STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5703	1	46

REFERENCE: R-5703

PROJECT: 46375

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *LENOIR*

PROJECT DESCRIPTION *C.F. HARVEY PARKWAY AND NC 58 TO INTERSECTION OF NC 11 AND GRANGER STATION ROAD GRADING, PAVING, DRAINAGE, STRUCTURES AND SIGNALS*

SITE DESCRIPTION *BRIDGE NO. 218 AND NO. 219 ON -L- (FELIX HARVEY PARKWAY) OVER -Y7- (SHARON CHURCH ROAD)*

INVENTORY

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 SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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 STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

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

PERSONNEL

S. LANEY

K. HILL

S. MITCHELL

S. TIERNAN

C. CHANDLER

F. WRIGHT

E. BLONSHINE

J. PEELE

M. RAWLS

INVESTIGATED BY *S&ME, INC.*

DRAWN BY *C. CHANDLER*

CHECKED BY *S. MITCHELL*

SUBMITTED BY *S&ME, INC.*

DATE *MARCH 2017*

NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

SIGNATURE 3-13-17 DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
R-5703	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1			A-3	A-2			A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b			A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10 #40 #200	50 MX 30 MX 15 MX		50 MX 25 MX	51 MN 10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN	GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
MATERIAL PASSING #40 LL PI	— 6 MX			— NP	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	40 MX 10 MX	41 MN 10 MX	40 MX 11 MN	41 MN 11 MN	SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER		HIGHLY ORGANIC SOILS
GROUP INDEX	0			0	0		4 MX		8 MX	12 MX	16 MX	NO MX			
USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND	SILTY OR CLAYEY GRAVEL AND SAND					SILTY SOILS		CLAYEY SOILS				
GEN. RATING AS SUBGRADE	EXCELLENT TO GOOD								FAIR TO POOR				FAIR TO POOR	POOR	UNSUITABLE

PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30

CONSISTENCY OR DENSENESS

PRIMARY SOIL TYPE	COMPACTNESS OR CONSISTENCY	RANGE OF STANDARD PENETRATION RESISTENCE (N-VALUE)	RANGE OF UNCONFINED COMPRESSIVE STRENGTH ($TONS/FT^2$)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE	< 4 4 TO 10 10 TO 30 30 TO 50 > 50	N/A
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD	< 2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 > 30	< 0.25 0.25 TO 0.5 0.5 TO 1.0 1 TO 2 2 TO 4 > 4

TEXTURE OR GRAIN SIZE

U.S. STD. SIEVE SIZE	4	10	40	60	200	270
OPENING (MM)	4.76	2.00	0.42	0.25	0.075	0.053

BOULDER (BLDR.)	COBBLE (COB.)	GRAVEL (GR.)	COARSE SAND (CSE. SD.)	FINE SAND (F SD.)	SILT (SL.)	CLAY (CL.)

GRAIN SIZE	MM	305	75	2.0	0.25	0.05	0.005
	IN.	12	3				

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

	PLASTICITY INDEX (PI)	DRY STRENGTH
NON PLASTIC	0-5	VERY LOW
SLIGHTLY PLASTIC	6-15	SLIGHT
MODERATELY PLASTIC	16-25	MEDIUM
HIGHLY PLASTIC	26 OR MORE	HIGH

COLOR

DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY), MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.

GRADATION

WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.
UNIFORMLY GRADED - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE.
GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.

ANGULARITY OF GRAINS

THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.

MINERALOGICAL COMPOSITION

MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.

COMPRESSIBILITY

SLIGHTLY COMPRESSIBLE	LL < 31
MODERATELY COMPRESSIBLE	LL = 31 - 50
HIGHLY COMPRESSIBLE	LL > 50

PERCENTAGE OF MATERIAL

ORGANIC MATERIAL	GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	
TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	1 - 10%
LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	10 - 20%
MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	20 - 35%
HIGHLY ORGANIC	> 10%	> 20%	HIGHLY	35% AND ABOVE

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER ____ HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT, DPT, DMT, VST, PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] D-25
- [X] D-50

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.
ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:

WEATHERED ROCK (WR)	NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.
CRYSTALLINE ROCK (CR)	FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.
NON-CRYSTALLINE ROCK (NCR)	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.
COASTAL PLAIN SEDIMENTARY ROCK (CP)	COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.

WEATHERING

FRESH	ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.
VERY SLIGHT (V SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.
SLIGHT (SLI.)	ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.
MODERATE (MOD.)	SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK.
MODERATELY SEVERE (MOD. SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. *IF TESTED, WOULD YIELD SPT REFUSAL*
SEVERE (SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF*
VERY SEVERE (V SEV.)	ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. *IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF*
COMPLETE	ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.

ROCK HARDNESS

VERY HARD	CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.
HARD	CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.
MODERATELY HARD	CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.
MEDIUM HARD	CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.
SOFT	CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.
VERY SOFT	CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.

FRACTURE SPACING

TERM	SPACING
VERY WIDE	MORE THAN 10 FEET
WIDE	3 TO 10 FEET
MODERATELY CLOSE	1 TO 3 FEET
CLOSE	0.16 TO 1 FOOT
VERY CLOSE	LESS THAN 0.16 FEET

BEDDING

TERM	THICKNESS
VERY THICKLY BEDDED	4 FEET
THICKLY BEDDED	1.5 - 4 FEET
THINLY BEDDED	0.16 - 1.5 FEET
VERY THINLY BEDDED	0.03 - 0.16 FEET
THICKLY LAMINATED	0.008 - 0.03 FEET
THINLY LAMINATED	< 0.008 FEET

INDURATION

FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.

FRIABLE	RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.
MODERATELY INDURATED	GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.
INDURATED	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.
EXTREMELY INDURATED	SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.

TERMS AND DEFINITIONS

ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.

AQUIFER - A WATER BEARING FORMATION OR STRATA.

ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.

ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.

ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.

CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.

COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.

CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.

DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.

DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.

FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.

FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.

FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.

FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.

FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.

JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.

LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.

LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.

MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.

PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.

RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.

ROCK QUALITY DESIGNATION (RQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.

SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.

SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.

SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.

STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.

STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.

STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.

TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.

BENCH MARK: 135.18 FEET RIGHT -L- 343+61, R57037 GPS MONUMENT

N 578,731.5020 E 2,447,574.9400 ELEVATION: 56.27 FEET

NOTES:
FIAD - FILLED IMMEDIATLEY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-5703	3

SITE PLAN

0 40 80
FEET

SKEW 105°47'56"
SITE 6

-L- POT Sta. 342+97.24 =
-Y7- POT Sta. 11+93.49

NC GRID
NAD 83/NSRS 2007

TO SR 1727

-Y7-

END BENT #1

BENT #1

END BENT #2

BRIDGE 218

EB2-A Lt. Ln.

EB1-A Lt. Ln.

B1-A Lt. Ln.

B-1

TO SR 1735

LEFT CONTROL LINE

340 341 342 343 344 345

-L-

105°47'56"

BRIDGE 219

BRIDGE I.D.
STA. 342+97.24 -L- =
STA. 11+93.49 -Y7-

B-2

B1-B Rt. Ln.

RIGHT CONTROL LINE

TO NC 11

EB1-B Rt. Ln.

EB2-B Rt. Ln.

END BENT #1

BENT #1

SR 1720 (SHARON CHURCH RD) 18' BST

11

END BENT #2

R57037

10

TO NC HWY 11

PROJECT REFERENCE NO.	SHEET NO.
R-5703	4

ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

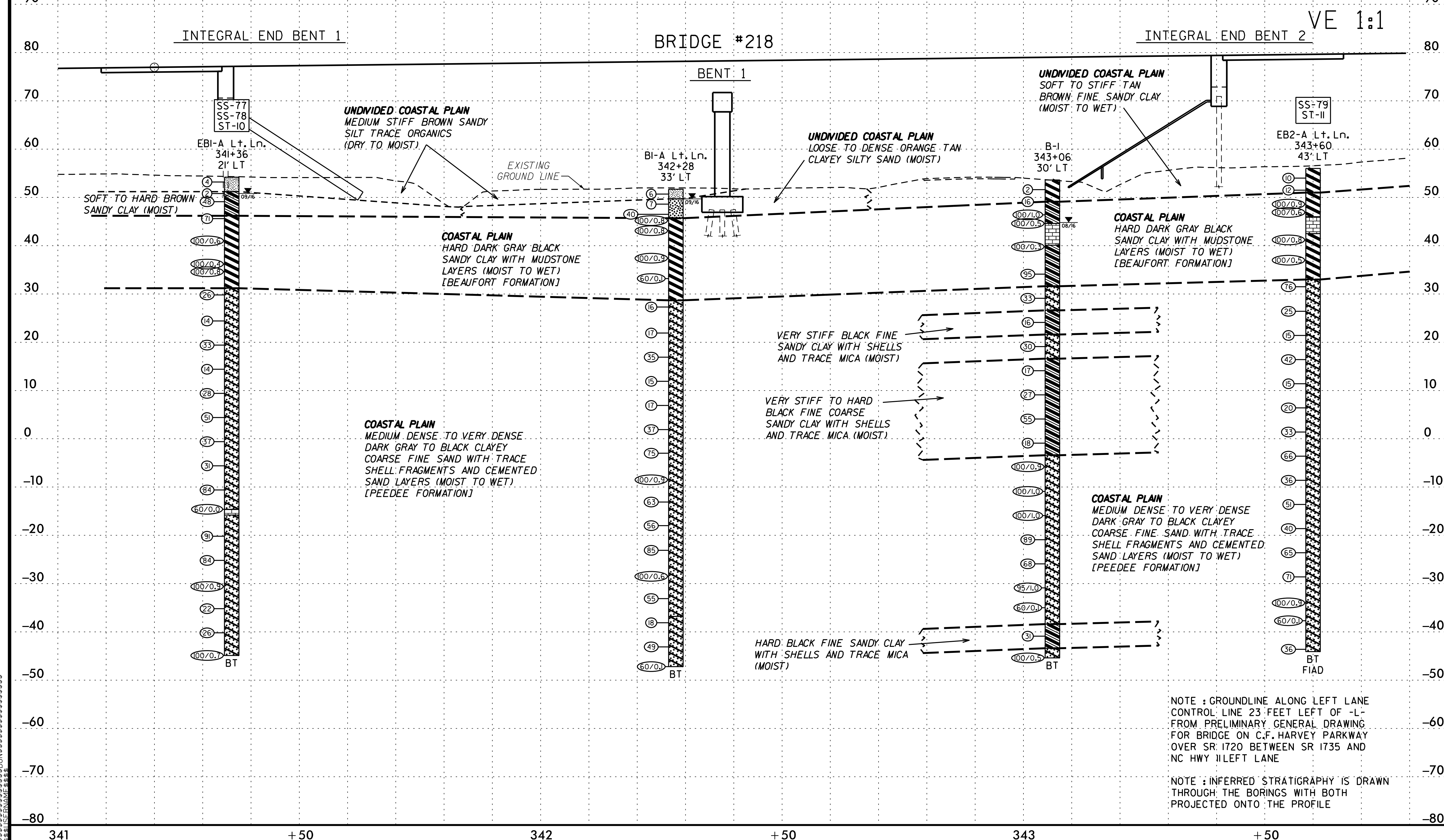
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)				% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	60	200		
SS–77	21' LT	341+36	0.0 – 1.5	A–4 (0)	21	5	10	42	33	15	99	95	89	55.6	21.6	4.0
SS–78	21' LT	341+36	18.8 – 19.6	A–7–5 (16)	62	24	20	20	23	37	100	87	80	64.6	52.2	1.8
SS–79	43' LT	343+60	8.5 – 9.1	A–7–6 (24)	62	33	10	24	31	35	90	83	81	71.6	52.6	ND
ST–10	23' LT	341+36	3.0 – 5.0	A–6 (10)	14	20	8	32	20	39	99	95	92	65.0	22.5	ND
ST–11	40' LT	343+60	5.0 – 7.0	A–7–5 (24)	68	47	4	21	23	52	100	98	96	84.1	46.4	ND

PROFILE THROUGH BORINGS PROJECTED ALONG LEFT LANE CONTROL LINE

VE 1:1



NOTE : GROUNDLINE ALONG LEFT LANE CONTROL LINE 23 FEET LEFT OF -L- FROM PRELIMINARY GENERAL DRAWING FOR BRIDGE ON C.F. HARVEY PARKWAY OVER SR 1720 BETWEEN SR 1735 AND NC HWY 11 LEFT LANE

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

5/14/99

$$$$$SYSTIME$$$$$ $$$$$DGN$$$$$$$$$$$$$$$$$ $$$$$USERNAME$$$$$

PROJECT REFERENCE NO.	SHEET NO.
R-5703	5

ROADWAY DESIGN ENGINEER

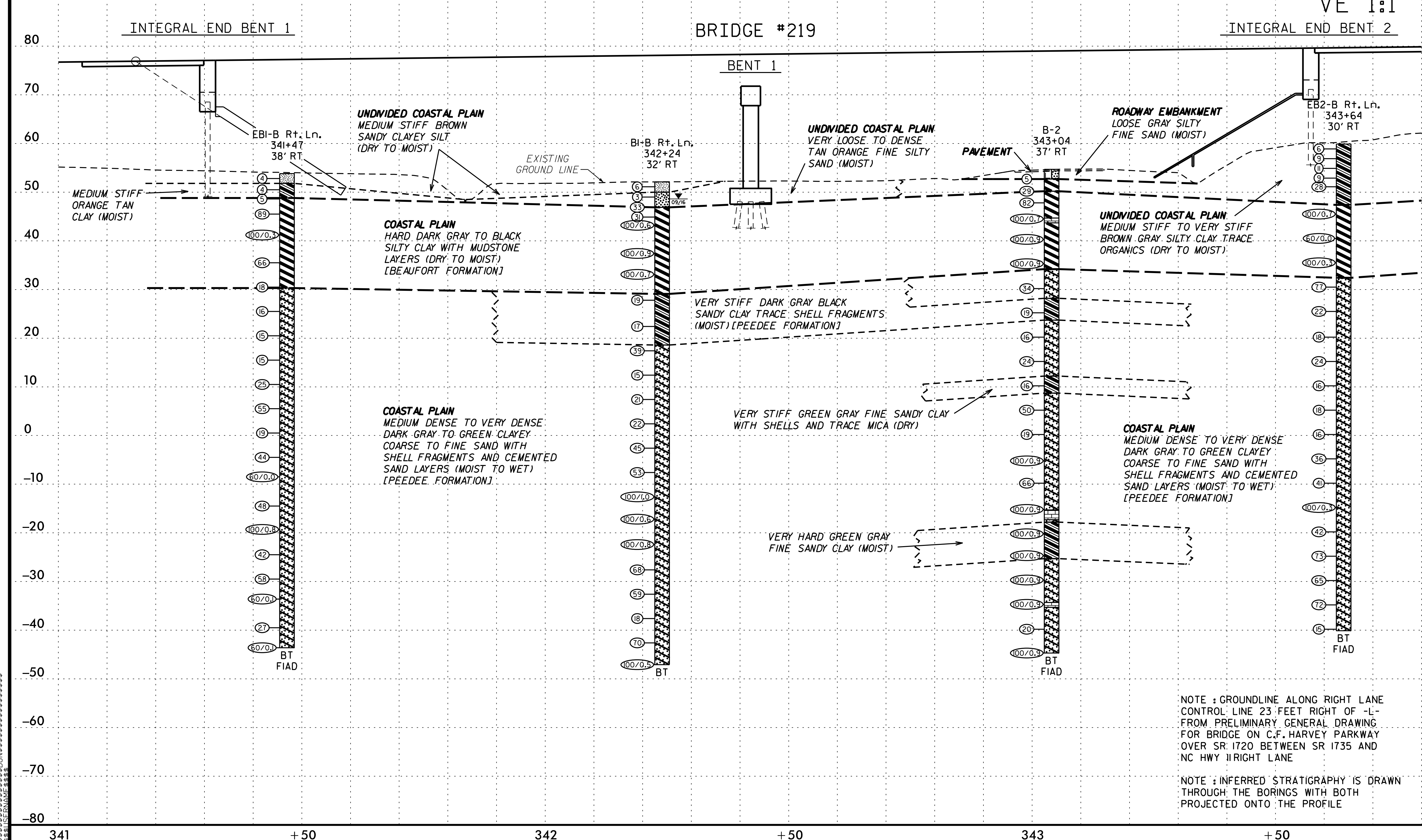
HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROFILE THROUGH BORINGS PROJECTED ALONG RIGHT LANE CONTROL LINE

VE 1:1



NOTE : GROUNDLINE ALONG RIGHT LANE CONTROL LINE 23 FEET RIGHT OF -L- FROM PRELIMINARY GENERAL DRAWING FOR BRIDGE ON C.F. HARVEY PARKWAY OVER SR 1720 BETWEEN SR 1735 AND NC HWY 11 RIGHT LANE

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

5/14/99

$$$$SYSTIME$$$$ $$$$DGN$$$$ $$$$USERNAME$$$$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB1-A Lt. Ln.	**STATION** 341+36	**OFFSET** 21 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 54.2 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 578,960	**EASTING** 2,447,423	**24 HR.** 3.4
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/06/16	**COMP. DATE** 09/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
55	54.2	0.0	1	2	2	4	SS-77	22%		54.2 / 0.0 GROUND SURFACE
	51.8	2.4	WOH	WOH	2	2		M		**UNDIVIDED COASTAL PLAIN** Brown Sandy SILT, Trace Organics
50	50.1	4.1	2	4	44	48		M		51.2 / 3.0 Brown Sandy Clay
	46.6	7.6	21	13	58	71		M		46.2 / 8.0 **COASTAL PLAIN** Gray Sandy CLAY, with Mudstone Layers [Beaufort Formation]
45										
	41.6	12.6	23	77/0.1		100/0.6		M		
40										
	36.6	17.6	100/0.4			100/0.4		M		
35	35.4	18.8	19	81/0.3		100/0.8	SS-78	52%		
	30.8	23.4	10	11	15	26		W		31.2 / 23.0 **COASTAL PLAIN** Gray Brown to Green Gray Clayey Fine SAND, Trace Shell Fragments and cemented sand layers [Peedee Formation]
30										
	25.4	28.8	5	6	8	14		W		
25										
	20.4	33.8	6	13	20	33		W		
20										
	15.4	38.8	5	6	8	14		M		
15										
	10.4	43.8	6	14	14	28		M		
10										
	5.4	48.8	15	24	27	51		M		
5										
	0.4	53.8	6	9	28	37		M		
0										
	-4.6	58.8	10	12	19	31		M		
-5										
	-9.6	63.8	24	36	48	84		W		
-10										
	-14.6	68.8	60/0.0			60/0.0		W		-14.6 / 68.8 -15.8 / 70.0
-15										
	-19.2	73.4	34	48	43	91		W		
-20										
	-24.2	78.4	31	45	39					
-25										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB1-A Lt. Ln.	**STATION** 341+36	**OFFSET** 21 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 54.2 ft	**TOTAL DEPTH** 99.1 ft	**NORTHING** 578,960	**EASTING** 2,447,423	**24 HR.** 3.4
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/06/16	**COMP. DATE** 09/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line		W		
	-29.2	83.4	22	33	67/0.4	84		M		
-30						100/0.9				
	-34.2	88.4	8	10	12	22		M		
-35										
	-39.2	93.4	7	9	17	26		M		
-40										
	-44.2	98.4	69	31/0.2		100/0.7		W		-44.9 / 99.1 Boring Terminated at Elevation -44.9 ft in Very Dense Clayey Fine SAND ST-10 collected in offset boring at Station 341+36 Offset 23 ft LT Other Samples: ST-10 (3.0 - 5.0)

NCDOT BORE DOUBLE SITE #6 GINT.GPJ NC_DOT.GDT 3/9/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B1-A RT LN	**STATION** 342+28	**OFFSET** 33 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 51.7 ft	**TOTAL DEPTH** 98.9 ft	**NORTHING** 578,937	**EASTING** 2,447,513	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/08/16	**COMP. DATE** 09/08/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
55										
	51.7	0.0	2	2	4	6	D			51.7 GROUND SURFACE 0.0
50	49.6	2.1	4	3	4	7 40		M		**UNDIVIDED COASTAL PLAIN** Dark Brown SILT, Trace Organics 49.7 2.0 Orange Tan Clayey Silty SAND
	47.5	4.2	18	14	26			M		45.7 6.0
45	46.0	5.7	23	77/0.3		100/0.8		M		**COASTAL PLAIN** Brown to Dark Gray sandy CLAY, with Mudstone Layers [Beaufort Formation]
	43.9	7.8	33	67/0.3		100/0.8		M		
40	38.3	13.4	31	69/0.4		100/0.9		M		
35	33.3	18.4	60/0.1			60/0.1		M		
30	28.3	23.4	8	6	10	16		M		28.7 23.0 **COASTAL PLAIN** Dark Gray Clayey Fine SAND, Trace Shell Fragments [Peedee Formation]
25	22.9	28.8	5	7	10	17		M		
20	17.9	33.8	10	18	17	35		M		
15	12.9	38.8	5	7	8	15		M		
10	7.9	43.8	6	8	9	17		M		
5	2.9	48.8	19	20	17	37		M		
0	-2.0	53.7	15	37	38	75		M		
-5	-7.1	58.8	12	17	83/0.4	100/0.9		W		
-10	-12.1	63.8	22	30	33	63		W		
-15	-17.0	68.7	23	23	33	56		W		
-20	-22.1	73.8	24	46	39	85		W		
-25										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B1-A RT LN	**STATION** 342+28	**OFFSET** 33 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 51.7 ft	**TOTAL DEPTH** 98.9 ft	**NORTHING** 578,937	**EASTING** 2,447,513	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/08/16	**COMP. DATE** 09/08/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line				
	-27.1	78.8	14	27	73/0.1	100/0.6		W		**COASTAL PLAIN** Dark Gray Clayey Fine SAND, Trace Shell Fragments [Peedee Formation] *(continued)*
-30	-32.1	83.8	19	22	33	55		M		
-35	-37.1	88.8	8	8	10	18		M		-36.8 88.5 Dark Gray Fine Clayey SAND, Trace Shell Fragments
-40	-42.1	93.8	12	17	32	49		M		
-45	-47.1	98.8	60/0.1			60/0.1		M		-47.2 98.9 Boring Terminated at Elevation -47.2 ft in Very Dense Clayey Fine SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 343+06	**OFFSET** 30 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 53.6 ft	**TOTAL DEPTH** 99.0 ft	**NORTHING** 578,905	**EASTING** 2,447,584	**24 HR.** 8.8
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Cain, J.	**START DATE** 08/24/16	**COMP. DATE** 08/25/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
55										
	52.6	1.0								53.6 / 0.0 GROUND SURFACE
			1	1	1	2		M		**UNDIVIDED COASTAL PLAIN** Brown Gray Fine Sandy CLAY with Rootlets
50	50.1	3.5								49.1 / 4.5
			1	1	15	16		W		**COASTAL PLAIN** Black Coarse Sandy CLAY with Mudstone Layers [Beaufort Formation]
	47.4	6.2								
			11	62	38/0.5	100/1.0		W		
45	45.1	8.5	100/0.5			100/0.5		W		44.6 / 9.0
40	40.1	13.5	100/0.3			100/0.3		W		40.1 / 13.5
			30	48	47	95		W		
35	35.1	18.5								
			11	14	19	33		M		31.6 / 22.0 **COASTAL PLAIN** Black Clayey Coarse SAND [Peedee Formation]
30	30.1	23.5								
	25.1	28.5	6	7	9	16		M		26.6 / 27.0 Black Fine Sandy CLAY with Shells, Trace Mica
25										
	20.1	33.5	7	11	19	30		M		21.6 / 32.0 Gray Clayey Coarse SAND with Shells
20										
	15.1	38.5	7	8	9	17		M		16.6 / 37.0 Black Fine to Coarse Sandy CLAY with Shells, Trace Mica
15										
	10.1	43.5	6	10	17	27		M		
10										
	5.1	48.5	21	27	28	55		M		
5										
	0.1	53.5	7	8	10	18		M		
0										
	-4.9	58.5	44	56/0.4		100/0.9		M		-3.4 / 57.0 Gray Clayey Coarse to Fine SAND, Trace Shells
-5										
	-9.9	63.5	37	63/0.5		100/1.0		M		
-10										
	-14.9	68.5	50	50/0.5		100/1.0		W		
-15										
	-19.9	73.5	28	43	46	89		W		
-20										
	-24.9	78.5								
-25										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 343+06	**OFFSET** 30 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 53.6 ft	**TOTAL DEPTH** 99.0 ft	**NORTHING** 578,905	**EASTING** 2,447,584	**24 HR.** 8.8
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Cain, J.	**START DATE** 08/24/16	**COMP. DATE** 08/25/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line				
			24	30	38	68		M		Gray Clayey Coarse to Fine SAND, Trace Shells *(continued)*
-30	-29.9	83.5								
			35	60/0.5		95/1.0		M		
-35	-34.9	88.5	60/0.1			60/0.1		M		
										-38.4 / 92.0 Black Fine Sandy CLAY with Shells, Trace Mica
-40	-39.9	93.5	7	11	20	31		M		
										-43.4 / 97.0 Green Gray Clayey Fine SAND with Shells
-45	-44.9	98.5	100/0.5			100/0.5		M		-45.4 / 99.0 Boring Terminated at Elevation -45.4 ft in Very Dense Clayey Fine SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 218 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB2-A Lt. Ln.	**STATION** 343+60	**OFFSET** 43 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 56.0 ft	**TOTAL DEPTH** 100.1 ft	**NORTHING** 578,898	**EASTING** 2,447,639	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 08/25/16	**COMP. DATE** 08/26/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
60										
55	55.0	1.0	4	5	5	10		M		56.0 GROUND SURFACE 0.0 **UNDIVIDED COASTAL PLAIN** Orange Tan Fine Sandy CLAY
	52.5	3.5	4	4	8	12		M		
50	50.0	6.0	8	12	88/0.4	100/0.9		M		51.0 5.0 **COASTAL PLAIN** Brown Black CLAY with Mudstone Layers [Beaufort Formation]
	47.5	8.5	52	48/0.1		100/0.6	SS-79	53%		
45	42.5	13.5	12	62	38/0.3	100/0.8		W		46.0 10.0 42.5 13.5
40	37.5	18.5	100/0.5			100/0.5		W		
35	32.5	23.5	22	33	43	76		M		33.0 23.0 **COASTAL PLAIN** Greenish Dark Gray Clayey Fine SAND, Clay Seams, Trace Shell Fragments [Peedee Formation]
30	27.4	28.6	9	13	12	25		W		
25	22.4	33.6	5	6	9	15		W		
20	17.4	38.6	15	21	21	42		W		
15	12.4	43.6	5	7	8	15		M		
10	7.4	48.6	9	9	11	20		M		
5	2.4	53.6	18	15	18	33		M		
0	-2.6	58.6	9	29	37	66		M		
-5	-7.6	63.6	10	14	22	36		W		
-10	-12.6	68.6	17	26	25	51		W		
-15	-17.6	73.6	6	20	20	40		W		
-20										

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-20						Match Line				
-25	-22.6	78.6	21	33	32	65		W		**COASTAL PLAIN** Greenish Dark Gray Clayey Fine SAND, Clay Seams, Trace Shell Fragments [Peedee Formation] *(continued)*
-30	-27.6	83.6	16	26	45	71		M		
-35	-32.6	88.6	21	29	71/0.4	100/0.9		M		
-40	-37.6	93.6	60/0.1			60/0.1		M		
	-42.6	98.6	8	12	24	36		M		-44.1 100.1 Boring Terminated at Elevation -44.1 ft in Dense Clayey Fine SAND ST-11 collected in offset boring at Station 343+60 Offset 40 ft LT <u>Other Samples:</u> ST-11 (5.0 - 7.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB1-B Rt. Ln.	**STATION** 341+47	**OFFSET** 38 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 53.8 ft	**TOTAL DEPTH** 97.4 ft	**NORTHING** 578,901	**EASTING** 2,447,411	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 08/31/16	**COMP. DATE** 08/31/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
55										
	53.8	0.0	3	2	2	4		M		53.8 / 0.0 GROUND SURFACE
	51.5	2.3	1	2	2	4		M		**UNDIVIDED COASTAL PLAIN** Light Brown Clayey SILT Orange Tan CLAY
50	49.6	4.2	1	2	3	5		M		51.8 / 2.0
	46.5	7.3	11	58	31	89		M		48.8 / 5.0 **COASTAL PLAIN** Dark Gray Silty CLAY with Mudstone Layers [Beaufort Formation]
45										
	41.5	12.3	100/0.3			100/0.3		M		
40										
	36.5	17.3	52	43	23	66		M		
35										
	31.5	22.3	7	8	10	18		M		30.3 / 23.5 **COASTAL PLAIN** Dark Gray Clayey Fine SAND with Shell Fragments [Peedee Formation]
30										
	26.5	27.3	5	7	9	16		M		
25										
	21.5	32.3	5	6	9	15		W		
20										
	16.5	37.3	5	7	8	15		M		
15										
	11.5	42.3	10	13	12	25		M		
10										
	6.5	47.3	26	31	24	55		M		
5										
	1.5	52.3	6	8	11	19		M		
0										
	-3.5	57.3	8	18	26	44		M		
-5										
	-8.5	62.3	60/0.0			60/0.0		M		
-10										
	-13.5	67.3	29	15	33	48		W		
-15										
	-18.5	72.3	54	46/0.3		100/0.8		W		
-20										
	-23.5	77.3	13	19	23	42		W		
-25										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB1-B Rt. Ln.	**STATION** 341+47	**OFFSET** 38 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 53.8 ft	**TOTAL DEPTH** 97.4 ft	**NORTHING** 578,901	**EASTING** 2,447,411	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 08/31/16	**COMP. DATE** 08/31/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line				
	-28.5	82.3	12	24	34	58		M		**COASTAL PLAIN** Dark Gray Clayey Fine SAND with Shell Fragments [Peedee Formation] *(continued)*
-30										
	-33.5	87.3	60/0.1			60/0.1		M		
-35										
	-38.5	92.3	7	10	17	27		W		
-40										
	-43.5	97.3	60/0.1			60/0.1		W		-43.6 / 97.4 Boring Terminated at Elevation -43.6 ft in Very Dense Clayey Fine SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B1-B RT LN	**STATION** 342+24	**OFFSET** 32 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 52.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 578,878	**EASTING** 2,447,485	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/07/16	**COMP. DATE** 09/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
55										
	52.1	0.0	1	2	4	6		D		52.1 GROUND SURFACE 0.0
50	50.0	2.1	1	1	2	3		M		**UNDIVIDED COASTAL PLAIN** 50.0 Dark Brown Sandy SILT, Trace Fine Sand 2.1 Tan Orange Fine Silty SAND
	47.9	4.2	3	8	25	33		M		46.9 5.2
45	45.9	6.2	3	20	11	31		M		**COASTAL PLAIN** Dark Gray to Black Fine Sandy CLAY with Mudstone Layers [Beaufort Formation]
	43.8	8.3	70	30/0.1		100/0.6		M		
40	38.8	13.3	30	33	67/0.4	100/0.9		M		
35	33.8	18.3	17	83/0.2		100/0.7		M		
30	28.8	23.3	10	9	10	19		M		29.1 23.0 **COASTAL PLAIN** Dark Gray Sandy CLAY, Trace Shell Fragments [Peedee Formation]
25	23.4	28.7	5	7	10	17		M		
20	18.4	33.7	10	20	19	39		W		18.6 33.5 Gray to Green Gray Clayey Fine SAND, Trace Shell Fragments
15	13.4	38.7	5	7	8	15		W		
10	8.4	43.7	8	10	11	21		M		
5	3.4	48.7	7	8	14	22		M		
0	-1.6	53.7	8	14	31	45		M		
-5	-6.6	58.7	24	20	33	53		W		
-10	-11.6	63.7	19	43	57/0.5	100/1.0		W		
-15	-16.6	68.7	81	19/0.1		100/0.6		W		
-20	-21.6	73.7	29	71/0.3		100/0.8		W		
-25										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B1-B RT LN	**STATION** 342+24	**OFFSET** 32 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 52.1 ft	**TOTAL DEPTH** 99.2 ft	**NORTHING** 578,878	**EASTING** 2,447,485	**24 HR.** 3.5
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/07/16	**COMP. DATE** 09/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line				
	-26.6	78.7	20	28	40	68		W		Gray to Green Gray Clayey Fine SAND, Trace Shell Fragments *(continued)*
-30	-31.6	83.7	18	26	33	59		M		
-35	-36.6	88.7	7	8	10	18		M		
-40	-41.6	93.7	14	20	50	70		M		
-45	-46.6	98.7	100/0.5			100/0.5		W		-47.1 99.2 Boring Terminated at Elevation -47.1 ft in Very Dense Clayey Fine SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 343+04	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 54.7 ft	**TOTAL DEPTH** 99.4 ft	**NORTHING** 578,844	**EASTING** 2,447,558	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Cain, J.	**START DATE** 08/18/16	**COMP. DATE** 08/18/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
55										54.7 GROUND SURFACE	0.0
	53.7	1.0	9	3	2	5		M		54.4 Asphalt Pavement	0.3
										52.7 **ROADWAY EMBANKMENT** Pavement - Gray Silty Fine SAND	2.0
50	51.2	3.5	3	10	19	29		M		50.2 **UNDIVIDED COASTAL PLAIN** Gray Brown CLAY	4.5
	48.8	5.9	63	36	46	82		D		**COASTAL PLAIN** Tan Brown Silty CLAY with Mudstone Layers	
45	46.2	8.5	39	53	47/.2	100/0.7		M		44.7 [Beaufort Formation]	10.0
										43.7	11.0
40	41.2	13.5	50	50/0.4		100/0.9		M			
35	36.2	18.5	50	50/0.4		100/0.9		M		34.2 **COASTAL PLAIN** Black Clayey Fine SAND	20.5
										[Peedee Formation]	
30	31.2	23.5	13	14	20	34		M		28.2 Black Fine Sandy CLAY with Mica	26.5
25	26.2	28.5	5	8	11	19		M		23.7 Green Gray Clayey Coarse SAND	31.0
20	21.2	33.5	6	7	9	16		M			
15	16.2	38.5	11	11	13	24		M			
10	11.2	43.5	7	7	9	16		D		12.2 Green Gray Fine Sandy CLAY, Trace Mica, with Shells	42.5
5	6.2	48.5	7	15	35	50		M		8.7 Green, Gray Clayey Coarse SAND with Shells, Trace Mica and cemented sand layers	46.0
0	1.2	53.5	7	8	11	19		M			
-5	-3.8	58.5	12	24	76/0.4	100/0.9		M			
-10	-8.8	63.5	25	40	26	66		M			
-15	-13.8	68.5	20	35	65/0.4	100/0.9		M		-15.3	70.0
										-17.3	72.0
-20	-18.8	73.5	17	40	60/0.4	100/0.9		M		-17.8 Green Gray Fine Sandy CLAY	72.5
-25	-23.8	78.5	50	50/0.4		100/0.9		M			

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 343+04	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 54.7 ft	**TOTAL DEPTH** 99.4 ft	**NORTHING** 578,844	**EASTING** 2,447,558	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC0279 Diedrich D50 88% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Cain, J.	**START DATE** 08/18/16	**COMP. DATE** 08/18/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-25						Match Line				
	-28.8	83.5	50	50/0.4		100/0.9		M		
-30										
	-33.8	88.5	50	50/0.4		100/0.9		M		-34.3 89.0
-35										-35.3 90.0
	-38.8	93.5	7	8	12	20		M		
-40										
	-43.8	98.5	50	50/0.4		100/0.9		M		-44.7 99.4

-25.3 80.0 Green Gray Clayey Fine SAND, with cemented sand layers

Boring Terminated at Elevation -44.7 ft in Very Dense Clayey Fine SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB2-B Rt. Ln.	**STATION** 343+64	**OFFSET** 30 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 59.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 578,829	**EASTING** 2,447,616	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/12/16	**COMP. DATE** 09/12/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
60										
	59.9	0.0	WOH	2	4	6		D		59.9 GROUND SURFACE 0.0
	57.9	2.0	4	4	5	9		D		**UNDIVIDED COASTAL PLAIN**
55	55.9	4.0	2	4	7	11		M		Light to Dark Brown Silty CLAY, Trace Organics
	53.9	6.0	2	4	5	9		M		
	52.1	7.8	13	14	14	28		M		
50										
	46.5	13.4	20	80/0.2		100/0.7		M		47.4 12.5 **COASTAL PLAIN**
45										Dark Gray Silty CLAY, Mudstone Seams [Beaufort Formation]
	41.5	18.4	60/0.0			60/0.0		M		
40										
	36.5	23.4	100/0.3			100/0.3		M		
35										
	31.5	28.4	48	33	44	77		M		32.4 27.5 **COASTAL PLAIN**
30										Dark Gray Clayey Fine SAND [Peedee Formation]
	26.5	33.4	5	11	11	22		M		
25										
	21.2	38.7	5	8	10	18		M		
20										
	16.2	43.7	9	11	13	24		M		
15										
	11.2	48.7	5	7	9	16		M		
10										
	6.2	53.7	6	8	10	18		M		
5										
	1.2	58.7	5	7	9	16		M		
0										
	-3.8	63.7	14	16	20	36		M		
-5										
	-8.8	68.7	15	17	24	41		W		
-10										
	-13.8	73.7	100/0.3			100/0.3		W		
-15										
	-18.8	78.7	17	19	23	42		W		
-20										

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
-20						Match Line				
	-23.8	83.7	44	44	29	73		W		**COASTAL PLAIN**
-25										Dark Gray Clayey Fine SAND [Peedee Formation] *(continued)*
	-28.8	88.7	10	25	40	65		W		
-30										
	-33.8	93.7	18	27	45	72		W		
-35										
	-38.8	98.7	6	7	8	15		M		-40.1 100.0
-40										Boring Terminated at Elevation -40.3 ft in Medium Dense Clayey Fine Sand

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Peele, J.E.	
SITE DESCRIPTION Bridge No. 219 on -L- (Felix Harvey Pkwy) over -Y7- (Ferrell Rd)				**GROUND WTR (ft)**
BORING NO. EB2-B Rt. Ln.	**STATION** 343+64	**OFFSET** 30 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 59.9 ft	**TOTAL DEPTH** 100.2 ft	**NORTHING** 578,829	**EASTING** 2,447,616	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE MID0314 D-25 86% 08/04/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Wiggins, M.	**START DATE** 09/12/16	**COMP. DATE** 09/12/16	**SURFACE WATER DEPTH** N/A	

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

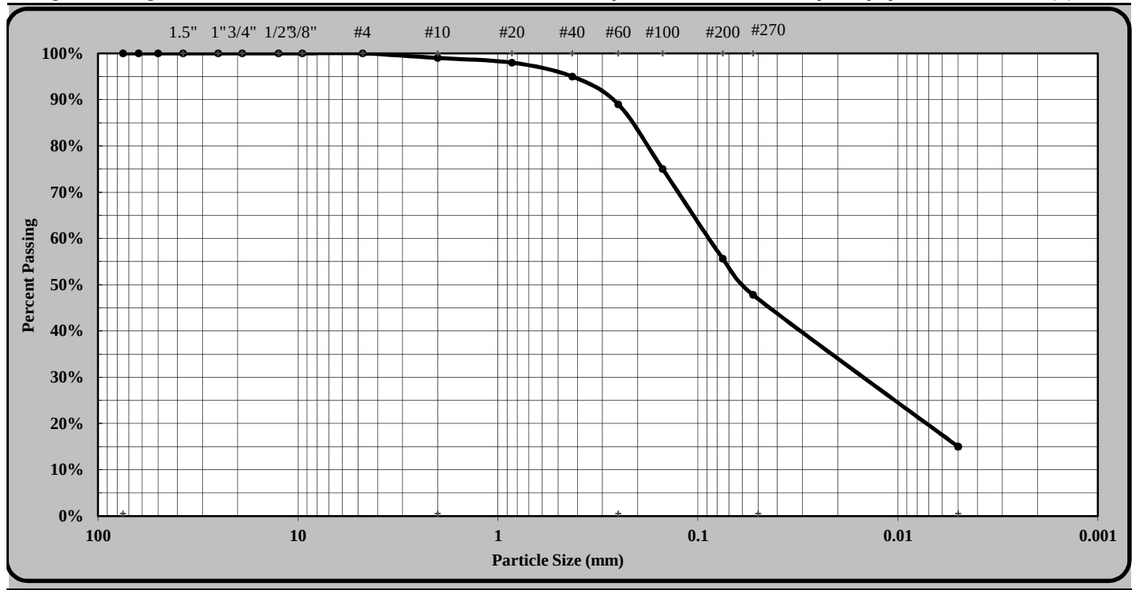
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-16-010			Report Date:	11/14/16
Project Name:	C.F. Harvey Parkway Extension R-5703			Test Date(s):	10/7 - 11/14/16
State Project #:	46375.1.1	F.A. Project No:	N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering				
Address:	Raleigh, NC				
Boring #:	EB1-A LT LN	Sample #:	SS-77	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	0.0 - 1.5
Sample Description:			Gray Coarse to Fine Sandy Clayey SILT	A-4	(0)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	10%	Silt	33%
Gravel	1%	Fine Sand	41%	Clay	15%
Apparent Relative Density	ND	Moisture Content	22%	% Passing #200	55.6%
Liquid Limit	21	Plastic Limit	16	Plastic Index	5

Soil Mortar (-#10 Sieve)

Coarse Sand	10%	Fine Sand	42%	Silt	33%	Clay	15%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	11/14/2016
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	11/14/2016
Technical Responsibility	*Signature*	*Position*	*Date*

Form No: TR-T267
Revision No. 0
Revision Date: 07/10/08

Moisture, Ash, and Organic Matter

AASHTO T-267

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Raod, Raleigh, North Carolina 27616

Project #:	**6235-16-010**			Report Date:	10/21/16
Project Name:	C.F. Harvey Parkway Extension R-5703			Test Date(s):	10/18 - 10/21/16
Client Name:	Michael Baker Engineering				
Client Address:	Raleigh, NC				
Boring #:	EB1-A LT LN	Sample #:	SS-77	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	0.0 - 1.5
Sample Description:	Gray Coarse to Fine Sandy Clayey SILT (A-4) (0)				

Equipment: *Balance: 0.01 g.Readability, 500g. Minimum Capaccity*
Balance: *S&ME ID #:* ***1024*** *Cal. Date:* ***11/06/16*** *Due:* ***11/06/17***

Method A: Moisture Content Determination *Required Oven Temperature:105 ± 5 °C*

	Oven Temperature: **105 °C**	*Tare #*	e
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	47.07
a	Mass of ***As-Received*** Specimen + Tare Wt.	*grams*	91.58
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	83.66
w	Water Weight	*(a-b)*	7.92
A	Mass of As-Received Specimen	*(a-t)*	44.51
B	Mass of Oven Dry Specimen	*(b-t)*	36.59
	% Moisture Content as a % of As Received or Total Mass	*(w/A)*100*	**17.8%**
	% Moisture Content as a % of Oven-dried Mass	*(w/B)*100*	**21.6%**

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 #*	4
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	21.03
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	45.77
c	Ash Weight + Tare Wt.	*grams*	44.77
C	Ash Weight	*c-t*	23.74
B	Mass of Oven Dry Specimen	*(b-t)*	24.74
D	***% Ash Content***	*(C/B)*100*	**96.0%**
	% Organic Matter	*100-D*	**4.0%**

Muffle Furnace: *S&ME ID #:* ***00261***

Notes / Deviations / References:

Mal Krajan, ET		Laboratory Manager	11/14/2016
Technical Responsibility	*Signature*	*Position*	*Date*

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

pH of Soil

AASHTO T289

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	**6235-16-010**	Report Date:	11/7/16
Project Name:	C.F. Harvey Parkway Extension R-5703	Test Date(s):	11/5 - 11/7/16
Client Name:	Michael Baker Engineering		
Client Address:	Raleigh, NC		

Boring #:	EB1-A LT LN	Sample #:	SS-77	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	0.0 - 1.5
Sample Description:	Gray Coarse to Fine Sandy Clayey SILT (A-4) (0)				

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

Measurements	
Weigtht of Air Dry Soil (g)	***29.99***
Distilled Water (g)	***30.02***
Temperature ^{0}C	***22.6***
pH Readings	***5.74***

Notes / Deviations / References: AASHTO T-289: Determining pH of Soil for Use in Corrosion Testing

Mal Krajan, ET		Laboratory Manager	11/14/2016
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

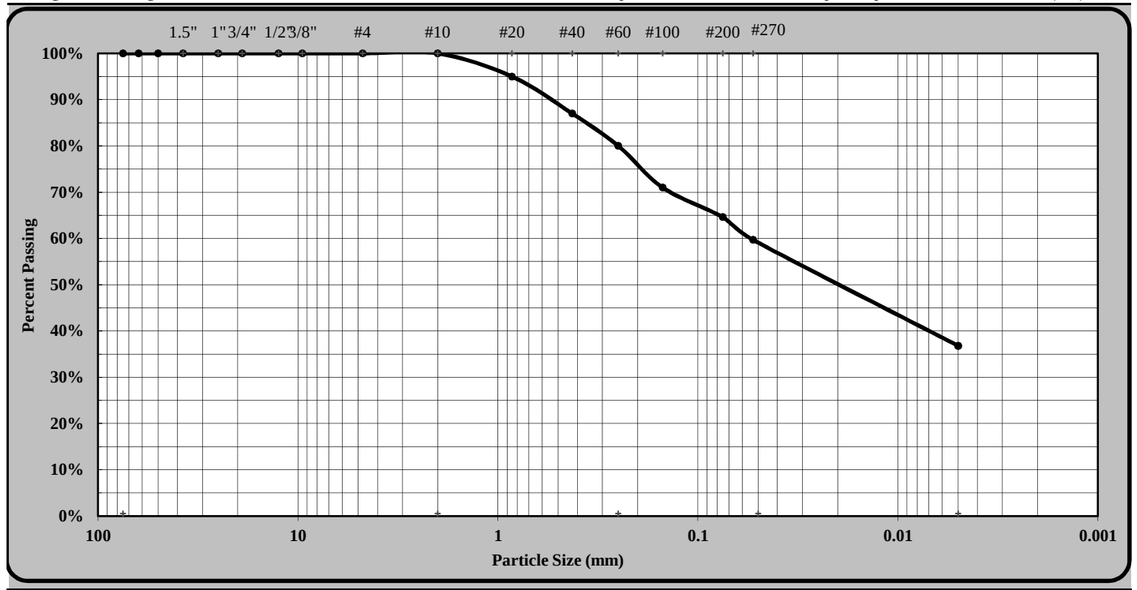
Particle Size Analysis of Soils

AASHTO T88 as Modified by NCDOT

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-16-010			Report Date:	11/14/16
Project Name:	C.F. Harvey Parkway Extension R-5703			Test Date(s):	10/7 - 11/14/16
State Project #:	46375.1.1	F.A. Project No:	N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering				
Address:	Raleigh, NC				
Boring #:	EB1-A LT LN	Sample #:	SS-78	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	18.8 - 19.6
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY A-7-5 (16)				



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	3/8"	Coarse Sand	20%	Silt	23%
Gravel	0%	Fine Sand	20%	Clay	37%
Apparent Relative Density	ND	Moisture Content	52%	% Passing #200	64.6%
Liquid Limit	62	Plastic Limit	38	Plastic Index	24

Soil Mortar (-#10 Sieve)

Coarse Sand	20%	Fine Sand	20%	Silt	23%	Clay	37%
Description of Sand & Gravel Particles:		Rounded	☐			Angular	☐
Hard & Durable	☐	Soft	☐			Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	11/14/2016
Technician Name	*Certification No.*	*Position*	*Date*

Mal Krajan, ET		Laboratory Manager	11/14/2016
Technical Responsibility	*Signature*	*Position*	*Date*

Form No: TR-T267
Revision No. 0
Revision Date: 07/10/08

Moisture, Ash, and Organic Matter

AASHTO T-267 — *Quality Assurance*

S&ME, Inc. Raleigh, 3201 Spring Forest Raod, Raleigh, North Carolina 27616

Project #:	**6235-16-010**			Report Date:	10/21/16
Project Name:	C.F. Harvey Parkway Extension R-5703			Test Date(s):	10/18 - 10/21/16
Client Name:	Michael Baker Engineering				
Client Address:	Raleigh, NC				
Boring #:	EB1-A LT LN	Sample #:	SS-78	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	18.8 - 19.6
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY (A-7-5) (16)				

Equipment: *Balance: 0.01 g.Readability, 500g. Minimum Capaccity*

Balance: *S&ME ID #:* ***1024*** *Cal. Date:* ***11/06/16*** *Due:* ***11/06/17***

Method A: Moisture Content Determination *Required Oven Temperature:105 ± 5 °C*

	Oven Temperature: **105 °C**	*Tare #*	a
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	51.04
a	Mass of ***As-Received*** Specimen + Tare Wt.	*grams*	95.61
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	80.33
w	Water Weight	*(a-b)*	15.28
A	Mass of As-Received Specimen	*(a-t)*	44.57
B	Mass of Oven Dry Specimen	*(b-t)*	29.29
	% Moisture Content as a % of As Received or Total Mass	*(w/A)*100*	**34.3%**
	% Moisture Content as a % of Oven-dried Mass	*(w/B)*100*	**52.2%**

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 #*	5
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	21.02
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	37.38
c	Ash Weight + Tare Wt.	*grams*	37.09
C	Ash Weight	*c-t*	16.07
B	Mass of Oven Dry Specimen	*(b-t)*	16.36
D	***% Ash Content***	*(C/B)*100*	**98.2%**
	% Organic Matter	*100-D*	**1.8%**

Muffle Furnace: *S&ME ID #:* ***00261***

Notes / Deviations / References:

Mal Krajan, ET — *Technical Responsibility*
Signature
Laboratory Manager — *Position*
11/14/2016 — *Date*

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

pH of Soil

AASHTO T289 — *Quality Assurance*

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

Project #:	**6235-16-010**			Report Date:	11/7/16
Project Name:	C.F. Harvey Parkway Extension R-5703			Test Date(s):	11/5 - 11/7/16
Client Name:	Michael Baker Engineering				
Client Address:	Raleigh, NC				
Boring #:	EB1-A LT LN	Sample #:	SS-78	Sample Date:	9/6/16
Location:	341+36	Offset:	21' LT	Depth (ft):	18.8 - 19.6
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY (A-7-5) (16)				

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

Measurements	
Weigtht of Air Dry Soil (g)	***30.00***
Distilled Water (g)	***30.01***
Temperature ^{0}C	***21.9***
pH Readings	***5.58***

Notes / Deviations / References: AASHTO T-289: Determining pH of Soil for Use in Corrosion Testing

Mal Krajan, ET — *Technical Responsibility*
Signature
Laboratory Manager — *Position*
11/14/2016 — *Date*

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

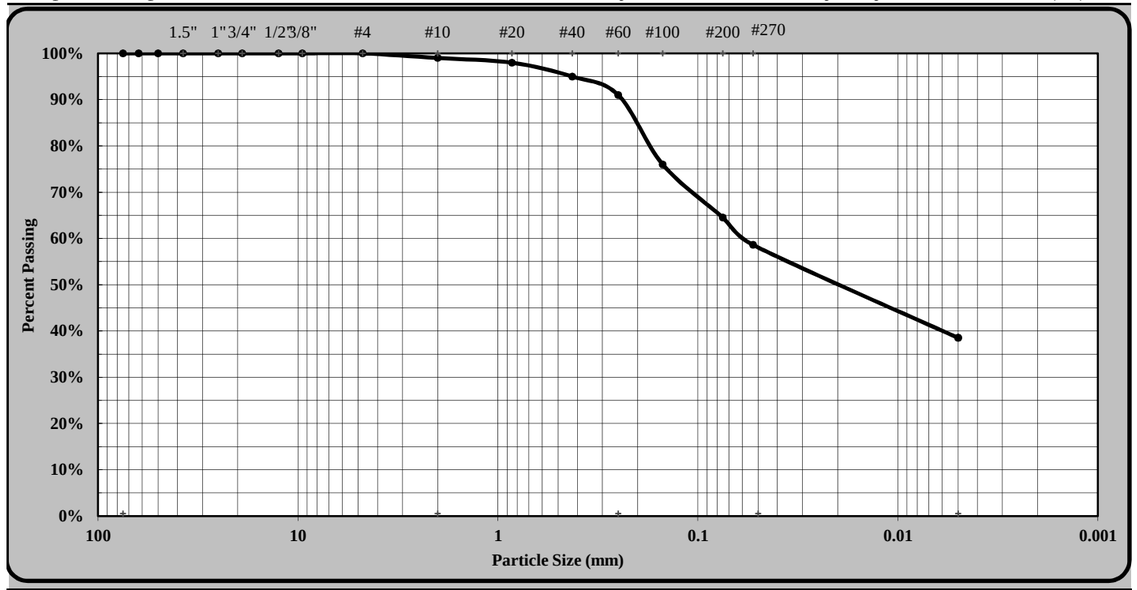
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-16-010	Report Date:	12/27/16
Project Name:	C.F. Harvey Parkway Extension R-5703	Test Date(s):	12/24 - 12/27/16
State Project #:	46375.1.1 F.A. Project No: N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering		
Address:	Raleigh, NC		
Boring #:	EB1-A LT LN Sample #: ST-10	Sample Date:	9/6/16
Location:	341+36 Offset: 23' LT	Depth (ft):	3.0 - 5.0 ft.
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY	A-6	(10)



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#4	Coarse Sand	8%	Silt	20%
Gravel	1%	Fine Sand	32%	Clay	39%
Apparent Relative Density	ND	Moisture Content	23%	% Passing #200	64.5%
Liquid Limit	34	Plastic Limit	14	Plastic Index	20

Soil Mortar (-#10 Sieve)

Coarse Sand	8%	Fine Sand	33%	Silt	20%	Clay	39%

Description of Sand & Gravel Particles:	Rounded	☐		Angular	☒
Hard & Durable	☒	Soft	☐	Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	12/27/2016
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET	*Signature*	Laboratory Manager	9/26/2016
Technical Responsibility		*Position*	*Date*

Oedometer Settlement Tests

Sample details

Sketch showing specimen location in original Sample

Depth	3.0 - 5.0 ft.
Description:	Gray Coarse to Fine Sandy Silty CLAY (A-6) (10)
Type	Undisturbed
Height H_0 (in)	0.999
Diameter D_0 (in)	2.501
Weight W_0 (gr)	156.58
Bulk Density ρ (PCF)	121.54
Particle Density ρ_s	2.671 (measured)

Initial Conditions

Settlement Channel	1001
Moisture Content w_0%	22.5
Dry Density ρ_d (PCF)	99.22
Voids Ratio e_0	0.6798
Deg of Saturation S_0%	88.4
Swelling Pressure Ss (TSF)	0.000

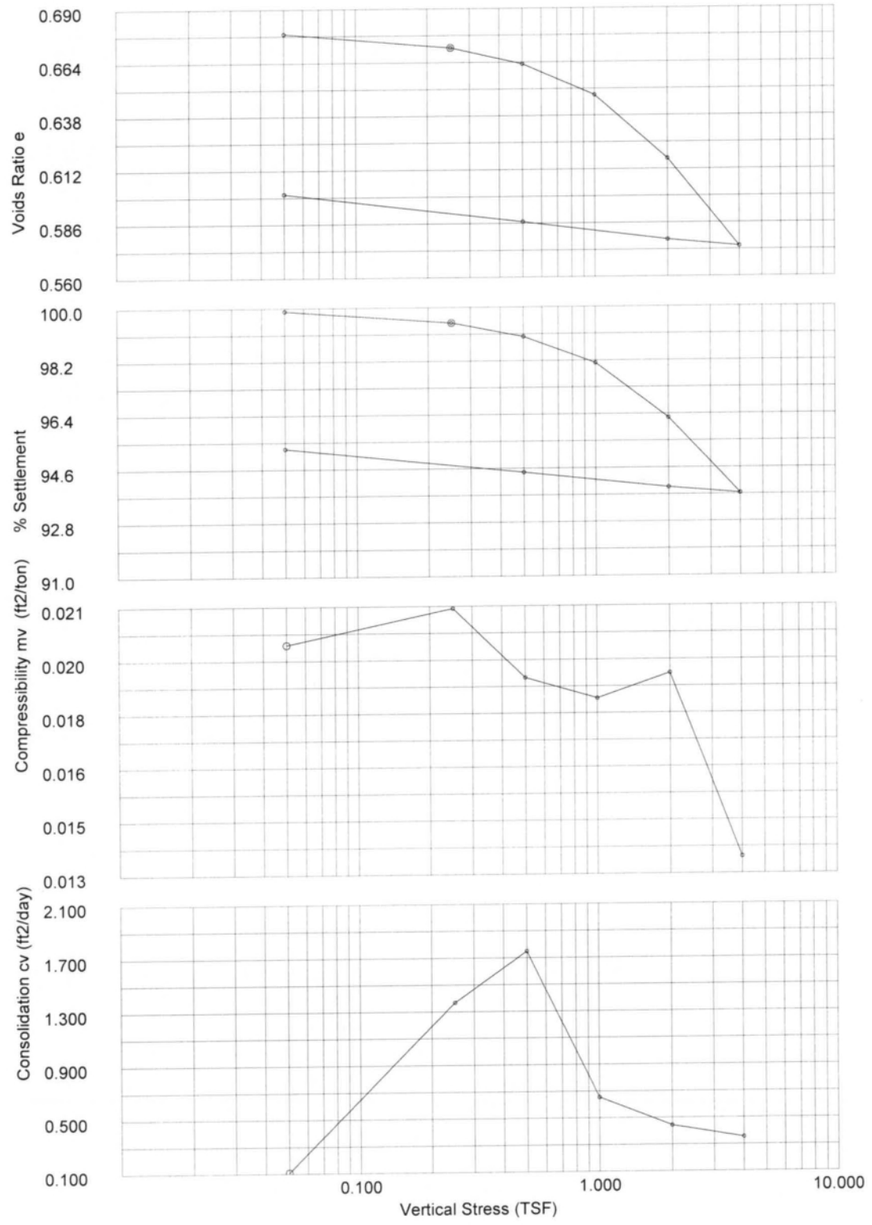
Final Conditions

Moisture Content w_f%	22.1
Dry Density ρ_d (PCF)	104.12
Voids Ratio e_f	0.6007
Deg of Saturation S_f%	98.11
Settlement: (in)	0.047
Compression Index C_c	0.140
Notes:	Test specimen taken from the middle portion of UD tube.

S&ME

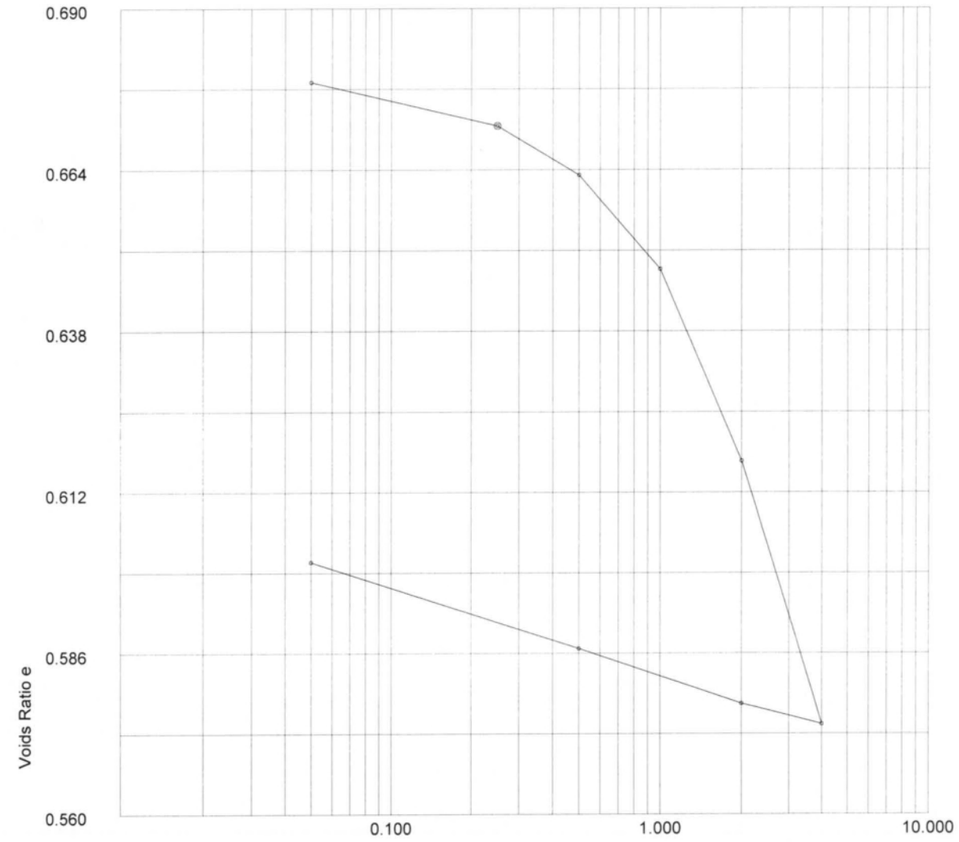
ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MK	Checked: MK		Approved:

Oedometer Settlement Tests



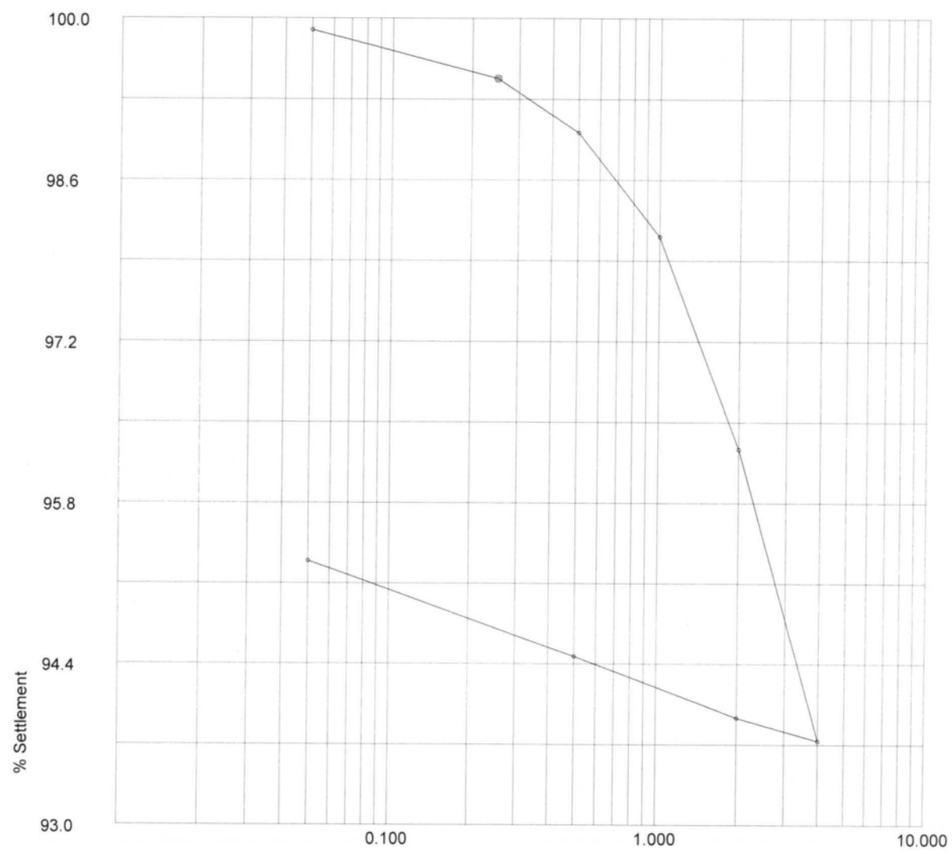
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	11-29-16
	Site Reference: C.F. Harvey	Sample:	ST-10
	Jobfile: E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



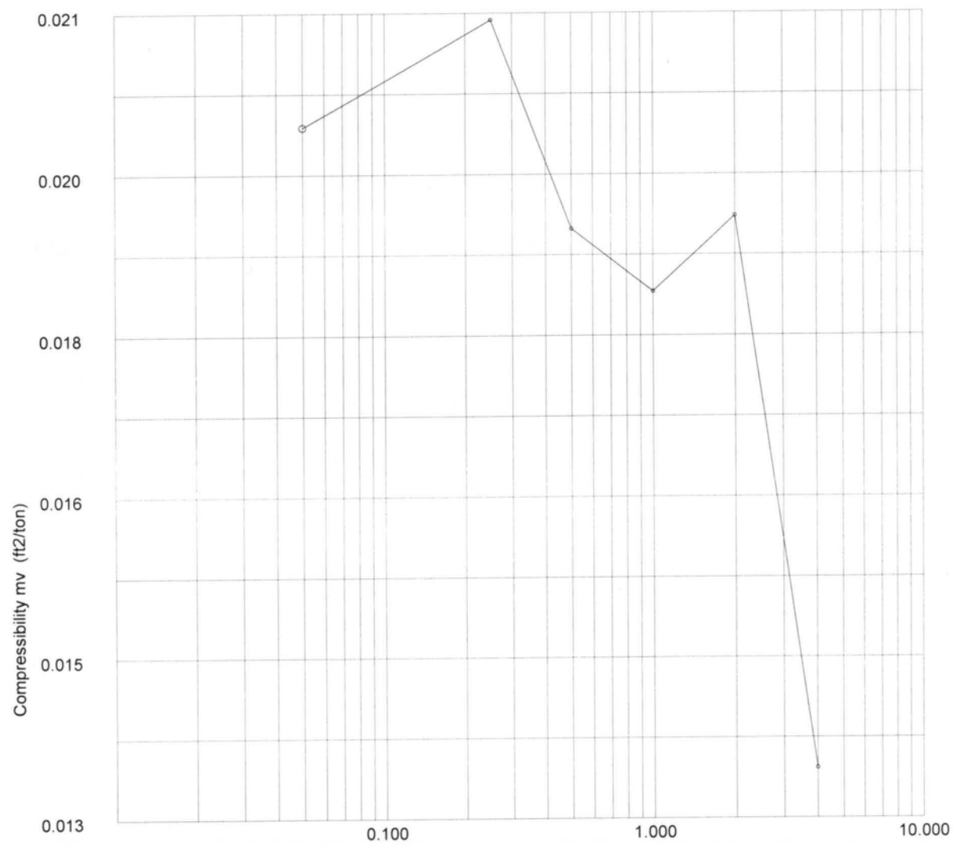
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	11-29-16
	Site Reference: C.F. Harvey	Sample:	ST-10
	Jobfile: E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



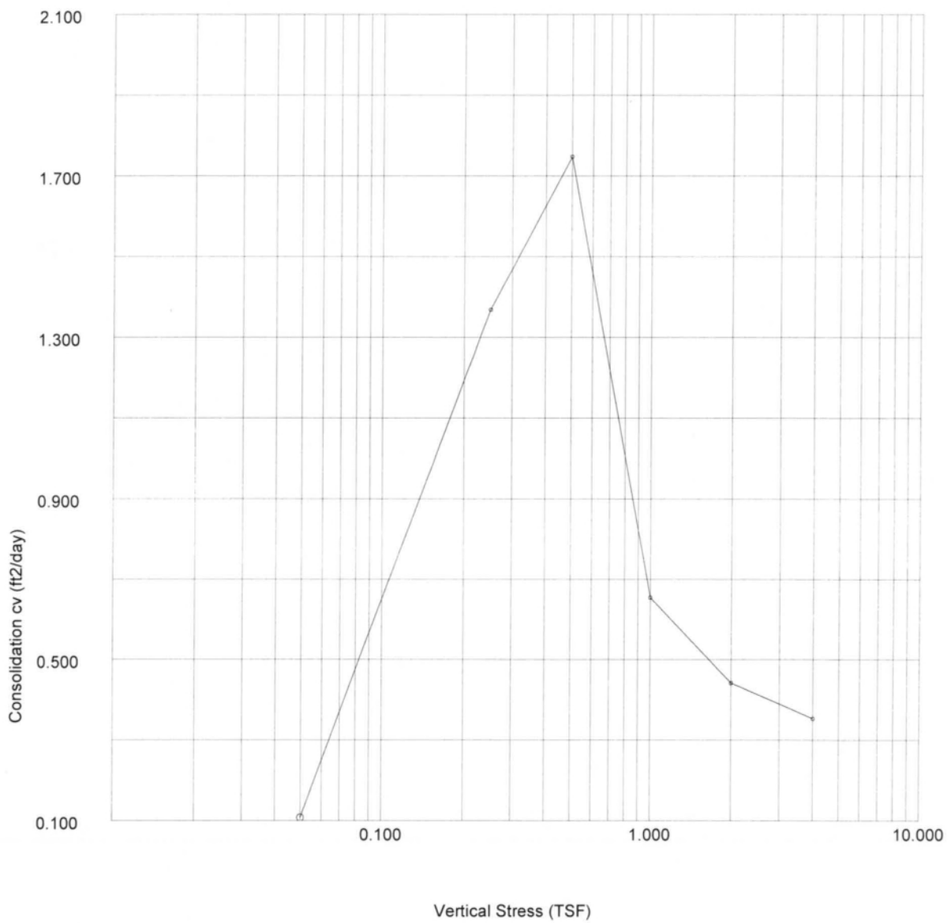
S&ME	ASTM D2435-96	Test name: Consolidation Date of Test: 11-29-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB	Sample: ST-10 Borehole: EB1-A Lt. Ln.	
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name: Consolidation Date of Test: 11-29-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB	Sample: ST-10 Borehole: EB1-A Lt. Ln.	
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



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	0.0010	0.0	21.6	0.6781	4.624	0.00	0.108	0.020
0.250	21.6	0.0052	0.0	21.6	0.6710	0.362	0.00	1.368	0.021
0.500	21.6	0.0099	0.0	21.6	0.6631	0.281	0.0003	1.748	0.019
1.000	21.6	0.0189	0.0	21.6	0.6480	0.741	0.0004	0.655	0.018
2.000	21.6	0.0373	0.0	21.6	0.6170	1.067	0.0006	0.442	0.019
4.000	21.6	0.0626	0.0	21.6	0.5745	1.274	0.0001	0.354	0.014
2.000	21.6	0.0606	0.0	21.6	0.5779				0.001
0.500	21.6	0.0553	0.0	21.6	0.5868				0.004
0.050	21.6	0.0470	0.0	21.6	0.6007				0.019

S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MK	*Checked:* MK		*Approved:*

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	3	0.0003	0.0003
4	0.050	4	0.0004	0.0004
5	0.067	4	0.0004	0.0004
6	0.083	4	0.0004	0.0004
7	0.100	4	0.0004	0.0004
8	0.200	4	0.0004	0.0004
9	0.400	5	0.0005	0.0005
10	0.800	5	0.0005	0.0005
11	1.000	5	0.0005	0.0005
12	2.000	6	0.0006	0.0006
13	4.000	7	0.0007	0.0007
14	8.000	8	0.0008	0.0008
15	10.000	8	0.0008	0.0008
16	20.000	9	0.0009	0.0009
17	40.000	10	0.0010	0.0010
18	80.000	10	0.0010	0.0010
19	100.000	10	0.0010	0.0010
20	169.690	10	0.0010	0.0010

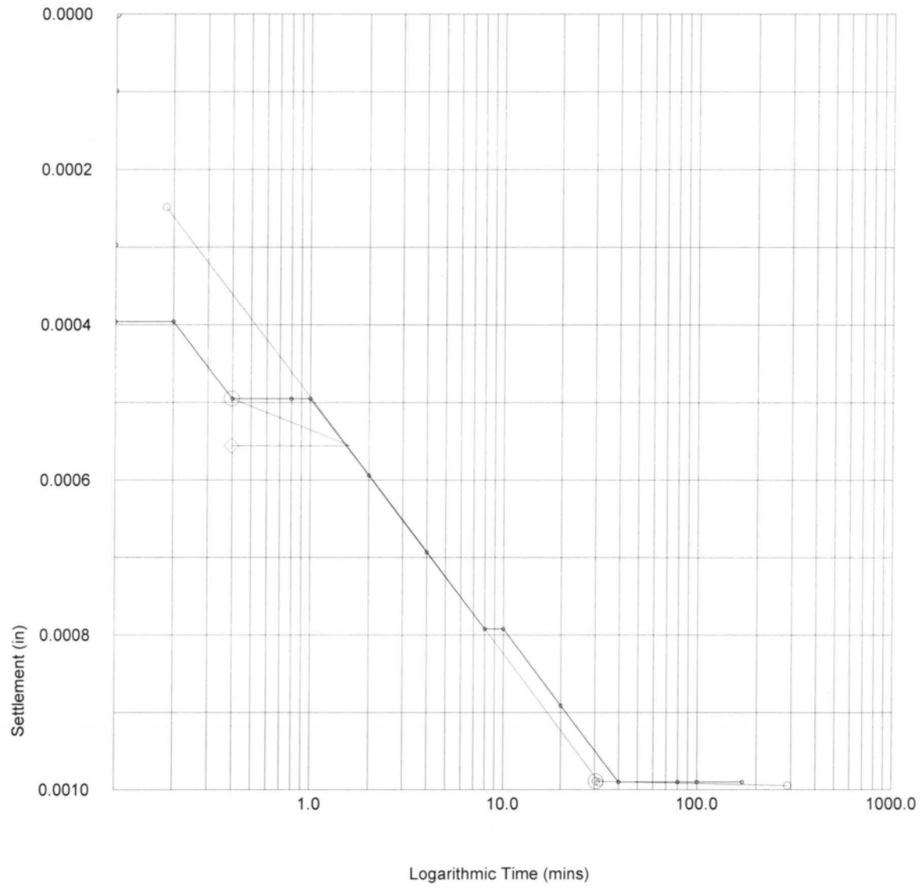
S&ME

ASTM D2435-96		Test name	Consolidation Load: 0.050 (TSF)
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.001
Voids Ratio e	0.6781
Final Temp oC	0.0
t_{50} (mins)	4.62
c_v (ft2/day)	0.108
m_v (ft2/ton)	0.02
Sec Compression C_{sec}	0.00



S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	10	0.0010	0.0010
2	0.017	12	0.0012	0.0012
3	0.033	41	0.0041	0.0041
4	0.050	43	0.0043	0.0043
5	0.067	43	0.0043	0.0043
6	0.083	44	0.0044	0.0044
7	0.100	44	0.0044	0.0044
8	0.200	45	0.0045	0.0045
9	0.400	47	0.0047	0.0047
10	0.800	49	0.0049	0.0049
11	1.000	49	0.0049	0.0049
12	2.000	50	0.0050	0.0050
13	4.000	51	0.0051	0.0051
14	8.000	51	0.0051	0.0051
15	10.000	51	0.0051	0.0051
16	20.000	52	0.0052	0.0052
17	40.000	52	0.0052	0.0052
18	80.000	52	0.0052	0.0052
19	100.000	52	0.0052	0.0052
20	126.310	52	0.0052	0.0052

S&ME

ASTM D2435-96 | Test name Consolidation Load: 0.250 (TSF) | Date of Test: 11-29-16

Site Reference: C.F. Harvey | Sample: ST-10

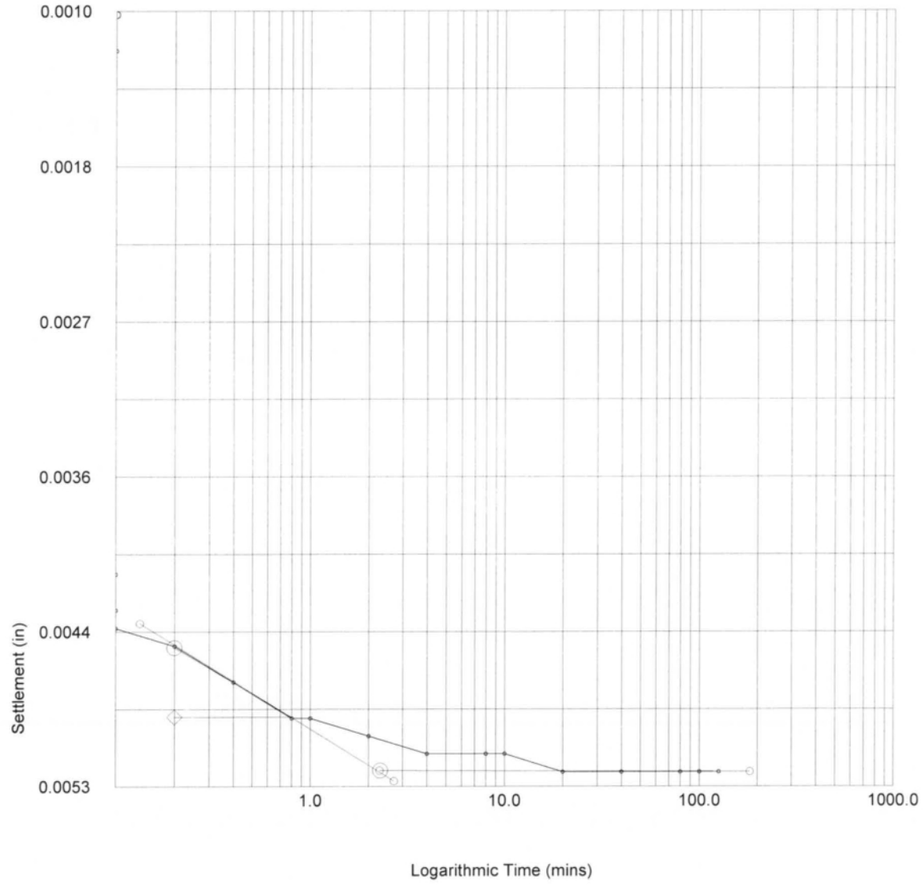
Jobfile: E:\16010.JOB | Borehole: EB1-A Lt. Ln.

Operator: MLC | Checked: MLC | Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0042
Voids Ratio e	0.6710
Final Temp oC	0.0
t_{50} (mins)	0.36
c_v (ft2/day)	1.368
m_v (ft2/ton)	0.021
Sec Compression C_{sec}	0.00



S&ME

ASTM D2435-96 | Test name Consolidation | Date of Test: 11-29-16

Site Reference: C.F. Harvey | Sample: ST-10

Jobfile: E:\16010.JOB | Borehole: EB1-A Lt. Ln.

Operator: MLC | Checked: MLC | Approved:

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	52	0.0052	0.0052
2	0.017	55	0.0055	0.0055
3	0.033	55	0.0055	0.0055
4	0.050	78	0.0078	0.0078
5	0.067	81	0.0081	0.0081
6	0.083	83	0.0083	0.0083
7	0.100	83	0.0083	0.0083
8	0.200	85	0.0085	0.0085
9	0.400	88	0.0088	0.0088
10	0.800	90	0.0090	0.0090
11	1.000	90	0.0090	0.0090
12	2.000	91	0.0091	0.0091
13	4.000	92	0.0092	0.0092
14	8.000	93	0.0093	0.0093
15	10.000	94	0.0094	0.0094
16	20.000	96	0.0096	0.0096
17	40.000	97	0.0097	0.0097
18	80.000	98	0.0098	0.0098
19	100.000	99	0.0099	0.0099
20	146.140	99	0.0099	0.0099

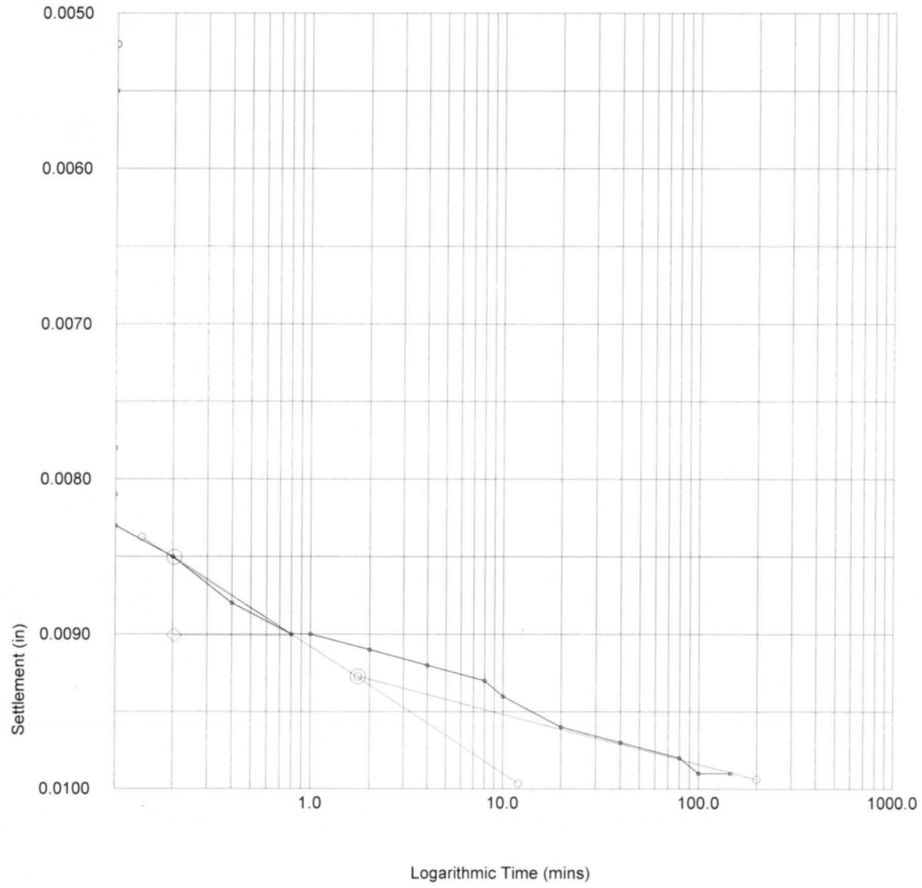
S&ME

ASTM D2435-96		Test name	Consolidation Load: 0.500 (TSF)
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MK	Checked: MK	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0047
Voids Ratio e	0.6631
Final Temp oC	0.0
t_{50} (mins)	0.28
c_v (ft2/day)	1.748
m_v (ft2/ton)	0.019
Sec Compression C_{sec}	0.0003



S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MK	Checked: MK	Approved:	

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	99	0.0099	0.0099
2	0.017	100	0.0100	0.0100
3	0.033	100	0.0100	0.0100
4	0.050	146	0.0146	0.0146
5	0.067	153	0.0153	0.0153
6	0.083	155	0.0155	0.0155
7	0.100	156	0.0156	0.0156
8	0.200	162	0.0162	0.0162
9	0.400	165	0.0165	0.0165
10	0.800	170	0.0170	0.0170
11	1.000	171	0.0171	0.0171
12	2.000	174	0.0174	0.0174
13	4.000	178	0.0178	0.0178
14	8.000	181	0.0181	0.0181
15	10.000	181	0.0181	0.0181
16	20.000	185	0.0185	0.0185
17	40.000	187	0.0187	0.0187
18	80.000	188	0.0188	0.0188
19	100.000	189	0.0189	0.0189
20	122.417	189	0.0189	0.0189

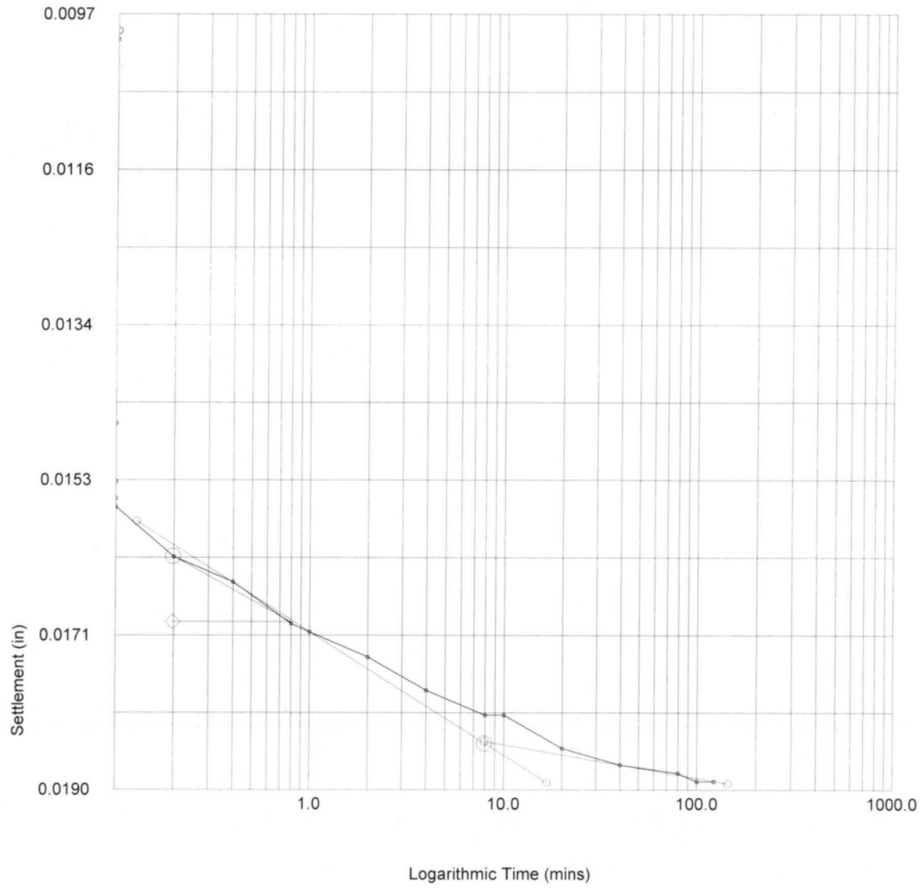
S&ME

ASTM D2435-96		Test name	Consolidation Load: 1.000 (TSF)
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.009
Voids Ratio e	0.6480
Final Temp oC	0.0
t_{50} (mins)	0.74
c_v (ft2/day)	0.655
m_v (ft2/ton)	0.018
Sec Compression C_{sec}	0.0004



S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	11-29-16
Site Reference:	C.F. Harvey	Sample:	ST-10
Jobfile:	E:\16010.JOB	Borehole:	EB1-A Lt. Ln.
Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	189	0.0189	0.0189
2	0.017	191	0.0191	0.0191
3	0.033	257	0.0257	0.0257
4	0.050	287	0.0287	0.0287
5	0.067	296	0.0296	0.0296
6	0.083	304	0.0304	0.0304
7	0.100	307	0.0307	0.0307
8	0.200	316	0.0316	0.0316
9	0.400	324	0.0324	0.0324
10	0.800	331	0.0331	0.0331
11	1.000	332	0.0332	0.0332
12	2.000	339	0.0339	0.0339
13	4.000	346	0.0346	0.0346
14	8.000	352	0.0352	0.0352
15	10.000	354	0.0354	0.0354
16	20.000	358	0.0358	0.0358
17	40.000	362	0.0362	0.0362
18	80.000	365	0.0365	0.0365
19	100.000	365	0.0365	0.0365
20	200.000	369	0.0369	0.0369
21	400.000	371	0.0371	0.0371
22	800.000	373	0.0373	0.0373
23	912.383	373	0.0373	0.0373

S&ME

ASTM D2435-96 | Test name Consolidation Load: 2.000 (TSF) | Date of Test: 11-29-16

Site Reference: C.F. Harvey | Sample: ST-10

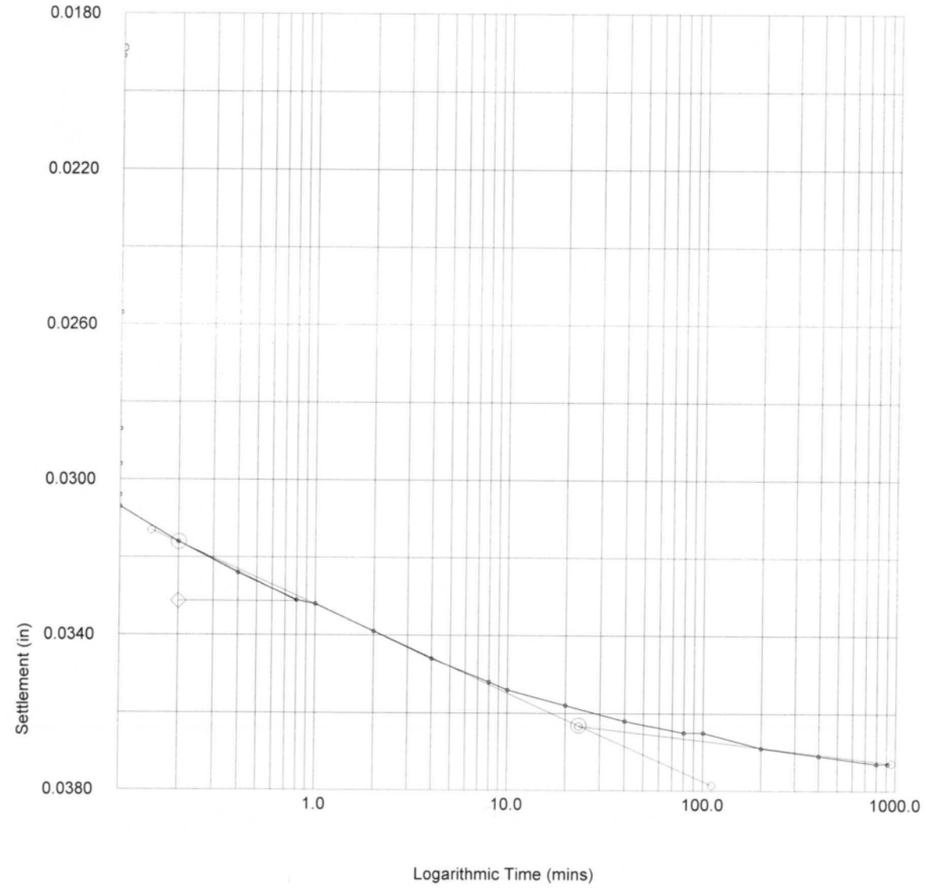
Jobfile: E:\16010.JOB | Borehole: EB1-A Lt. Ln.

Operator: MLC | Checked: MLC | Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0184
Voids Ratio e	0.6170
Final Temp oC	0.0
t_{50} (mins)	1.07
c_v (ft2/day)	0.442
m_v (ft2/ton)	0.019
Sec Compression C_{sec}	0.0006



S&ME

ASTM D2435-96 | Test name Consolidation | Date of Test: 11-29-16

Site Reference: C.F. Harvey | Sample: ST-10

Jobfile: E:\16010.JOB | Borehole: EB1-A Lt. Ln.

Operator: MLC | Checked: MLC | Approved:

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	373	0.0373	0.0373
2	0.017	374	0.0374	0.0374
3	0.033	386	0.0386	0.0386
4	0.050	411	0.0411	0.0411
5	0.067	501	0.0501	0.0501
6	0.083	516	0.0516	0.0516
7	0.100	521	0.0521	0.0521
8	0.200	532	0.0532	0.0532
9	0.400	543	0.0543	0.0543
10	0.800	556	0.0556	0.0556
11	1.000	561	0.0561	0.0561
12	2.000	574	0.0574	0.0574
13	4.000	589	0.0589	0.0589
14	8.000	603	0.0603	0.0603
15	10.000	606	0.0606	0.0606
16	20.000	615	0.0615	0.0615
17	40.000	620	0.0620	0.0620
18	80.000	625	0.0625	0.0625
19	100.000	625	0.0625	0.0625
20	148.910	626	0.0626	0.0626

S&ME

ASTM D2435-96

Test name Consolidation Load: 4.000 (TSF)
Date of Test: 11-29-16

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

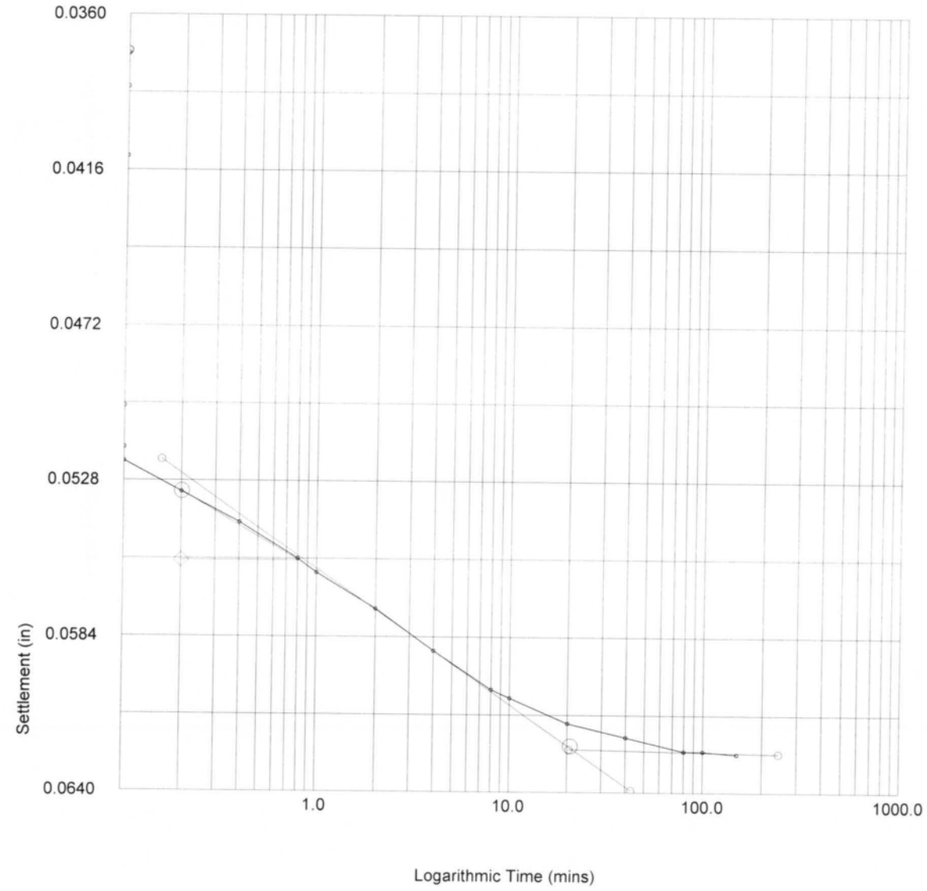
Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	4.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0253
Voids Ratio e	0.5745
Final Temp oC	0.0
t_{50} (mins)	1.27
c_v (ft2/day)	0.354
m_v (ft2/ton)	0.014
Sec Compression C_{sec}	0.0001



S&ME

ASTM D2435-96

Test name Consolidation
Date of Test: 11-29-16

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

Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	625	0.0625	0.0625
2	0.017	619	0.0619	0.0619
3	0.033	613	0.0613	0.0613
4	0.050	612	0.0612	0.0612
5	0.067	612	0.0612	0.0612
6	0.083	612	0.0612	0.0612
7	0.100	612	0.0612	0.0612
8	0.200	611	0.0611	0.0611
9	0.400	611	0.0611	0.0611
10	0.800	610	0.0610	0.0610
11	1.000	610	0.0610	0.0610
12	2.000	609	0.0609	0.0609
13	4.000	609	0.0609	0.0609
14	8.000	608	0.0608	0.0608
15	10.000	608	0.0608	0.0608
16	20.000	607	0.0607	0.0607
17	40.000	606	0.0606	0.0606
18	80.000	606	0.0606	0.0606
19	100.000	606	0.0606	0.0606
20	168.817	606	0.0606	0.0606

S&ME

ASTM D2435-96

Test name Consolidation Load: 2.000 (TSF)
Date of Test: 11-29-16

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

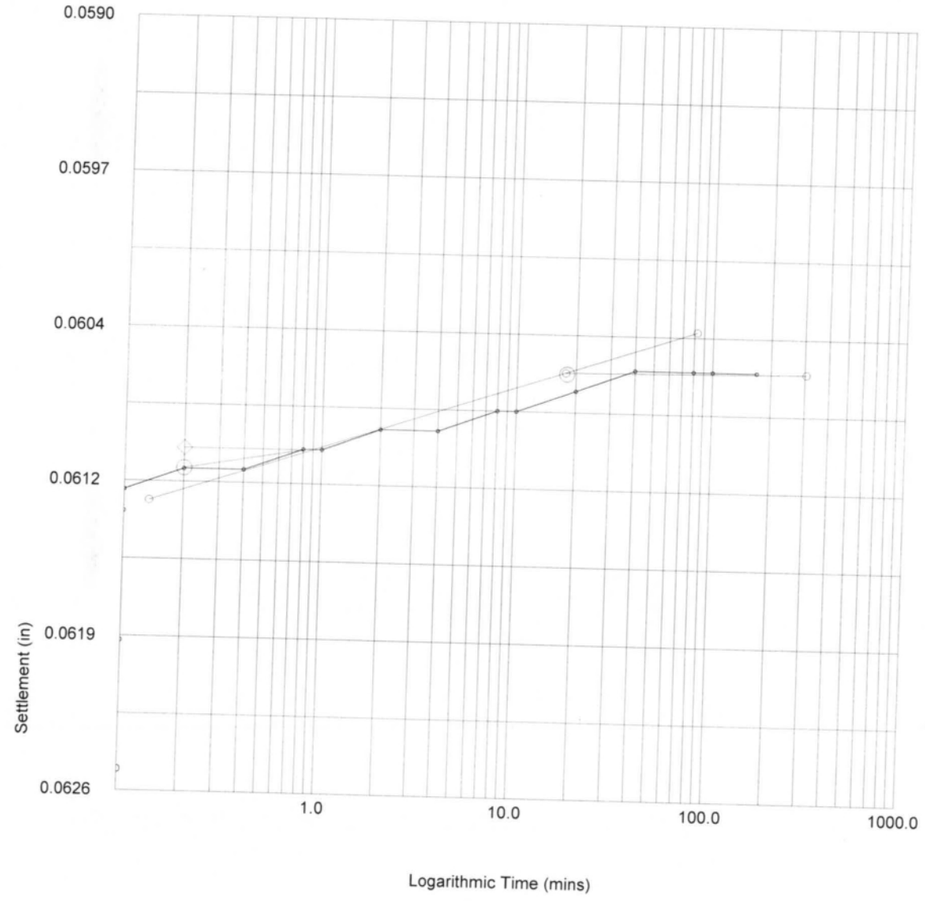
Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0019
Voids Ratio e	0.5779
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME

ASTM D2435-96

Test name Consolidation
Date of Test: 11-29-16

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

Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Oedometer Settlement Tests

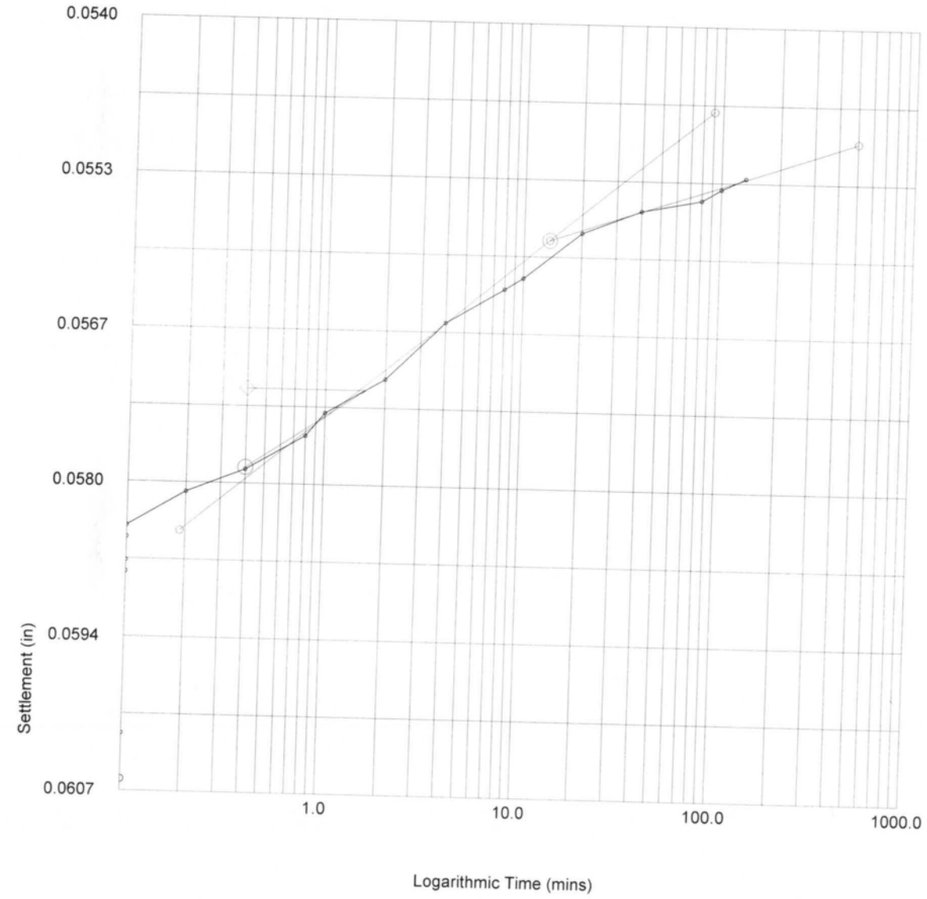
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	606	0.0606	0.0606
2	0.017	602	0.0602	0.0602
3	0.033	602	0.0602	0.0602
4	0.050	588	0.0588	0.0588
5	0.067	587	0.0587	0.0587
6	0.083	585	0.0585	0.0585
7	0.100	584	0.0584	0.0584
8	0.200	581	0.0581	0.0581
9	0.400	579	0.0579	0.0579
10	0.800	576	0.0576	0.0576
11	1.000	574	0.0574	0.0574
12	2.000	571	0.0571	0.0571
13	4.000	566	0.0566	0.0566
14	8.000	563	0.0563	0.0563
15	10.000	562	0.0562	0.0562
16	20.000	558	0.0558	0.0558
17	40.000	556	0.0556	0.0556
18	80.000	555	0.0555	0.0555
19	100.000	554	0.0554	0.0554
20	133.120	553	0.0553	0.0553

S&ME	ASTM D2435-96	Test name: Consolidation Load: 0.500 (TSF)	
	Site Reference: C.F. Harvey	Date of Test: 11-29-16	
	Jobfile: E:\16010.JOB	Sample: ST-10	
	Operator: MK	Borehole: EB1-A Lt. Ln.	
	Checked: MK	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0053
Voids Ratio e	0.5868
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME	ASTM D2435-96	Test name: Consolidation	
	Site Reference: C.F. Harvey	Date of Test: 11-29-16	
	Jobfile: E:\16010.JOB	Sample: ST-10	
	Operator: MK	Borehole: EB1-A Lt. Ln.	
	Checked: MK	Approved:	

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	553	0.0553	0.0553
2	0.017	549	0.0549	0.0549
3	0.033	549	0.0549	0.0549
4	0.050	542	0.0542	0.0542
5	0.067	542	0.0542	0.0542
6	0.083	541	0.0541	0.0541
7	0.100	540	0.0540	0.0540
8	0.200	539	0.0539	0.0539
9	0.400	536	0.0536	0.0536
10	0.800	532	0.0532	0.0532
11	1.000	532	0.0532	0.0532
12	2.000	526	0.0526	0.0526
13	4.000	520	0.0520	0.0520
14	8.000	512	0.0512	0.0512
15	10.000	508	0.0508	0.0508
16	20.000	500	0.0500	0.0500
17	40.000	492	0.0492	0.0492
18	80.000	482	0.0482	0.0482
19	100.000	480	0.0480	0.0480
20	200.000	475	0.0475	0.0475
21	400.000	471	0.0471	0.0471
22	569.610	470	0.0470	0.0470

S&ME

ASTM D2435-96

Test name Consolidation Load: 0.050 (TSF)
Date of Test: 11-29-16

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

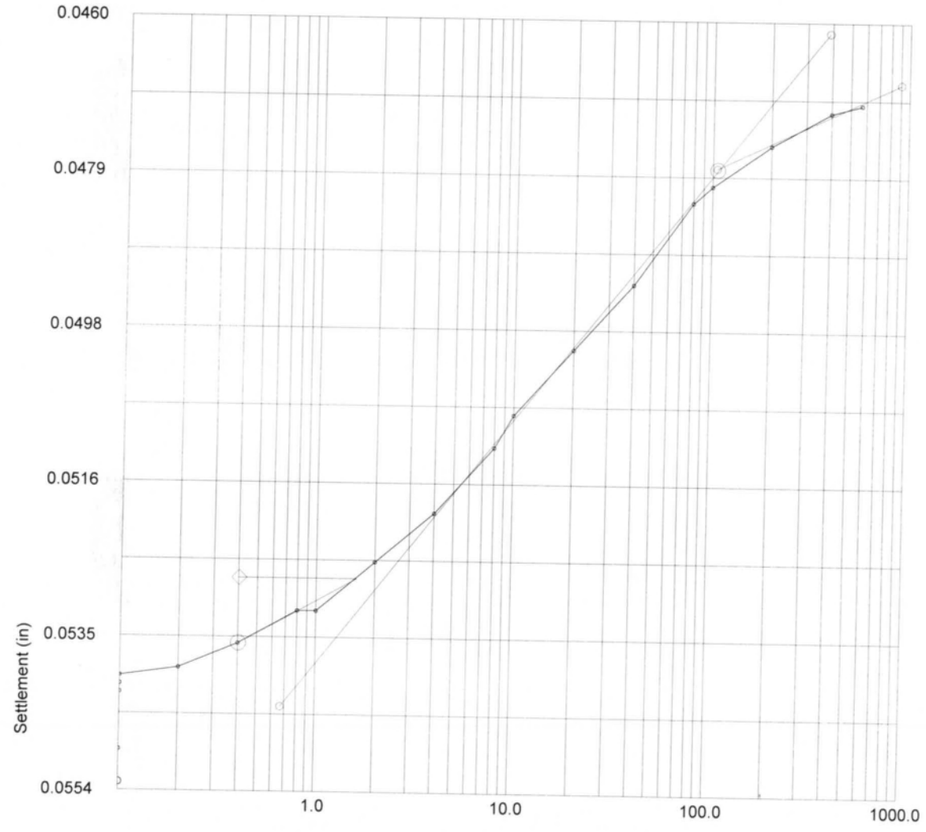
Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0083
Voids Ratio e	0.6007
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME

ASTM D2435-96

Test name Consolidation
Date of Test: 11-29-16

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

Sample: ST-10
Borehole: EB1-A Lt. Ln.

Operator: MLC Checked: MLC Approved:

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

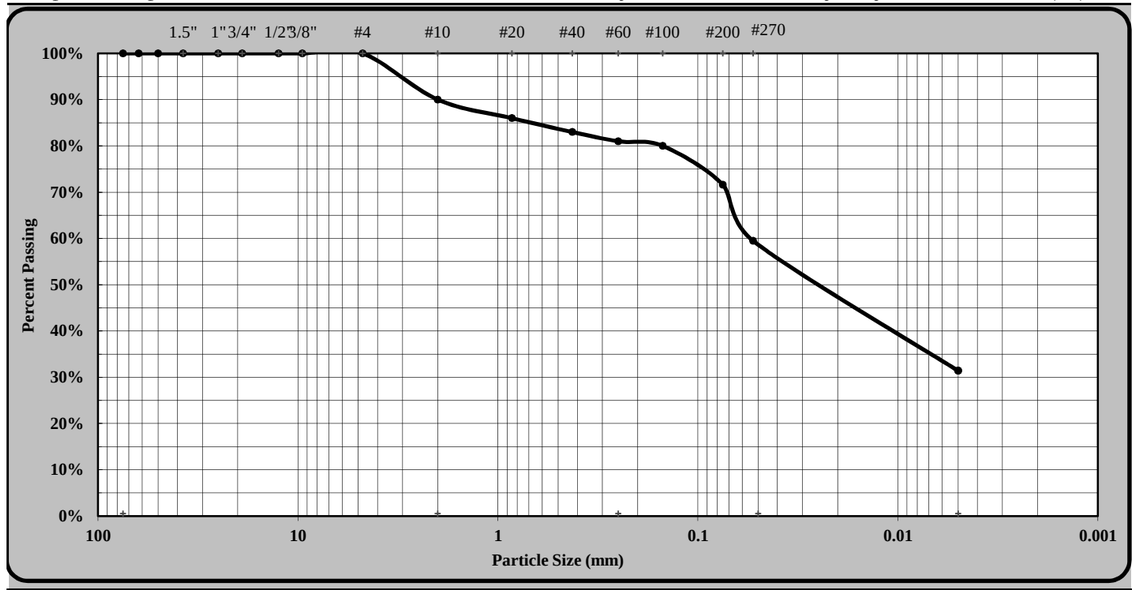
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-16-010	Report Date:	11/14/16
Project Name:	C.F. Harvey Parkway Extension R-5703	Test Date(s):	10/7 - 11/14/16
State Project #:	46375.1.1 F.A. Project No: N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering		
Address:	Raleigh, NC		
Boring #:	EB2-A LT LN Sample #: SS-79	Sample Date:	8/25/16
Location:	343+60 Offset: 43' LT	Depth (ft):	8.5 - 9.1
Sample Description:	Dark Gray Coarse to Fine Sandy Silty CLAY A-7-6 (24)		



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#4	Coarse Sand	9%	Silt	28%
Gravel	10%	Fine Sand	22%	Clay	31%
Apparent Relative Density	ND	Moisture Content	53%	% Passing #200	71.6%
Liquid Limit	62	Plastic Limit	29	Plastic Index	33

Soil Mortar (-#10 Sieve)

Coarse Sand	10%	Fine Sand	24%	Silt	31%	Clay	35%

Description of Sand & Gravel Particles:	Rounded	☐	Angular	☐	
Hard & Durable	☐	Soft	☐	Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	10/7/2016
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	11/14/2016
Technical Responsibility	*Signature*	*Position*	*Date*

Form No. TR-T88
Revision No. 0
Revision Date: 12/20/09

Particle Size Analysis of Soils

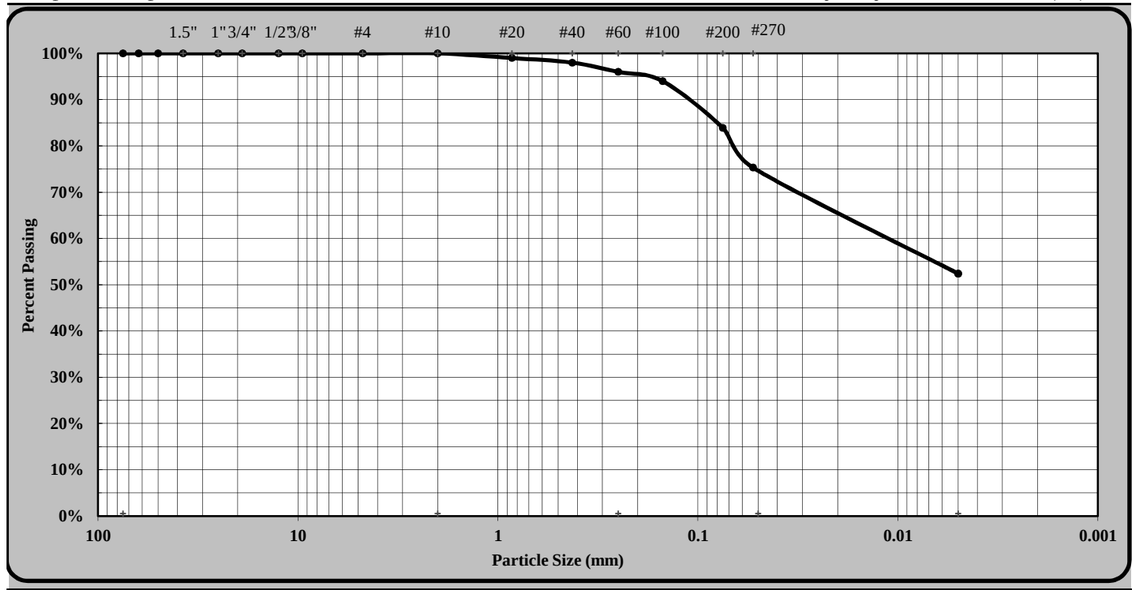
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-16-010	Report Date:	12/27/16
Project Name:	C.F. Harvey Parkway Extension R-5703	Test Date(s):	12/24 - 12/27/16
State Project #:	46375.1.1 F.A. Project No: N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering		
Address:	Raleigh, NC		
Boring #:	EB2-A LT LN Sample #: ST-11	Sample Date:	8/25/16
Location:	343+60 Offset: 40' LT	Depth (ft):	5.0 - 7.0 ft.
Sample Description:	Tan-Brown Coarse to Fine Sandy Silty CLAY A-7-5 (24)		



As Defined by NCDOT		Fine Sand	< 0.25 mm and > 0.05 mm
Gravel	< 75 mm and > 2.00 mm	Silt	< 0.05 and > 0.005 mm
Coarse Sand	< 2.00 mm and >0.25 mm	Clay	< 0.005 mm

Maximum Particle Size	#10	Coarse Sand	4%	Silt	23%
Gravel	0%	Fine Sand	21%	Clay	52%
Apparent Relative Density	ND	Moisture Content	46%	% Passing #200	83.9%
Liquid Limit	68	Plastic Limit	47	Plastic Index	21

Soil Mortar (-#10 Sieve)

Coarse Sand	4%	Fine Sand	21%	Silt	23%	Clay	52%

Description of Sand & Gravel Particles:	Rounded	☐	Angular	☒	
Hard & Durable	☒	Soft	☐	Weathered & Friable	☐

References / Comments / Deviations: ND=Not Determined.

Mal Krajan, ET	104-01-0703	Laboratory Manager	12/27/2016
Technician Name	*Certification No.*	*Position*	*Date*
Mal Krajan, ET		Laboratory Manager	9/26/2016
Technical Responsibility	*Signature*	*Position*	*Date*

Oedometer Settlement Tests

Sample details

Sketch showing specimen location in original Sample

Depth	5.0 - 7.0 ft.
Description:	Tan-Brown Coarse to Fine Sandy Silty CLAY (A-7-5) (25)
Type	Undisturbed
Height H_0 (in)	0.999
Diameter D_0 (in)	2.501
Weight W_0 (gr)	136.51
Bulk Density ρ (PCF)	105.96
Particle Density ρ_s	2.693 (measured)

Initial Conditions

Settlement Channel	1001
Moisture Content w_0%	46.4
Dry Density ρ_d (PCF)	72.39
Voids Ratio e_0	1.3215
Deg of Saturation S_0%	94.5
Swelling Pressure Ss (TSF)	0.000

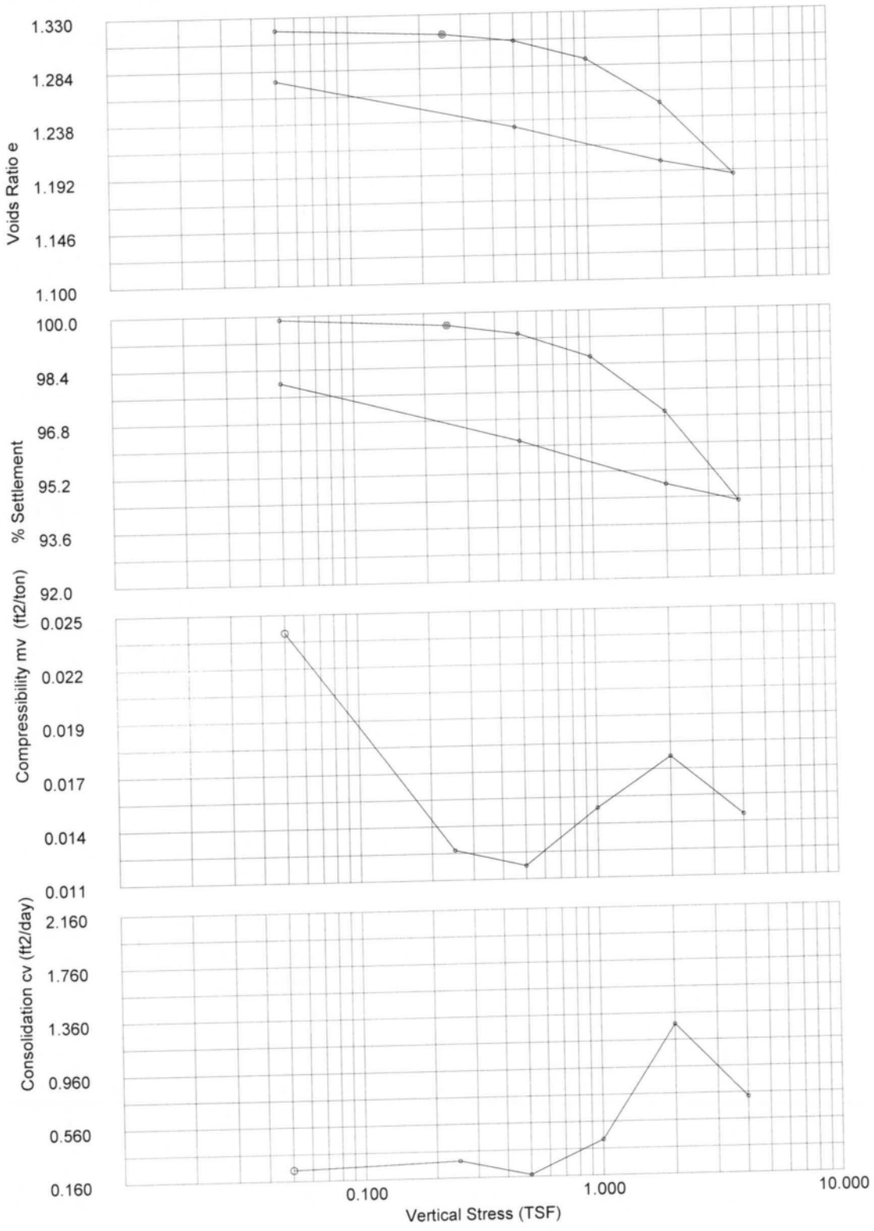
Final Conditions

Moisture Content w_f%	48.0
Dry Density ρ_d (PCF)	73.87
Voids Ratio e_f	1.2750
Deg of Saturation S_f%	100.00
Settlement: (in)	0.02
Compression Index C_c	0.213
Notes:	Test specimen taken from the middle portion of UD tube.

S&ME

ASTM D2435-96		Test name	Consolidation
		Date of Test:	12-8-16
Site Reference:	C.F. Harvey	Sample:	ST-11
Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
Operator: MK	Checked: MK	Approved:	

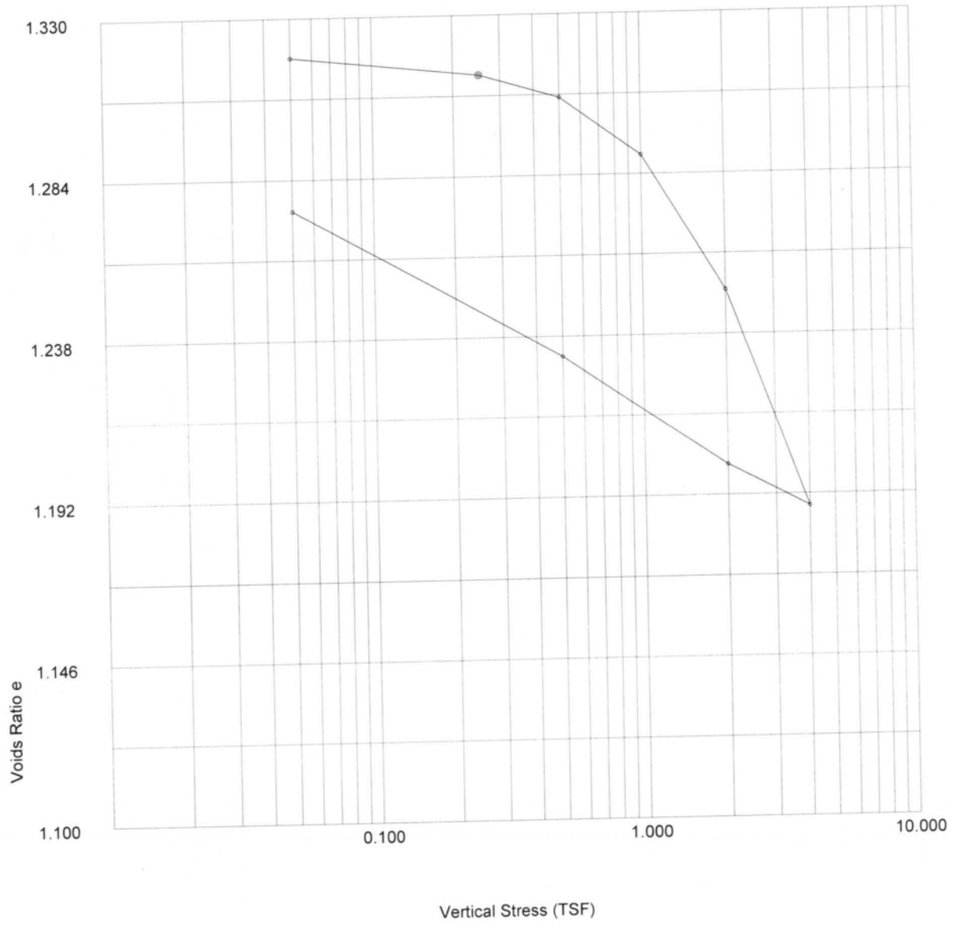
Oedometer Settlement Tests



S&ME

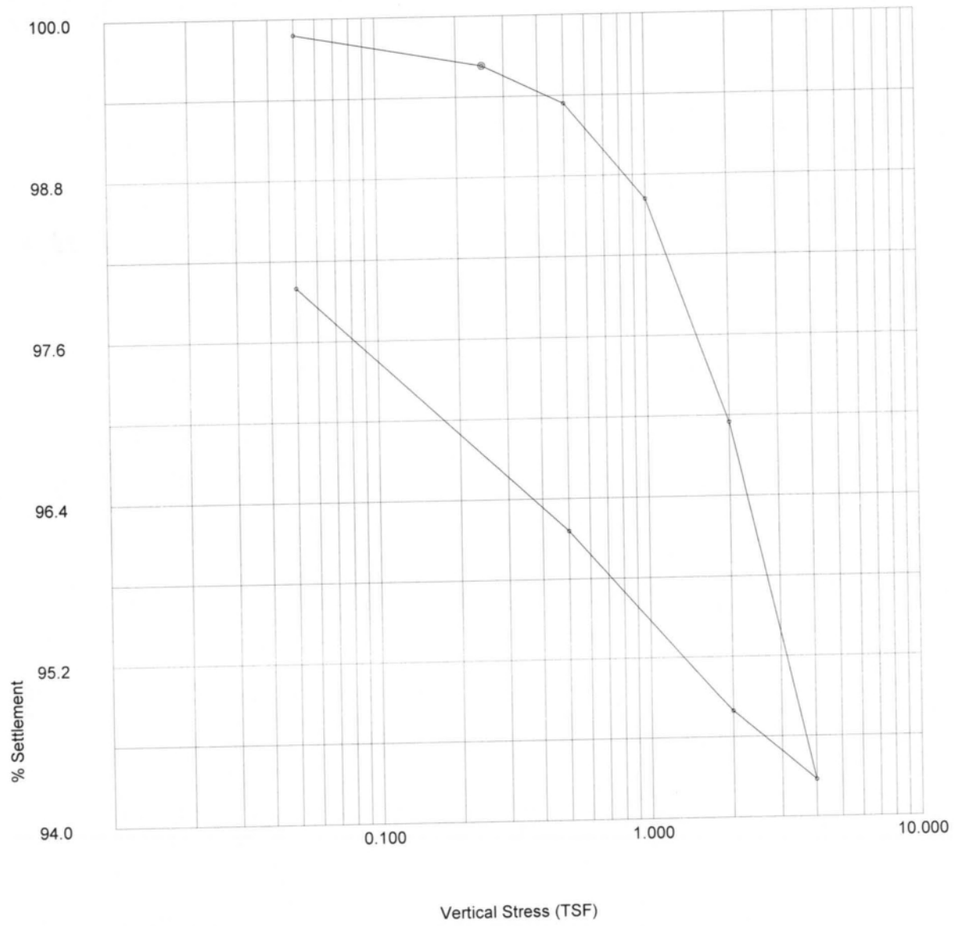
ASTM D2435-96		Test name	Consolidation
		Date of Test:	12-8-16
Site Reference:	C.F. Harvey	Sample:	ST-11
Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
Operator: MK	Checked: MK	Approved:	

Oedometer Settlement Tests



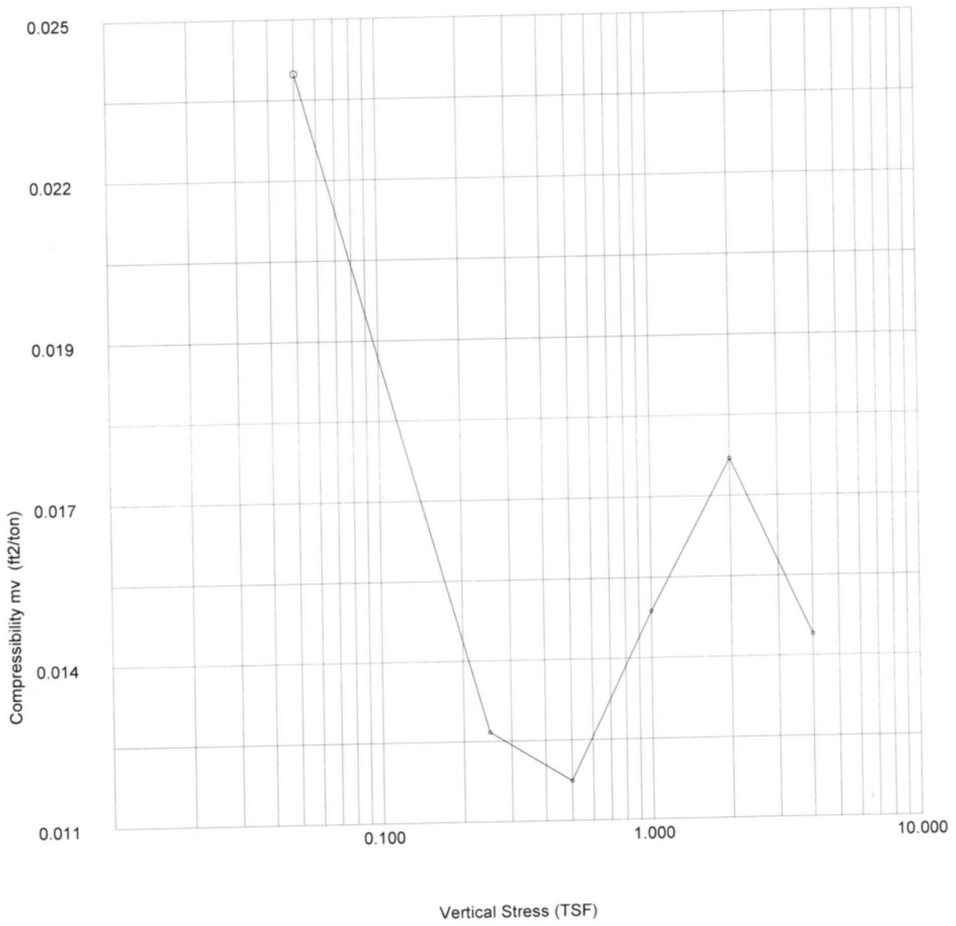
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



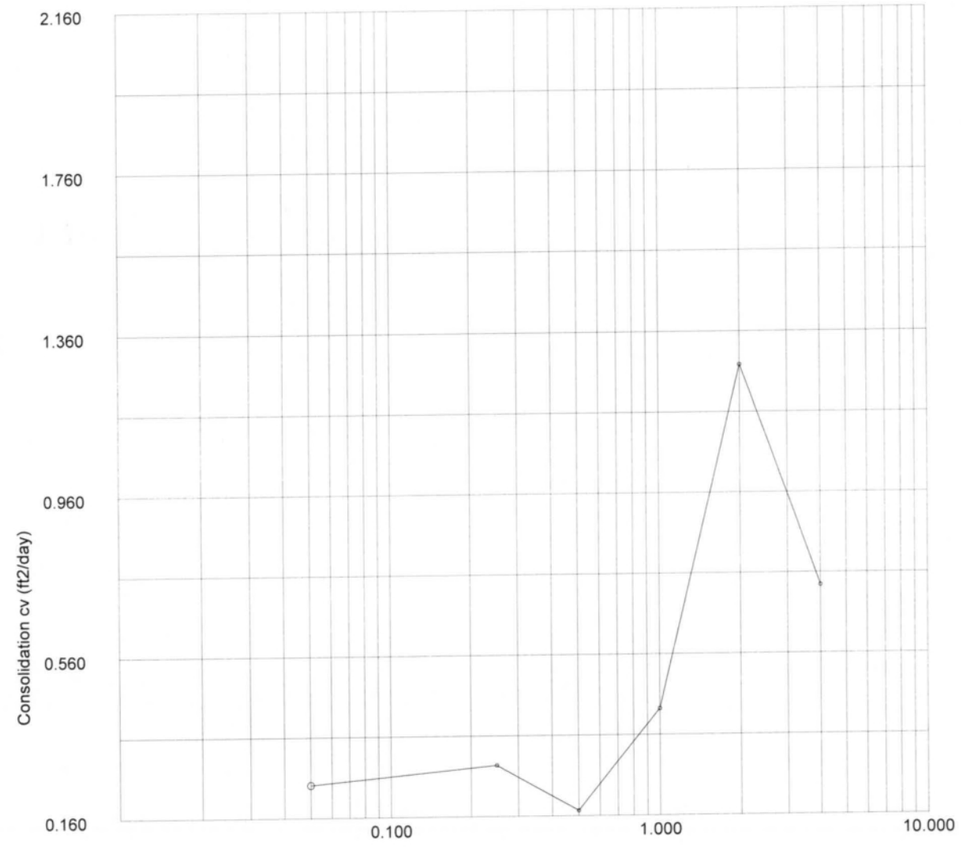
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests

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	1.3187	2.062	0.00	0.242	0.024
0.250	21.6	0.0037	0.0	21.6	1.3129	1.731	0.00	0.287	0.013
0.500	21.6	0.0066	0.0	21.6	1.3061	2.856	0.0001	0.173	0.012
1.000	21.6	0.0138	0.0	21.6	1.2894	1.151	0.0004	0.425	0.015
2.000	21.6	0.0305	0.0	21.6	1.2506	0.374	0.0009	1.277	0.017
4.000	21.6	0.0572	0.0	21.6	1.1886	0.626	0.0003	0.728	0.014
2.000	21.6	0.0520	0.0	21.6	1.2006				0.003
0.500	21.6	0.0384	0.0	21.6	1.2322				0.009
0.050	21.6	0.0200	0.0	21.6	1.2750				0.042

S&ME

ASTM D2435-96

Test name: Consolidation
Date of Test: 12-8-16

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

Sample: ST-11
Borehole: EB2-A Lt. Ln.

Operator: MK
Checked: MK
Approved:

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	3	0.0003	0.0003
4	0.050	4	0.0004	0.0004
5	0.067	4	0.0004	0.0004
6	0.083	4	0.0004	0.0004
7	0.100	4	0.0004	0.0004
8	0.200	4	0.0004	0.0004
9	0.400	5	0.0005	0.0005
10	0.800	6	0.0006	0.0006
11	1.000	6	0.0006	0.0006
12	2.000	7	0.0007	0.0007
13	4.000	8	0.0008	0.0008
14	8.000	9	0.0009	0.0009
15	10.000	9	0.0009	0.0009
16	20.000	11	0.0011	0.0011
17	40.000	11	0.0011	0.0011
18	80.000	12	0.0012	0.0012
19	100.000	12	0.0012	0.0012
20	122.130	12	0.0012	0.0012

S&ME

ASTM D2435-96

Test name: Consolidation Load: 0.050 (TSF)
Date of Test: 12-8-16

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

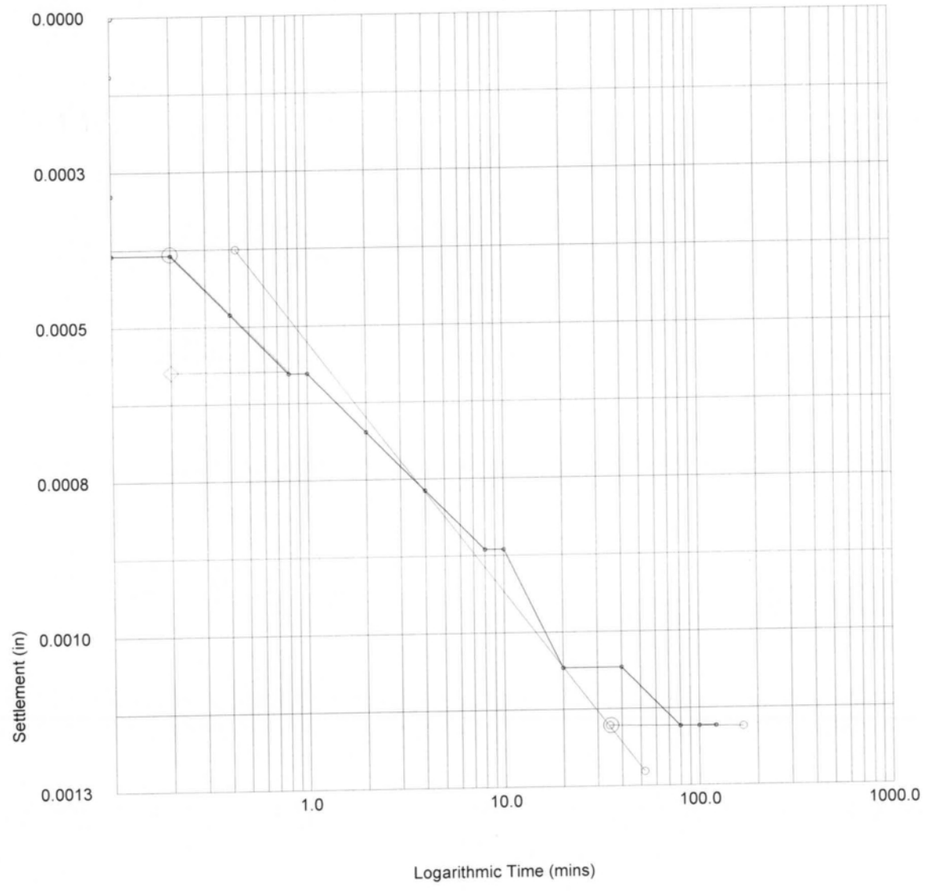
Sample: ST-11
Borehole: EB2-A Lt. Ln.

Operator: MK
Checked: MK
Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0012
Voids Ratio e	1.3187
Final Temp oC	0.0
t_{50} (mins)	2.06
c_v (ft2/day)	0.242
m_v (ft2/ton)	0.024
Sec Compression C_{sec}	0.00



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

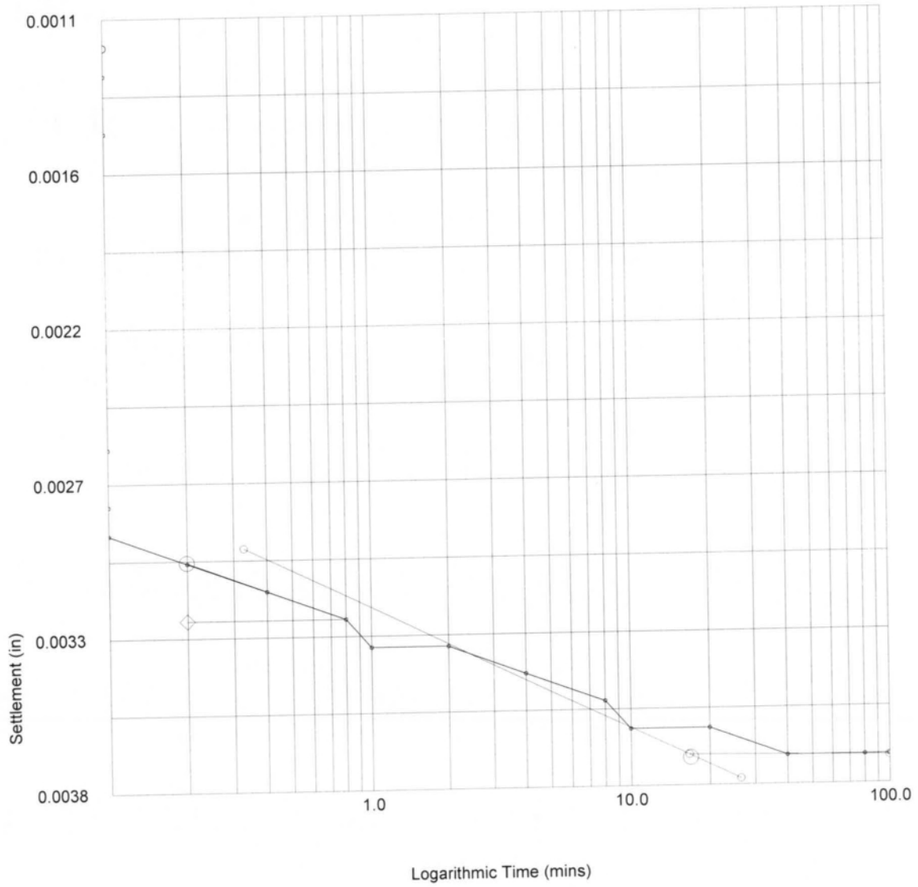
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	12	0.0012	0.0012
2	0.017	13	0.0013	0.0013
3	0.033	15	0.0015	0.0015
4	0.050	26	0.0026	0.0026
5	0.067	28	0.0028	0.0028
6	0.083	29	0.0029	0.0029
7	0.100	29	0.0029	0.0029
8	0.200	30	0.0030	0.0030
9	0.400	31	0.0031	0.0031
10	0.800	32	0.0032	0.0032
11	1.000	33	0.0033	0.0033
12	2.000	33	0.0033	0.0033
13	4.000	34	0.0034	0.0034
14	8.000	35	0.0035	0.0035
15	10.000	36	0.0036	0.0036
16	20.000	36	0.0036	0.0036
17	40.000	37	0.0037	0.0037
18	80.000	37	0.0037	0.0037
19	99.330	37	0.0037	0.0037

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.250 (TSF) Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0025
Voids Ratio e	1.3129
Final Temp oC	0.0
t_{50} (mins)	1.73
c_v (ft2/day)	0.287
m_v (ft2/ton)	0.013
Sec Compression C_{sec}	0.00



S&ME	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:	

Oedometer Settlement Tests

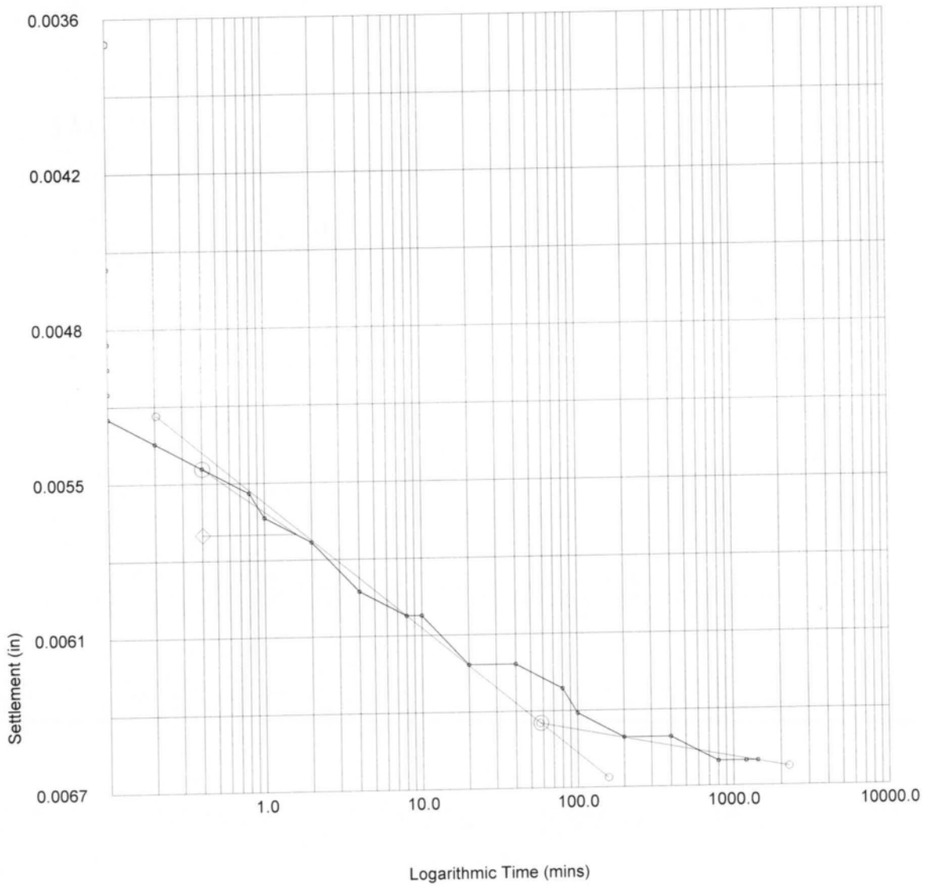
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	37	0.0037	0.0037
2	0.017	46	0.0046	0.0046
3	0.033	49	0.0049	0.0049
4	0.050	50	0.0050	0.0050
5	0.067	51	0.0051	0.0051
6	0.083	52	0.0052	0.0052
7	0.100	52	0.0052	0.0052
8	0.200	53	0.0053	0.0053
9	0.400	54	0.0054	0.0054
10	0.800	55	0.0055	0.0055
11	1.000	56	0.0056	0.0056
12	2.000	57	0.0057	0.0057
13	4.000	59	0.0059	0.0059
14	8.000	60	0.0060	0.0060
15	10.000	60	0.0060	0.0060
16	20.000	62	0.0062	0.0062
17	40.000	62	0.0062	0.0062
18	80.000	63	0.0063	0.0063
19	100.000	64	0.0064	0.0064
20	200.000	65	0.0065	0.0065
21	400.000	65	0.0065	0.0065
22	800.000	66	0.0066	0.0066
23	1200.000	66	0.0066	0.0066
24	1419.633	66	0.0066	0.0066

S&ME	ASTM D2435-96		Test name	Consolidation Load: 0.500 (TSF)
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK	Approved:	

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0029
Voids Ratio e	1.3061
Final Temp oC	0.0
t_{50} (mins)	2.86
c_v (ft2/day)	0.173
m_v (ft2/ton)	0.012
Sec Compression C_{sec}	0.0001



S&ME	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MLL	*Checked:* MLL		*Approved:*

Oedometer Settlement Tests

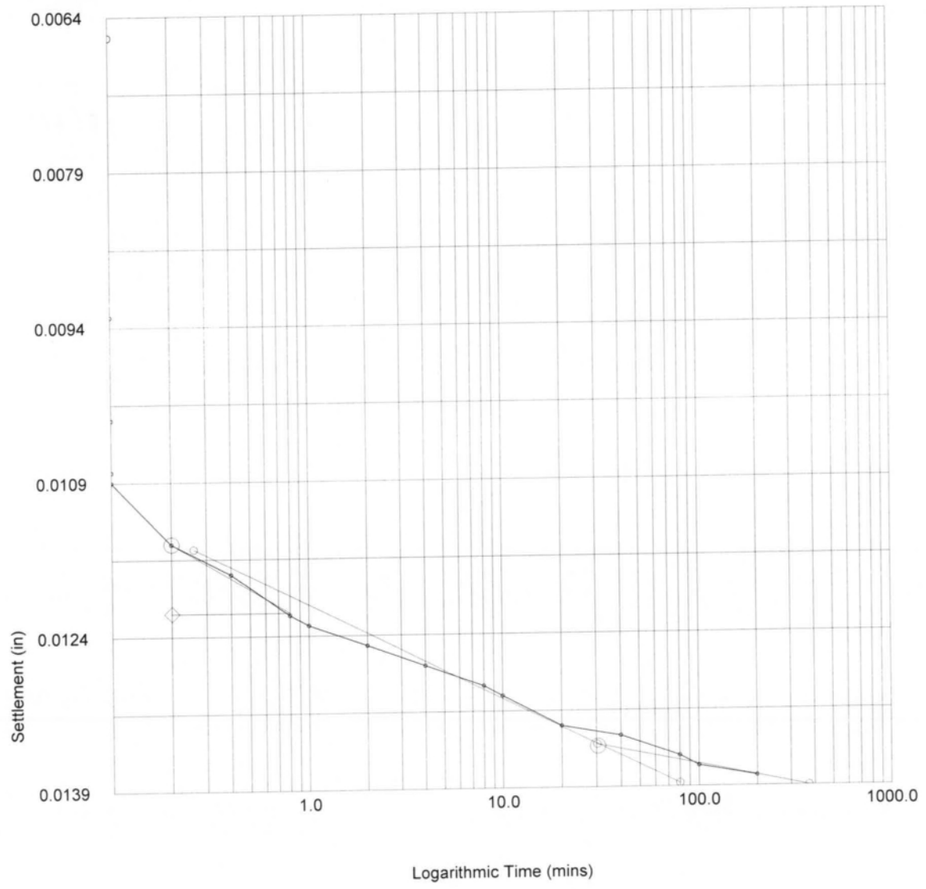
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	66	0.0066	0.0066
2	0.017	93	0.0093	0.0093
3	0.033	93	0.0093	0.0093
4	0.050	103	0.0103	0.0103
5	0.067	108	0.0108	0.0108
6	0.083	109	0.0109	0.0109
7	0.100	109	0.0109	0.0109
8	0.200	115	0.0115	0.0115
9	0.400	118	0.0118	0.0118
10	0.800	122	0.0122	0.0122
11	1.000	123	0.0123	0.0123
12	2.000	125	0.0125	0.0125
13	4.000	127	0.0127	0.0127
14	8.000	129	0.0129	0.0129
15	10.000	130	0.0130	0.0130
16	20.000	133	0.0133	0.0133
17	40.000	134	0.0134	0.0134
18	80.000	136	0.0136	0.0136
19	100.000	137	0.0137	0.0137
20	199.330	138	0.0138	0.0138

S&ME	ASTM D2435-96		Test name	Consolidation Load: 1.000 (TSF)
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MLL	*Checked:* MLL		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0072
Voids Ratio e	1.2894
Final Temp oC	0.0
t_{50} (mins)	1.15
c_v (ft2/day)	0.425
m_v (ft2/ton)	0.015
Sec Compression C_{sec}	0.0004



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MLE	*Checked:* MLE		*Approved:*

Oedometer Settlement Tests

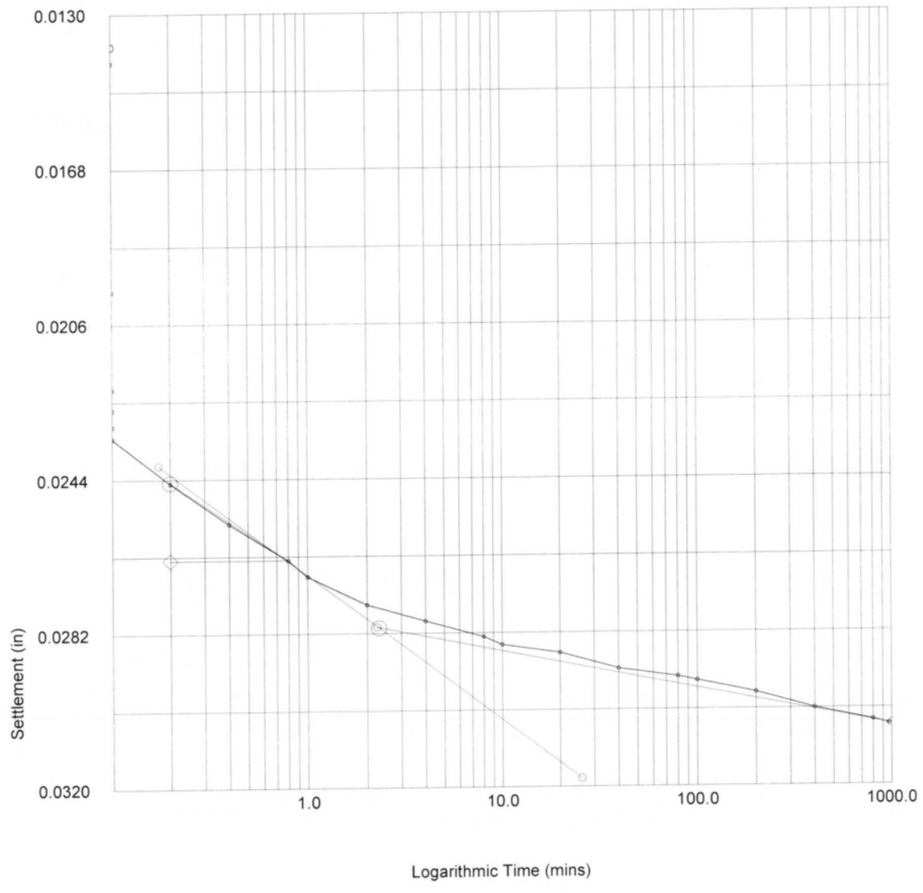
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	138	0.0138	0.0138
2	0.017	142	0.0142	0.0142
3	0.033	198	0.0198	0.0198
4	0.050	222	0.0222	0.0222
5	0.067	227	0.0227	0.0227
6	0.083	231	0.0231	0.0231
7	0.100	234	0.0234	0.0234
8	0.200	245	0.0245	0.0245
9	0.400	255	0.0255	0.0255
10	0.800	264	0.0264	0.0264
11	1.000	268	0.0268	0.0268
12	2.000	275	0.0275	0.0275
13	4.000	279	0.0279	0.0279
14	8.000	283	0.0283	0.0283
15	10.000	285	0.0285	0.0285
16	20.000	287	0.0287	0.0287
17	40.000	291	0.0291	0.0291
18	80.000	293	0.0293	0.0293
19	100.000	294	0.0294	0.0294
20	200.000	297	0.0297	0.0297
21	400.000	301	0.0301	0.0301
22	800.000	304	0.0304	0.0304
23	966.350	305	0.0305	0.0305

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0167
Voids Ratio e	1.2506
Final Temp oC	0.0
t_{50} (mins)	0.37
c_v (ft2/day)	1.277
m_v (ft2/ton)	0.017
Sec Compression C_{sec}	0.0009



S&ME	ASTM D2435-96	Test name: Consolidation	
		Date of Test: 12-8-16	
	Site Reference: C.F. Harvey	Sample: ST-11	
	Jobfile: E:\16010.JOB	Borehole: EB2-A Lt. Ln.	
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests

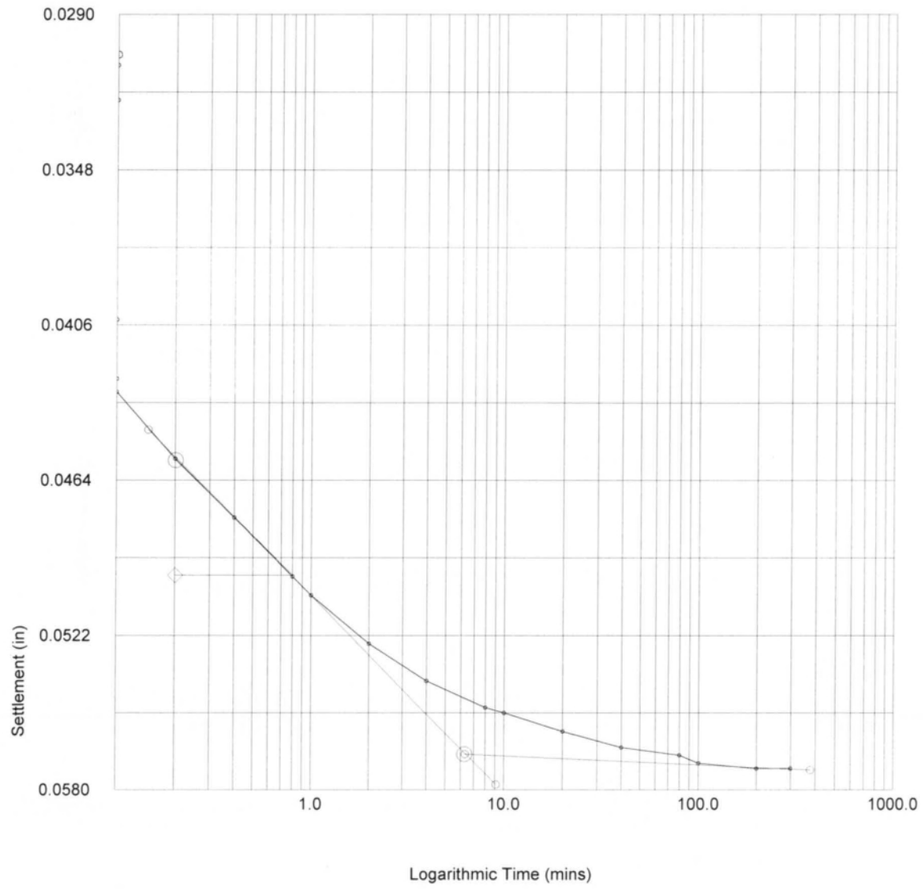
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	305	0.0305	0.0305
2	0.017	309	0.0309	0.0309
3	0.033	309	0.0309	0.0309
4	0.050	322	0.0322	0.0322
5	0.067	404	0.0404	0.0404
6	0.083	426	0.0426	0.0426
7	0.100	431	0.0431	0.0431
8	0.200	456	0.0456	0.0456
9	0.400	478	0.0478	0.0478
10	0.800	500	0.0500	0.0500
11	1.000	507	0.0507	0.0507
12	2.000	525	0.0525	0.0525
13	4.000	539	0.0539	0.0539
14	8.000	549	0.0549	0.0549
15	10.000	551	0.0551	0.0551
16	20.000	558	0.0558	0.0558
17	40.000	564	0.0564	0.0564
18	80.000	567	0.0567	0.0567
19	100.000	570	0.0570	0.0570
20	200.000	572	0.0572	0.0572
21	299.210	572	0.0572	0.0572

S&ME	ASTM D2435-96	Test name: Consolidation Load: 4.000 (TSF)	
		Date of Test: 12-8-16	
	Site Reference: C.F. Harvey	Sample: ST-11	
	Jobfile: E:\16010.JOB	Borehole: EB2-A Lt. Ln.	
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	4.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0267
Voids Ratio e	1.1886
Final Temp oC	0.0
t_{50} (mins)	0.63
c_v (ft2/day)	0.728
m_v (ft2/ton)	0.014
Sec Compression C_{sec}	0.0003



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

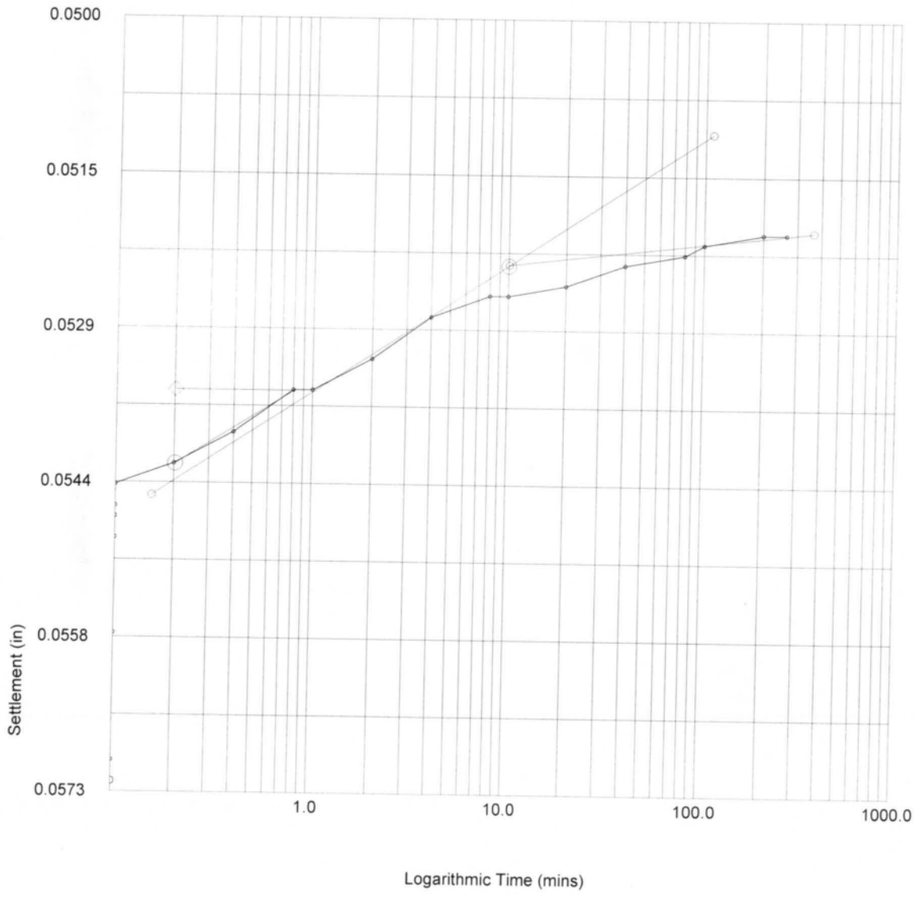
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	572	0.0572	0.0572
2	0.017	570	0.0570	0.0570
3	0.033	558	0.0558	0.0558
4	0.050	549	0.0549	0.0549
5	0.067	547	0.0547	0.0547
6	0.083	546	0.0546	0.0546
7	0.100	544	0.0544	0.0544
8	0.200	542	0.0542	0.0542
9	0.400	539	0.0539	0.0539
10	0.800	535	0.0535	0.0535
11	1.000	535	0.0535	0.0535
12	2.000	532	0.0532	0.0532
13	4.000	528	0.0528	0.0528
14	8.000	526	0.0526	0.0526
15	10.000	526	0.0526	0.0526
16	20.000	525	0.0525	0.0525
17	40.000	523	0.0523	0.0523
18	80.000	522	0.0522	0.0522
19	100.000	521	0.0521	0.0521
20	200.000	520	0.0520	0.0520
21	263.330	520	0.0520	0.0520

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0052
Voids Ratio e	1.2006
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK		Approved:

Oedometer Settlement Tests

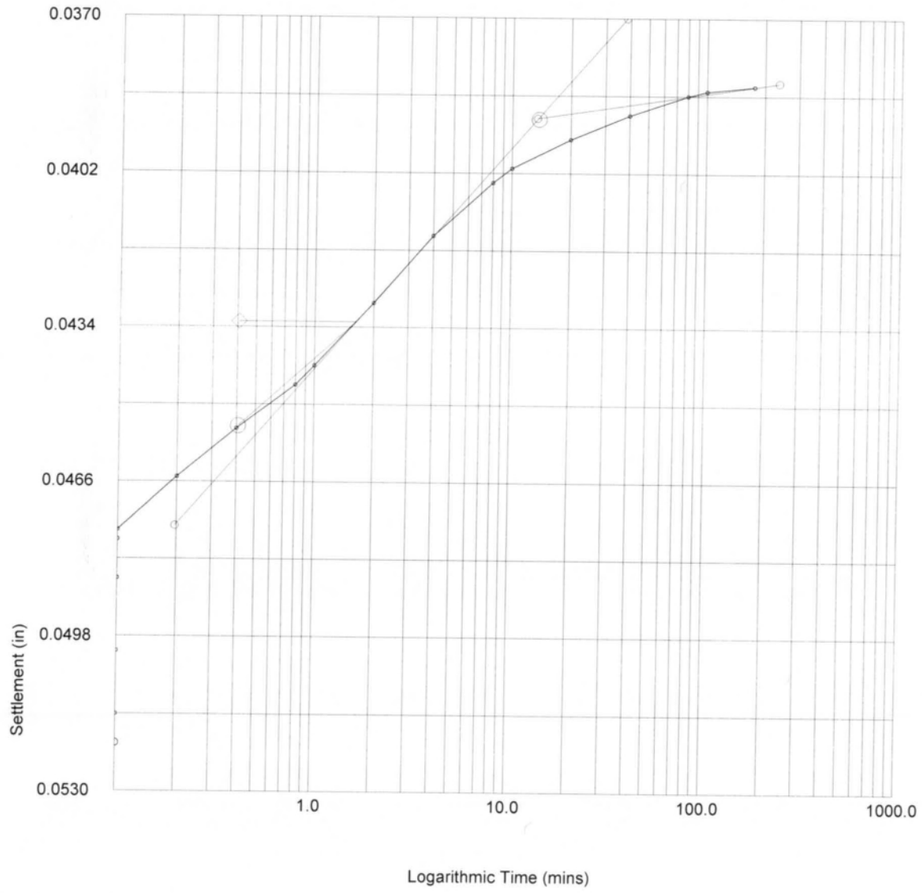
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	520	0.0520	0.0520
2	0.017	514	0.0514	0.0514
3	0.033	514	0.0514	0.0514
4	0.050	501	0.0501	0.0501
5	0.067	486	0.0486	0.0486
6	0.083	478	0.0478	0.0478
7	0.100	476	0.0476	0.0476
8	0.200	465	0.0465	0.0465
9	0.400	455	0.0455	0.0455
10	0.800	446	0.0446	0.0446
11	1.000	442	0.0442	0.0442
12	2.000	429	0.0429	0.0429
13	4.000	415	0.0415	0.0415
14	8.000	404	0.0404	0.0404
15	10.000	401	0.0401	0.0401
16	20.000	395	0.0395	0.0395
17	40.000	390	0.0390	0.0390
18	80.000	386	0.0386	0.0386
19	100.000	385	0.0385	0.0385
20	176.130	384	0.0384	0.0384

S&ME	ASTM D2435-96		Test name	Consolidation Load: 0.500 (TSF)
			Date of Test:	12-8-16
	Site Reference:	C.F. Harvey	Sample:	ST-11
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MK	Checked: MK		Approved:

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0136
Voids Ratio e	1.2322
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

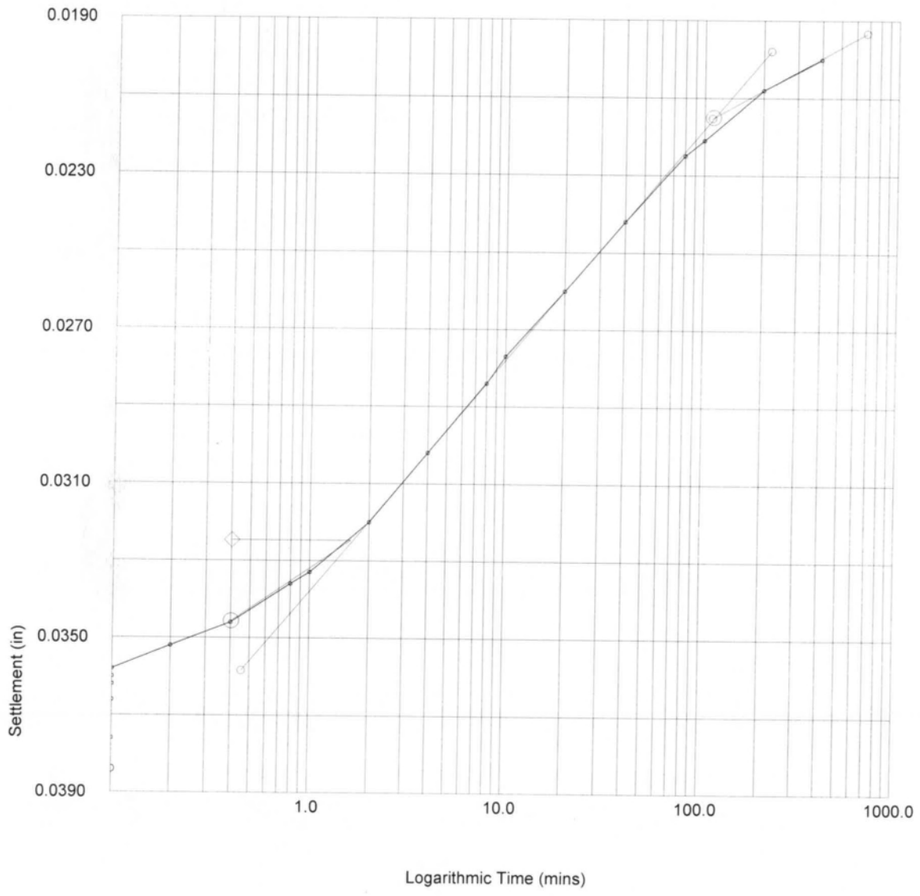
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	384	0.0384	0.0384
2	0.017	376	0.0376	0.0376
3	0.033	366	0.0366	0.0366
4	0.050	362	0.0362	0.0362
5	0.067	360	0.0360	0.0360
6	0.083	358	0.0358	0.0358
7	0.100	358	0.0358	0.0358
8	0.200	352	0.0352	0.0352
9	0.400	346	0.0346	0.0346
10	0.800	336	0.0336	0.0336
11	1.000	333	0.0333	0.0333
12	2.000	320	0.0320	0.0320
13	4.000	302	0.0302	0.0302
14	8.000	284	0.0284	0.0284
15	10.000	277	0.0277	0.0277
16	20.000	260	0.0260	0.0260
17	40.000	242	0.0242	0.0242
18	80.000	225	0.0225	0.0225
19	100.000	221	0.0221	0.0221
20	200.000	208	0.0208	0.0208
21	396.170	200	0.0200	0.0200

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.050 (TSF) Date of Test: 12-8-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-11 Borehole: EB2-A Lt. Ln.	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.050
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0184
Voids Ratio e	1.2750
Final Temp oC	
t_{50} (mins)	
c_v (ft2/day)	
m_v (ft2/ton)	
Sec Compression C_{sec}	



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MJC	Checked: MJC	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained

Sample details

Sketch showing specimen location in original Sample

Depth 5.0 - 7.0 ft.
Description: Tan-Brown Coarse to Fine Sandy Silty CLAY (A-7-5) (25)

	Specimen 1	Specimen 2	Specimen 3
Type	Undisturbed	Undisturbed	Undisturbed
Height H_0 (in)	5.852	5.787	5.784
Diameter D_0 (in)	2.854	2.855	2.857
Weight W_0 (gr)	1019.3	1022.3	1026.3
Bulk Density ρ (PCF)	103.72	105.12	105.44
Particle Density ρ_s	2.693 (measured)	2.693 (measured)	2.693 (measured)

Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (lbf/in2)	3.5	13.0	23.0
Pore Pressure u (lbf/in2)	0.0	0.0	0.0
Machine Speed d_r(in/min)	0.0106	0.0042	0.0091
No. of Membranes	1	1	1
Total Thickness (in)	0.012	0.012	0.012
Strain Channel	1798	1798	1798
Load Channel	1776	1776	1776
Pore P. Channel	1779	1779	1779
Volume Channel	Volume Chang	Volume Chang	Volume Chang
Moisture Content w_0%	45.7	46.4	45.6
Dry Density ρ_{d0} (PCF)	71.18	71.78	72.41
Voids Ratio e_0	1.36	1.34	1.32
Deg of Saturation S_0%	90.48	93.27	93.01
Final B Value	0.96	0.97	0.95

Final Conditions

	Specimen 1	Specimen 2	Specimen 3
Moisture Content w_f%	53.7	48.8	43.7
Dry Density ρ_d (PCF)	71.85	73.90	75.07
Voids Ratio e_f	1.34	1.27	1.24
Deg of Saturation S_f%	100.00	100.00	94.94
Failure Criteria	Mx Stress Ratio	Mx Stress Ratio	Mx Stress Ratio
Axial Strain ε_f%	1.1	2.0	3.0
Corr Dev Stress $(\sigma_1 - \sigma_3)f$ (lbf/in2)	10.1	19.4	23.6
Minor Stress σ_{3f} (lbf/in2)	0.7	5.6	9.6
Major Stress σ_{1f} (lbf/in2)	10.8	25.0	33.2
Stress Ratio $(\sigma_1/\sigma_3)_f$	15.5	4.5	3.5

Notes:

Failure Sketch

Sp 1 Sp 2

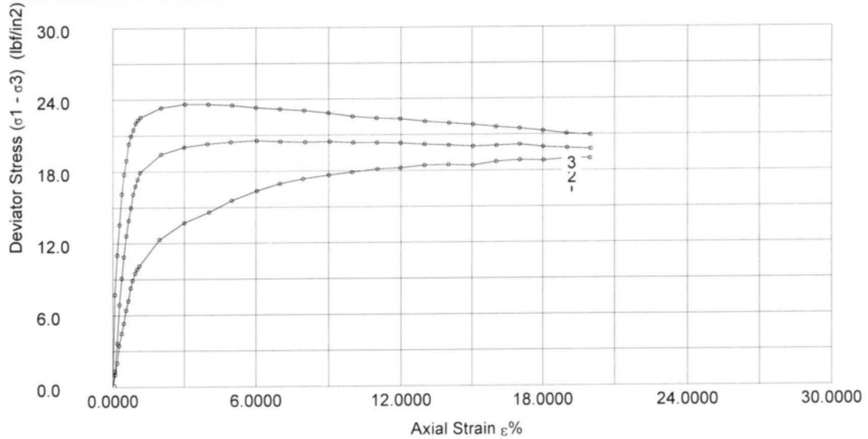
Sp 3

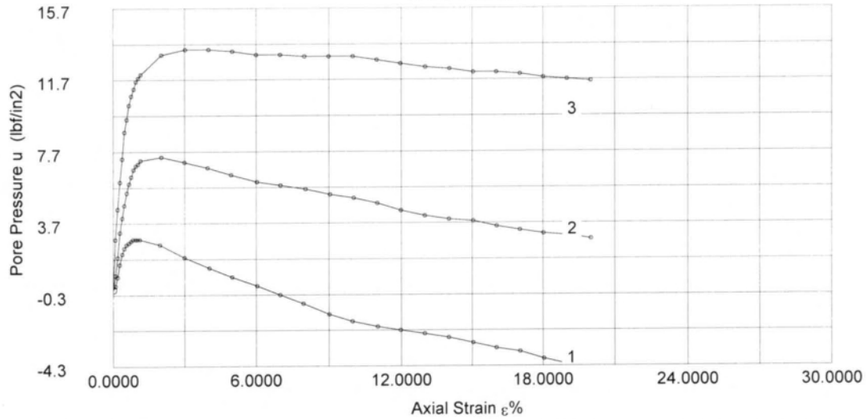
Surface Inclination

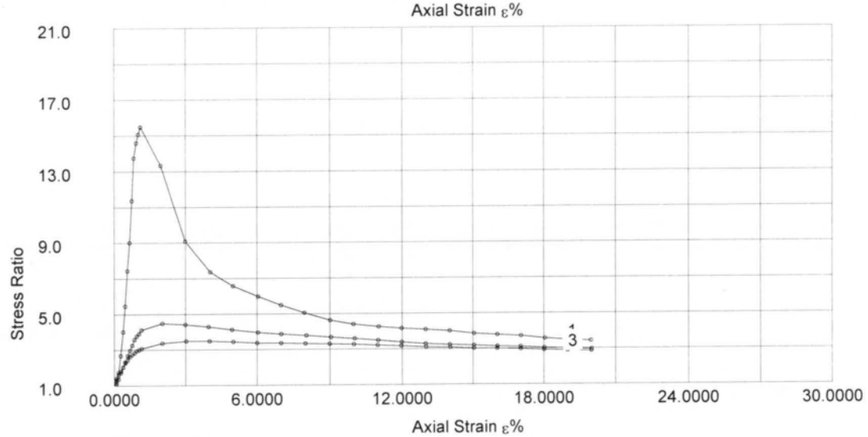
S&ME	Test Method: ASTM D4767-95	Test name	CU Triaxial (SS, MS)
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MJC	Checked: MJC	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained



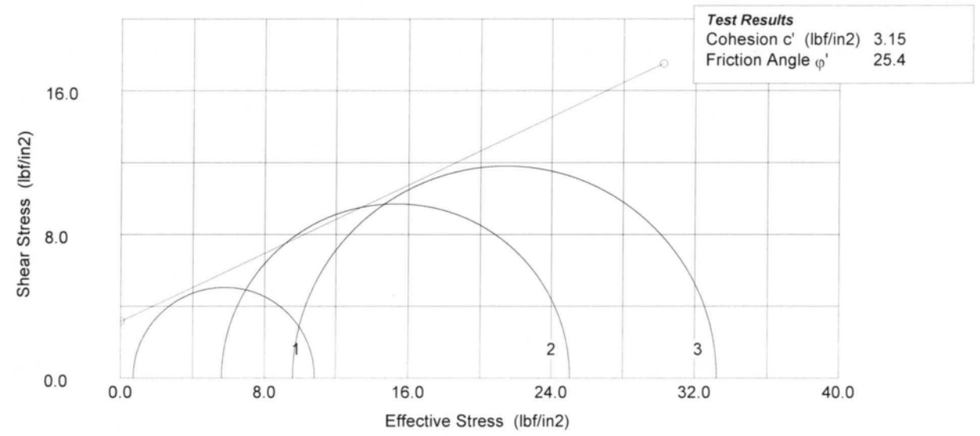


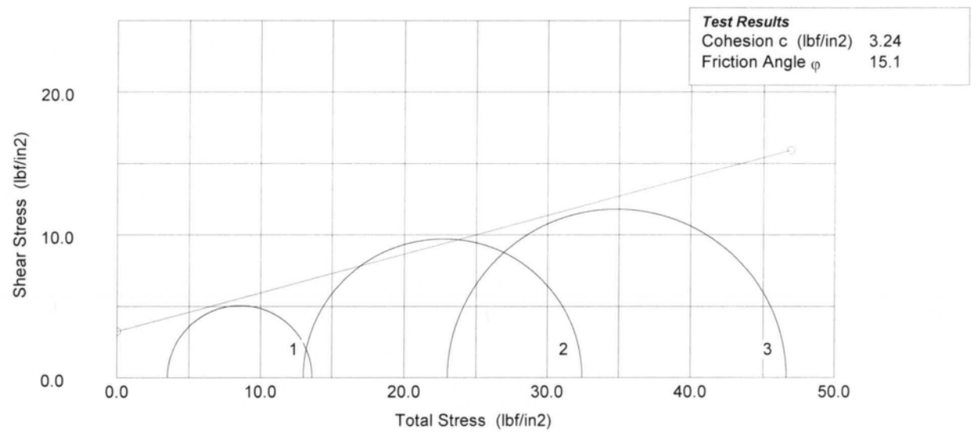


S&ME	Test Method: ASTM D4767-95	Test name	CU Triaxial (SS, MS)
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MLL	Checked: MLL	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained

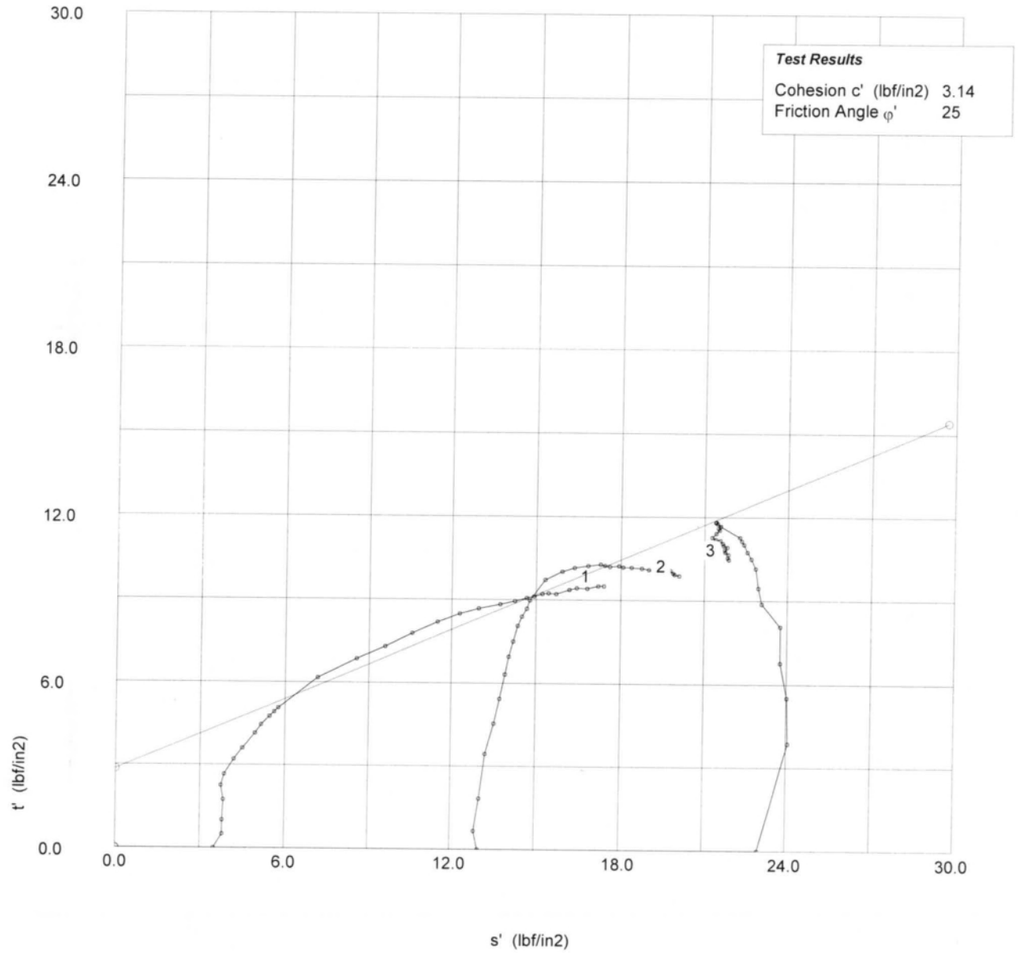




S&ME	Test Method: ASTM D4767-95	Test name	CU Triaxial (SS, MS)
		Date of Test:	12-8-16
	Site Reference: C.F. Harvey	Sample:	ST-11
	Jobfile: E:\16010.JOB	Borehole:	EB2-A Lt. Ln.
	Operator: MLL	Checked: MLL	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained



S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)	
	Site Reference: C.F. Harvey	Date of Test: 12-8-16	
	Jobfile: E:\16010.JOB	Sample: ST-11	
	Operator: MLL	Checked: MLL	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 1)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_m$ (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_c$ (lbf/in2)	Minor Str σ_3' (lbf/in2)	Major Str σ_1' (lbf/in2)	Ratio σ_1'/σ_3'
1	29	0.00	522	0.0	0	0.0	0.0	0.0	3.50	3.50	1.00
2	82	0.09	586	6.4	2	0.2	1.0	1.0	3.30	4.31	1.30
3	135	0.18	650	12.8	7	0.7	2.0	2.0	2.80	4.81	1.72
4	186	0.27	744	22.2	14	1.4	3.5	3.5	2.10	5.58	2.66
5	243	0.37	809	28.7	20	2.0	4.5	4.5	1.50	6.00	4.00
6	297	0.46	862	34.0	23	2.3	5.3	5.3	1.20	6.52	5.44
7	348	0.55	942	42.0	25	2.5	6.6	6.4	1.00	7.41	7.41
8	405	0.64	993	47.1	26	2.6	7.4	7.2	0.90	8.10	9.00
9	458	0.74	1063	54.1	27	2.7	8.4	8.3	0.80	9.09	11.36
10	513	0.83	1103	58.1	28	2.8	9.1	8.9	0.70	9.60	13.72
11	569	0.93	1142	62.0	28	2.8	9.7	9.5	0.70	10.20	14.57
12	623	1.02	1164	64.2	28	2.8	10.0	9.8	0.70	10.54	15.05
13	674	1.11	1183	66.1	28	2.8	10.3	10.1	0.70	10.82	15.46
14	1169	1.95	1339	81.7	25	2.5	12.6	12.3	1.00	13.32	13.32
15	1777	3.00	1444	92.2	18	1.8	14.1	13.7	1.70	15.41	9.06
16	2386	4.04	1520	99.8	12	1.2	15.1	14.6	2.30	16.88	7.34
17	2939	4.99	1600	107.8	7	0.7	16.1	15.6	2.80	18.35	6.55
18	3553	6.04	1673	115.1	2	0.2	17.0	16.4	3.30	19.67	5.96
19	4108	6.99	1731	120.9	-3	-0.3	17.7	17.0	3.80	20.77	5.47
20	4665	7.95	1775	125.3	-8	-0.8	18.1	17.3	4.30	21.64	5.03
21	5282	9.00	1817	129.5	-14	-1.4	18.5	17.7	4.90	22.56	4.60
22	5840	9.96	1853	133.1	-18	-1.8	18.8	17.9	5.30	23.19	4.38
23	6458	11.02	1892	137.0	-21	-2.1	19.2	18.1	5.60	23.74	4.24
24	7016	11.98	1920	139.8	-23	-2.3	19.4	18.2	5.80	24.04	4.14
25	7606	12.99	1955	143.3	-25	-2.5	19.6	18.4	6.00	24.43	4.07
26	8198	14.00	1981	145.9	-27	-2.7	19.7	18.5	6.20	24.67	3.98
27	8799	15.03	1999	147.7	-30	-3.0	19.7	18.4	6.50	24.92	3.83
28	9381	16.03	2045	152.3	-33	-3.3	20.1	18.7	6.80	25.53	3.75
29	9966	17.03	2079	155.7	-35	-3.5	20.3	18.9	7.00	25.86	3.69
30	10551	18.04	2099	157.7	-39	-3.9	20.3	18.8	7.40	26.21	3.54
31	11126	19.02	2136	161.4	-42	-4.2	20.6	19.0	7.70	26.70	3.47
32	11682	19.97	2158	163.6	-44	-4.4	20.6	19.0	7.90	26.89	3.40

S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 1)	
	Site Reference: C.F. Harvey	Date of Test: 12-8-16	
	Jobfile: E:\16010.JOB	Sample: ST-11	
	Operator: MLL	Checked: MLL	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained Shear (Specimen 2)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_m$ (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_c$ (lbf/in2)	Minor Str σ_3' (lbf/in2)	Major Str σ_1' (lbf/in2)	Ratio σ_1'/σ_3'
1	506	0.00	653	0.0	0	0.0	0.0	0.0	13.00	13.00	1.00
2	559	0.09	736	8.3	8	0.8	1.3	1.3	12.20	13.52	1.11
3	608	0.18	884	23.1	18	1.8	3.7	3.7	11.20	14.87	1.33
4	664	0.28	1086	43.3	32	3.2	6.9	6.9	9.80	16.67	1.70
5	716	0.37	1225	57.2	40	4.0	9.1	9.1	9.00	18.07	2.01
6	768	0.46	1339	68.6	47	4.7	10.9	10.9	8.30	19.17	2.31
7	826	0.56	1461	80.8	54	5.4	12.8	12.6	7.60	20.23	2.66
8	880	0.65	1542	88.9	59	5.9	14.1	13.9	7.10	21.00	2.96
9	935	0.75	1612	95.9	63	6.3	15.2	15.0	6.70	21.69	3.24
10	992	0.85	1684	103.1	67	6.7	16.3	16.1	6.30	22.42	3.56
11	1047	0.94	1728	107.5	69	6.9	17.0	16.8	6.10	22.89	3.75
12	1099	1.03	1764	111.1	70	7.0	17.5	17.3	6.00	23.35	3.89
13	1159	1.14	1803	115.0	72	7.2	18.1	17.9	5.80	23.74	4.09
14	1662	2.02	1917	126.4	74	7.4	19.7	19.4	5.60	25.04	4.47
15	2220	2.99	1973	132.0	71	7.1	20.4	20.0	5.90	25.93	4.39
16	2779	3.97	2012	135.9	68	6.8	20.8	20.3	6.20	26.50	4.27
17	3343	4.95	2042	138.9	64	6.4	21.0	20.5	6.60	27.06	4.10
18	3960	6.03	2070	141.7	60	6.0	21.2	20.6	7.00	27.56	3.94
19	4520	7.00	2084	143.1	58	5.8	21.2	20.5	7.20	27.67	3.84
20	5108	8.03	2101	144.8	56	5.6	21.2	20.4	7.40	27.80	3.76
21	5686	9.04	2126	147.3	53	5.3	21.3	20.5	7.70	28.15	3.66
22	6246	10.01	2141	148.8	51	5.1	21.3	20.4	7.90	28.26	3.58
23	6809	11.00	2162	150.9	48	4.8	21.4	20.3	8.20	28.55	3.48
24	7377	11.99	2181	152.8	44	4.4	21.4	20.3	8.60	28.89	3.36
25	7948	12.98	2196	154.3	41	4.1	21.4	20.2	8.90	29.10	3.27
26	8536	14.01	2214	156.1	39	3.9	21.4	20.1	9.10	29.21	3.21
27	9123	15.03	2229	157.6	38	3.8	21.3	20.0	9.20	29.20	3.17
28	9699	16.04	2258	160.5	35	3.5	21.5	20.1	9.50	29.57	3.11
29	10268	17.03	2288	163.5	33	3.3	21.6	20.1	9.70	29.84	3.08
30	10837	18.02	2297	164.4	31	3.1	21.5	19.9	9.90	29.84	3.01
31	11408	19.02	2314	166.1	30	3.0	21.4	19.9	10.00	29.86	2.99
32	11976	20.01	2331	167.8	28	2.8	21.4	19.8	10.20	29.97	2.94

S&ME

Test Method: ASTM D4767-95

Test name: CU Triaxial (SS, MS) Shear (Specimen 2)
Date of Test: 12-8-16

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

Sample: ST-11
Borehole: EB2-A Lt. Ln.

Operator: MLL Checked: MLL Approved:

Consolidated Undrained Shear (Specimen 3)

No.	Strain (divs)	Strain ε%	Load (divs)	Load (lbs)	Pore Prs (divs)	Pore Prs (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_m$ (lbf/in2)	D. Stress $(\sigma_1 - \sigma_3)_c$ (lbf/in2)	Minor Str σ_3' (lbf/in2)	Major Str σ_1' (lbf/in2)	Ratio σ_1'/σ_3'
1	21	0.00	725	0.0	0	0.0	0.0	0.0	23.00	23.00	1.00
2	71	0.09	1209	48.4	28	2.8	7.7	7.7	20.20	27.93	1.38
3	123	0.18	1417	69.2	45	4.5	11.0	11.0	18.50	29.54	1.60
4	180	0.28	1575	85.0	60	6.0	13.5	13.5	17.00	30.54	1.80
5	232	0.37	1739	101.4	73	7.3	16.1	16.1	15.70	31.84	2.03
6	286	0.46	1842	111.7	88	8.8	17.8	17.8	14.20	31.96	2.25
7	343	0.56	1926	120.1	95	9.5	19.1	18.9	13.50	32.42	2.40
8	398	0.66	2015	129.0	103	10.3	20.5	20.3	12.70	33.01	2.60
9	451	0.75	2059	133.4	108	10.8	21.2	21.0	12.20	33.19	2.72
10	510	0.86	2092	136.7	112	11.2	21.7	21.5	11.80	33.29	2.82
11	564	0.95	2128	140.3	116	11.6	22.2	22.0	11.40	33.44	2.93
12	617	1.04	2145	142.0	118	11.8	22.4	22.3	11.20	33.49	2.99
13	677	1.15	2162	143.7	120	12.0	22.7	22.5	11.00	33.53	3.05
14	1178	2.02	2234	150.9	131	13.1	23.6	23.3	9.90	33.24	3.36
15	1748	3.02	2273	154.8	134	13.4	24.0	23.6	9.60	33.22	3.46
16	2311	4.01	2295	157.0	134	13.4	24.1	23.6	9.60	33.20	3.46
17	2879	5.00	2312	158.7	133	13.3	24.1	23.5	9.70	33.23	3.43
18	3448	6.00	2320	159.5	131	13.1	24.0	23.3	9.90	33.21	3.36
19	4016	6.99	2334	160.9	131	13.1	23.9	23.2	9.90	33.09	3.34
20	4583	7.98	2348	162.3	130	13.0	23.9	23.1	10.00	33.06	3.31
21	5157	8.99	2356	163.1	130	13.0	23.7	22.8	10.00	32.84	3.28
22	5725	9.98	2359	163.4	130	13.0	23.5	22.5	10.00	32.54	3.25
23	6293	10.97	2373	164.8	128	12.8	23.4	22.4	10.20	32.60	3.20
24	6864	11.97	2392	166.7	126	12.6	23.4	22.3	10.40	32.73	3.15
25	7456	13.01	2401	167.6	124	12.4	23.3	22.1	10.60	32.71	3.09
26	8044	14.04	2416	169.1	123	12.3	23.2	22.0	10.70	32.66	3.05
27	8618	15.04	2430	170.5	121	12.1	23.1	21.8	10.90	32.72	3.00
28	9180	16.02	2441	171.6	121	12.1	23.0	21.6	10.90	32.54	2.99
29	9753	17.03	2456	173.1	120	12.0	22.9	21.5	11.00	32.49	2.95
30	10316	18.01	2467	174.2	118	11.8	22.8	21.3	11.20	32.50	2.90
31	10885	19.01	2474	174.9	117	11.7	22.6	21.1	11.30	32.37	2.86
32	11453	20.00	2488	176.3	116	11.6	22.5	20.9	11.40	32.34	2.84

S&ME

Test Method: ASTM D4767-95

Test name: CU Triaxial (SS, MS) Shear (Specimen 3)
Date of Test: 12-8-16

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

Sample: ST-11
Borehole: EB2-A Lt. Ln.

Operator: MLL Checked: MLL Approved: