>Mal Krajan, ET</u> | | 104-01-0703 | | Laboratory M | lanager | 12/27/2016 |
| Technician Name | | Certification No. | | Position | | Date |
| Mal Krajan, ET | | m C | \geq | Laboratory M | lanager | <u>9/26/2016</u> |
| Technical Responsibility | | Signature | | Position | | Date |

Technical Responsibility Signature This report shall not be reproduced, except in full, without the written approval of S&ME, Inc.

3201 Spring Forest Road

B1-A LT LN ST-12 (5.0 - 7.0 ft) Classification.xls Raleigh, NC 27616

Quality Assurance

Effective Stress Triaxial Compression

Consolidated Undrained

| Sample details | Dooth | 0 700 | | | | | | |
|---|--|--|---|--|--|--|--|--|
| Sketch showing specimen location in original Sample | Description: | Gray Coarse to F | ay Coarse to Fine Sandy Silty CLAY (A-6) (8) | | | | | |
| | Type Height H_0 (in) Diameter D_0 (in) Weight W_0 (gr) Bulk Density ρ (PCF) Particle Density ρ_s | Specimen 1 Undisturbed 5.927 2.866 1277.8 127.31 2.669 (measured) | Specimen 2 Undisturbed 5.96 2.868 1277.8 126.43 2.669 (measured) | Specimen 3 Undisturbed 5.833 2.864 1255.3 127.26 2.669 (measured) | | | | |

| Initial Conditions | | | | |
|---------------------------------------|--------------|--------------|--------------|--|
| | Specimen 1 | Specimen 2 | Specimen 3 | |
| Cell Pressure σ_3 (lbf/in2) | 4.0 | 14.0 | 24.0 | |
| Pore Pressure u (lbf/in2) | 0.0 | 0.0 | 0.0 | |
| Machine Speed d _r (in/min) | 0.0079 | 0.0108 | 0.0092 | |
| No. of Membranes | 1 | 1 | 1 | |
| Total Thickness (in) | 0.012 | 0.012 | 0.012 | |
| Strain Channel | 1798 | 1798 | 1708 | |
| Load Channel | 1776 | 1776 | 1776 | |
| Pore P. Channel | 1779 | 1770 | 1770 | |
| Volume Channel | Volume Chang | Volume Chang | Volume Chang | |
| Moisture Content w_% | 21.6 | 22.1 | 21.1 | |
| Dry Density Odo (PCF) | 104.68 | 103 53 | 105 10 | |
| Voids Ratio e | 0.59 | 0.61 | 0.58 | |
| Deg of Saturation S ₂ % | 97.63 | 96.98 | 96.25 | |
| | 01.00 | 50.50 | 30.23 | |

| Final Conditions | | |
|--|---------------|-------------|
| | Specimen 1 | Specime |
| Moisture Content w _f % | 23.5 | 20.6 |
| Dry Density Pd (PCF) | 105.75 | 105.97 |
| Voids Ratio e _f | 0.57 | 0.57 |
| Deg of Saturation S _f % | 100.00 | 96.27 |
| Failure Criteria | Mx Stress Rat | tioMx Stres |
| Axial Strain _{Ef} % | 5.0 | 5.0 |
| Corr Dev Stress (o1 - o3)f (lbf/in2 |) 19.1 | 28.0 |
| Minor Stress ogf (lbf/in2) | 1.0 | 7.8 |
| Major Stress o _{1f} (lbf/in2) | 20.1 | 35.8 |
| Stress Ratio $(\sigma_1/\sigma_3)_f$ | 20.1 | 4.6 |
| Notes: | | |

Test Method: ASTM D4767-95



Same Site Reference: C.F. Harvey Jobfile: E:\16010.JOB Operator: ML

Che

| en 2 | Specimen 3 | Failure Sketch |
|--------|-------------------|---------------------|
| | 108.69 | Sp 1 Sp 2 |
| | 0.53 | (5 |
| | 100.00 | 15 |
| ss Rat | ioMx Stress Ratio | 1 5 |
| | 6.0 | |
| | 36.4 | Sp 3 |
| | 12.7 | 5 |
| | 49.1 | 5 |
| | 3.9 | م م |
| | | |
| | | Surface Inclination |

| | Test name Date of Test: | CU Triaxial (12-3-16 | SS, MS) |
|----------|----------------------------|--------------------------|---------|
| | Sample: Borehole: | ST-12 B1-A LT LN | |
| ecked: 🔉 | uc | Approved: | |



Effective Stress Triaxial Compression

Consolidated Undrained



| ecked: | ule | Approved: | |
|--------|----------------------------|---------------------------------|--|
| | Sample: Borehole: | ST-12 B1-A LT LN | |
| | Test name Date of Test: | CU Triaxial (SS, MS) 12-3-16 | |



| | | | | | | | | | | 10 01 33 |) |
|------|------------------|--------------|----------------|---------------|--------------------|-----------------------|---|---|--|---|-----------------------------|
| Effe | ective S | Stress | Triax | ial Co | mpres | sion | | | | Page 1 / 3 | |
| Con | solidate | d Und | rained | Shear | (Specir | nen 1) | | | | | |
| No. | Strain (divs) | Strain ε% | Load (divs) | Load (Ibs) | Pore Prs (divs) | Pore Prs (Ibf/in2) | D. Stress (σ ₁ - σ ₃) _m (Ibf/in2) | D. Stress $(\sigma_1 - \sigma_3)_c$ (lbf/in2) | Minor Str σ ₃ ΄ (lbf/in2) | Major Str ^σ 1 ['] (lbf/in2) | Ratio $\sigma_1' \sigma_3'$ |
| 1 | 12 | 0.00 | 647 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 4.00 | 4.00 | 1.00 |
| 2 | 61 | 0.08 | 833 | 18.6 | 3 | 0.3 | 2.9 | 2.9 | 3.70 | 6.60 | 1 78 |
| 3 | 117 | 0.18 | 911 | 26.4 | 6 | 0.6 | 4.1 | 4.1 | 3.40 | 7.51 | 2.21 |
| 4 | 174 | 0.27 | 953 | 30.6 | 8 | 0.8 | 4.8 | 4.8 | 3.20 | 7.96 | 2.49 |
| 5 | 229 | 0.37 | 986 | 33.9 | 10 | 1.0 | 5.3 | 5.3 | 3.00 | 8.27 | 2.76 |
| 6 | 284 | 0.46 | 1006 | 35.9 | 11 | 1.1 | 5.6 | 5.6 | 2.90 | 8.48 | 2.92 |
| 7 | 342 | 0.56 | 1056 | 40.9 | 13 | 1.3 | 6.3 | 6.2 | 2.70 | 8.89 | 3.29 |
| 8 | 396 | 0.65 | 1081 | 43.4 | 15 | 1.5 | 6.7 | 6.6 | 2.50 | 9.07 | 3.63 |
| 9 | 450 | 0.74 | 1108 | 46.1 | 16 | 1.6 | 7.1 | 7.0 | 2.40 | 9.38 | 3.91 |
| 10 | 509 | 0.84 | 1133 | 48.6 | 18 | 1.8 | 7.5 | 7.4 | 2.20 | 9.56 | 4.35 |
| 11 | 563 | 0.93 | 1156 | 50.9 | 19 | 1.9 | 7.9 | 7.7 | 2.10 | 9.81 | 4.67 |
| 12 | 617 | 1.02 | 1181 | 53.4 | 20 | 2.0 | 8.2 | 8.1 | 2.00 | 10.09 | 5.04 |
| 13 | 677 | 1.13 | 1209 | 56.2 | 22 | 2.2 | 8.7 | 8.5 | 1.80 | 10.31 | 5.73 |
| 14 | 1181 | 1.98 | 1420 | 77.3 | 28 | 2.8 | 11.8 | 11.5 | 1.20 | 12.75 | 10.62 |
| 15 | 1797 | 3.02 | 1637 | 99.0 | 30 | 3.0 | 15.0 | 14.6 | 1.00 | 15.62 | 15.62 |
| 16 | 2360 | 3.97 | 1807 | 116.0 | 31 | 3.1 | 17.4 | 16.9 | 0.90 | 17.81 | 19.78 |
| 17 | 2983 | 5.03 | 1975 | 132.8 | 30 | 3.0 | 19.7 | 19.1 | 1.00 | 20.12 | 20.12 |
| 18 | 3550 | 5.99 | 2077 | 143.0 | 29 | 2.9 | 21.0 | 20.3 | 1.10 | 21.44 | 19.49 |
| 19 | 4150 | 7.01 | 2150 | 150.3 | 27 | 2.7 | 21.8 | 21.1 | 1.30 | 22.40 | 17.23 |
| 20 | 4756 | 8.03 | 2166 | 151.9 | 25 | 2.5 | 21.8 | 21.0 | 1.50 | 22.51 | 15.00 |
| 21 | 5352 | 9.04 | 2223 | 157.6 | 23 | 2.3 | 22.4 | 21.5 | 1.70 | 23.20 | 13.64 |
| 22 | 5940 | 10.04 | 2287 | 164.0 | 21 | 2.1 | 23.0 | 22.1 | 1.90 | 23.97 | 12.62 |
| 23 | 6518 | 11.01 | 2315 | 166.8 | 20 | 2.0 | 23.2 | 22.1 | 2.00 | 24.13 | 12.06 |
| 24 | 7106 | 12.01 | 2369 | 172.2 | 18 | 1.8 | 23.6 | 22.5 | 2.20 | 24.73 | 11.24 |
| 25 | 7695 | 13.01 | 2388 | 174.1 | 17 | 1.7 | 23.6 | 22.5 | 2.30 | 24.76 | 10.76 |
| 26 | 8286 | 14.01 | 2436 | 178.9 | 16 | 1.6 | 24.0 | 22.8 | 2.40 | 25.15 | 10.48 |
| 27 | 8876 | 15.01 | 2489 | 184.2 | 14 | 1.4 | 24.4 | 23.1 | 2.60 | 25.72 | 9.89 |
| 28 | 9466 | 16.00 | 2511 | 186.4 | 12 | 1.2 | 24.4 | 23.1 | 2.80 | 25.86 | 9.23 |
| 29 | 10056 | 17.00 | 2574 | 192.7 | 10 | 1.0 | 25.0 | 23.5 | 3.00 | 26.51 | 8.84 |
| 30 | 10649 | 18.01 | 2601 | 195.4 | 8 | 0.8 | 25.0 | 23.5 | 3.20 | 26.69 | 8.34 |
| 31 | 11245 | 19.02 | 2643 | 199.6 | 7 | 0.7 | 25.2 | 23.7 | 3.30 | 26.97 | 8.17 |
| 32 | 11846 | 20.03 | 2689 | 204.2 | 5 | 0.5 | 25.5 | 23.9 | 3.50 | 27.39 | 7 83 |

| Test | Method: | ASTM | D4767-95 |
|------|---------|------|----------|
| 1000 | mounda. | / | 01101 00 |

S&ME Site Reference: C.F. Harvey Jobfile: E:\16010.JOB Operator: MLC

| | Test name Date of Test: | CU Triaxial 12-3-16 | (SS, MS) Shear (Specimen 1) |
|-----------|----------------------------|------------------------|-----------------------------|
| | Sample: Borehole: | ST-12 B1-A LT LN | |
| hecked: 🔥 | ric | Approved | d: |

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 2)

Load (divs)

686

808

942

1038

1108

1239

1328

1453

1540

1600

1688

1745

1801

2118

2384

2501

2596

2673

2757

2824

2874

2932

2962

3010

3040

3068

3093

3132

3143

3160

3174

3198

Load (Ibs)

0.0

12.2

25.6

35.2

42.2

55.3

64.2

76.7

85.4

91.4

100.2

105.9

111.5

143.2

169.8

181.5

191.0

198.7

207.1

213.8

218.8

224.6

227.6

232.4

235.4

238.2

240.7

244.6

245.7

247.4

248.8

251.2

Pore Prs Pore Prs

0.0

0.4

1.0

1.4

1.9

2.3

2.6

3.1

3.3

3.8

4.2

4.6

5.0

6.1

6.4

6.4

6.2

5.9

5.5

5.1

4.7

4.4

4.2

4.0

3.8

3.5

3.2

3.0

2.8

2.7

2.5

2.3

(lbf/in2)

(divs)

0

4

10

14

19

23

26

31

33

38

42

46

50

61

64

64

62

59

55

51

47

44

42

40

38

35

32

30

28

27

25

23

Strain (divs)

33

80

137

190

241

297

352

404

462

515

569

627

681

1188

1811

2377

3004

3572

4180

4768

5336

5966

6535

7109

7734

8308

8878

9507

10079

10648

11263

11848

No.

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23 24

25

26

27

28

29

30

31

32

Strain ε%

0.00

0.08

0.18

0.27

0.35

0.45

0.54

0.63

0.73

0.82

0.91

1.00

1.10

1.95

3.01

3.96

5.02

5.98

7.01

8.01

8.97

10.03

10.99

11.96

13.02

13.99

14.96

16.02

16.99

17.95

18.99

19.98

Page 2 / 3

σı

(lbf/in2)

14.00

15.52

17.02

18.12

18.71

20.36

21.28

22.72

23.87

24.29

25.25

25.72

26.18

29.70

33.14

34.53

35.76

36.83

38.06

39.03

39.74

40.41

40.62

41.05

41.21

41.45

41.67

41.92

41.82

41.70

41.64

41.71

σ1'/σ3

1.00

1.14

1.31

1.44

1.55

1.74

1.87

2.08

2.23

2.38

2.58

2.74

2.91

3.76

4.36

4.54

4.59

4.55

4.48

4.39

4.27

4.21

4.14

4.11

4.04

3.95

3.86

3.81

3.73

3.69

3.62

3.57

D. Stress D. Stress Minor Str Major Str Ratio

14.00

13.60

13.00

12.60

12.10

11.70

11.40

10.90

10.70

10.20

9.80

9.40

9.00

7.90

7.60

7.60

7.80

8.10

8.50

8.90

9.30

9.60

9.80

10.00

10.20

10.50

10.80

11.00

11.20

11.30

11.50

11.70

(lbf/in2)

 σ_3

 $(\sigma_1 - \sigma_3)_m (\sigma_1 - \sigma_3)_c$

0.0

1.9

4.0

5.5

6.6

8.7

9.9

11.8

13.2

14.1

15.5

16.3

17.2

21.8

25.5

26.9

28.0

28.7

29.6

30.1

30.4

30.8

30.8

31.1

31.0

31.0

30.9

30.9

30.6

30.4

30.1

30.0

(lbf/in2)

(lbf/in2)

0.0

1.9

4.0

5.5

6.6

8.7

10.0

12.0

13.3

14.3

15.6

16.5

17.3

22.1

25.9

27.4

28.5

29.4

30.3

30.9

31.3

31.8

31.8

32.2

32.2

32.2

32.2

32.3

32.1

31.9

31.7

31.6

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 3)

| No. | Strain (divs) | Strain ε% | Load (divs) | Load (Ibs) | Pore Prs (divs) | Pore Prs (lbf/in2) | D. Stress (σ ₁ - σ ₃) _m (lbf/in2) | D. Stress $(\sigma_1 - \sigma_3)_c$ (Ibf/in2) | Minor Str σ ₃ ΄ (Ibf/in2) | Major Str ^σ 1 ['] (Ibf/in2) | Ratio $\sigma_1' \sigma_3'$ |
|-----|------------------|--------------|----------------|---------------|--------------------|-----------------------|---|---|--|---|-----------------------------|
| 1 | 47 | 0.00 | 717 | 0.0 | 0 | 0.0 | 0.0 | 0.0 | 24.00 | 24.00 | 1.00 |
| 2 | 102 | 0.10 | 864 | 14.7 | 5 | 0.5 | 2.3 | 2.3 | 23.50 | 25.83 | 1.10 |
| 3 | 156 | 0.19 | 967 | 25.0 | 9 | 0.9 | 4.0 | 4.0 | 23.10 | 27.06 | 1.17 |
| 4 | 208 | 0.28 | 1245 | 52.8 | 18 | 1.8 | 8.4 | 8.4 | 22.20 | 30.56 | 1.38 |
| 5 | 267 | 0.38 | 1428 | 71.1 | 23 | 2.3 | 11.2 | 11.2 | 21.70 | 32.94 | 1.52 |
| 6 | 320 | 0.47 | 1484 | 76.7 | 27 | 2.7 | 12.1 | 12.1 | 21.30 | 33.42 | 1.57 |
| 7 | 375 | 0.57 | 1642 | 92.5 | 33 | 3.3 | 14.6 | 14.4 | 20.70 | 35.14 | 1.70 |
| 8 | 434 | 0.67 | 1706 | 98.9 | 37 | 3.7 | 15.6 | 15.4 | 20.30 | 35.73 | 1.76 |
| 9 | 487 | 0.76 | 1856 | 113.9 | 42 | 4.2 | 17.9 | 17.8 | 19.80 | 37.58 | 1.90 |
| 10 | 543 | 0.86 | 1906 | 118.9 | 46 | 4.6 | 18.7 | 18.6 | 19.40 | 37.95 | 1.96 |
| 11 | 601 | 0.96 | 1967 | 125.0 | 50 | 5.0 | 19.7 | 19.5 | 19.00 | 38.49 | 2.03 |
| 12 | 655 | 1.05 | 2015 | 129.8 | 55 | 5.5 | 20.4 | 20.2 | 18.50 | 38.73 | 2.09 |
| 13 | 711 | 1.15 | 2059 | 134.2 | 58 | 5.8 | 21.1 | 20.9 | 18.20 | 39.10 | 2.15 |
| 14 | 1218 | 2.03 | 2429 | 171.2 | 87 | 8.7 | 26.6 | 26.3 | 15.30 | 41.64 | 2 72 |
| 15 | 1787 | 3.02 | 2712 | 199.5 | 103 | 10.3 | 30.7 | 30.4 | 13.70 | 44 05 | 3.22 |
| 16 | 2354 | 4.00 | 2904 | 218.7 | 111 | 11.1 | 33.3 | 32.8 | 12.90 | 45.75 | 3 55 |
| 17 | 2921 | 4.98 | 3060 | 234.3 | 113 | 11.3 | 35.3 | 34.8 | 12.70 | 47 48 | 3 74 |
| 18 | 3496 | 5.98 | 3196 | 247.9 | 113 | 11.3 | 37.0 | 36.4 | 12.70 | 49.06 | 3.86 |
| 19 | 4065 | 6.97 | 3299 | 258.2 | 109 | 10.9 | 38.1 | 37.4 | 13.10 | 50.51 | 3.86 |
| 20 | 4636 | 7.96 | 3396 | 267.9 | 105 | 10.5 | 39.1 | 38.3 | 13.50 | 51.85 | 3.84 |
| 21 | 5263 | 9.04 | 3490 | 277.3 | 99 | 9.9 | 40.0 | 39.2 | 14.10 | 53 26 | 3 78 |
| 22 | 5833 | 10.03 | 3568 | 285.1 | 94 | 9.4 | 40.7 | 39.8 | 14 60 | 54.36 | 3 72 |
| 23 | 6407 | 11.03 | 3646 | 292.9 | 89 | 8.9 | 41.4 | 40.3 | 15.10 | 55 43 | 3.67 |
| 24 | 6976 | 12.01 | 3713 | 299.6 | 85 | 8.5 | 41.8 | 40.7 | 15 50 | 56 23 | 3.63 |
| 25 | 7544 | 13.00 | 3766 | 304.9 | 80 | 8.0 | 42.1 | 40.9 | 16.00 | 56.93 | 3.56 |
| 26 | 8119 | 13.99 | 3843 | 312.6 | 77 | 7.7 | 42.7 | 41.4 | 16.30 | 57 72 | 3 54 |
| 27 | 8688 | 14.98 | 3902 | 318.5 | 73 | 7.3 | 43.0 | 41 7 | 16 70 | 58 37 | 3 50 |
| 28 | 9258 | 15.97 | 3936 | 321.9 | 70 | 7.0 | 42.9 | 41.6 | 17.00 | 58 56 | 3 44 |
| 29 | 9831 | 16.96 | 4013 | 329.6 | 68 | 6.8 | 43.4 | 42.0 | 17.20 | 59.20 | 3 44 |
| 30 | 10454 | 18.04 | 4057 | 334.0 | 62 | 6.2 | 43.5 | 41.9 | 17.80 | 59 74 | 3 36 |
| 31 | 11023 | 19.03 | 4102 | 338.5 | 60 | 6.0 | 43.5 | 42.0 | 18.00 | 59 95 | 3 33 |
| 32 | 11598 | 20.02 | 4113 | 339.6 | 59 | 5.9 | 43.1 | 41.5 | 18 10 | 59.62 | 3 29 |
| | | | | | | | | | | | And a star with |

| 🗢 S&ME | Test Method: AS | TM D4767-95 | | Test name Date of Test: | CU Tri 12-3-1 | iaxial (SS, MS) Shear (Specimen 2) 6 |
|--------|-----------------------------|-----------------------------|----------|----------------------------|------------------|---|
| | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-12 B1-A L | T LN |
| | Operator: ML | - | Checked: | ALL | Ap | pproved: |



& ME Site Reference: C.F. Harvey Jobfile: E:\16010.JOB Operator: MLC

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| | Test name Date of Test: | CU Triaxial (SS, MS) Shear (Specimen 3) 12-3-16 |
|------------|----------------------------|---|
| | Sample: Borehole: | ST-12 B1-A LT LN |
| Checked: ~ | uc. | Approved: |

| ample details Sketch showing specimen location in original Sample | Depth 5. Description: G | .0 - 7.0 ft. iray Coarse to Fine Sandy Silty CLAY (A-6) (8) | |
|---|---|--|--|
| | Type Height H ₀ (in) Diameter D ₀ (in) Weight W ₀ (gr) Bulk Density ρ (PCF) Particle Density ρ_s | Undisturbed 0.995 2.501 162.05 126.29 2.669 (measured) | |
| itial Conditions | | | |
| attlement Channel oisture Content w_0 % ry Density ρ_d (PCF) oids Ratio e_0 ag of Saturation S ₀ % welling Pressure Ss (TSF) | 1065 22.1 103.40 0.6107 96.8 0.000 | | |
| | | | |
| pisture Content w _f % y Density ρ _d (PCF) | 20.5 108.07 | | |
| bisture Content w_f % y Density ρ_d (PCF) bids Ratio e_f eg of Saturation S_f % ttlement: (in) | 20.5 108.07 0.5411 100.00 0.043 | | |
| inal Conditions oisture Content w_f % ry Density ρ_d (PCF) oids Ratio e_f eg of Saturation S_f % ettlement: (in) compression Index C_c otes: | 20.5 108.07 0.5411 100.00 0.043 0.120 Test specimen | taken from the middle portion of UD tube. | |
| the formation of the second state of the seco | 20.5 108.07 0.5411 100.00 0.043 0.120 Test specimen | taken from the middle portion of UD tube. | |



| | ASTM D2435-96 | | |
|------|-----------------|--------------|---|
| S&ME | Site Reference: | C.F. Harvey | |
| | Jobfile: | E:/16010.JOB | |
| | Operator: MIC | - | C |

Date of Test: 12-3-16
Sample: ST-1
Borehole: B1-A LT LN
Checked: MC Approvea:





| Stress (TSF) | Initial Temp. oC | Settlement Total (in) | Cal Corr. (in) | Final Temp. oC | Voids Ratio e _f | t ₅₀ (mins) | Secondary Compr C _{sec} | c _v (ft2/day) | m _v (ft2/ton) |
|-----------------|---------------------|--------------------------|-------------------|-------------------|-------------------------------|---------------------------|-------------------------------------|-----------------------------|-----------------------------|
| 0.050 | 21.6 | 0.0012 | 0.0 | 21.6 | 0.6087 | 4.017 | 0.0001 | 0.123 | 0.024 |
| 0.250 | 21.6 | 0.0047 | 0.0 | 21.6 | 0.6031 | 3.156 | 0.0003 | 0.156 | 0.018 |
| 0.500 | 21.6 | 0.0110 | 0.0 | 21.6 | 0.5929 | 2.711 | 0.0005 | 0.180 | 0.026 |
| 1.000 | 21.6 | 0.0200 | 0.0 | 21.6 | 0.5783 | 2.413 | 0.0025 | 0.199 | 0.018 |
| 2.000 | 21.6 | 0.0355 | 0.0 | 21.6 | 0.5532 | 1.701 | 0.0002 | 0.275 | 0.016 |
| 4.000 | 21.6 | 0.0568 | 0.0 | 21.6 | 0.5187 | 1.789 | 0.0008 | 0.252 | 0.011 |
| 2.000 | 21.6 | 0.0553 | 0.0 | 21.6 | 0.5212 | | | | 0.001 |
| 0.500 | 21.6 | 0.0508 | 0.0 | 21.6 | 0.5285 | | | | 0.003 |
| 0.050 | 21.6 | 0.0430 | 0.0 | 21.6 | 0.5411 | | | | 0.018 |

Oedometer Settlement Tests

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 0 | 0.0000 | 0.0000 |
| 2 | 0.017 | 1 | 0.0001 | 0.0001 |
| 3 | 0.033 | 2 | 0.0002 | 0.0002 |
| 4 | 0.050 | 2 | 0.0002 | 0.0002 |
| 5 | 0.067 | 2 | 0.0002 | 0.0002 |
| 6 | 0.083 | 2 | 0.0002 | 0.0002 |
| 7 | 0.100 | 2 | 0.0002 | 0.0002 |
| 8 | 0.200 | 2 | 0.0002 | 0.0002 |
| 9 | 0.400 | 3 | 0.0003 | 0.0003 |
| 10 | 0.800 | 4 | 0.0004 | 0.0004 |
| 11 | 1.000 | 4 | 0.0004 | 0.0004 |
| 12 | 2.000 | 5 | 0.0005 | 0.0005 |
| 13 | 4.000 | 6 | 0.0006 | 0.0006 |
| 14 | 8.000 | 8 | 0.0008 | 0.0008 |
| 15 | 10.000 | 9 | 0.0009 | 0.0009 |
| 16 | 20.000 | 10 | 0.0010 | 0.0010 |
| 17 | 40.000 | 11 | 0.0011 | 0.0011 |
| 18 | 80.000 | 11 | 0.0011 | 0.0011 |
| 19 | 100.000 | 12 | 0.0012 | 0.0012 |
| 20 | 199.170 | 12 | 0.0012 | 0.0012 |

| | ASTM D2435-96 | | | Test name Date of Test: | Consolidation 12-3-16 | |
|------|-----------------------------|-----------------------------|------------|----------------------------|--------------------------|--|
| S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-1 B1-A LT LN | |
| | Operator: MLC | | Checked: M | | Approvea: | |



Site Reference: C.F. Harvey Jobfile: E:\16010.JOB

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 0.050 (TSF) |
|-----------|----------------------------|-----------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| hecked: 🔨 | le | Approved: | |

Settlement Stage Results

| Vertical Stress (TSF) | 0.050 |
|----------------------------------|--------|
| Initial Temp oC | 21.6 |
| Correction (in) | 0.0 |
| Settlement (in) | 0.0012 |
| Voids Ratio e | 0.6087 |
| Final Temp oC | 0.0 |
| t_{50} (mins) | 4.02 |
| c_v (ft2/day) | 0.123 |
| m_v (ft2/ton) | 0.024 |
| Sec Compression C _{sec} | 0.0001 |



Logarithmic Time (mins)

| • • • • • • • | ASTM D2435-96 | | | Test name Date of Test: | Consolidation 12-3-16 | |
|---------------|-----------------------------|-----------------------------|------------|----------------------------|--------------------------|--|
| S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-1 B1-A LT LN | |
| | Operator: MLK | _ | Checked: 🔨 | n | Approvea: | |

Oedometer Settlement Tests

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 12 | 0.0012 | 0.0012 |
| 2 | 0.017 | 13 | 0.0013 | 0.0013 |
| 3 | 0.033 | 13 | 0.0013 | 0.0013 |
| 4 | 0.050 | 20 | 0.0020 | 0.0020 |
| 5 | 0.067 | 20 | 0.0020 | 0.0020 |
| 6 | 0.083 | 21 | 0.0021 | 0.0021 |
| 7 | 0.100 | 21 | 0.0021 | 0.0021 |
| 8 | 0.200 | 23 | 0.0023 | 0.0023 |
| 9 | 0.400 | 25 | 0.0025 | 0.0025 |
| 10 | 0.800 | 26 | 0.0026 | 0.0026 |
| 11 | 1.000 | 27 | 0.0027 | 0.0027 |
| 12 | 2.000 | 30 | 0.0030 | 0.0030 |
| 13 | 4.000 | 34 | 0.0034 | 0.0034 |
| 14 | 8.000 | 38 | 0.0038 | 0.0038 |
| 15 | 10.000 | 40 | 0.0040 | 0.0040 |
| 16 | 20.000 | 43 | 0.0043 | 0.0043 |
| 17 | 40.000 | 46 | 0.0046 | 0.0046 |
| 18 | 80.000 | 47 | 0.0047 | 0.0047 |
| 19 | 99.930 | 47 | 0.0047 | 0.0047 |

ASTM D2435-96



Site Reference: C.F. Harvey Jobfile: E:\16010.JOB

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 0.250 (TSF) | |
|----------|----------------------------|-----------------------|-------------------|--|
| | Sample: Borehole: | ST-1 B1-A LT LN | | |
| Checked: | uc | Approved: | | |



| No | Time | Displacement | Displacement | Settlement |
|------|---------|--------------|--------------|------------|
| 140. | (mins) | (divs) | (in) | (in) |
| 1 | 0.000 | 47 | 0.0047 | 0.0047 |
| 2 | 0.017 | 52 | 0.0052 | 0.0052 |
| 3 | 0.033 | 52 | 0.0052 | 0.0052 |
| 4 | 0.050 | 63 | 0.0063 | 0.0063 |
| 5 | 0.067 | 64 | 0.0064 | 0.0064 |
| 6 | 0.083 | 66 | 0.0066 | 0.0066 |
| 7 | 0.100 | 66 | 0.0066 | 0.0066 |
| 8 | 0.200 | 69 | 0.0069 | 0.0069 |
| 9 | 0.400 | 72 | 0.0072 | 0.0072 |
| 10 | 0.800 | 75 | 0.0075 | 0.0075 |
| 11 | 1.000 | 76 | 0.0076 | 0.0076 |
| 12 | 2.000 | 80 | 0.0080 | 0.0080 |
| 13 | 4.000 | 85 | 0.0085 | 0.0085 |
| 14 | 8.000 | 91 | 0.0091 | 0.0091 |
| 15 | 10.000 | 93 | 0.0093 | 0.0093 |
| 16 | 20.000 | 98 | 0.0098 | 0.0098 |
| 17 | 40.000 | 102 | 0.0102 | 0.0102 |
| 18 | 80.000 | 104 | 0.0104 | 0.0104 |
| 19 | 100.000 | 105 | 0.0105 | 0.0105 |
| 20 | 200.000 | 106 | 0.0106 | 0.0106 |
| 21 | 400.000 | 108 | 0.0108 | 0.0108 |
| 22 | 800.000 | 110 | 0.0110 | 0.0110 |
| 23 | 942.950 | 110 | 0.0110 | 0.0110 |

| | ASTM D2435-96 | |
|------|-----------------|--------------------------|
| S&ME | Site Reference: | C.F. Harve E:\16010.J |

Site Reference: C.F. Harvey Jobfile: E:\16010.JOB

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 0.500 (TSF) |
|------------|----------------------------|--------------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| Checked: M | C | Approvea: | |

Settlement Stage Results

| Vertical Stress (TSF) | 0.500 |
|--------------------------|--------|
| Initial Temp oC | 21.6 |
| Correction (in) | 0.0 |
| Settlement (in) | 0.0063 |
| Voids Ratio e | 0.5929 |
| Final Temp oC | 0.0 |
| t ₅₀ (mins) | 2.71 |
| c _v (ft2/day) | 0.18 |
| m _v (ft2/ton) | 0.026 |
| Sec Compression Csec | 0.0005 |
| 300 | |



| • • • • • • • | ASTM D2435-96 | | | Test name Date of Test: | Consolidation 12-3-16 | |
|---------------|-----------------------------|-----------------------------|----------|----------------------------|--------------------------|--|
| S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-1 B1-A LT LN | |
| | Operator: M | L | Checked: | LL L | Approved: | |

Oedometer Settlement Tests

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 110 | 0.0110 | 0.0110 |
| 2 | 0.017 | 118 | 0.0118 | 0.0118 |
| 3 | 0.033 | 138 | 0.0138 | 0.0138 |
| 4 | 0.050 | 141 | 0.0141 | 0.0141 |
| 5 | 0.067 | 142 | 0.0142 | 0.0142 |
| 6 | 0.083 | 144 | 0.0144 | 0.0144 |
| 7 | 0.100 | 145 | 0.0145 | 0.0145 |
| 8 | 0.200 | 149 | 0.0149 | 0.0149 |
| 9 | 0.400 | 153 | 0.0153 | 0.0153 |
| 10 | 0.800 | 158 | 0.0158 | 0.0158 |
| 11 | 1.000 | 160 | 0.0160 | 0.0160 |
| 12 | 2.000 | 166 | 0.0166 | 0.0166 |
| 13 | 4.000 | 173 | 0.0173 | 0.0173 |
| 14 | 8.000 | 181 | 0.0181 | 0.0181 |
| 15 | 10.000 | 183 | 0.0183 | 0.0183 |
| 16 | 20.267 | 190 | 0.0190 | 0.0190 |
| 17 | 40.267 | 194 | 0.0194 | 0.0194 |
| 18 | 80.267 | 197 | 0.0197 | 0.0197 |
| 19 | 100.267 | 198 | 0.0198 | 0.0198 |
| 20 | 200.267 | 200 | 0.0200 | 0.0200 |
| 21 | 250.117 | 200 | 0.0200 | 0.0200 |

| | ASTM D2435-96 | |
|--------|-----------------------------|-----------------------------|
| 🔷 S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB |
| | Operator: MI | L |

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 1.000 | (TSF) |
|------------|----------------------------|-----------------------|-------------|-------|
| | Sample: Borehole: | ST-1 B1-A LT LN | | |
| Checked: 🔨 | ĸ | Approvea: | | |



| | Oedome | ter Sett | lement | Tests |
|--|--------|----------|--------|-------|
|--|--------|----------|--------|-------|

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 200 | 0.0200 | 0.0200 |
| 2 | 0.017 | 201 | 0.0201 | 0.0201 |
| 3 | 0.033 | 201 | 0.0201 | 0.0201 |
| 4 | 0.050 | 205 | 0.0205 | 0.0205 |
| 5 | 0.067 | 259 | 0.0259 | 0.0259 |
| 6 | 0.083 | 266 | 0.0266 | 0.0266 |
| 7 | 0.100 | 268 | 0.0268 | 0.0268 |
| 8 | 0.200 | 277 | 0.0277 | 0.0277 |
| 9 | 0.400 | 286 | 0.0286 | 0.0286 |
| 10 | 0.800 | 295 | 0.0295 | 0.0295 |
| 11 | 1.000 | 298 | 0.0298 | 0.0298 |
| 12 | 2.000 | 309 | 0.0309 | 0.0309 |
| 13 | 4.000 | 321 | 0.0321 | 0.0321 |
| 14 | 8.000 | 332 | 0.0332 | 0.0332 |
| 15 | 10.000 | 336 | 0.0336 | 0.0336 |
| 16 | 20.000 | 345 | 0.0345 | 0.0345 |
| 17 | 40.000 | 349 | 0.0349 | 0.0349 |
| 18 | 80.000 | 353 | 0.0353 | 0.0353 |
| 19 | 100.000 | 354 | 0.0354 | 0.0354 |
| 20 | 200.000 | 355 | 0.0355 | 0.0355 |
| 21 | 216,170 | 355 | 0.0355 | 0.0355 |

ASTM D2435-96

Same Site Reference: C.F. Harvey Jobfile: E:\16010.JOB

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 2.000 (TSF) |
|--------------|----------------------------|-----------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| Checked: MUL | | Approvea: | |

Oedometer Settlement Tests

| ttlement Stage Results | | | | |
|--|--|------|-------|--------|
| /ertical Stress (TSF) nitial Temp oC Correction (in) Settlement (in) /oids Ratio e | 2.000 21.6 0.0 0.0155 0.5532 | | | |
| inal Temp oC ₅₀ (mins) ₅ (ft2/day) n _v (ft2/ton) Sec Compression C _{sec} | 0.0 1.70 0.275 0.016 0.0002 | | | |
| 0.0190 | | | | |
| 2 | | | | |
| 0.0226 | | | | |
| 0.0262 | | | | |
| 0.0298 | | | | |
| 0.0334 | | | | |
| 0.0270 | | Q | | 0 |
| 0.0370 | 1.0 | 10.0 | 100.0 | 1000.0 |
| | | | | |

| | ASTM D2435-96 | | | Test name Date of Test: | Consolidation 12-3-16 | |
|------|-----------------------------|-----------------------------|------------|----------------------------|--------------------------|--|
| S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-1 B1-A LT LN | |
| | Operator: MLL | - | Checked: M | e | Approved: | |

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 355 | 0.0355 | 0.0355 |
| 2 | 0.017 | 364 | 0.0364 | 0.0364 |
| 3 | 0.033 | 364 | 0.0364 | 0.0364 |
| 4 | 0.050 | 393 | 0.0393 | 0.0393 |
| 5 | 0.067 | 421 | 0.0421 | 0.0421 |
| 6 | 0.083 | 434 | 0.0434 | 0.0434 |
| 7 | 0.100 | 437 | 0.0437 | 0.0437 |
| 8 | 0.200 | 449 | 0.0449 | 0.0449 |
| 9 | 0.400 | 460 | 0.0460 | 0.0460 |
| 10 | 0.800 | 473 | 0.0473 | 0.0473 |
| 11 | 1.000 | 477 | 0.0477 | 0.0477 |
| 12 | 2.000 | 493 | 0.0493 | 0.0493 |
| 13 | 4.000 | 511 | 0.0511 | 0.0511 |
| 14 | 8.000 | 528 | 0.0528 | 0.0528 |
| 15 | 10.000 | 533 | 0.0533 | 0.0533 |
| 16 | 20.000 | 546 | 0.0546 | 0.0546 |
| 17 | 40.000 | 554 | 0.0554 | 0.0554 |
| 18 | 80.000 | 559 | 0.0559 | 0.0559 |
| 19 | 100.000 | 560 | 0.0560 | 0.0560 |
| 20 | 200.000 | 562 | 0.0562 | 0.0562 |
| 21 | 400.000 | 565 | 0.0565 | 0.0565 |
| 22 | 800.000 | 567 | 0.0567 | 0.0567 |
| 23 | 999.967 | 568 | 0.0568 | 0.0568 |

ASTM D2435-96

Operator: MK

Same Site Reference: C.F. Harvey E:\16010.JOB

| | Test name Date of Test: | Consolidation Load: 4.000 (TS 12-3-16 | SF) |
|---------------|----------------------------|--|-----|
| | Sample: | ST-1 | |
| | Borehole: | B1-A LT LN | |
| Checked: mile | | Approved. | |

Settlement Stage Results

| Vertical Stress (TSF) | 4.000 |
|----------------------------------|--------|
| Initial Temp oC | 21.6 |
| Correction (in) | 0.0 |
| Settlement (in) | 0.0213 |
| Voids Ratio e | 0.5187 |
| Final Temp oC | 0.0 |
| t ₅₀ (mins) | 1.79 |
| c _v (ft2/day) | 0.252 |
| m _v (ft2/ton) | 0.011 |
| Sec Compression C _{sec} | 0.0008 |
| | |



Logarithmic Time (mins)

| | ASTM D2435-96 | | | Test name Date of Test: | Consolidation 12-3-16 | |
|------|-----------------------------|-----------------------------|-------------|----------------------------|--------------------------|--|
| S&ME | Site Reference: Jobfile: | C.F. Harvey E:\16010.JOB | | Sample: Borehole: | ST-1 B1-A LT LN | |
| | Operator: MLC | - | Checked: MI | c | Approved: | |

Oedometer Settlement Tests

| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 568 | 0.0568 | 0.0568 |
| 2 | 0.017 | 565 | 0.0565 | 0.0565 |
| 3 | 0.033 | 560 | 0.0560 | 0.0560 |
| 4 | 0.050 | 559 | 0.0559 | 0.0559 |
| 5 | 0.067 | 559 | 0.0559 | 0.0559 |
| 6 | 0.083 | 559 | 0.0559 | 0.0559 |
| 7 | 0.100 | 558 | 0.0558 | 0.0558 |
| 8 | 0.200 | 558 | 0.0558 | 0.0558 |
| 9 | 0.400 | 557 | 0.0557 | 0.0557 |
| 10 | 0.800 | 556 | 0.0556 | 0.0556 |
| 11 | 1.000 | 556 | 0.0556 | 0.0556 |
| 12 | 2.000 | 555 | 0.0555 | 0.0555 |
| 13 | 4.000 | 554 | 0.0554 | 0.0554 |
| 14 | 8.000 | 554 | 0.0554 | 0.0554 |
| 15 | 10.000 | 553 | 0.0553 | 0.0553 |
| 16 | 20.000 | 553 | 0.0553 | 0.0553 |
| 17 | 40.000 | 553 | 0.0553 | 0.0553 |
| 18 | 80.000 | 553 | 0.0553 | 0.0553 |
| 19 | 100.000 | 553 | 0.0553 | 0.0553 |
| 20 | 169.630 | 553 | 0.0553 | 0.0553 |

ASTM D2435-96

S&ME

Site Reference: C.F. Harvey Jobfile: E:\16010.JOB 27 of 33

| | Test name Date of Test: | Consolidation 12-3-16 | Load: 2.000 (TSF) |
|------------|----------------------------|-----------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| Checked: m | le | Approved: | |



| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 553 | 0.0553 | 0.0553 |
| 2 | 0.017 | 552 | 0.0552 | 0.0552 |
| 3 | 0.033 | 546 | 0.0546 | 0.0546 |
| 4 | 0.050 | 545 | 0.0545 | 0.0545 |
| 5 | 0.067 | 540 | 0.0540 | 0.0540 |
| 6 | 0.083 | 538 | 0.0538 | 0.0538 |
| 7 | 0.100 | 538 | 0.0538 | 0.0538 |
| 8 | 0.200 | 535 | 0.0535 | 0.0535 |
| 9 | 0.400 | 533 | 0.0533 | 0.0533 |
| 10 | 0.800 | 530 | 0.0530 | 0.0530 |
| 11 | 1.000 | 529 | 0.0529 | 0.0529 |
| 12 | 2.000 | 525 | 0.0525 | 0.0525 |
| 13 | 4.000 | 521 | 0.0521 | 0.0521 |
| 14 | 8.000 | 516 | 0.0516 | 0.0516 |
| 15 | 10.000 | 515 | 0.0515 | 0.0515 |
| 16 | 20.000 | 511 | 0.0511 | 0.0511 |
| 17 | 40.000 | 509 | 0.0509 | 0.0509 |
| 18 | 80.000 | 508 | 0.0508 | 0.0508 |
| 19 | 100.000 | 508 | 0.0508 | 0.0508 |
| 20 | 174.580 | 508 | 0.0508 | 0.0508 |

ASTM D2435-96



| | Test name Date of Test: | Consolidation 12-3-16 | Load: 0.500 (TSF) |
|---------|----------------------------|-----------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| hecked: | ull | Approvea: | |



| No. | Time (mins) | Displacement (divs) | Displacement (in) | Settlement (in) |
|-----|----------------|------------------------|----------------------|--------------------|
| 1 | 0.000 | 508 | 0.0508 | 0.0508 |
| 2 | 0.017 | 504 | 0.0504 | 0.0504 |
| 3 | 0.033 | 504 | 0.0504 | 0.0504 |
| 4 | 0.050 | 501 | 0.0501 | 0.0501 |
| 5 | 0.067 | 500 | 0.0500 | 0.0500 |
| 6 | 0.083 | 500 | 0.0500 | 0.0500 |
| 7 | 0.100 | 499 | 0.0499 | 0.0499 |
| 8 | 0.200 | 498 | 0.0498 | 0.0498 |
| 9 | 0.400 | 496 | 0.0496 | 0.0496 |
| 10 | 0.800 | 493 | 0.0493 | 0.0493 |
| 11 | 1.000 | 492 | 0.0492 | 0.0492 |
| 12 | 2.000 | 488 | 0.0488 | 0.0488 |
| 13 | 4.000 | 483 | 0.0483 | 0.0483 |
| 14 | 8.000 | 476 | 0.0476 | 0.0476 |
| 15 | 10.000 | 473 | 0.0473 | 0.0473 |
| 16 | 20.000 | 464 | 0.0464 | 0.0464 |
| 17 | 40.000 | 451 | 0.0451 | 0.0451 |
| 18 | 80.000 | 440 | 0.0440 | 0.0440 |
| 19 | 100.000 | 438 | 0.0438 | 0.0438 |
| 20 | 200.000 | 434 | 0.0434 | 0.0434 |
| 21 | 400.000 | 431 | 0.0431 | 0.0431 |
| 22 | 492.120 | 430 | 0.0430 | 0.0430 |
| | | | | |

ASTM D2435-96



| | Test name Date of Test: | Consolidation 12-3-16 | Load: 0.050 (TSF) |
|------------|----------------------------|--------------------------|-------------------|
| | Sample: Borehole: | ST-1 B1-A LT LN | |
| Checked: / | ule | Approved: | |



Form No. TR-T88 Revision No. 0

Revision Date: 12/20/09

Particle Size Analysis of Soils

| | | | | | | | | | | | Qualit | y Assu | rance |
|-------------------------------|---|-----------|--------|--------------------------|---------------------|------------|------------|----------------|--------------------|-----------|-----------|-------------|-----------------------|
| S | &ME, 1 | [nc. Ral | leigh, | 3201 Spi | ring F | orest] | Road, Ral | leigh, No | orth C | arolina | 27616 | | |
| S&ME Project #: | 6235 | 5-16-010 |) | | | | | | Repor | rt Date: | | 11/14 | /16 |
| Project Name: | C.F. | Harvey | Park | way Exte | nsion 1 | R-570 | 3 | | Test I | Date(s): | 10 | /7 - 11 | /14/16 |
| State Project #: | 4637 | 75.1.1 | | F.A. Pr | oject N | Io: N/ | А | | TIP | NO: | R-570 | 3 | |
| Client Name: | Micl | hael Bal | ker Eı | ngineerin | g | | | | | | | | |
| Address: | Rale | igh, NC | - | | | | | | | | | | |
| Boring #: | EB2 | -A Lt. I | Ln. | Sa | ample i | #: SS | 5-91 | | | Sample | Date: | 9/ | /1/16 |
| Location: | 365- | +32 | | | Offset | : 20 |)' LT | | | Dept | h (ft): | 0.0 |) - 1.5 |
| Sample Description | : | | | | | G | ray Coarse | e to Fine | Sandy | y Clayey | SILT | A-4 | (4) |
| 1.5' | ' 1"3/4" 1 | 1/2'3/8" | #4 | #10 | #20 | #40 | #60 #100 | #200 #2 | 270 | | | | |
| 100% | | • | | | | | | | | | | | |
| 90% | | | | | | | | | | | | | |
| 80% | | | | | | | | | | | | | |
| 70% | | | | | | | | N | | | | | |
| | | | | | | | | | | | | | |
| L Pass 1 Pass 20% | | | | | | | | | | | | | |
| อบ 24 40% | | | | | | | | | | | | | |
| 30% | | | | | | | | | | | | | |
| 200/ | | | | | | | | | | | | | |
| 20% | | | | | | | | | | | | | |
| 10% | | | | | | | | | | | | | |
| 100 | | 10 | | * | 1 | | <u> </u> | 0.1 | | 0.0 |)1 | | 0.001 |
| | | | | | Partic | le Size (1 | mm) | | | | | | |
| | As Defin | ed by NC | DOT | | | | Fin | e Sand | | < (|).25 mm a | nd > 0.0 | 05 mm |
| Gravel | | < | 75 mm | n and > 2.00 |) mm | | Silt < | | | 0.05 and | > 0.005 | 5 mm | |
| Coarse Sand | | < 2 | 2.00 m | m and >0.2 | 5 mm | | (| Clay | | | < 0.0 | 05 mm | |
| Maximum Particle | Size | #1 | 0 | | Coars | se San | d | 6 | % | Silt | | | 40% |
| Gravel | | 0% |) | | Fine | Sand | | 28 | \$% | Clay | | | 26% |
| Apparent Relative I | Density | NI |) | | Mois | ture C | ontent | 19 | 9% | % Pass | ing #20 | 0 | 72.5% |
| Liquid Limit | | 28 | | | Plasti | c Lim | it | 2 | 0 | Plastic | Index | | 8 |
| | | | | Se | oil Mor | tar (-# | 10 Sieve) | | | | | | |
| Coarse Sand | | 6% | | Fine | Sand | 28 | 3% | Si | ilt | 40% | С | lay | 26% |
| Description of San | d & Grav | el Partic | eles: | Rou | unded | | | | | A | ngular | | |
| Hard & Dura | ble | | | | Soft | | | | Weat | hered & I | Friable | | |
| References / Comments | / Deviati | ons: | ND= | =Not Deterr | nined. | | | | | | | | |
| <u>Mal Kraj</u> Technician | an, ET Name | | | <u>104-0</u> Certific | 01-0703 ation No | <u>3</u> | | Laborat F | ory Ma Position | anager | | <u>11/1</u> | <u>4/2016</u> Date |
| Mal Kraj | <u>an, ET</u> | | | me | R | 5 | > | <u>Laborat</u> | ory Ma | anager | | <u>11/1</u> | 4/2016 |
| Technical Resp | ponsibility | | | Sigr | iature | | | F | Position | | | 1 | Date |
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AASHTO T88 as Modified by NCDOT

3201 Spring Forest Road Raleigh, NC 27616

EB2-A Lt. Ln. SS-91 (0 - 1.5 ft) Classification.xls

Form No: TR-T267

Revision No. 0

Revision Date: 07/10/08

Moisture, Ash, and Organic Matter



| | | AASHTO T-267 | | | | | | Quality A | Assura | nce |
|---|-------------------------|---------------------------------------|---|---------------------|---------------|-------|--------------|------------|--------|-----|
| S&ME, Inc. Raleigh, 3201 Spring Forest Raod, Raleigh, North Carolina 27616 | | | | | | | | | | |
| Project # | #: | 6235-16-0 | 10 | | | | Report Date: | 10/2 | 21/16 | |
| Project N | lame: | C.F. Harve | F. Harvey Parkway Extension R-5703Test Date(s):10/18 - 10/21/16 | | | | | | | |
| Client Na | ame: | e: Michael Baker Engineering | | | | | | | | |
| Client Ac | nt Address: Raleigh, NC | | | | | | | | | |
| Boring #: | | EB2-A Lt. Ln. Sample #: SS-91 | | | | -91 | Sam | ple Date: | 9/1/ | /16 |
| Location | : | 365+32 | | Offset: | 20' | LT | D | epth (ft): | 0.0 - | 1.5 |
| Sample I | Descripti | on: Gray C | Coarse to F | ine Sandy Claye | ey SILT (A-4 |) (4) | | | | |
| Equipmen | nt: | Balance: 0.0 |)1 g.Readal | oility, 500g. Minin | num Capaccity | , | | | | |
| Balance: | S& | <i>ME ID #</i> : | 1024 | Cal. Date: | 11/06/16 | Due: | 11/06/17 | | | |
| <i>Method A: Moisture Content Determination</i> Required Oven Temperature: $105 \pm 5^{\circ}C$ | | | | | | | | | | |
| | | Oven | ı Tempera | ture: 105 | °C | | Tare # | В | | |
| | t | Tare W | Veight (Di. | sh plus Aluminu | m Foil Cover | ·) | grams | 52.79 | | |
| | а | Mass of | of As-Rece | ived Specimen | + Tare Wt. | | grams | 95.22 | | |
| | b | Mass of | of Oven Di | ry Specimen + T | Tare Wt. | | grams | 88.59 | | |
| | w | Water Weight (a-b) | | | | 6.63 | | | | |
| | Α | Mass of | Mass of As-Received Specimen (a-t) 42.43 | | | | | | | |
| | В | Mass of Oven Dry Specimen (b-t) 35.80 | | | | | | | | |
| | % N | Moisture Co | ntent as a | % of As Receiv | ed or Total M | lass | (w/A)*100 | 15.6% | | |
| | | % Moistur | e Content | as a % of Oven | -dried Mass | | (w/B)*100 | 18.5% | | |
| Oven | S& | ME ID #: | 1454 | Cal. Date: | 10/7/16 | Due: | 10/7/17 | | | |

Method C (440° C) or D (750° C): Ash Content and Organic Matter Determination

| | Muffle Furnace: 455 °C | Tare # | 6 |
|---------|---|-------------------------|-------|
| t | Tare Weight (Dish plus Aluminum Foil Cover) | grams | 13.60 |
| b | Mass of Oven Dry Specimen + Tare Wt. | grams | 39.84 |
| С | Ash Weight + Tare Wt. | grams | 38.94 |
| С | Ash Weight | c-t | 25.34 |
| В | Mass of Oven Dry Specimen | (<i>b</i> - <i>t</i>) | 26.24 |
| D | % Ash Content | (C/B)*100 | 96.6% |
| | % Organic Matter | 100-D | 3.4% |
| nace: S | &ME ID #: 00261 | | |

Muffle Furnace: *S&ME ID #:*

Notes / Deviations / References:

| 0.17 | | / | 7 |
|------|---|-----|---|
| | N | -Cr | - |
| | | C | |

Signature

<u>Mal Krajan, ET</u> Technical Responsibility Laboratory Manager

Position

11/14/2016 Date

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Form No: TR-T289-1 Revision No. 0 Revision Date: 07/10/08

| | | AASHTO T289 | | | | | Quality Assurance | |
|----------------|--|-------------------------|---------------|------------------|--------------|-------|-------------------|--|
| | S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616 | | | | | | | |
| Project #: | 6235-16 | 6235-16-010 | | | Report Date: | 1 | 1/7/16 | |
| Project Name: | C.F. Har | vey Parkway Extension I | Test Date(s): | 11/5 | - 11/7/16 | | | |
| Client Name: | Michael | Baker Engineering | | | | | | |
| Client Address | s: Raleigh, | Raleigh, NC | | | | | | |
| Boring #: | EB2-A Lt. Lr | n. Sample | #: SS-91 | | Sample D | ate: | 9/1/16 | |
| Location: | 365+32 | Offs | et: 20' LT | | Depth | (ft): | 0.0 - 1.5 | |
| Sample Descr | iption: | Gray Coarse to Fine San | dy Clayey | v SILT (A-4) (4) |) | | | |
| Equipment: | | | | | | | | |
| Balance | | S&ME ID# | 1024 | Cal. Date: | 11/6/16 | Due: | 11/6/17 | |
| Sieve: | #10 | S&ME ID# | 13223 | Cal. Date: | 6/11/16 | Due: | 6/11/17 | |
| pH Meter: | | S&ME ID# | 1365 | Cal. Date: | 11/7/16 | Due: | NA | |

pH Meter Calibration

| Buffer Solution | Results |
|-----------------------------------|---------|
| pH buffer 7.0 | 7.02 |
| pH buffer 4.01 | 4.01 |
| pH buffer 10.0 | 10.03 |
| Buffer Temperature ⁰ C | 22.4 |

Measuring pH of Soil

| | Meas |
|----------------------------------|----------------------|
| Weigtht of Air | Dry Soil (g) |
| Distilled Water | (g) |
| Temperature ⁰ C | l , |
| pH Readings | |
| | |
| Notes / Deviations / References: | AASHTO T-289: Deterr |
| | |

<u>Mal Krajan, ET</u> Technical Responsibility

| er l | t |
|------|---------|
| | Signatu |

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pH of Soil



| surements | | |
|-----------|-------|--|
| | 30.03 | |
| | 30.04 | |
| | 21.8 | |
| | 5.97 | |

mining pH of Soil for Use in Corrosion Testing

Laboratory Manager

Position

11/14/2016

Date

S&ME, Inc.

Revision No. 0

Particle Size Analysis of Soils



Form No. TR-T88

Revision No. 0 Revision Date: 12/20/09

| Revision Date: 12/ | /20/09 | | | AASHT | 0 T88 a | s Mod | lified | by NCDOT | Γ | | | | |
|---|-------------------------|--------------|--------|------------------------------|------------|---------|--------|----------|--------------------------|-------------------|---------|----------|-------------|
| | | | | | | | | | | Quality Assurance | | | |
| S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616 | | | | | | | | | | | | | |
| S&ME Project #: 6235-16-010 | | | | | | | | Rep | Report Date: 1 | | 10/5 | 0/5/16 | |
| Project Name: | C.F. | Harvey | y Parl | kway Extension R-5703 | | | | Tes | Test Date(s): 9/28 - 10/ | | 0/5/16 | | |
| State Project #: 46375.1.1 | | | | F.A. Project No: N/A | | | | Т | 'IP NO: | R-57 | 03 | | |
| Client Name: Michael Baker F | | | | Ingineering | | | | | | | | | |
| Address: Raleigh, NC | | | U | 0 | | | | _ | | | | | |
| Boring #: | B1-B RT LN | | | Sample #: SS-85 | | | | | _ | Sample | Date: | 8/. | 30/16 |
| Location: | ocation: 364+28 | | | Offset: 36' RT | | | | | Dept | h (ft): | 4.(|) - 5.5 | |
| Sample Descript | ion: | | | Gray Coarse to F | | | | | Fine Sa | ndy Silty C | CLAY | A-6 | (5) |
| | 1 51 112/41 1 | 012 (011 | | #10 | 1120 | | | 1100 110 | 00 #270 | | | | |
| 100% | 1.5" 1" <i>3</i> /4" 1, | 23/8" • • | #4 | #10 | #20 | #40 | #60 | #100 #20 | 00 #270 | | | | |
| | | | | | | | | | | | | | |
| 90% | | | | | | | | | | | | | |
| 80% | | | | | | | | | | | | | |
| 0070 | | | | | | | | | | | | | _ |
| 70% | | | | | | | | | | | | | |
| 50 F | | | | | | | | | | | | | |
| assi ov% | | | | | | | | | | | | | |
| t 50% | | | | | | | | | | | | | _ |
| erce | | | | | | | | | | | | | |
| ₽ 40% | | | | | | | | | | | | | |
| 30% | | | | | | | | | | | | | _ |
| | | | | | | | | | | | | | - |
| 20% | | | | | | | | | | | | | |
| 10% | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | 10 | | | 1 | | * | 0.1 | | 0 (|)1 | | 0.001 |
| 100 | | 10 | | | Partic | le Size | (mm) | 0.1 | | 0.0 | ,1 | | 0.001 |
| | A D. C | 11N | | | | | _ | E' 0 | 1 | | 0.05 | 1. 0. | |
| Gravel | As Define | a by NC | 75 mr | and $> 2.00 \text{ mm}$ Silt | | | | nd | < 0.25 mm and | | | 0.005 mm | |
| Coarse Sat | nd | < | 2.00 m | m and >0.2 | 5 mm | | | Clay | | | < 0.0 |)05 mm | , mm |
| Maximum Partic | le Size | #4 | | | Coars | se Sar | nd | | 7% | Silt | | | 18% |
| Gravel | | 0% | 6 | | Fine | Sand | | | 39% | Clay | | | 36% |
| Apparent Relativ | ve Densitv | N | D | | Mois | ture C | Conte | nt | 23% | % Pass | ing #20 | 00 | 59.3% |
| Liquid Limit | | 27 | , | | Plasti | c Lin | nit | | 13 | Plastic | Index | | 14 |
| Soil Mortar (-#10 Sieve) | | | | | | | | | | | | | |
| Coarse Sa | and ' | 7% | | Fine | Sand | 3 | 9% | , | Silt | 18% | (| Clay | 36% |
| Description of S | Sand & Grav | el Parti | cles: | Ro | unded | | | | | А | ngular | 5 | |
| Hard & D | urable | | | | Soft | | | | We | eathered & I | Friable | | |
| References / Comme | ents / Deviatio | ons: | ND | =Not Deteri | nined. | | _ | | | | | | _ |
| | | | | | | | | | | | | | |
| <u>Ma</u> l Krajan, ET | | | | 104-0 |)1-0703 | 3 | | Lab | Laboratory Manager | | | 9/1 | 2/2016 |
| Technie | cian Name | | | Certific | cation No. | | | | Positic | on | | i | Date |
| | | | | M | Q | _ | | | | | | | |
| <u>Mal K</u> | <u>rajan, ET</u> | | _ | \subset | 1 | | | Lab | oratory] | <u>Manager</u> | | 9/2 | 6/2016 |
| Technical Responsibility | | | | Sign | nature | | | | Positio | on | | Ĺ | Date |
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| | S&ME I | nc Raleigh | 3201 Spring Fore | st Road | Raleigh North (| Carolina 27616 | any Assurance | | |
|-----------------------|-----------------|------------------|----------------------------|---|-------------------------|------------------------------|---------------------------|--|--|
| S&ME Project #: | 6235 | -16-010 | She spring i ore | st Road, I | Repo | ort Date: | 10/5/16 | | |
| Project Name: | C.F. | Harvey Park | way Extension R-5 | 703 | Test | Test Date(s): 9/28 - 10/5/16 | | | |
| State Project #: | 4637 | 5.1.1 | F.A. Project No: | TI | P NO: R-5' | 703 | | | |
| Client Name: | Mich | ael Baker Er | ngineering | | | | | | |
| Address: | Ralei | gh, NC | | | | | | | |
| Boring #: | B1-B | RT LN | Sample #: | | Sample Date: | 8/30/16 | | | |
| Location: | 364+ | 28 | Offset: | 36' RT | Depth (ft): 44.0 - 44.7 | | | | |
| Sample Description | n: | | Dark | c Gray Silt | ty Clayey Coarse | to Fine SAND | A-2-4 (0) | | |
| 1.5 100% | " 1"3/4" 1/ | "2"3/8" #4 | #10 #20 # | 40 #60 #1 | 100 #200 #270 | | | | |
| 90% | | | | | | | | | |
| | | | | \mathbf{N} | | | | | |
| 80% | | | | | | | | | |
| 70% | | | | | | | | | |
| 50 | | | | $+$ \cdot | | | | | |
| | | | | | | | | | |
| tu 50% | | | | | \ | | | | |
| 40% | | | | | | | | | |
| 209/ | | | | | - N | | | | |
| 30% | | | | | | | | | |
| 20% | | | | | | | | | |
| 10% | | | | | | | • | | |
| | | | | | | | | | |
| 100 | | 10 | 1 | * | 0.1 | 0.01 | | | |
| | | | Particle Si | ze (mm) | | | | | |
| | As Define | d by NCDOT | | | Fine Sand | < 0.25 mm | n and $> 0.05 \text{ mm}$ | | |
| Gravel | | < 75 mm | and > 2.00 mm | d > 2.00 mm Silt | | | < 0.05 and > 0.005 mm | | |
| Coarse Sand | Cina | < 2.00 mm | m and >0.25 mm | $\frac{\text{Clay}}{280/2} < 0.005 \text{ m}$ | | | 0.005 mm | | |
| Maximum Particle | Size | #4 10/ | Coarse S | and | 28% | Silt | 9% | | |
| Gravel | Danaitar | 1% | Fine San | lu Contont | 51% 129/ | Clay | 12% | | |
| Apparent Relative | Density | ND 17 | Moisture Diastia I | imit | 12% | % Passing #. | 200 28.0% | | |
| | | 17 | Soil Mortar | | 10 ve) | Flastic Index | 1 | | |
| Coarse Sand | d 2 | 28% | Fine Sand | 51% | Silt | 9% | Clay 12% | | |
| Description of Sar | d & Grave | el Particles: | Rounded | | | Angular | | | |
| Hard & Dura | able | | Soft | | Wea | thered & Friable | | | |
| References / Comment | s / Deviatio | ns: ND= | Not Determined. | | | | | | |
| | | | | | | _ | | | |
| <u>Mal Krajan, ET</u> | | | <u>104-01-0703</u> | | Laboratory N | boratory Manager | | | |
| Technicia | п ічате | | Certification No. | | Position | | Date | | |
| Mal Kra | j <u>an,</u> ET | | IV C | > | <u>La</u> boratory N | <u>Ianag</u> er | <u>9/26/2016</u> | | |
| Technical Res | sponsibility | - | Signature | | Position | | Date | | |
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| | | | | | | | | | |

3201 Spring Forest Road Raleigh, NC 27616

B1-B RT LN SS-85 (4 - 5.5 ft) Classification.xls

S&ME, Inc.

Particle Size Analysis of Soils



AASHTO T88 as Modified by NCDOT

| Ouality | Assurance |
|---------|---------------|
| Quanty | 1100000000000 |

3201 Spring Forest Road Raleigh, NC 27616

B1-B RT LN SS-86 (44 - 44.7 ft) Classification.xls

Revision Date: 12/20/09

Revision No. 0

Particle Size Analysis of Soils



Form No. TR-T88 Revision No. 0

| <i>Revision Dure</i> . 12/20/0 | 19 | misino noo us iv | Tougree by NCD01 | | v | |
|---|---|---|---|---|---|--|
| | | | | | Quality Ass | suranc |
| Sð | &ME, Inc. Raleigh | a, 3201 Spring Fore | est Road, Raleigh | n, North Carolin | a 27616 | |
| S&ME Project #: | 6235-16-010 | | | Report Date: | : 10/ | /5/16 |
| Project Name: | C.F. Harvey Parl | kway Extension R-5 | 5703 | Test Date(s) | : 9/28 - | 10/5/ |
| State Project #: | 46375.1.1 | F.A. Project No: | N/A | TIP NO: | R-5703 | |
| Client Name: | Michael Baker E | Engineering | | _ | | |
| Address: | Raleigh, NC | ~ | ~~ ~~ | ~ ~ ~ | | |
| Boring #: | EB2-B Rt. Ln. | Sample #: | SS-88 | Sampl | le Date: | 8/26/1 |
| Location: | 365+32 | Offset: | 37' RT | De | $\frac{\text{pth (ft):}}{2} = 48$ | 3.7 - 5 |
| Sample Description: | | Dai | rk Gray Coarse to | Fine Sandy Silty | CLAY A-/- | -6 (1 |
| 1.5" | 1"3/4" 1/2'3/8" #4 | #10 #20 # | #40 #60 #100 #20 | 00 #270 | | |
| | | | | · · · · · · · · · · · · · · · · · · · | | |
| 90% | | | \ | | | |
| | | | \ | | | |
| 80% | | | | | | |
| 70% | | | N | | | |
| <u>م</u> | | | N | | | |
| ·ii. 60% | | | | | | |
| ti 50% | | | | | | |
| erce | | | | | | |
| | | | | | | |
| 30% | | | | | | |
| | | | | | | |
| 20% | | | | | | |
| 10% | | | | | | |
| | | | | | | |
| 0% | | * + + + + + + + + + + + + + + + + + + + | | * * | 0.01 | |
| 100 | 10 | 1 | 0.1 | | 0.01 | |
| 100 | 10 | 1 Particle S | 0.1 ize (mm) | | 0.01 | |
| 100 | 10 As Defined by NCDOT | 1 Particle S | 0.1 ize (mm) Fine San | ıd < | < 0.25 mm and > | 0.05 m |
| 100 Gravel | 10 As Defined by NCDOT <75 m | 1 Particle S m and > 2.00 mm | 0.1 ize (mm) Fine San Silt | id < | < 0.25 mm and > < 0.05 and > 0.0 | 0.05 m 005 mn |
| 100 Gravel Coarse Sand | 10 As Defined by NCDOT <75 mi <2.00 m | 1 Particle S m and > 2.00 mm nm and >0.25 mm | 0.1 ize (mm) Fine San Silt Clay | id < | < 0.25 mm and > < 0.05 and > 0.0 < 0.005 m | 0.05 m 005 mn m |
| 100 Gravel Coarse Sand Maximum Particle S | 10 As Defined by NCDOT < 75 m | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S | 0.1 ize (mm) Fine San Silt Clay Sand | 1% Silt | <0.01 <0.25 mm and > <0.05 and >0.0 <0.005 m | 0.05 m 005 mn m 12 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel | 10 As Defined by NCDOT < 75 million | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San | 0.1 ize (mm) Fine San Silt Clay Sand nd | 1% Silt 55% Clay | <0.01 < 0.25 mm and > < 0.05 and > 0.0 < 0.005 m | 0.05 m 005 mn m 12 32 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D | 10 As Defined by NCDOT < 75 minor | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content | 1% Silt 55% Clay 29% % Pas | < <u>0.25 mm and ></u> < <u>0.05 and > 0.0</u> < <u>0.005 m</u> ssing #200 | 0.05 m 005 mn m 12 32 56. |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit | I0 As Defined by NCDOT < 75 m | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I | 0.1 ize (mm) Fine San Silt Clay Sand ad e Content Limit | 1% Silt 1% Silt 55% Clay 29% % Pas 21 Plasti | <0.01 < 0.25 mm and > < 0.05 and > 0.0 < 0.005 m < 0.005 m ssing #200 c Index | 0.05 m 005 mn m 12 32 56. 3 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit | I0 As Defined by NCDOT < 75 mi | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fino Sond | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit · (-#10 Sieve) 55% | 1% Silt 55% Clay 29% % Pas 21 Plasti | <0.01 <0.25 mm and > <0.05 and > 0.0 <0.005 m <0.005 m ssing #200 c Index | 0.05 m 005 mn m 12 32 56. 3 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand | 10As Defined by NCDOT $< 75 \text{ m}$ $< 2.00 \text{ n}$ ize#40%bensityND531%& Gravel Particles: | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine Sar Moistur Plastic I Soil Mortar Fine Sand Pounded | 0.1 ize (mm) Fine San Silt Clay Sand ad e Content Limit · (-#10 Sieve) 55% | nd 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% | <0.01 <0.25 mm and > <0.05 and > 0.0 <0.005 m <0.005 m ssing #200 c Index Clay Angular | 0.05 mn 005 mn m 12 32 56. 3 32 32 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab | 10As Defined by NCDOT $< 75 \text{ m}$ $< 2.00 \text{ n}$ ize#40%bensityND531%& Gravel Particles:ale | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit · (-#10 Sieve) 55% | id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% | < | 0.05 m 005 m m 12 32 56. 3 32 56. 32 0 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments | 10As Defined by NCDOT $< 75 \text{ m}$ $< 2.00 \text{ n}$ ize#40%bensityND531%4 & Gravel Particles:ble \Box / Deviations:ND | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft | 0.1 ize (mm) Fine San Silt Clay Sand ad e Content Limit (-#10 Sieve) 55% | Id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% Weathered & | <0.01 <p>(0.01) (0.025 mm and >) (0.05 and > 0.0) (0.005 m) (0.</p> | 0.05 m 005 m 12 32 56. 3 32 56. 32 0 0 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments / | 10 As Defined by NCDOT As Defined by NCDOT < 2.00 n | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft D=Not Determined. | 0.1 ize (mm) Fine San Silt Clay Sand ad e Content Limit · (-#10 Sieve) 55% | id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% Weathered & | < | 0.05 mn 005 mn m 12 32 56. 57. 57. 57. 57. 57. 57. 57. 57 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments of Mal Kraja | 10As Defined by NCDOT $< 75 miler< 2.00 niler$ | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft D=Not Determined. | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit (-#10 Sieve) 55% Lab | id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% Weathered & | <0.01 <p>< 0.25 mm and > < 0.05 and > 0.0 < 0.005 m</p> ssing #200 c Index Clay Angular t Friable 9/ | 0.05 m 005 m 12 32 56. 3 3 2 12 12 12 12 12 12 12 12 12 |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments of Mal Kraja Technician of | 10As Defined by NCDOT $< 75 miler$ | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft D=Not Determined. | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit · (-#10 Sieve) 55% □ □ Lab | Id A A A A A A A A A A A A A A A A A A A | < | 0.05 m 005 m m 12 32 56 3 3 2 12 /12/20 Date |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments / Mal Kraja Technician | 10As Defined by NCDOT $< 75 million (200 million)$ | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine Sar Moistur Plastic I Soil Mortar Fine Sand Rounded Soft D=Not Determined. <u>104-01-0703</u> <i>Certification No.</i> | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit (-#10 Sieve) 55% Lab | id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% Weathered & oratory Manager Position | < | 0.05 n 005 m 12 32 56 3 3 2 /12/20 Date |
| 100 Gravel Coarse Sand Maximum Particle S Gravel Apparent Relative D Liquid Limit Coarse Sand Description of Sand Hard & Durab References / Comments J Mal Kraja Technician J | 10As Defined by NCDOT $< 75 miler$ | 1 Particle S m and > 2.00 mm nm and >0.25 mm Coarse S Fine San Moistur Plastic I Soil Mortar Fine Sand Rounded Soft D=Not Determined. <u>104-01-0703</u> Certification No. | 0.1 ize (mm) Fine San Silt Clay Sand nd e Content Limit (-#10 Sieve) 55% Lab | Id 1% Silt 55% Clay 29% % Pas 21 Plasti Silt 12% Weathered & oratory Manager Position | < | 0.05 m 005 mn m 12 32 56. 32 56. 32 0 12 256. 32 0 0 12 256. 32 256. 257. 256. 257. 256. 32 256. 32 256. 32 256. 32 256. 32 256. 257. 256. 257. 256. 257. 256. 257. 256. 257. 25 |

AASHTO T88 as Modified by NCDOT

| | | | | | Quali | ty Assurance | |
|------------------------------|-----------------------------|--------------------------|-------------------|----------------------|---------------------------|--------------|--|
| S&MI | E, Inc. Raleigh, 3 | 3201 Spring Fore | st Road, Ral | eigh, North C | arolina 27616 | | |
| S&ME Project #: 62 | 235-16-010 | Repor | rt Date: | 11/13/16 | | | |
| Project Name: N | C 242 (Harvey P | arkway) | Test I | Date(s): | 11/1-13/16 | | |
| State Project #: 46 | 5375.1.1 | F.A. Project No: | N/A | TIP | NO: R-57 |)3 | |
| Client Name: N | CDOT | | | | | | |
| Address: R | aleigh, NC | | | | | | |
| Boring #: B | 1-B RT LN | Sample #: | SS-87 | | Sample Date: | 8/30/16 | |
| Location: 30 | tion: 364+28 Offset: 36' RT | | | | | 59.0-60.5' | |
| Sample Description: | | | | | 0 | A-6 (4) | |
| | | | | 1070 | | | |
| 1.5" 1"3/4 | 4" 1/23/8" #4 | #10 #20 # | 40 #60 #100 | #200 #270 | | | |
| | | | | | | | |
| 90% | | | | | | | |
| 80% | | | | | | | |
| 0070 | | | | | | | |
| 70% | | | | | | | |
| 50 () | | | | | | | |
| | | | | X | | | |
| 1 1 50% | | | | | | | |
| erce | | | | | | | |
| | | | | | | | |
| 30% | | | | | | | |
| | | | | | | | |
| 20% | | | | | ¥ | | |
| 10% | | | | | | | |
| 1070 | | | | | | | |
| 0% | | | | | | | |
| 100 | 10 | 1 Particle Si | ze (mm) | 0.1 | 0.01 | 0.001 | |
| | | i ui ticte Si | | | | | |
| As De | fined by NCDOT | 1 2 00 | Fine | e Sand | d < 0.25 mm and > 0.05 mm | | |
| Gravel Coarse Sand | < 75 mm a | and $> 2.00 \text{ mm}$ | | Silt | < 0.05 and > 0.005 mm | | |
| Maximum Particle Size | #20 | | and | 21% | Silt | 19% | |
| Gravel | 0% | Eine San | d | 38% | Clay | 2206 | |
| Annount Deleting Densit | 070 | Moisture | u Contont | 21 50/ | 0 Deceipe #2 | 2270 | |
| Apparent Relative Densit | ty 2.650 | Moisture | | 21.5% | % Passing #20 | 14 | |
| Liquid Limit | 31 | Plastic L | 1mit | 17 | Plastic Index | 14 | |
| | 210/ | Soil Mortar | (-#10 Sieve) | 011 | 100/ | 200/ | |
| Coarse Sand | 21% | Fine Sand | 38% | Silt | <u>19%</u> | lay 22% | |
| Description of Sand & G | Rounded | | *** | Angular | <u> </u> | | |
| Hard & Durable | Soft | | Weat | hered & Friable | | | |
| References / Comments / Devi | ations: ND=N | Not Determined. | | | | | |
| 17 117 | | 110.06.0205 | T | 1 / 7 | 1 • • | 11/12/2016 | |
| Karen Warner | <u>118-06-0305</u> | <u>L</u> | aboratory lec | <u>hnician</u> | <u>11/13/2016</u> | | |
| Technician Name | | Certification No. | | Position | | Date | |
| Stewart Lanes | 7 | | | Project Man | ager | | |
| Technical Responsibility | | Signature | | Position | | Date | |
| 200.mourresponsion | This report shall not be | e reproduced except in t | ull without the w | ritten approval of S | &ME_Inc | 2.000 | |
| | | слеері III j | , manout the Wi | en approvai of S | | | |

S&ME, Inc.

Particle Size Analysis of Soils



3201 Spring Forest Road Raleigh, NC 27616

EB2-B Rt. Ln. SS-88 (48.7 - 50.2 ft) Classification.xls