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. 210 AND NO. 211 ON -L- (FELIX HARVEY PARKWAY) OVER -Y3- (HUGO ROAD)*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5703	1	43

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.

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SUBMITTED BY *S&ME, INC.*

DATE *APRIL 2017*

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Stewart S. Laney
Sep 15 2017 11:48 AM

SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
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NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

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

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER ____ 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
- [X] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CME-750
- [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: 538.99 FEET RIGHT -L- 168+93 BM 13 RR SPIKE IN BASE OF 24" CYPRESS
N 580,461.7410 E 2,430,741.9690 ELEVATION: 68.35 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 117°19'53"
SITE 2

NC GRID
NAD 83/NSRS 2007

-L- POT Sta.166+72.51 =
-Y3- POT Sta.11+86.25

165 166 167 13 168 169

CONC

TO SR 1703

SR 1004 (HUGO RD)

END BENT #1

END BENT #2

BRIDGE 210

EB2-A LT LN

EB1-A LT LN

B-1

TO SR 1729

LEFT CONTROL LINE

-L-

RIGHT CONTROL LINE

117°19'53"

TO SR 1732

EB1-B RT LN

B-2

EB2-B RT LN

BRIDGE 211

END BENT #1

11

-Y3-

END BENT #2

10

TO HWY 58

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

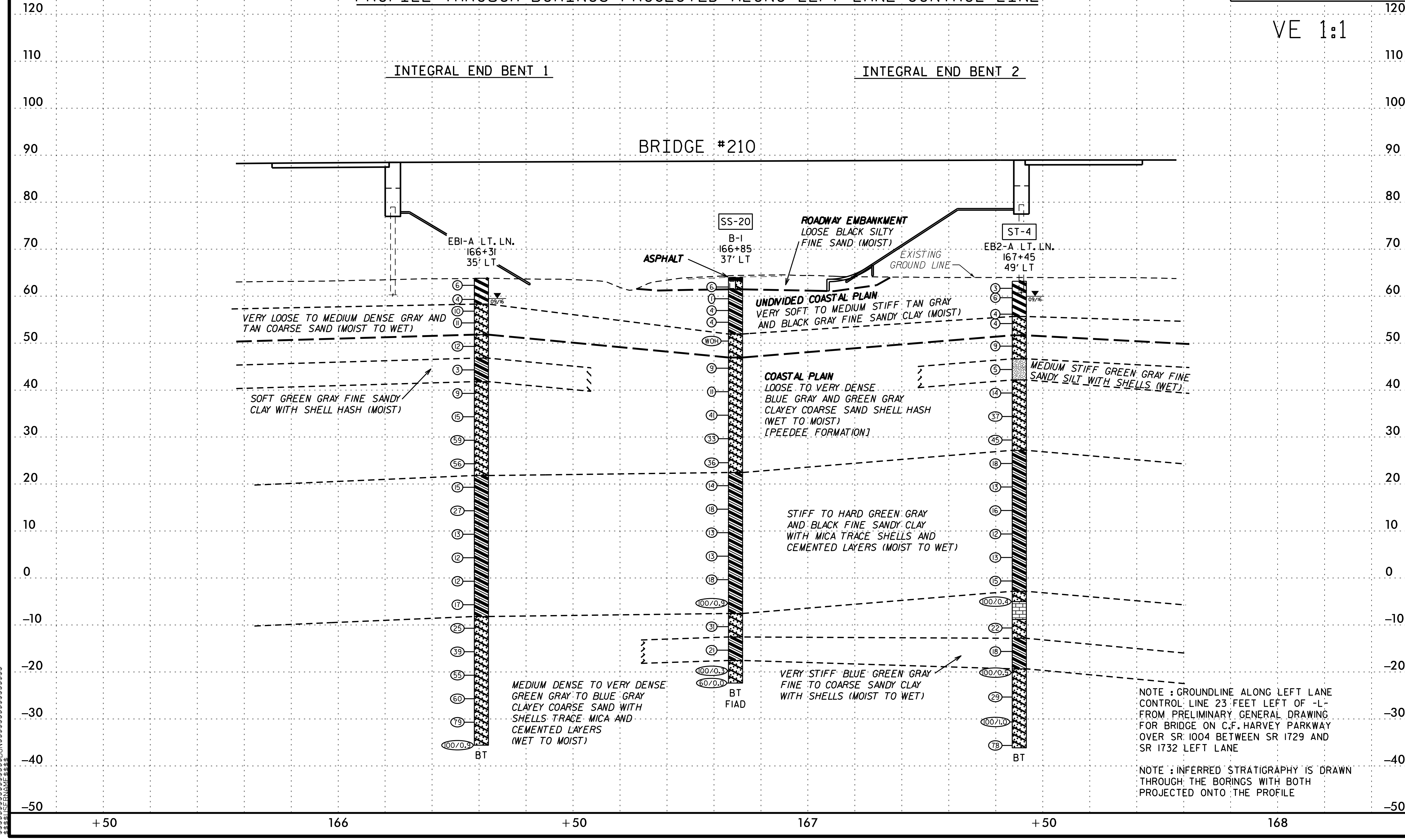
5/14/99

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-20	37' LT	166+85	3.5 - 5.0	A-6 (4)	28	16	18	37	17	28	99	90	81	48.8	19.8	ND
ST-4	46' LT	167+45	17.0 - 19.0	A-4 (0)	27	6	23	38	18	19	98	82	75	40.3	19.5	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 1004 BETWEEN SR 1729 AND SR 1732 LEFT LANE

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

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

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

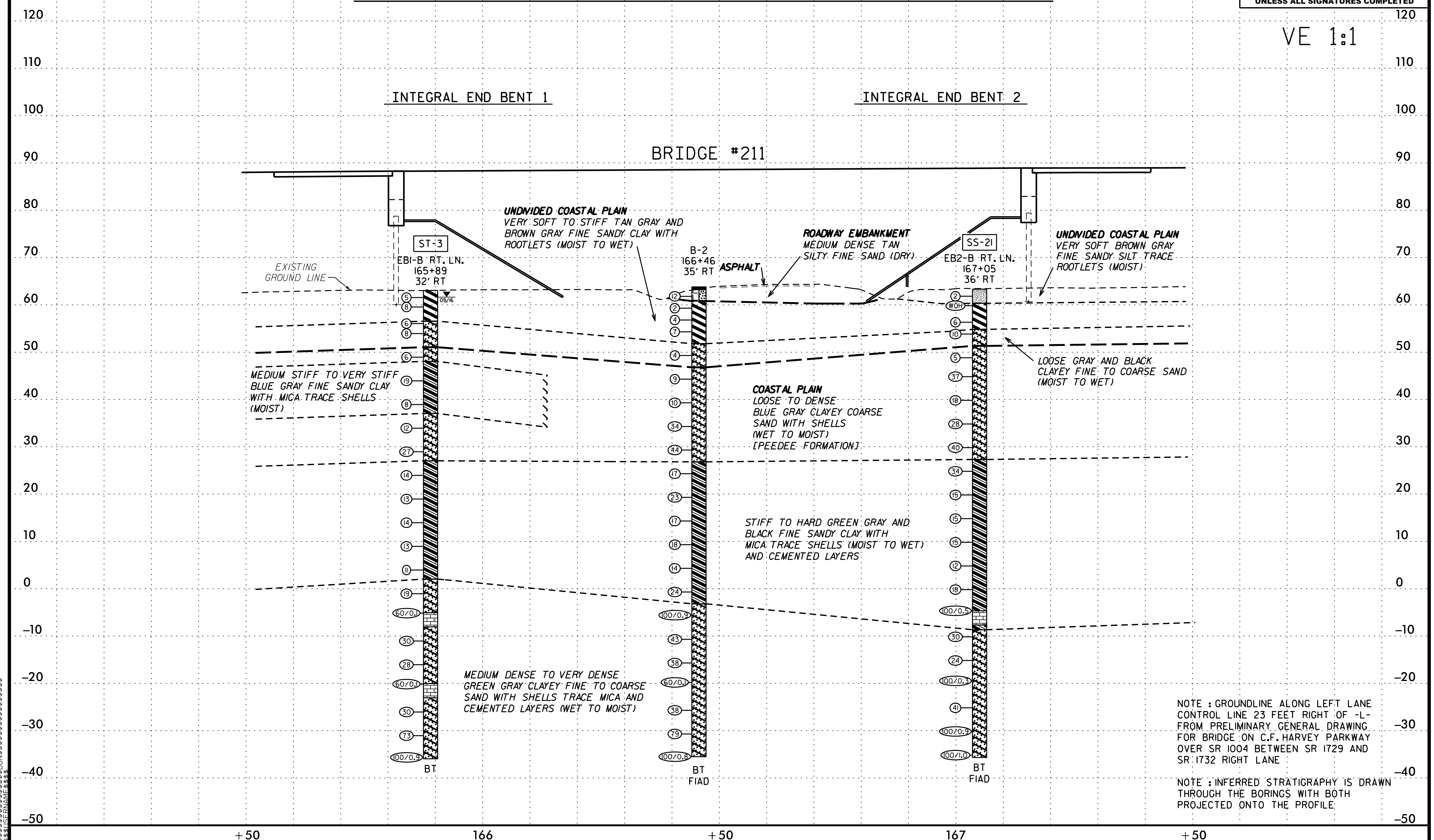
5/14/99

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-21	36' RT	167+05	0.5 - 2.0	A-4 (2)	19	7	19	43	21	17	100	91	81	44.1	17.6	0.8
ST-3	35' RT	165+89	18.0 - 20.0	A-6 (2)	25	12	20	41	11	28	100	94	80	43.1	22.3	ND

PROFILE THROUGH BORINGS PROJECTED ALONG RIGHT LANE CONTROL LINE

VE 1:1



NOTE : GROUNDLINE ALONG LEFT LANE CONTROL LINE 23 FEET RIGHT OF -L- FROM PRELIMINARY GENERAL DRAWING FOR BRIDGE ON C.F. HARVEY PARKWAY OVER SR 1004 BETWEEN SR 1729 AND SR 1732 RIGHT LANE

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

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

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 210 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB1-A Lt. Ln.	**STATION** 166+31	**OFFSET** 35 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.8 ft	**TOTAL DEPTH** 99.4 ft	**NORTHING** 580,059	**EASTING** 2,430,326	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**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)
65											
	63.3	0.5	3	3	3	6		M		63.8 GROUND SURFACE	0.0
60	60.3	3.5	1	2	2	4		M		**UNDIVIDED COASTAL PLAIN** Tan Gray Fine Sandy CLAY	
	57.8	6.0	3	4	6	10		M		58.3 Gray Clayey Coarse SAND	5.5
55	55.3	8.5	4	6	5	11		M			
50	50.3	13.5	3	5	7	12		W		51.8 **COASTAL PLAIN** Blue Gray Clayey Coarse SAND with Shell Hash [Peedee Formation]	12.0
45	45.3	18.5	3	2	1	3		M		46.8 Green Gray Fine Sandy CLAY with Shell Hash	17.0
40	40.3	23.5	4	4	5	9		M		41.8 Green Gray Clayey Coarse SAND	22.0
35	35.3	28.5	3	5	10	15		M			
30	30.3	33.5	20	26	33	59		M			
25	25.3	38.5	10	15	41	56		M			
20	20.3	43.5	4	7	8	15		M		21.8 Green Gray Fine Sandy CLAY with Shells, Trace Mica	42.0
15	15.3	48.5	13	14	13	27		M			
10	10.3	53.5	6	6	7	13		M			
5	5.3	58.5	4	5	7	12		M			
0	0.3	63.5	5	5	7	12		W			
-5	-4.7	68.5	8	8	9	17		W			
-10	-9.7	73.5	8	10	15	25		W		-8.2 Green Gray Clayey Coarse SAND with Shell Hash	72.0
-15	-14.7	78.5									

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 210 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB1-A Lt. Ln.	**STATION** 166+31	**OFFSET** 35 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.8 ft	**TOTAL DEPTH** 99.4 ft	**NORTHING** 580,059	**EASTING** 2,430,326	**24 HR.** 4.3
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**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
-15						Match Line				
			9	12	27	39		M		Green Gray Clayey Coarse SAND with Shell Hash *(continued)*
-20	-19.7	83.5	10	19	36	55		M		
-25	-24.7	88.5	16	24	36	60		W		
-30	-29.7	93.5	16	24	55	79		M		
-35	-34.7	98.5	40	60/0.4		100/0.9		M		-35.6 Boring Terminated at Elevation -35.6 ft in Very Dense Clayey Coarse SAND 99.4

NCDOT BORE DOUBLE SITE 2.GPJ NC_DOT.GDT 4/25/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 210 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 166+85	**OFFSET** 37 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.9 ft	**TOTAL DEPTH** 86.3 ft	**NORTHING** 580,047	**EASTING** 2,430,379	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 08/04/16	**COMP. DATE** 08/04/16	**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)
65										
	63.9	0.0								GROUND SURFACE
	63.3	0.6								ASPHALT
	61.4	2.5								**ROADWAY EMBANKMENT** Black Silty fine SAND
60	60.4	3.5	11	4	2	6		M		**UNDIVIDED COASTAL PLAIN** Black Gray Fine Sandy CLAY
	57.9	6.0	WOH	WOH	1	1	SS-20	20%		
			WOH	2	2	4		M		
55	55.4	8.5	1	2	2	4		M		
	51.9	12.0	WOH	WOH	WOH	0		W		Gray Tan Clayey Coarse SAND
50										
	46.9	17.0								**COASTAL PLAIN** Gray Clayey Coarse SAND with Shell Hash, Trace Fossilized Chunks [Peedee Formation]
45	45.6	18.3	2	1	8	9		W		
40	40.6	23.3	4	5	6	11		W		
35	35.6	28.3	10	18	23	41		W		
30	30.6	33.3	14	14	19	33		W		
25	25.5	38.4	8	22	14	36		W		
	22.4	41.5								Blue Gray Fine Sandy CLAY
20	20.6	43.3	5	6	8	14		M		
15	15.6	48.3	9	8	10	18		M		
10	10.6	53.3	5	5	8	13		M		
5	5.6	58.3	4	6	7	13		M		
0	0.6	63.3	5	8	10	18		M		
-5	-4.4	68.3	7	93/0.4		100/0.9		W		
	-7.6	71.5								Blue Gray Clayey Coarse SAND, with Shell Hash
-10	-9.4	73.3	9	14	17	31		W		
	-12.6	76.5								Blue Gray Fine Sandy CLAY, with Shell Hash
-15	-14.4	78.3								

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 210 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. B-1	**STATION** 166+85	**OFFSET** 37 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.9 ft	**TOTAL DEPTH** 86.3 ft	**NORTHING** 580,047	**EASTING** 2,430,379	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC2473 CME-550 92% 12/09/2015		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER White, J.	**START DATE** 08/04/16	**COMP. DATE** 08/04/16	**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
-15			8	8	13	Match Line 21		W		Blue Gray Fine Sandy CLAY, with Shell Hash *(continued)*
	-17.6	81.5								Blue Gray Clayey Coarse SAND with Shell Hash and Cemented Layers
-20	-19.4	83.3	100/0.3			100/0.3		W		
	-22.4	86.3	60/0.0			60/0.0				Boring Terminated at Elevation -22.4 ft in Very Dense Clayey Coarse SAND with Shell Hash and Cemented Layers

NCDOT BORE DOUBLE SITE 2.GPJ NC_DOT.GDT 4/25/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 210 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB2-A Lt. Ln	**STATION** 167+45	**OFFSET** 49 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.2 ft	**TOTAL DEPTH** 99.3 ft	**NORTHING** 580,042	**EASTING** 2,430,441	**24 HR.** 3.2
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**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)
65											
	62.7	0.5	1	2	1	3		M		63.2 GROUND SURFACE	0.0
60	60.7	2.5	4	3	3	6		M		**UNDIVIDED COASTAL PLAIN** Tan Gray Fine Sandy CLAY, Trace Rootlets	
	57.2	6.0	2	2	2	4		M		55.7 Tan Gray Clayey Coarse SAND	7.5
55	55.2	8.0	2	2	2	4		W		51.7 **COASTAL PLAIN** Blue Gray Clayey Coarse SAND with Shell Hash [Peedee Formation]	11.5
50	50.4	12.8	2	4	5	9		W		46.7 Green Gray Fine Sandy SILT with Shells	16.5
45	45.4	17.8	2	3	2	5		W		42.2 Dark Green Gray Clayey Coarse SAND	21.0
40	40.4	22.8	4	5	9	14		W			
35	35.4	27.8	11	17	20	37		M			
30	30.4	32.8	18	24	21	45		M		27.2 Black Fine Sandy CLAY, Trace Mica	36.0
25	25.4	37.8	9	10	8	18		M			
20	20.4	42.8	5	6	7	13		M			
15	15.4	47.8	5	7	9	16		M			
10	10.4	52.8	5	5	7	12		M			
5	5.4	57.8	4	5	8	13		M			
0	0.4	62.8	5	7	8	15		W		-2.8 Green Gray Clayey Fine SAND, Trace Mica with Cemented Sand Layers	66.0
-5	-4.6	67.8	100/0.4			100/0.4				-5.0	68.2
-10	-9.6	72.8	7	9	13	22		M		-8.8	72.0
-15	-14.6	77.8								-12.8 Green Gray Black Coarse Sandy CLAY with Shells	76.0

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
-15						Match Line				
			6	8	10	18		M		Green Gray Black Coarse Sandy CLAY with Shells *(continued)*
-20	-19.6	82.8	100/0.5			100/0.5				-19.3 Green Gray Clayey Coarse SAND with Shells 82.5
-25	-24.3	87.5	9	12	17	29		M		
-30	-29.6	92.8	37	63/0.5		100/1.0				
-35	-34.6	97.8	19	31	47	78		M		-36.1 Boring Terminated at Elevation -36.1 ft in Very Dense Clayey Coarse SAND 99.3

ST-4 collected in offset boring at Station 167+45 Offset 46 ft LT

Other Samples:
ST-4 (17.0 - 19.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 211 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB1-B Rt. Ln.	**STATION** 165+89	**OFFSET** 32 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.0 ft	**TOTAL DEPTH** 99.0 ft	**NORTHING** 580,004	**EASTING** 2,430,270	**24 HR.** 1.4
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 09/01/16	**COMP. DATE** 09/01/16	**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)
65										
	62.5	0.5	2	2	3	5		M		63.0 0.0 GROUND SURFACE **UNDIVIDED COASTAL PLAIN** Tan Gray Fine Sandy CLAY with Rootlets
60	60.5	2.5	3	4	4	8		M		
	57.0	6.0	3	3	3	6		M		56.5 6.5 Gray Clayey Fine SAND
55	54.9	8.1	4	4	4	8		M		
	51.0	12.0								51.0 12.0 **COASTAL PLAIN** Blue Gray Clayey Coarse SAND with Shell Hash
50	49.9	13.1	3	2	4	6		M		48.0 15.0 [Peedee Formation] Blue Gray Fine Sandy CLAY with Shells and Trace Mica
45	44.9	18.1	5	5	14	19		M		
40	39.9	23.1	4	3	5	8		M		37.0 26.0 Blue Gray Clayey Coarse SAND with Shell Hash
35	34.9	28.1	5	6	6	12		M		
30	29.9	33.1	9	12	15	27		M		27.0 36.0 Green Gray Fine Sandy CLAY with Shells and Trace Mica
25	24.9	38.1	7	7	7	14		M		
20	19.9	43.1	5	6	7	13		M		
15	14.9	48.1	5	6	8	14		M		
10	9.9	53.1	4	6	7	13		M		
5	4.9	58.1	5	5	6	11		M		
0	-0.1	63.1	8	7	12	19		M		2.0 61.0 Green Gray Clayey Fine SAND with Shells, Trace Mica and Cemented Sand Layers
-5	-5.1	68.1	60/0.1			60/0.1		M		-5.1 68.1
-10	-10.1	73.1	8	12	18	30		W		-8.1 71.1
-15										

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 211 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB1-B Rt. Ln.	**STATION** 165+89	**OFFSET** 32 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.0 ft	**TOTAL DEPTH** 99.0 ft	**NORTHING** 580,004	**EASTING** 2,430,270	**24 HR.** 1.4
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**START DATE** 09/01/16	**COMP. DATE** 09/01/16	**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
-15	-15.1	78.1	7	11	17	Match Line		M		
-20	-20.1	83.1	60/0.1			60/0.1		M		-20.1 83.1
-25	-25.1	88.1	10	11	19	30		M		-23.1 86.1
-30	-30.1	93.1	18	33	40	73		M		
-35	-35.1	98.1	71	29/0.4		100/0.9		W		-36.0 99.0 Boring Terminated at Elevation -36.0 ft in Very Dense Clayey Coarse SAND ST-3 collected in offset boring at Station 165+89 Offset 35 ft RT Other Samples: ST-3 (18.0 - 20.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 211 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 166+46	**OFFSET** 35 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.8 ft	**TOTAL DEPTH** 99.3 ft	**NORTHING** 579,988	**EASTING** 2,430,324	**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** 08/15/16	**COMP. DATE** 08/15/16	**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)
65										
	62.8	1.0								63.8 0.0 GROUND SURFACE
			8	7	5	12		D		63.2 0.6 ASPHALT
60	60.3	3.5								**ROADWAY EMBANKMENT**
			WOH	1	1	2		M		60.8 3.0 Tan Silty Fine SAND
	57.8	6.0								**UNDIVIDED COASTAL PLAIN**
			1	2	2	4		M		Tan Gray Fine Sandy CLAY
55	55.3	8.5								
			2	3	4	7		M		
										51.8 12.0 Black Clayey Coarse SAND
50	50.3	13.5								
			3	2	2	4		W		
										46.8 17.0 **COASTAL PLAIN**
45	45.3	18.5								Gray Clayey Coarse SAND with Shell Hash
			3	2	7	9		W		[Peedee Formation]
40	40.3	23.5								
			1	4	6	10		W		
35	35.3	28.5								
			10	12	22	34		W		
30	30.3	33.5								
			15	21	23	44		W		
										26.8 37.0 Black Fine Sandy CLAY with Shells, Trace
25	25.3	38.5								Mica
			7	8	9	17		M		
20	20.3	43.5								
			6	8	15	23		M		
15	15.3	48.5								
			6	8	9	17		M		
10	10.3	53.5								
			6	8	10	18		M		
5	5.3	58.5								
			6	6	8	14		W		
0	0.3	63.5								
			8	10	14	24		W		
-5	-4.7	68.5								
			83	17/0.4		100/0.9		W		-3.2 67.0 Green Gray to Gray Clayey Fine to Coarse
-10	-9.7	73.5								SAND with Shells
			10	16	27	43		W		
-15	-14.7	78.5								

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 211 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. B-2	**STATION** 166+46	**OFFSET** 35 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.8 ft	**TOTAL DEPTH** 99.3 ft	**NORTHING** 579,988	**EASTING** 2,430,324	**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** 08/15/16	**COMP. DATE** 08/15/16	**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
-15						Match Line				
			8	15	23	38		M		Green Gray to Gray Clayey Fine to Coarse
-20	-19.7	83.5	60/0.1			60/0.1		W		SAND with Shells *(continued)*
-25	-24.7	88.5	9	13	25	38		W		
-30	-29.7	93.5	16	35	44	79		W		
-35	-34.7	98.5	53	47/0.3		100/0.8		W		-35.5 99.3 Boring Terminated at Elevation -35.5 ft in Very Dense Clayey Coarse SAND

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 46375.1.1	**TIP** R-5703	**COUNTY** LENOIR	**GEOLOGIST** Blonshine, E.G.	
SITE DESCRIPTION Bridge No. 211 on -L- (Felix Harvey Pkwy) over -Y3- SR 1004 (Hugo Rd)				**GROUND WTR (ft)**
BORING NO. EB2-B Rt. Ln.	**STATION** 167+05	**OFFSET** 36 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 63.3 ft	**TOTAL DEPTH** 99.0 ft	**NORTHING** 579,972	**EASTING** 2,430,380	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME2938 CME-750 86% 02/11/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Miller, T.	**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)
65										
	62.8	0.5	1	1	1	2	SS-21	18%		63.3 / 0.0 GROUND SURFACE
60	60.8	2.5	WOH	WOH	WOH	0		W		**UNDIVIDED COASTAL PLAIN** Brown Gray Fine Sandy SILT, Trace Rootlets
	57.3	6.0	3	3	3	6		M		60.3 / 3.0 **UNDIVIDED COASTAL PLAIN** Brown Gray Fine Sandy CLAY, Trace Rootlets
55	54.8	8.5	2	3	7	10		W		54.8 / 8.5 Gray Clayey Coarse SAND
	49.8	13.5	2	2	3	5		W		51.3 / 12.0 **COASTAL PLAIN** Blue Gray Clayey Coarse SAND with Shell Hash [Peedee Formation]
50										
45	45.8	17.5	2	6	31	37		W		
	40.8	22.5	4	6	12	18		W		
40										
35	35.8	27.5	13	12	16	28		M		
	30.8	32.5	12	19	21	40		M		
30										
25	25.8	37.5	27	19	15	34		M		
	20.8	42.5	5	6	9	15		M		
20										
15	15.8	47.5	5	6	9	15		M		
	10.8	52.5	5	7	8	15		M		
10										
5	5.8	57.5	4	6	6	12		M		
	0.8	62.5	6	7	11	18		M		
0										
-5	-4.2	67.5	100/0.5			100/0.5				-4.7 / 68.0
	-9.2	72.5	9	12	18	30		W		-7.7 / 71.0 -8.7 / 72.0 Green Gray Clayey Fine to Coarse SAND with Shells
-10										
-15	-14.2	77.5	7	8	16					

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
-15						Match Line		W		Green Gray Clayey Fine to Coarse SAND with Shells *(continued)*
-20	-19.2	82.5	100/0.3			100/0.3				
-25	-24.2	87.5	10	16	25	41		M		
-30	-29.2	92.5	35	60	40/0.4	100/0.9		M		
-35	-34.2	97.5	21	26	74/0.5	100/1.0		W		-35.7 / 99.0 Boring Terminated at Elevation -35.7 ft in Very Dense Clayey Coarse SAND

NCDOT BORE DOUBLE SITE 2.GPJ NC_DOT.GDT 4/25/17

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

Particle Size Analysis of Soils

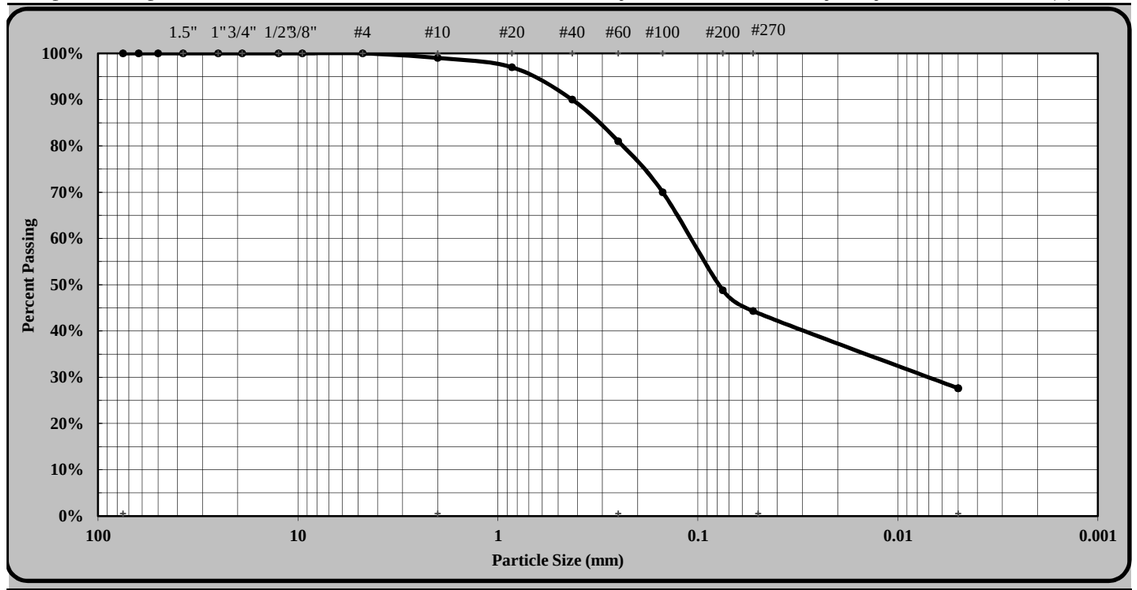
AASHTO T88 as Modified by NCDOT

S&ME

Quality Assurance

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

S&ME Project #:	6235-16-010	Report Date:	9/20/16
Project Name:	C.F. Harvey Parkway Extension R-5703	Test Date(s):	9/12 - 9/20/16
State Project #:	46375.1.1 F.A. Project No: N/A	TIP NO:	R-5703
Client Name:	Michael Baker Engineering		
Address:	Raleigh, NC		
Boring #:	B-1 Sample #: SS-20	Sample Date:	8/4/16
Location:	166+85 Offset: 37 LT	Depth (ft):	3.5 - 5.0
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY	A-6	(4)



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	18%	Silt	17%
Gravel	1%	Fine Sand	37%	Clay	28%
Apparent Relative Density	ND	Moisture Content	20%	% Passing #200	48.8%
Liquid Limit	28	Plastic Limit	12	Plastic Index	16

Soil Mortar (-#10 Sieve)

Coarse Sand	18%	Fine Sand	37%	Silt	17%	Clay	28%

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

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

Particle Size Analysis of Soils

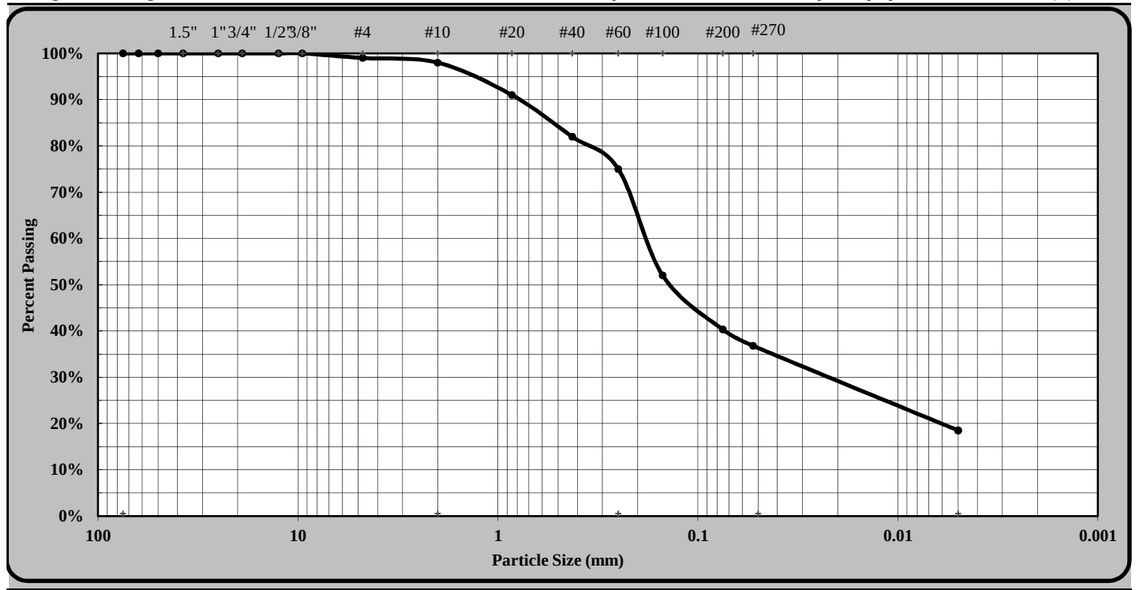
AASHTO T88 as Modified by NCDOT

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-4	Sample Date:	9/7/16
Location:	167+45 Offset: 46 LT	Depth (ft):	17.0 - 19.0 ft.
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	3/8"	Coarse Sand	23%	Silt	18%
Gravel	2%	Fine Sand	38%	Clay	19%
Apparent Relative Density	ND	Moisture Content	19%	% Passing #200	40.3%
Liquid Limit	27	Plastic Limit	21	Plastic Index	6

Soil Mortar (-#10 Sieve)

Coarse Sand	23%	Fine Sand	39%	Silt	19%	Clay	19%

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	17 - 19 ft.
Description:	Gray Coarse to Fine Sandy Clayey SILT (A-4) (0)
Type	Undisturbed
Height H_0 (in)	0.996
Diameter D_0 (in)	2.501
Weight W_0 (gr)	153.13
Bulk Density ρ (PCF)	119.22
Particle Density ρ_s	2.658 (assumed)

Initial Conditions

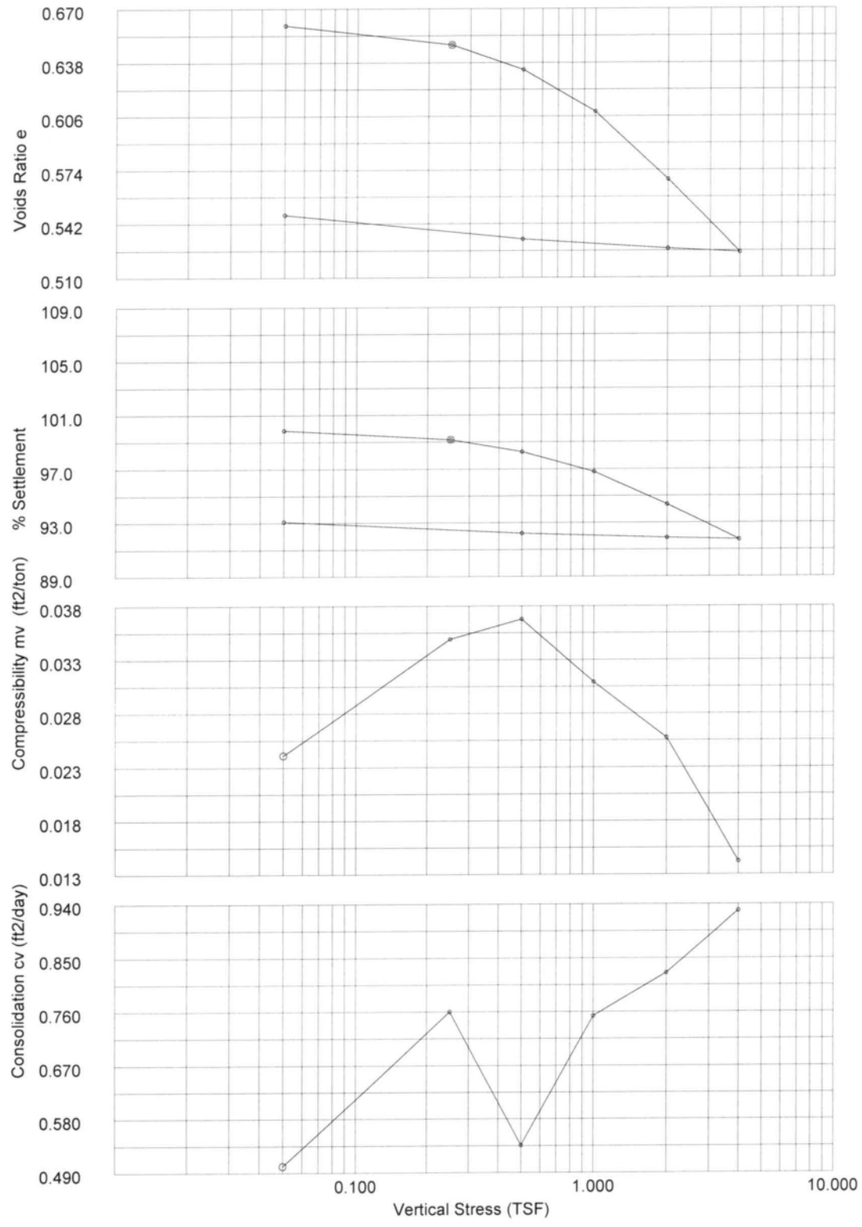
Settlement Channel	1066
Moisture Content w_0%	19.5
Dry Density ρ_d (PCF)	99.78
Voids Ratio e_0	0.6622
Deg of Saturation S_0%	78.2
Swelling Pressure Ss (TSF)	0.000

Final Conditions

Moisture Content w_f%	23.5
Dry Density ρ_d (PCF)	107.19
Voids Ratio e_f	0.5474
Deg of Saturation S_f%	100.00
Settlement: (in)	0.069
Compression Index C_c	0.149
Notes:	Test specimen taken from the middle portion of UD tube.

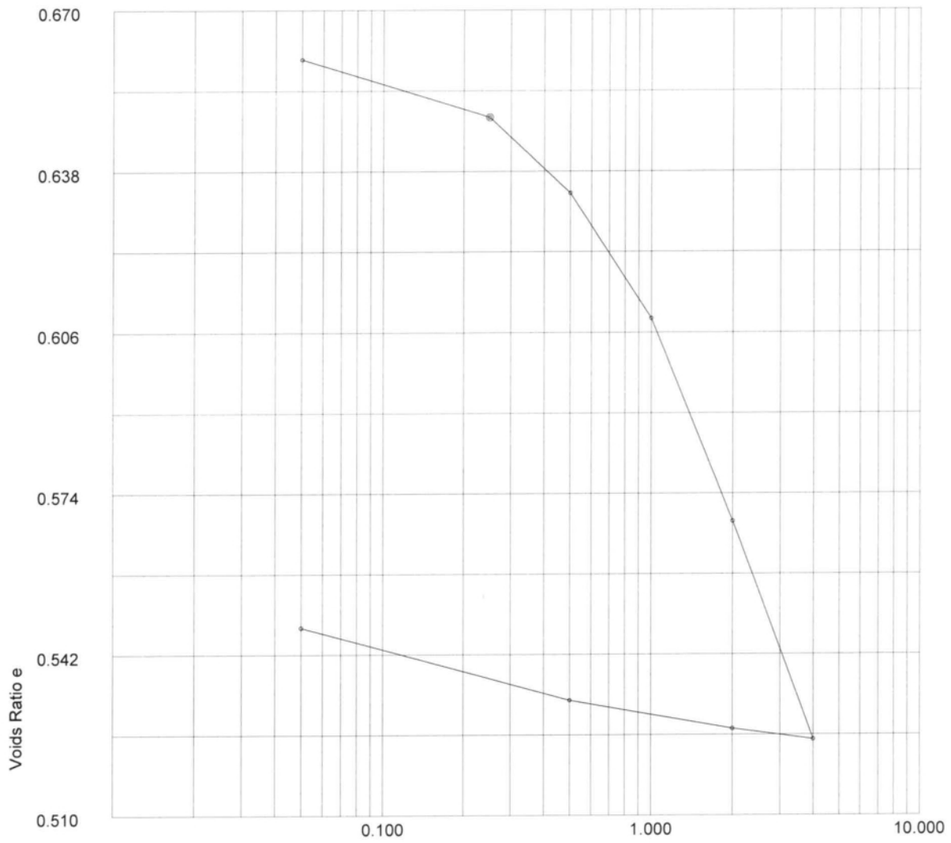
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	Jobfile: E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



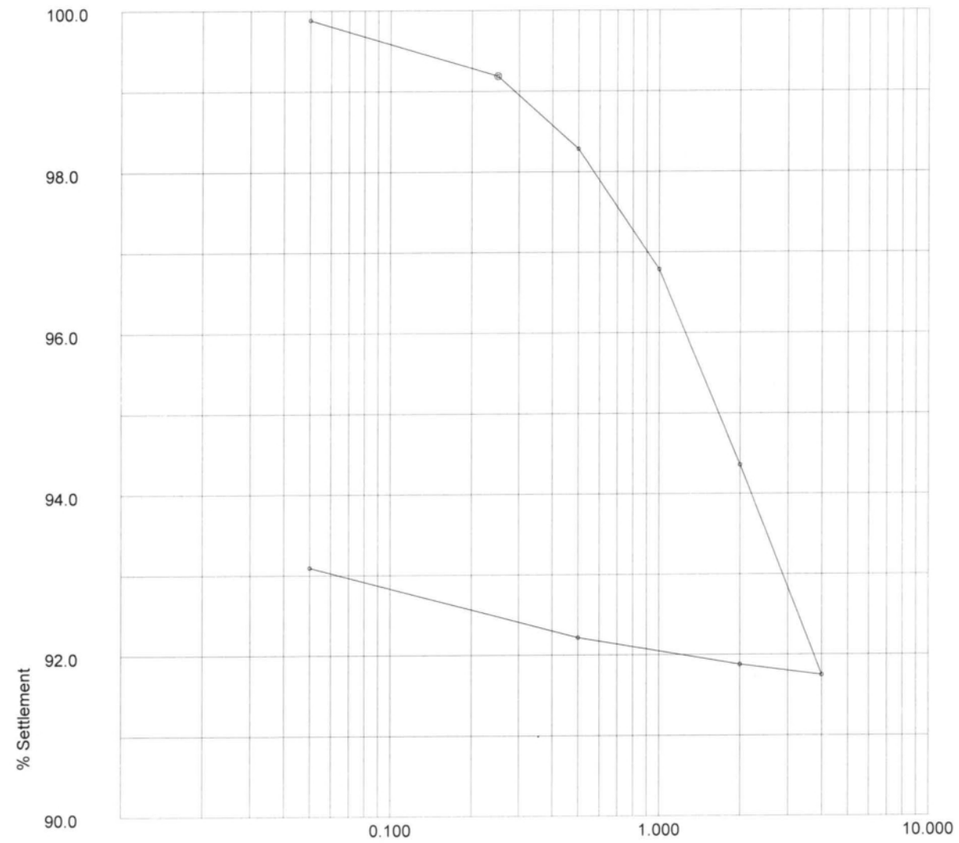
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	Jobfile: E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



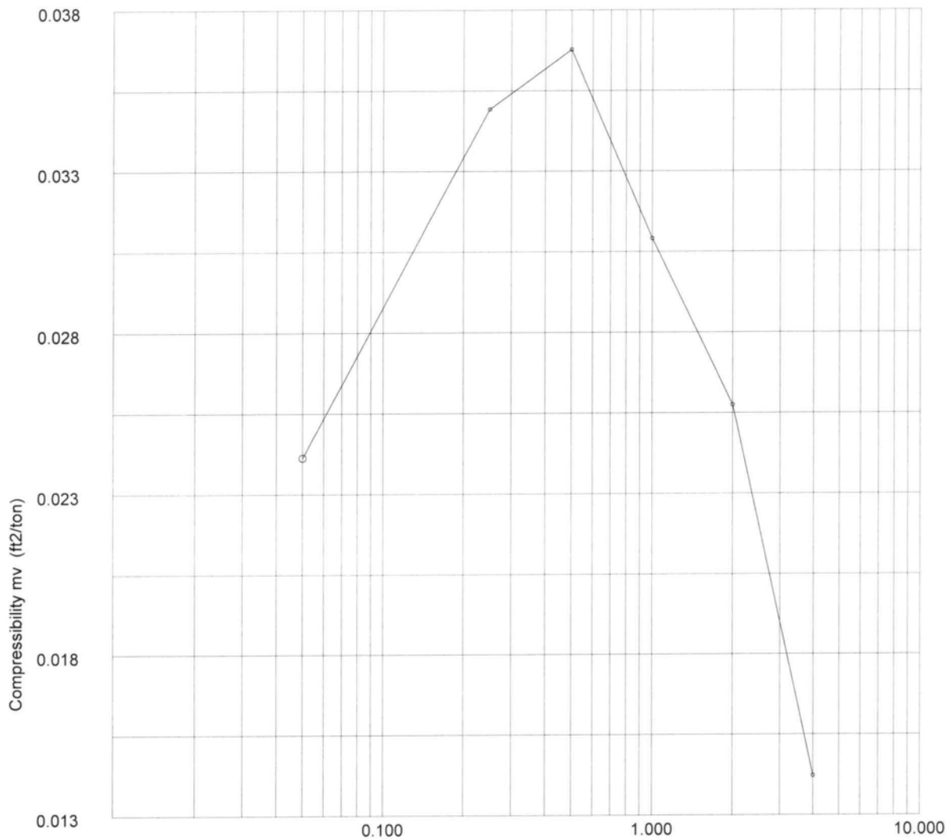
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	Jobfile: E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MJK	Checked: MJK	Approved:

Oedometer Settlement Tests



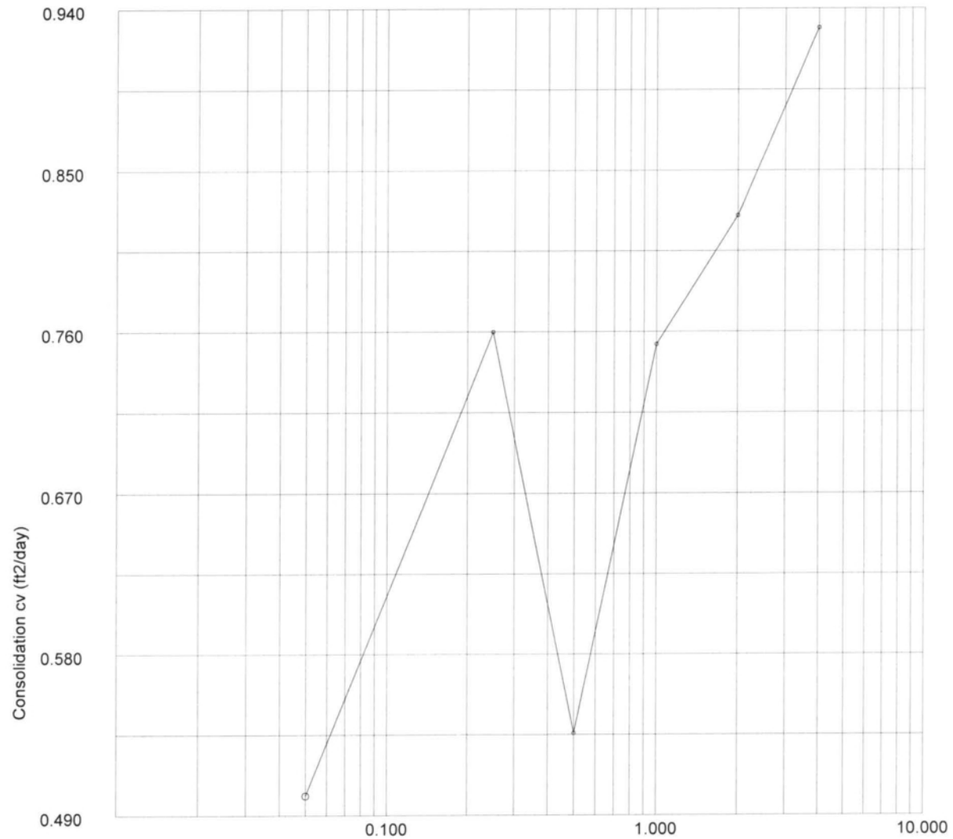
S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	Jobfile: E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MJK	Checked: MJK	Approved:

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	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:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	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	0.6602	0.989	0.0001	0.501	0.024
0.250	21.6	0.0081	0.0	21.6	0.6487	0.647	0.0008	0.760	0.035
0.500	21.6	0.0171	0.0	21.6	0.6337	0.902	0.0009	0.536	0.037
1.000	21.6	0.0320	0.0	21.6	0.6088	0.627	0.0006	0.753	0.031
2.000	21.6	0.0562	0.0	21.6	0.5684	0.549	0.0011	0.825	0.026
4.000	21.6	0.0822	0.0	21.6	0.5250	0.462	0.0019	0.929	0.014
2.000	21.6	0.0809	0.0	21.6	0.5272				0.001
0.500	21.6	0.0775	0.0	21.6	0.5329				0.002
0.050	21.6	0.0688	0.0	21.6	0.5474				0.021

S&ME

ASTM D2435-96

Test name: Consolidation
Date of Test: 12-13-16

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

Sample: ST-4
Borehole: EB2-A LT LN

Operator: MLL Checked: MLK 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	1	0.0001	0.0001
4	0.050	1	0.0001	0.0001
5	0.067	1	0.0001	0.0001
6	0.083	1	0.0001	0.0001
7	0.100	1	0.0001	0.0001
8	0.200	2	0.0002	0.0002
9	0.400	3	0.0003	0.0003
10	0.800	5	0.0005	0.0005
11	1.000	5	0.0005	0.0005
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	133.330	12	0.0012	0.0012

S&ME

ASTM D2435-96

Test name: Consolidation Load: 0.050 (TSF)
Date of Test: 12-13-16

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

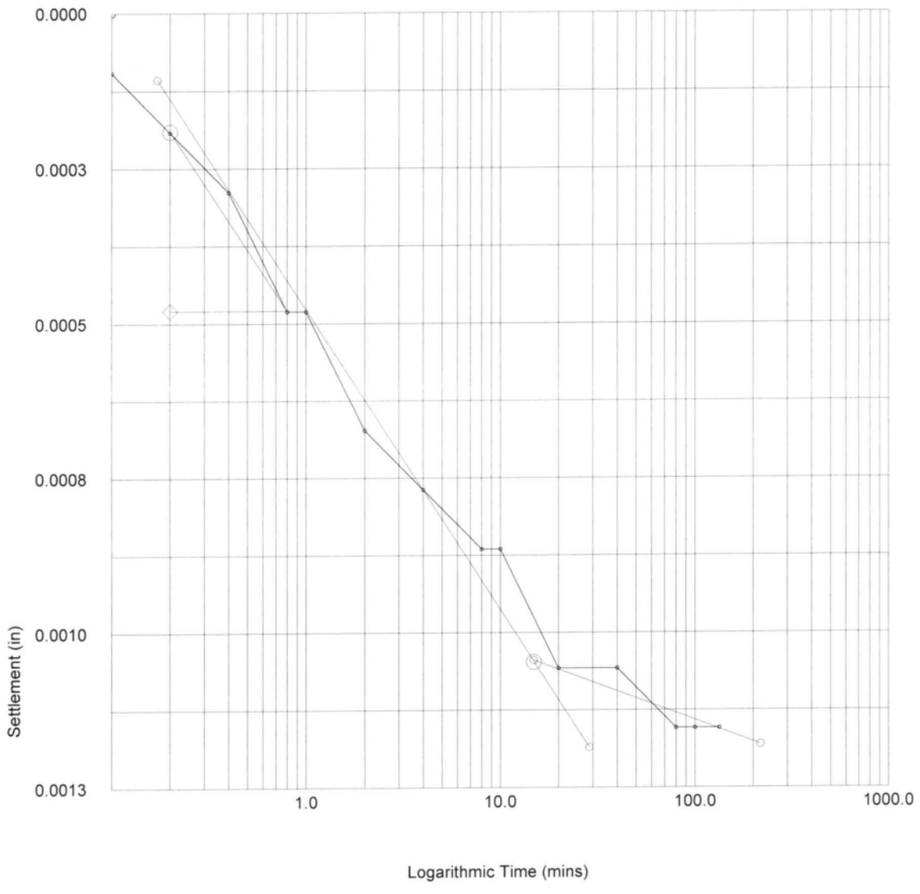
Sample: ST-4
Borehole: EB2-A LT LN

Operator: MLL Checked: MLK 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	0.6602
Final Temp oC	0.0
t_{50} (mins)	0.99
c_v (ft2/day)	0.501
m_v (ft2/ton)	0.024
Sec Compression C_{sec}	0.0001



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

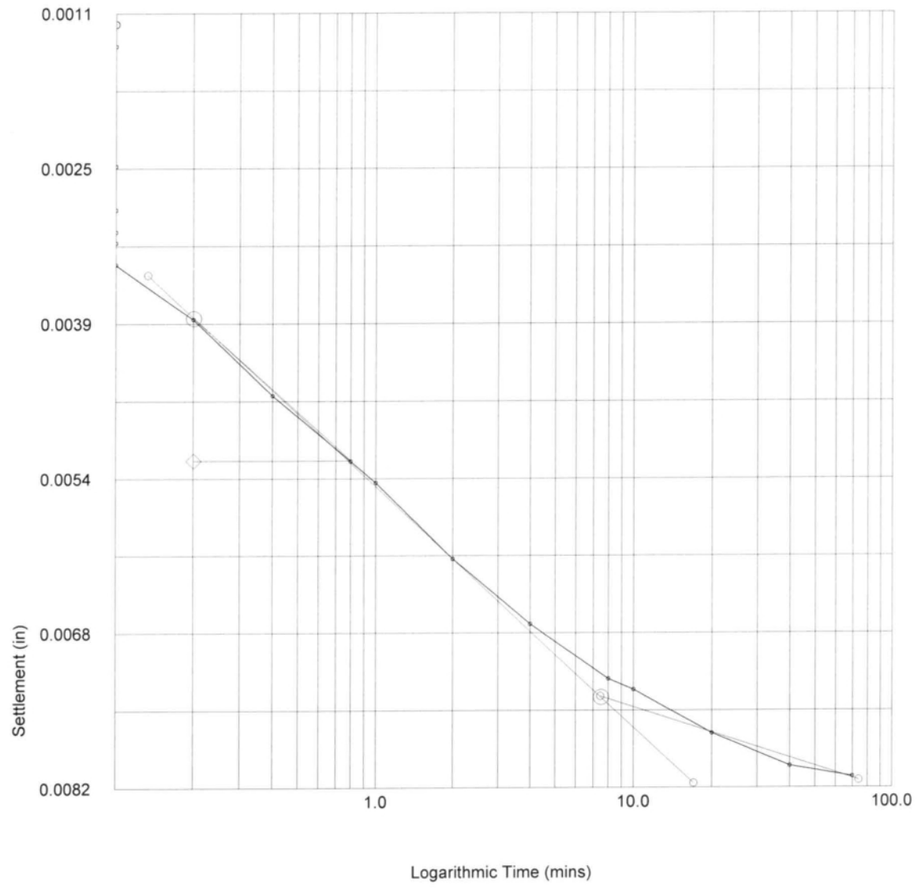
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	12	0.0012	0.0012
2	0.017	14	0.0014	0.0014
3	0.033	25	0.0025	0.0025
4	0.050	29	0.0029	0.0029
5	0.067	31	0.0031	0.0031
6	0.083	32	0.0032	0.0032
7	0.100	34	0.0034	0.0034
8	0.200	39	0.0039	0.0039
9	0.400	46	0.0046	0.0046
10	0.800	52	0.0052	0.0052
11	1.000	54	0.0054	0.0054
12	2.000	61	0.0061	0.0061
13	4.000	67	0.0067	0.0067
14	8.000	72	0.0072	0.0072
15	10.000	73	0.0073	0.0073
16	20.000	77	0.0077	0.0077
17	40.000	80	0.0080	0.0080
18	69.817	81	0.0081	0.0081

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.250 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 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)	0.0069
Voids Ratio e	0.6487
Final Temp oC	0.0
t_{50} (mins)	0.65
c_v (ft2/day)	0.76
m_v (ft2/ton)	0.035
Sec Compression C_{sec}	0.0008



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

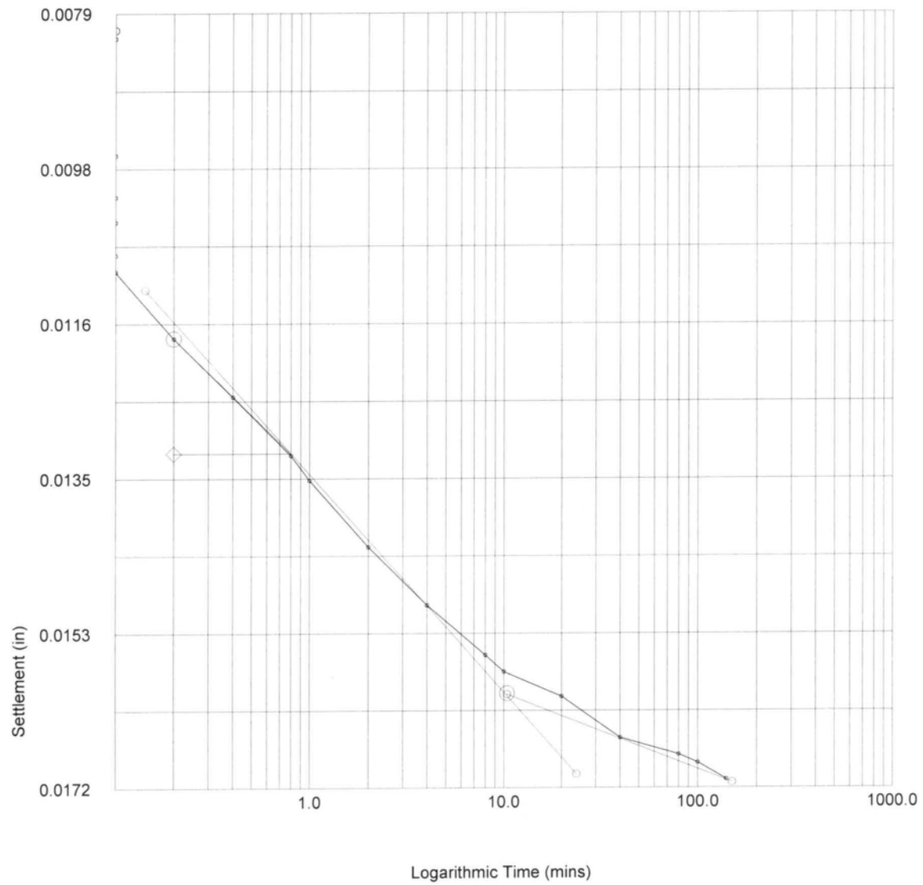
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	81	0.0081	0.0081
2	0.017	82	0.0082	0.0082
3	0.033	96	0.0096	0.0096
4	0.050	101	0.0101	0.0101
5	0.067	104	0.0104	0.0104
6	0.083	108	0.0108	0.0108
7	0.100	110	0.0110	0.0110
8	0.200	118	0.0118	0.0118
9	0.400	125	0.0125	0.0125
10	0.800	132	0.0132	0.0132
11	1.000	135	0.0135	0.0135
12	2.000	143	0.0143	0.0143
13	4.000	150	0.0150	0.0150
14	8.000	156	0.0156	0.0156
15	10.000	158	0.0158	0.0158
16	20.000	161	0.0161	0.0161
17	40.000	166	0.0166	0.0166
18	80.000	168	0.0168	0.0168
19	100.000	169	0.0169	0.0169
20	139.583	171	0.0171	0.0171

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.500 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.009
Voids Ratio e	0.6337
Final Temp oC	0.0
t_{50} (mins)	0.90
c_v (ft2/day)	0.536
m_v (ft2/ton)	0.037
Sec Compression C_{sec}	0.0009



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

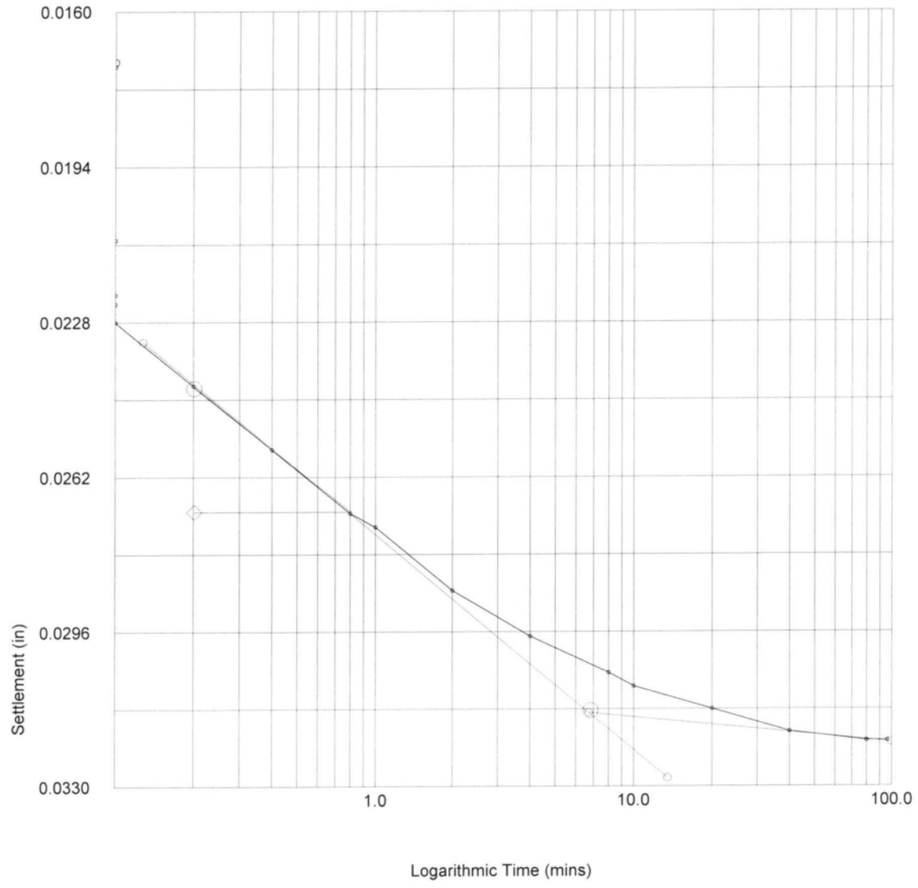
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	171	0.0171	0.0171
2	0.017	172	0.0172	0.0172
3	0.033	172	0.0172	0.0172
4	0.050	210	0.0210	0.0210
5	0.067	222	0.0222	0.0222
6	0.083	224	0.0224	0.0224
7	0.100	228	0.0228	0.0228
8	0.200	242	0.0242	0.0242
9	0.400	256	0.0256	0.0256
10	0.800	270	0.0270	0.0270
11	1.000	273	0.0273	0.0273
12	2.000	287	0.0287	0.0287
13	4.000	297	0.0297	0.0297
14	8.000	305	0.0305	0.0305
15	10.000	308	0.0308	0.0308
16	20.000	313	0.0313	0.0313
17	40.000	318	0.0318	0.0318
18	80.000	320	0.0320	0.0320
19	96.330	320	0.0320	0.0320

S&ME	ASTM D2435-96		Test name: Consolidation Load: 1.000 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-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)	0.0149
Voids Ratio e	0.6088
Final Temp oC	0.0
t_{50} (mins)	0.63
c_v (ft2/day)	0.753
m_v (ft2/ton)	0.031
Sec Compression C_{sec}	0.0006



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

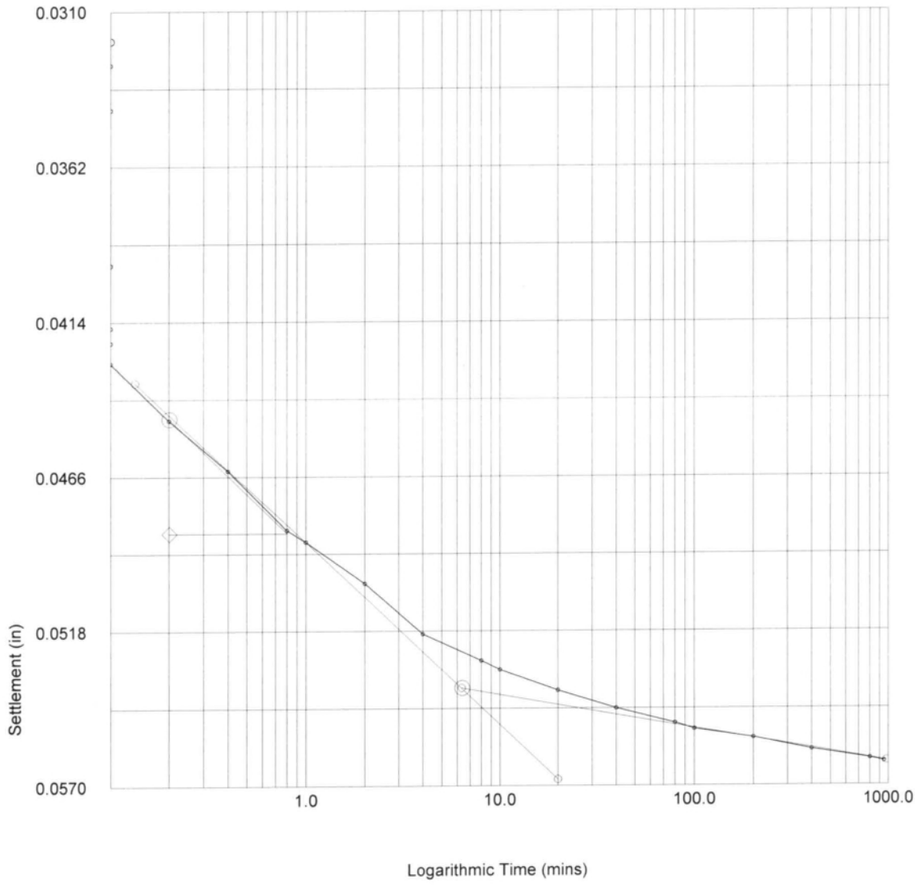
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	320	0.0320	0.0320
2	0.017	328	0.0328	0.0328
3	0.033	343	0.0343	0.0343
4	0.050	395	0.0395	0.0395
5	0.067	416	0.0416	0.0416
6	0.083	421	0.0421	0.0421
7	0.100	428	0.0428	0.0428
8	0.200	447	0.0447	0.0447
9	0.400	464	0.0464	0.0464
10	0.800	484	0.0484	0.0484
11	1.000	488	0.0488	0.0488
12	2.000	502	0.0502	0.0502
13	4.000	519	0.0519	0.0519
14	8.000	528	0.0528	0.0528
15	10.000	531	0.0531	0.0531
16	20.000	538	0.0538	0.0538
17	40.000	544	0.0544	0.0544
18	80.000	549	0.0549	0.0549
19	100.000	551	0.0551	0.0551
20	200.000	554	0.0554	0.0554
21	400.000	558	0.0558	0.0558
22	800.000	561	0.0561	0.0561
23	950.200	562	0.0562	0.0562

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0242
Voids Ratio e	0.5684
Final Temp oC	0.0
t_{50} (mins)	0.55
c_v (ft2/day)	0.825
m_v (ft2/ton)	0.026
Sec Compression C_{sec}	0.0011



S&ME	ASTM D2435-96	Test name: Consolidation	
		Date of Test: 12-13-16	
	Site Reference: C.F. Harvey	Sample: ST-4	
	Jobfile: E:\16010.JOB	Borehole: EB2-A LT LN	
	Operator: mlc	*Checked:* mlc	*Approved:*

Oedometer Settlement Tests

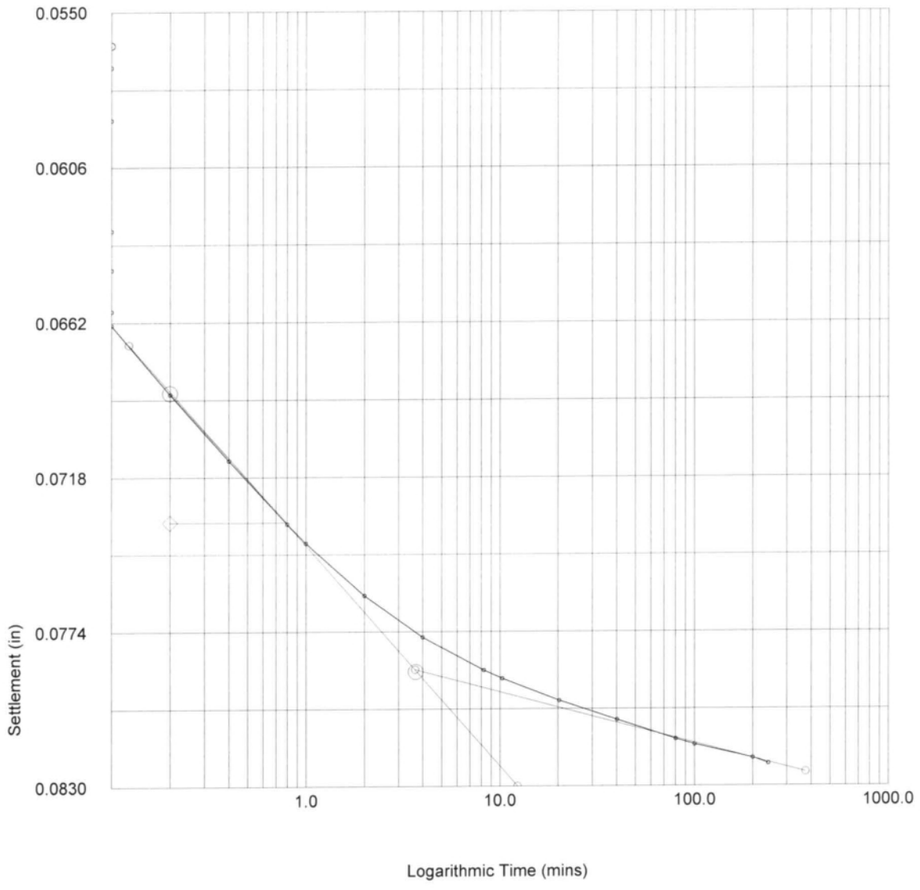
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	562	0.0562	0.0562
2	0.017	570	0.0570	0.0570
3	0.033	589	0.0589	0.0589
4	0.050	629	0.0629	0.0629
5	0.067	643	0.0643	0.0643
6	0.083	658	0.0658	0.0658
7	0.100	663	0.0663	0.0663
8	0.200	688	0.0688	0.0688
9	0.400	712	0.0712	0.0712
10	0.800	735	0.0735	0.0735
11	1.000	742	0.0742	0.0742
12	2.000	761	0.0761	0.0761
13	4.000	776	0.0776	0.0776
14	8.267	788	0.0788	0.0788
15	10.267	791	0.0791	0.0791
16	20.267	799	0.0799	0.0799
17	40.267	806	0.0806	0.0806
18	80.267	813	0.0813	0.0813
19	100.267	815	0.0815	0.0815
20	200.267	820	0.0820	0.0820
21	240.767	822	0.0822	0.0822

S&ME	ASTM D2435-96	Test name: Consolidation Load: 4.000 (TSF)	
		Date of Test: 12-13-16	
	Site Reference: C.F. Harvey	Sample: ST-4	
	Jobfile: E:\16010.JOB	Borehole: EB2-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)	0.026
Voids Ratio e	0.5250
Final Temp oC	0.0
t_{50} (mins)	0.46
c_v (ft2/day)	0.929
m_v (ft2/ton)	0.014
Sec Compression C_{sec}	0.0019



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

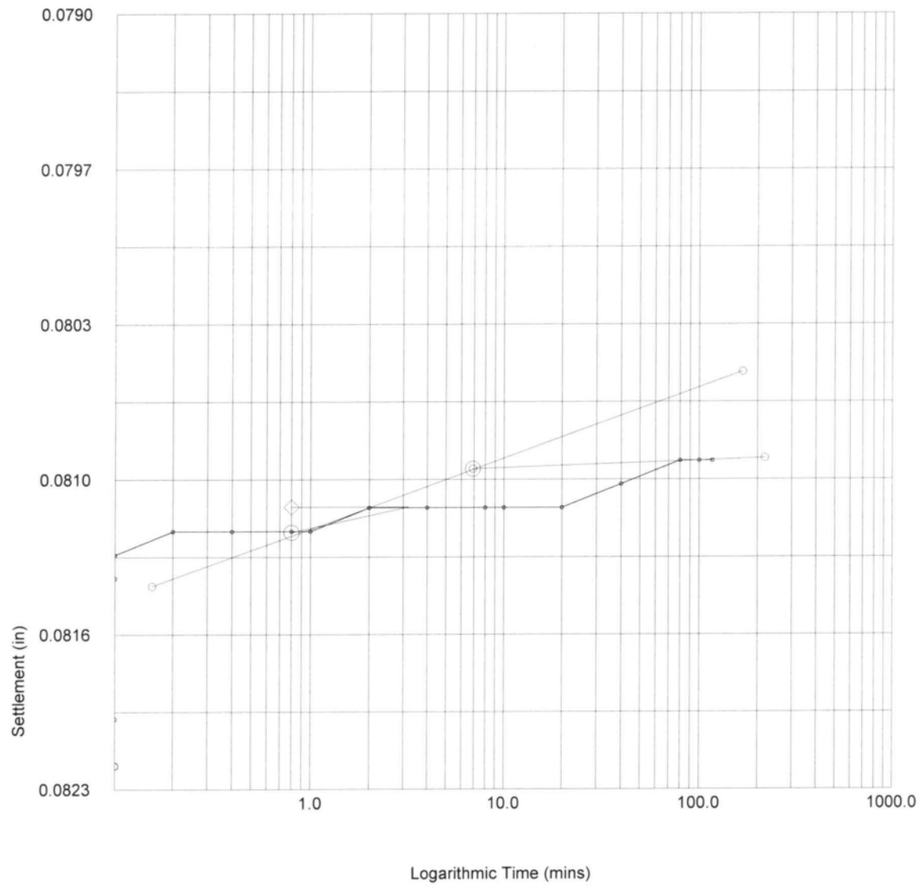
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	822	0.0822	0.0822
2	0.017	820	0.0820	0.0820
3	0.033	814	0.0814	0.0814
4	0.050	813	0.0813	0.0813
5	0.067	813	0.0813	0.0813
6	0.083	813	0.0813	0.0813
7	0.100	813	0.0813	0.0813
8	0.200	812	0.0812	0.0812
9	0.400	812	0.0812	0.0812
10	0.800	812	0.0812	0.0812
11	1.000	812	0.0812	0.0812
12	2.000	811	0.0811	0.0811
13	4.000	811	0.0811	0.0811
14	8.000	811	0.0811	0.0811
15	10.000	811	0.0811	0.0811
16	20.000	811	0.0811	0.0811
17	40.000	810	0.0810	0.0810
18	80.000	809	0.0809	0.0809
19	100.000	809	0.0809	0.0809
20	117.150	809	0.0809	0.0809

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0013
Voids Ratio e	0.5272
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: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

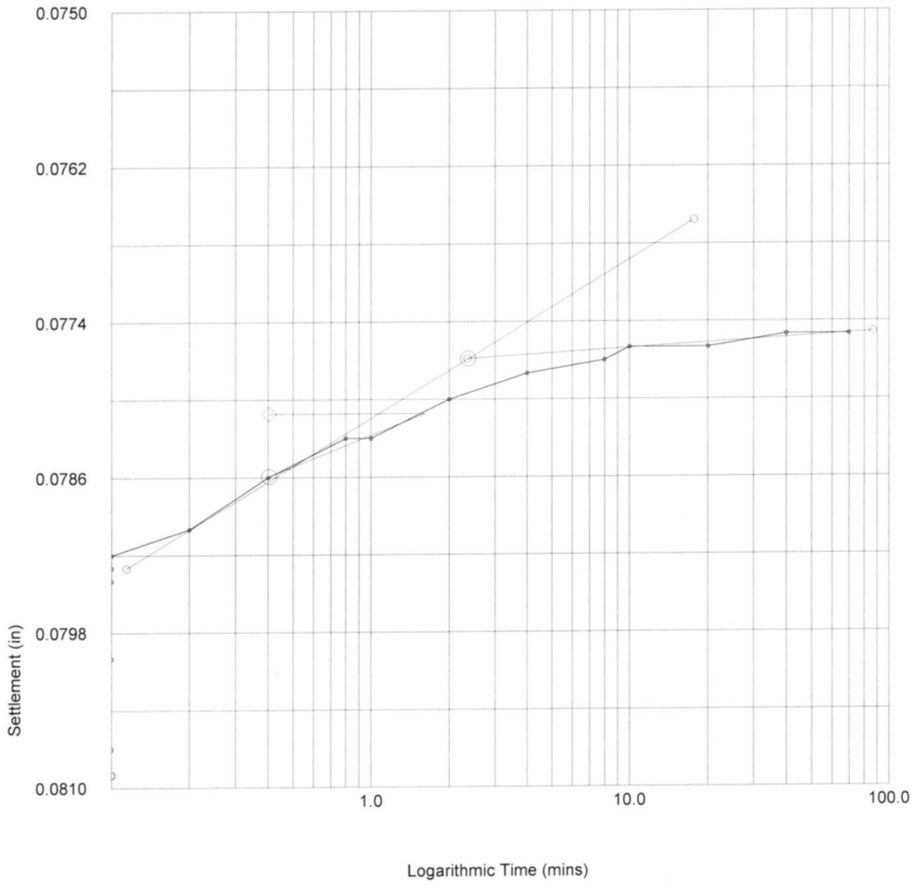
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	809	0.0809	0.0809
2	0.017	807	0.0807	0.0807
3	0.033	800	0.0800	0.0800
4	0.050	794	0.0794	0.0794
5	0.067	793	0.0793	0.0793
6	0.083	792	0.0792	0.0792
7	0.100	792	0.0792	0.0792
8	0.200	790	0.0790	0.0790
9	0.400	786	0.0786	0.0786
10	0.800	783	0.0783	0.0783
11	1.000	783	0.0783	0.0783
12	2.000	780	0.0780	0.0780
13	4.000	778	0.0778	0.0778
14	8.000	777	0.0777	0.0777
15	10.000	776	0.0776	0.0776
16	20.000	776	0.0776	0.0776
17	40.000	775	0.0775	0.0775
18	69.850	775	0.0775	0.0775

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.500 (TSF) Date of Test: 12-13-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-4 Borehole: EB2-A LT LN	
	Operator: MLC	*Checked:* MLC		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0034
Voids Ratio e	0.5329
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:	12-13-16
	Site Reference:	C.F. Harvey	Sample:	ST-4
	Jobfile:	E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

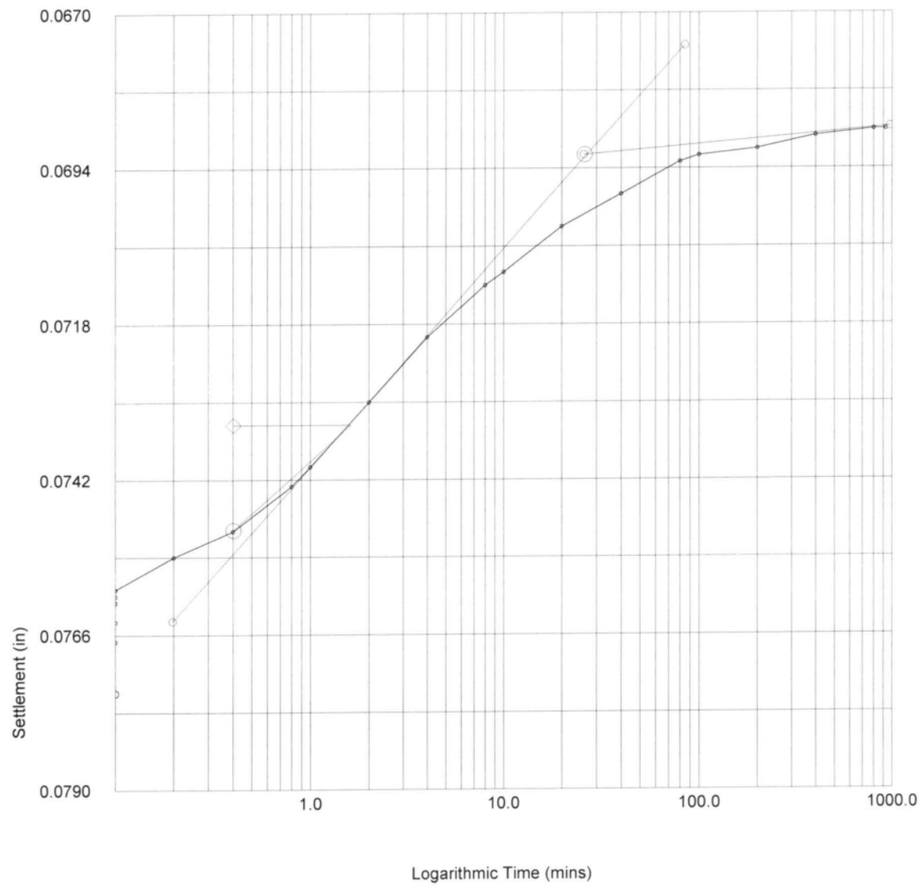
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	775	0.0775	0.0775
2	0.017	767	0.0767	0.0767
3	0.033	764	0.0764	0.0764
4	0.050	761	0.0761	0.0761
5	0.067	760	0.0760	0.0760
6	0.083	760	0.0760	0.0760
7	0.100	759	0.0759	0.0759
8	0.200	754	0.0754	0.0754
9	0.400	750	0.0750	0.0750
10	0.800	743	0.0743	0.0743
11	1.000	740	0.0740	0.0740
12	2.000	730	0.0730	0.0730
13	4.000	720	0.0720	0.0720
14	8.000	712	0.0712	0.0712
15	10.000	710	0.0710	0.0710
16	20.000	703	0.0703	0.0703
17	40.000	698	0.0698	0.0698
18	80.000	693	0.0693	0.0693
19	100.000	692	0.0692	0.0692
20	200.000	691	0.0691	0.0691
21	400.000	689	0.0689	0.0689
22	800.000	688	0.0688	0.0688
23	925.633	688	0.0688	0.0688

S&ME	ASTM D2435-96		Test name	Consolidation Load: 0.050 (TSF)
			Date of Test:	12-13-16
	Site Reference:	C.F. Harvey	Sample:	ST-4
	Jobfile:	E:\16010.JOB	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)	0.0087
Voids Ratio e	0.5474
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:	12-13-16
	Site Reference: C.F. Harvey	Sample:	ST-4
	Jobfile: E:\16010.JOB	Borehole:	EB2-A LT LN
	Operator: MK	Checked: MK	Approved:

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

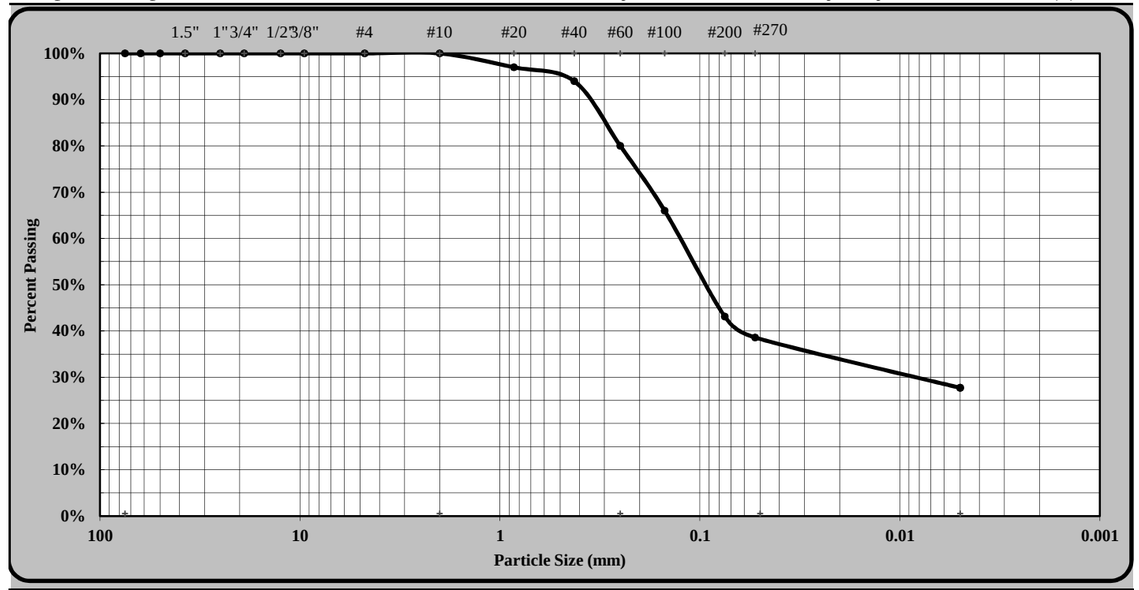
Particle Size Analysis of Soils

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:	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-B RT LN Sample #: ST-3	Sample Date:	9/1/16
Location:	165+89 Offset: 35 RT	Depth (ft):	18.0 - 20.0 ft.
Sample Description:	Gray Coarse to Fine Sandy Silty CLAY	A-6	(2)



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	20%	Silt	11%
Gravel	0%	Fine Sand	41%	Clay	28%
Apparent Relative Density	ND	Moisture Content	22%	% Passing #200	43.1%
Liquid Limit	25	Plastic Limit	13	Plastic Index	12

Soil Mortar (-#10 Sieve)

Coarse Sand	20%	Fine Sand	41%	Silt	11%	Clay	28%
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	18.0 - 20.0 ft.
Description:	Gray Coarse to Fine Sandy Silty CLAY (A-6) (2)
Type	Undisturbed
Height H_0 (in)	0.996
Diameter D_0 (in)	2.501
Weight W_0 (gr)	160.41
Bulk Density ρ (PCF)	124.89
Particle Density ρ_s	2.663 (measured)

Initial Conditions

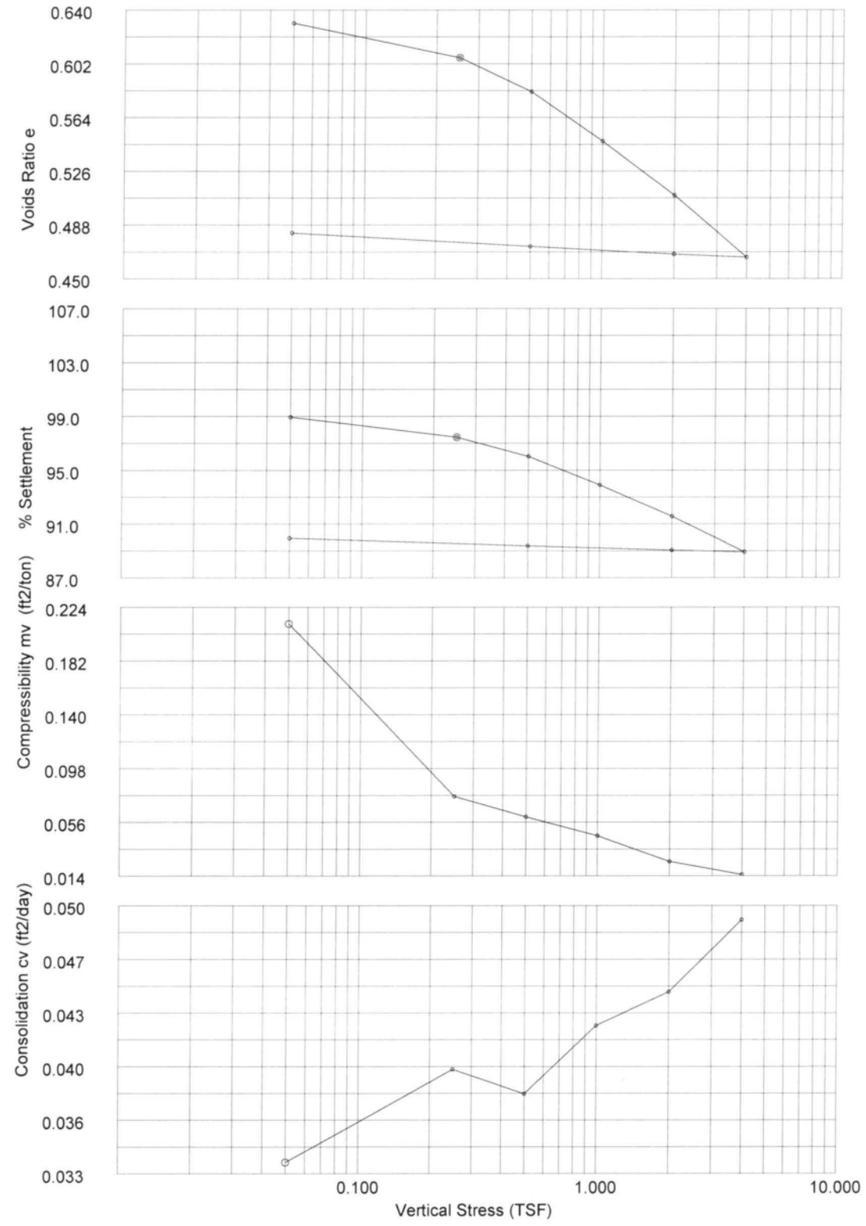
Settlement Channel	1942
Moisture Content w_0%	23.8
Dry Density ρ_d (PCF)	100.84
Voids Ratio e_0	0.6478
Deg of Saturation S_0%	98.0
Swelling Pressure Ss (TSF)	0.000

Final Conditions

Moisture Content w_f%	19.5
Dry Density ρ_d (PCF)	112.10
Voids Ratio e_f	0.4824
Deg of Saturation S_f%	100.00
Settlement: (in)	0.10
Compression Index C_c	0.162
Notes:	Test specimen taken from the middle portion of UD tube.

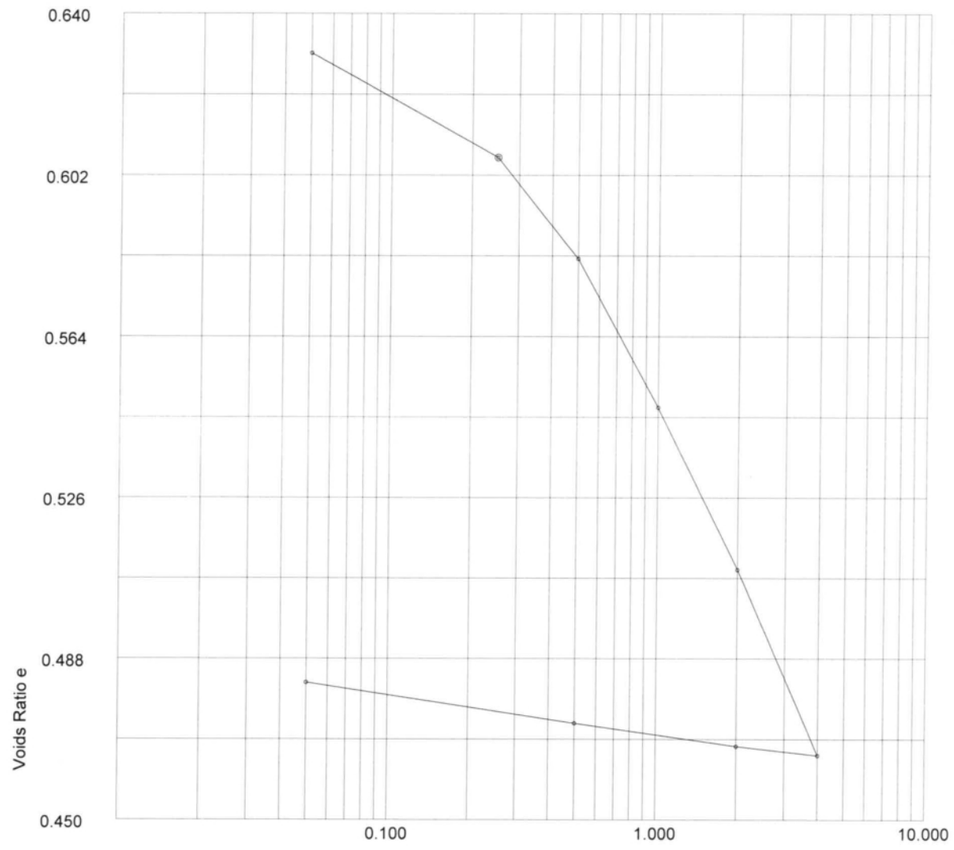
S&ME	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-14-16
	Site Reference:	C.F. Harvey	Sample:	ST-3
	Jobfile:	E:\16010.JOB	Borehole:	EB1-B RT LN
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests



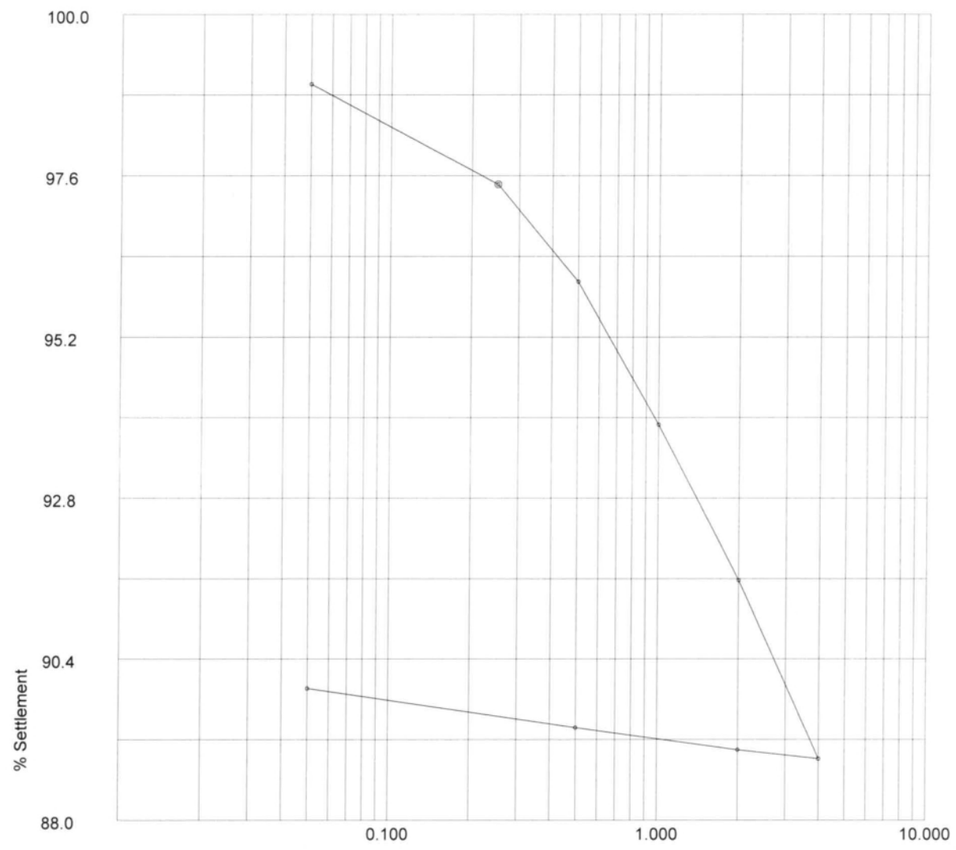
S&ME	ASTM D2435-96		Test name	Consolidation
			Date of Test:	12-14-16
	Site Reference:	C.F. Harvey	Sample:	ST-3
	Jobfile:	E:\16010.JOB	Borehole:	EB1-B RT LN
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests



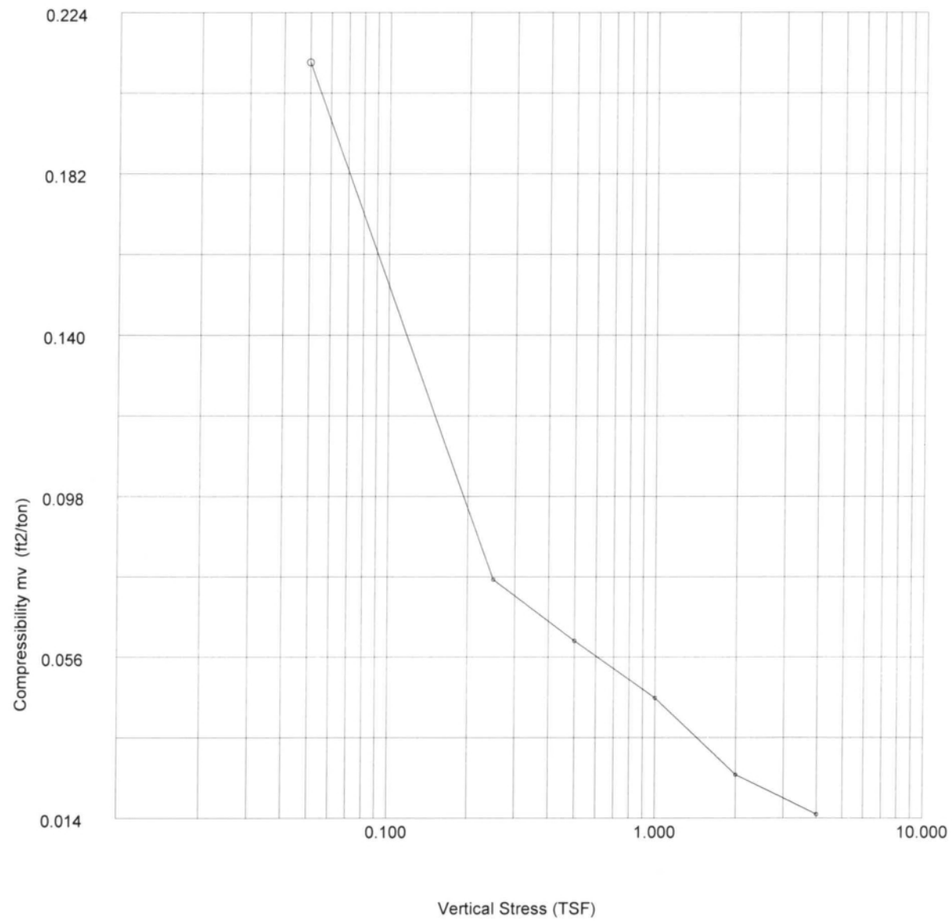
S&ME	ASTM D2435-96	Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB	Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK	*Approved:*

Oedometer Settlement Tests



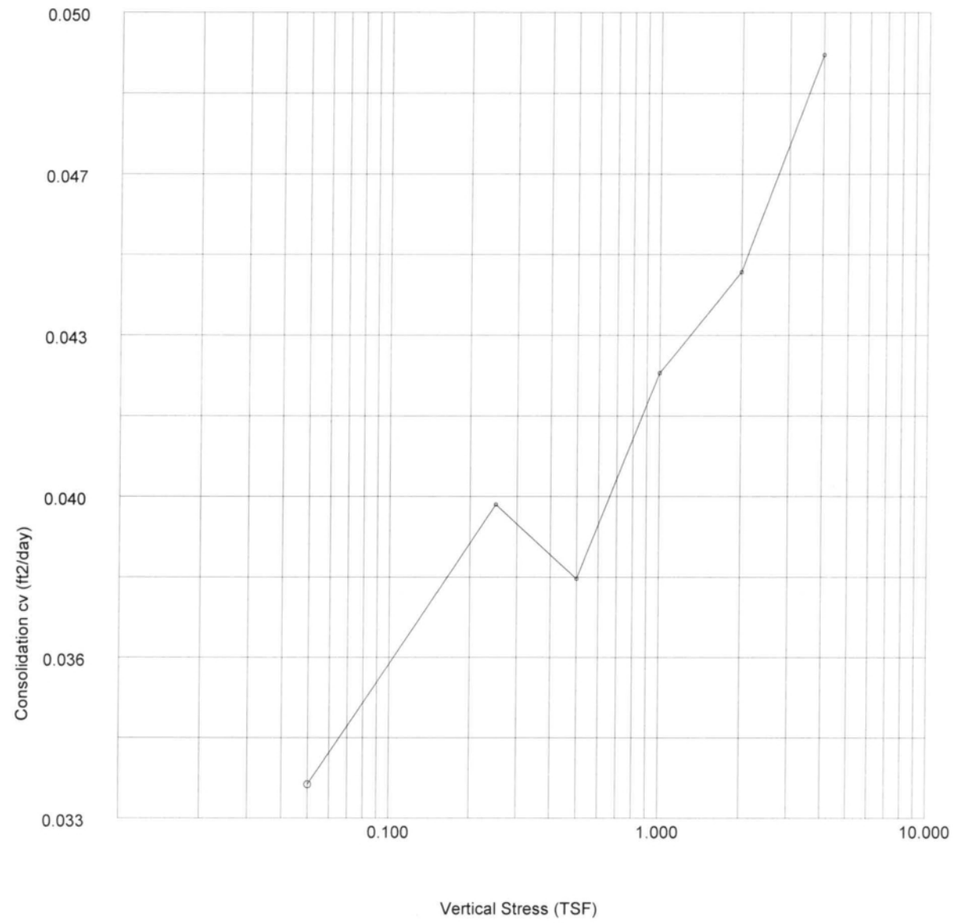
S&ME	ASTM D2435-96	Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB	Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK	*Approved:*

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-14-16
	Site Reference: C.F. Harvey	Sample:	ST-3
	Jobfile: E:\16010.JOB	Borehole:	EB1-B RT LN
	Operator: MK	Checked: MK	Approved:

Oedometer Settlement Tests



S&ME	ASTM D2435-96	Test name	Consolidation
		Date of Test:	12-14-16
	Site Reference: C.F. Harvey	Sample:	ST-3
	Jobfile: E:\16010.JOB	Borehole:	EB1-B RT 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	0.0104	0.0	21.6	0.6306	14.559	0.0005	0.034	0.211
0.250	21.6	0.0252	0.0	21.6	0.6061	12.073	0.0074	0.040	0.076
0.500	21.6	0.0396	0.0	21.6	0.5823	12.195	0.0023	0.038	0.060
1.000	21.6	0.0608	0.0	21.6	0.5472	10.547	0.0107	0.042	0.045
2.000	21.6	0.0839	0.0	21.6	0.5090	9.578	0.0022	0.045	0.025
4.000	21.6	0.1104	0.0	21.6	0.4652	8.227	0.0027	0.049	0.015
2.000	21.6	0.1091	0.0	21.6	0.4673				0.001
0.500	21.6	0.1058	0.0	21.6	0.4728				0.002
0.050	21.6	0.1000	0.0	21.6	0.4824				0.014

S&ME

ASTM D2435-96

Test name: Consolidation
Date of Test: 12-14-16

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

Sample: ST-3
Borehole: EB1-B RT LN

Operator: MLL Checked: MLC Approved:

Oedometer Settlement Tests

No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	0	0.0000	0.0000
2	0.017	4	0.0004	0.0004
3	0.033	4	0.0004	0.0004
4	0.050	5	0.0005	0.0005
5	0.067	5	0.0005	0.0005
6	0.083	5	0.0005	0.0005
7	0.100	5	0.0005	0.0005
8	0.200	6	0.0006	0.0006
9	0.400	7	0.0007	0.0007
10	0.800	9	0.0009	0.0009
11	1.000	10	0.0010	0.0010
12	2.000	15	0.0015	0.0015
13	4.000	22	0.0022	0.0022
14	8.000	32	0.0032	0.0032
15	10.000	39	0.0039	0.0039
16	20.000	56	0.0056	0.0056
17	40.000	80	0.0080	0.0080
18	80.000	92	0.0092	0.0092
19	100.000	96	0.0096	0.0096
20	200.000	101	0.0101	0.0101
21	400.000	104	0.0104	0.0104
22	800.000	104	0.0104	0.0104
23	1028.783	104	0.0104	0.0104

S&ME

ASTM D2435-96

Test name: Consolidation Load: 0.050 (TSF)
Date of Test: 12-14-16

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

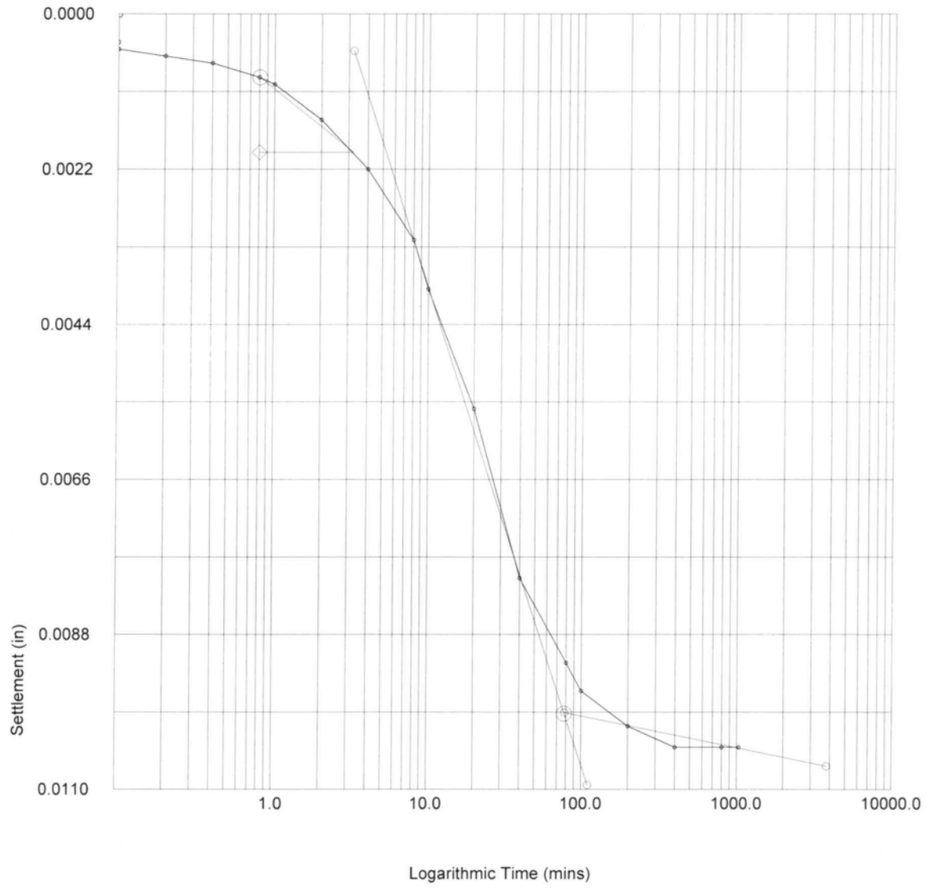
Sample: ST-3
Borehole: EB1-B RT LN

Operator: MLL 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)	0.0104
Voids Ratio e	0.6306
Final Temp oC	0.0
t_{50} (mins)	14.56
c_v (ft2/day)	0.034
m_v (ft2/ton)	0.211
Sec Compression C_{sec}	0.0005



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MLL	*Checked:* MLL		*Approved:*

Oedometer Settlement Tests

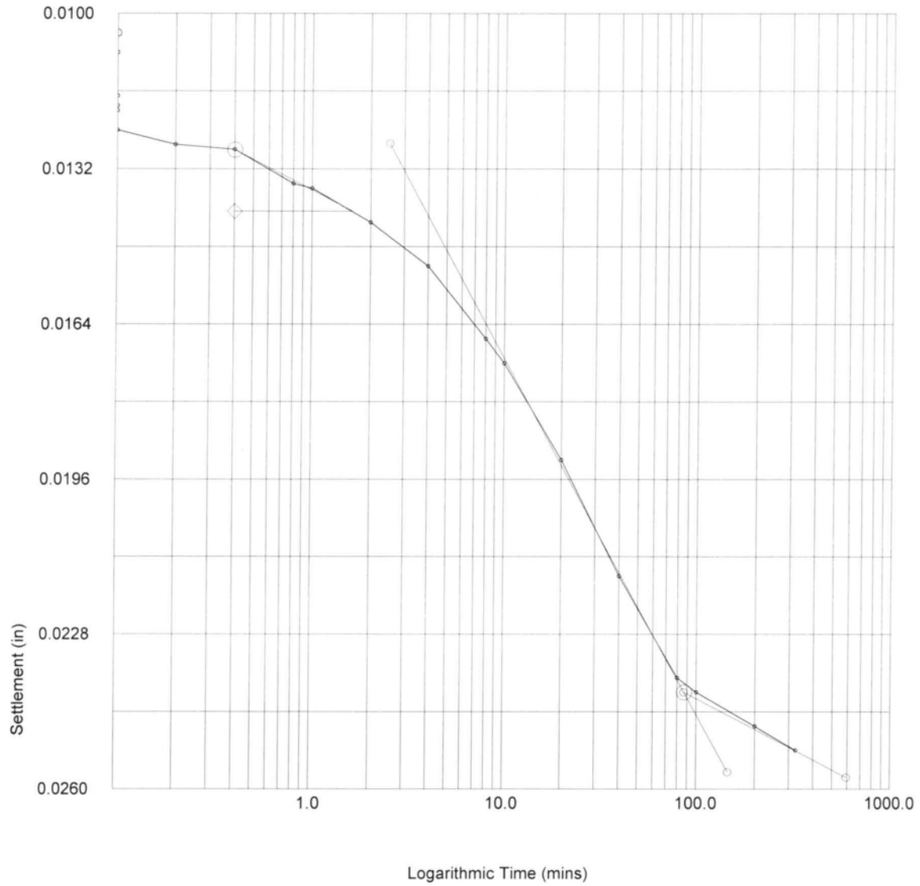
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	104	0.0104	0.0104
2	0.017	108	0.0108	0.0108
3	0.033	117	0.0117	0.0117
4	0.050	119	0.0119	0.0119
5	0.067	120	0.0120	0.0120
6	0.083	120	0.0120	0.0120
7	0.100	124	0.0124	0.0124
8	0.200	127	0.0127	0.0127
9	0.400	128	0.0128	0.0128
10	0.800	135	0.0135	0.0135
11	1.000	136	0.0136	0.0136
12	2.000	143	0.0143	0.0143
13	4.000	152	0.0152	0.0152
14	8.000	167	0.0167	0.0167
15	10.000	172	0.0172	0.0172
16	20.000	192	0.0192	0.0192
17	40.000	216	0.0216	0.0216
18	80.000	237	0.0237	0.0237
19	100.000	240	0.0240	0.0240
20	200.000	247	0.0247	0.0247
21	324.600	252	0.0252	0.0252

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.250 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MLL	*Checked:* MLL		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.250
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0148
Voids Ratio e	0.6061
Final Temp oC	0.0
t_{50} (mins)	12.07
c_v (ft2/day)	0.04
m_v (ft2/ton)	0.076
Sec Compression C_{sec}	0.0074



S&ME	ASTM D2435-96	Test name: Consolidation	Date of Test: 12-14-16
	Site Reference: C.F. Harvey	Sample: ST-3	
	Jobfile: E:\16010.JOB	Borehole: EB1-B RT LN	
	Operator: MLL	*Checked:* MLL	*Approved:*

Oedometer Settlement Tests

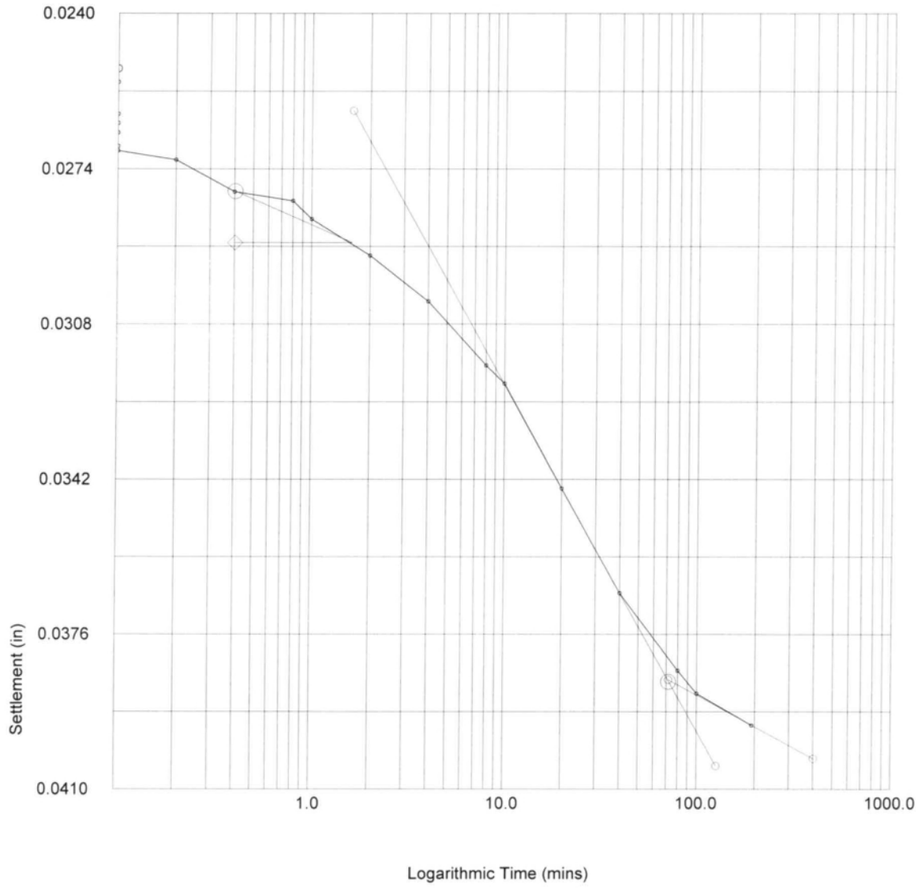
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	252	0.0252	0.0252
2	0.017	255	0.0255	0.0255
3	0.033	262	0.0262	0.0262
4	0.050	264	0.0264	0.0264
5	0.067	266	0.0266	0.0266
6	0.083	269	0.0269	0.0269
7	0.100	270	0.0270	0.0270
8	0.200	272	0.0272	0.0272
9	0.400	279	0.0279	0.0279
10	0.800	281	0.0281	0.0281
11	1.000	285	0.0285	0.0285
12	2.000	293	0.0293	0.0293
13	4.000	303	0.0303	0.0303
14	8.000	317	0.0317	0.0317
15	10.000	321	0.0321	0.0321
16	20.000	344	0.0344	0.0344
17	40.000	367	0.0367	0.0367
18	80.000	384	0.0384	0.0384
19	100.000	389	0.0389	0.0389
20	193.133	396	0.0396	0.0396

S&ME	ASTM D2435-96	Test name: Consolidation Load: 0.500 (TSF)	Date of Test: 12-14-16
	Site Reference: C.F. Harvey	Sample: ST-3	
	Jobfile: E:\16010.JOB	Borehole: EB1-B RT LN	
	Operator: MLL	*Checked:* MLL	*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	0.500
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0144
Voids Ratio e	0.5823
Final Temp oC	0.0
t_{50} (mins)	12.20
c_v (ft2/day)	0.038
m_v (ft2/ton)	0.06
Sec Compression C_{sec}	0.0023



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

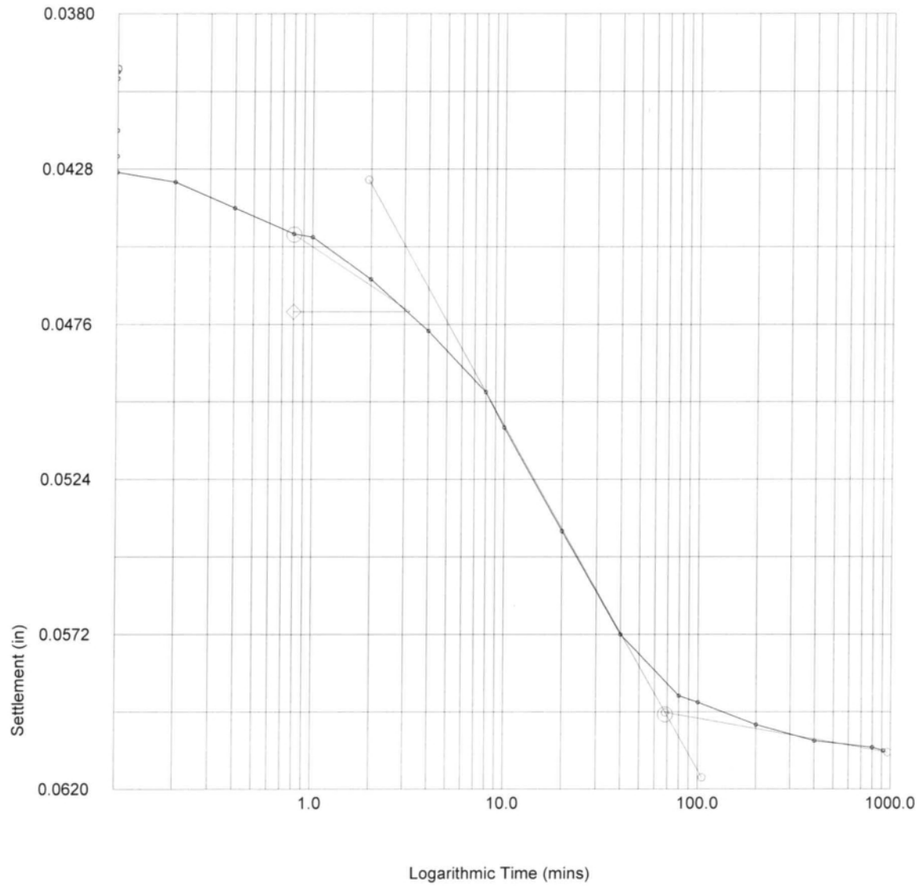
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	397	0.0397	0.0397
2	0.017	398	0.0398	0.0398
3	0.033	398	0.0398	0.0398
4	0.050	400	0.0400	0.0400
5	0.067	416	0.0416	0.0416
6	0.083	424	0.0424	0.0424
7	0.100	429	0.0429	0.0429
8	0.200	432	0.0432	0.0432
9	0.400	440	0.0440	0.0440
10	0.800	448	0.0448	0.0448
11	1.000	449	0.0449	0.0449
12	2.000	462	0.0462	0.0462
13	4.000	478	0.0478	0.0478
14	8.000	497	0.0497	0.0497
15	10.000	508	0.0508	0.0508
16	20.000	540	0.0540	0.0540
17	40.000	572	0.0572	0.0572
18	80.000	591	0.0591	0.0591
19	100.000	593	0.0593	0.0593
20	200.000	600	0.0600	0.0600
21	400.000	605	0.0605	0.0605
22	800.000	607	0.0607	0.0607
23	917.267	608	0.0608	0.0608

S&ME	ASTM D2435-96		Test name: Consolidation Load: 1.000 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	1.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0211
Voids Ratio e	0.5472
Final Temp oC	0.0
t_{50} (mins)	10.55
c_v (ft2/day)	0.042
m_v (ft2/ton)	0.045
Sec Compression C_{sec}	0.0107



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

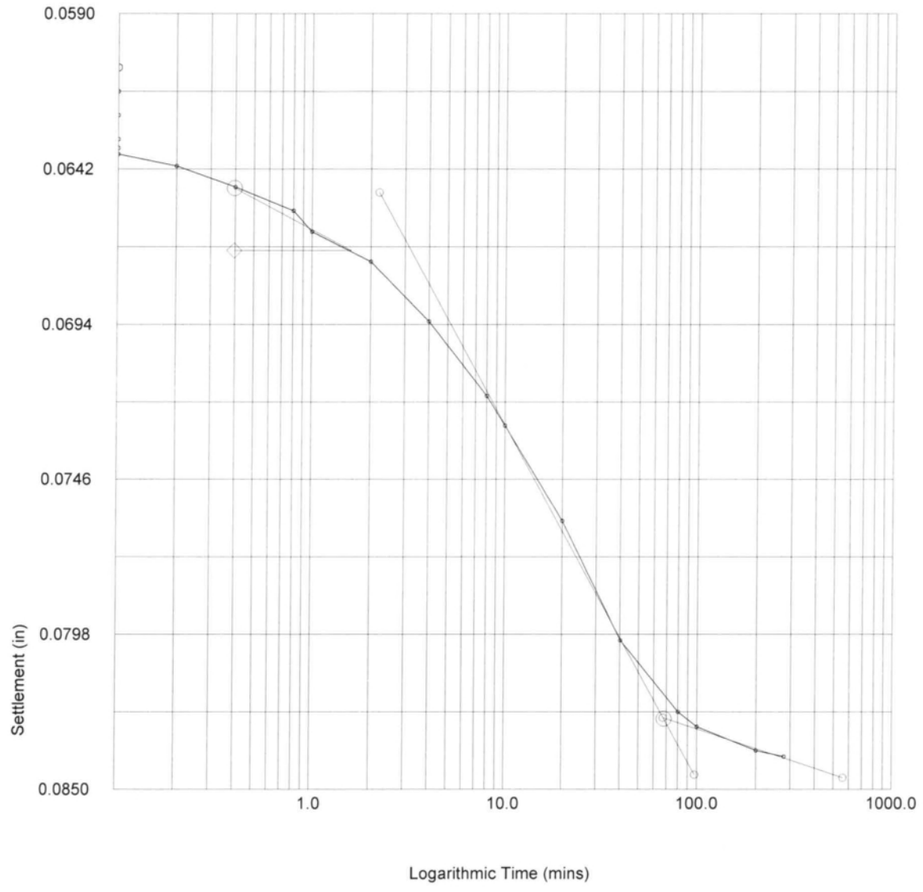
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	608	0.0608	0.0608
2	0.017	616	0.0616	0.0616
3	0.033	616	0.0616	0.0616
4	0.050	624	0.0624	0.0624
5	0.067	632	0.0632	0.0632
6	0.083	635	0.0635	0.0635
7	0.100	637	0.0637	0.0637
8	0.200	641	0.0641	0.0641
9	0.400	648	0.0648	0.0648
10	0.800	656	0.0656	0.0656
11	1.000	663	0.0663	0.0663
12	2.000	673	0.0673	0.0673
13	4.000	693	0.0693	0.0693
14	8.000	718	0.0718	0.0718
15	10.000	728	0.0728	0.0728
16	20.000	760	0.0760	0.0760
17	40.283	800	0.0800	0.0800
18	80.283	824	0.0824	0.0824
19	100.283	829	0.0829	0.0829
20	200.283	837	0.0837	0.0837
21	278.583	839	0.0839	0.0839

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0231
Voids Ratio e	0.5090
Final Temp oC	0.0
t_{50} (mins)	9.58
c_v (ft2/day)	0.045
m_v (ft2/ton)	0.025
Sec Compression C_{sec}	0.0022



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

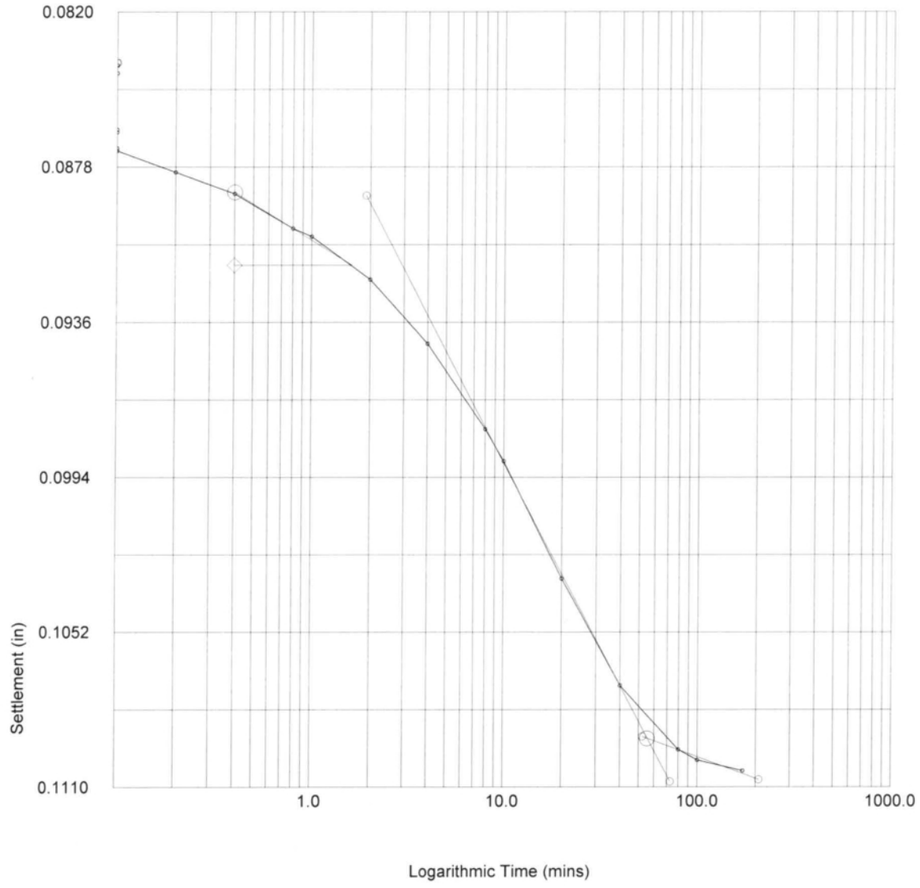
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	839	0.0839	0.0839
2	0.017	840	0.0840	0.0840
3	0.033	843	0.0843	0.0843
4	0.050	864	0.0864	0.0864
5	0.067	865	0.0865	0.0865
6	0.083	871	0.0871	0.0871
7	0.100	872	0.0872	0.0872
8	0.200	880	0.0880	0.0880
9	0.400	888	0.0888	0.0888
10	0.800	901	0.0901	0.0901
11	1.000	904	0.0904	0.0904
12	2.000	920	0.0920	0.0920
13	4.000	944	0.0944	0.0944
14	8.000	976	0.0976	0.0976
15	10.000	988	0.0988	0.0988
16	20.000	1032	0.1032	0.1032
17	40.000	1072	0.1072	0.1072
18	80.000	1096	0.1096	0.1096
19	100.000	1100	0.1100	0.1100
20	171.167	1104	0.1104	0.1104

S&ME	ASTM D2435-96		Test name: Consolidation Load: 4.000 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT 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)	0.0265
Voids Ratio e	0.4652
Final Temp oC	0.0
t_{50} (mins)	8.23
c_v (ft2/day)	0.049
m_v (ft2/ton)	0.015
Sec Compression C_{sec}	0.0027



S&ME	ASTM D2435-96		Test name: Consolidation Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

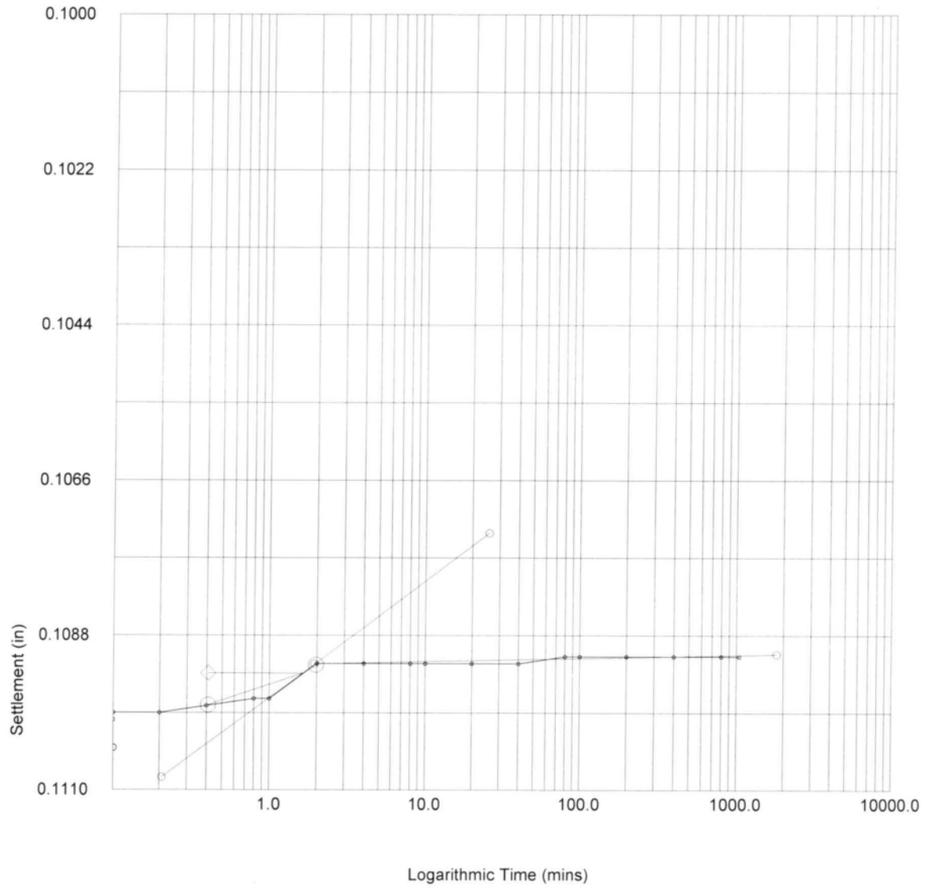
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	1104	0.1104	0.1104
2	0.017	1100	0.1100	0.1100
3	0.033	1100	0.1100	0.1100
4	0.050	1100	0.1100	0.1100
5	0.067	1099	0.1099	0.1099
6	0.083	1099	0.1099	0.1099
7	0.100	1099	0.1099	0.1099
8	0.200	1099	0.1099	0.1099
9	0.400	1098	0.1098	0.1098
10	0.800	1097	0.1097	0.1097
11	1.000	1097	0.1097	0.1097
12	2.000	1092	0.1092	0.1092
13	4.000	1092	0.1092	0.1092
14	8.000	1092	0.1092	0.1092
15	10.000	1092	0.1092	0.1092
16	20.000	1092	0.1092	0.1092
17	40.000	1092	0.1092	0.1092
18	80.000	1091	0.1091	0.1091
19	100.000	1091	0.1091	0.1091
20	200.000	1091	0.1091	0.1091
21	400.000	1091	0.1091	0.1091
22	800.000	1091	0.1091	0.1091
23	1042.500	1091	0.1091	0.1091

S&ME	ASTM D2435-96		Test name: Consolidation Load: 2.000 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

Settlement Stage Results

Vertical Stress (TSF)	2.000
Initial Temp oC	21.6
Correction (in)	0.0
Settlement (in)	0.0013
Voids Ratio e	0.4673
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: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

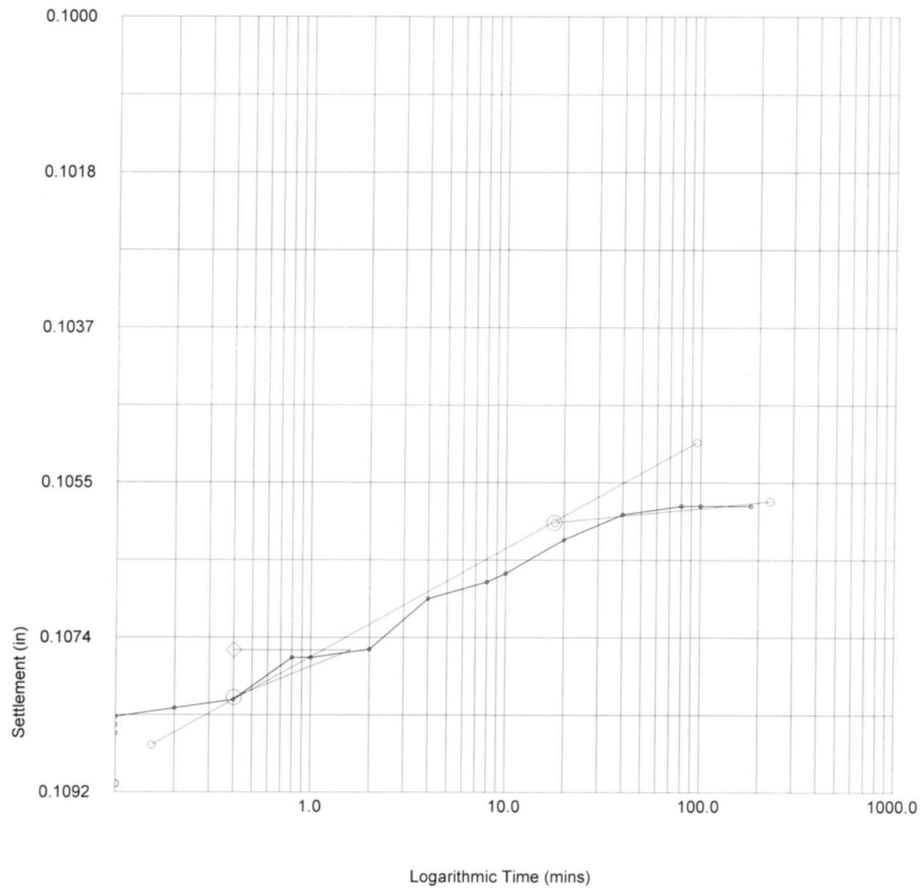
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	1091	0.1091	0.1091
2	0.017	1084	0.1084	0.1084
3	0.033	1085	0.1085	0.1085
4	0.050	1084	0.1084	0.1084
5	0.067	1083	0.1083	0.1083
6	0.083	1083	0.1083	0.1083
7	0.100	1083	0.1083	0.1083
8	0.200	1082	0.1082	0.1082
9	0.400	1081	0.1081	0.1081
10	0.800	1076	0.1076	0.1076
11	1.000	1076	0.1076	0.1076
12	2.000	1075	0.1075	0.1075
13	4.000	1069	0.1069	0.1069
14	8.000	1067	0.1067	0.1067
15	10.000	1066	0.1066	0.1066
16	20.000	1062	0.1062	0.1062
17	40.000	1059	0.1059	0.1059
18	80.000	1058	0.1058	0.1058
19	100.000	1058	0.1058	0.1058
20	182.140	1058	0.1058	0.1058

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.500 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT 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)	0.0033
Voids Ratio e	0.4728
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: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT LN	
	Operator: MK	*Checked:* MK		*Approved:*

Oedometer Settlement Tests

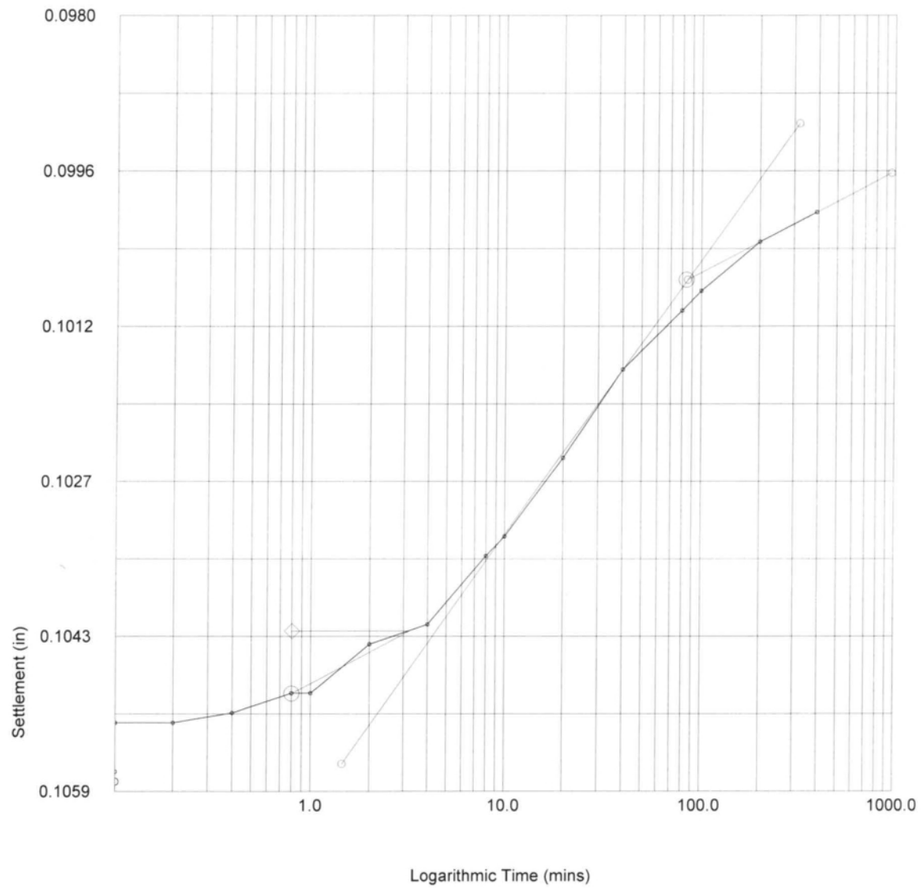
No.	Time (mins)	Displacement (divs)	Displacement (in)	Settlement (in)
1	0.000	1058	0.1058	0.1058
2	0.017	1057	0.1057	0.1057
3	0.033	1052	0.1052	0.1052
4	0.050	1052	0.1052	0.1052
5	0.067	1052	0.1052	0.1052
6	0.083	1052	0.1052	0.1052
7	0.100	1052	0.1052	0.1052
8	0.200	1052	0.1052	0.1052
9	0.400	1051	0.1051	0.1051
10	0.800	1049	0.1049	0.1049
11	1.000	1049	0.1049	0.1049
12	2.000	1044	0.1044	0.1044
13	4.000	1042	0.1042	0.1042
14	8.000	1035	0.1035	0.1035
15	10.000	1033	0.1033	0.1033
16	20.000	1025	0.1025	0.1025
17	40.000	1016	0.1016	0.1016
18	80.000	1010	0.1010	0.1010
19	100.000	1008	0.1008	0.1008
20	200.000	1003	0.1003	0.1003
21	391.230	1000	0.1000	0.1000

S&ME	ASTM D2435-96		Test name: Consolidation Load: 0.050 (TSF) Date of Test: 12-14-16	
	Site Reference: C.F. Harvey Jobfile: E:\16010.JOB		Sample: ST-3 Borehole: EB1-B RT 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)	0.0058
Voids Ratio e	0.4824
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:	12-14-16
	Site Reference: C.F. Harvey	Sample:	ST-3
	Jobfile: E:\16010.JOB	Borehole:	EB1-B RT LN
	Operator: MK	*Checked:* MK	*Approved:*

Effective Stress Triaxial Compression

Consolidated Undrained

Sample details

Sketch showing specimen location in original Sample

Depth 18.0 - 20.0 ft.
Description: Gray Coarse to Fine Sandy Silty CLAY (A-6) (2)

	Specimen 1	Specimen 2	Specimen 3
Type	Undisturbed	Undisturbed	Undisturbed
Height H_0 (in)	5.952	5.801	5.814
Diameter D_0 (in)	2.861	2.864	2.864
Weight W_0 (gr)	1275	1236.8	1226.3
Bulk Density ρ (PCF)	126.94	126.08	124.73
Particle Density ρ_s	2.663 (measured)	2.663 (measured)	2.663 (measured)

Initial Conditions

	Specimen 1	Specimen 2	Specimen 3
Cell Pressure σ_3 (lbf/in2)	8.0	15.0	22.0
Pore Pressure u (lbf/in2)	0.0	0.0	0.0
Machine Speed d_r(in/min)	0.0081	0.0079	0.0104
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%	21.3	23.8	21.9
Dry Density ρ_{d0} (PCF)	104.62	101.88	102.28
Voids Ratio e_0	0.59	0.63	0.62
Deg of Saturation S_0%	96.56	100.00	93.55
Final B Value	0.95	0.95	0.98

Final Conditions

	Specimen 1	Specimen 2	Specimen 3
Moisture Content w_f%	19.7	20.1	18.7
Dry Density ρ_d (PCF)	108.32	107.07	109.24
Voids Ratio e_f	0.53	0.55	0.52
Deg of Saturation S_f%	98.02	96.91	95.79
Failure Criteria	Mx Stress Ratio	Mx Stress Ratio	Mx Stress Ratio
Axial Strain ε_f%	6.0	10.0	7.0
Corr Dev Stress $(\sigma_1 - \sigma_3)f$ (lbf/in2)	7.8	13.4	16.4
Minor Stress σ_{3f} (lbf/in2)	3.7	6.8	8.3
Major Stress σ_{1f} (lbf/in2)	11.5	20.2	24.7
Stress Ratio $(\sigma_1/\sigma_3)_f$	3.1	3.0	3.0

Notes:

Failure Sketch

Sp 1 Sp 2

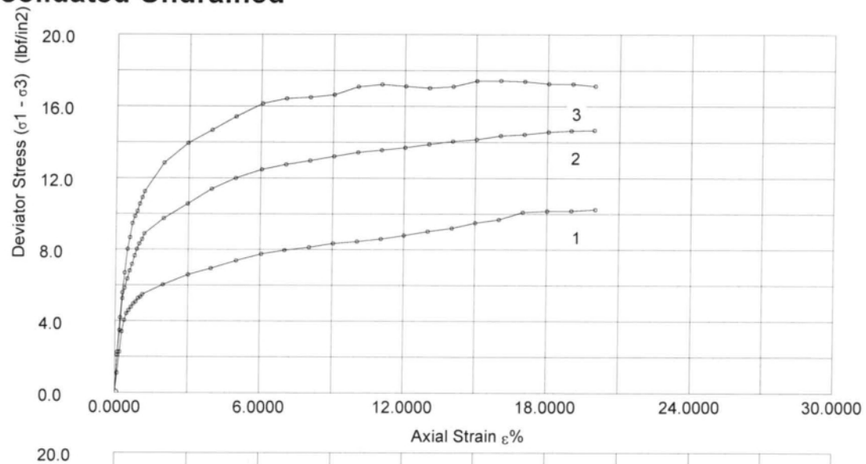
Sp 3

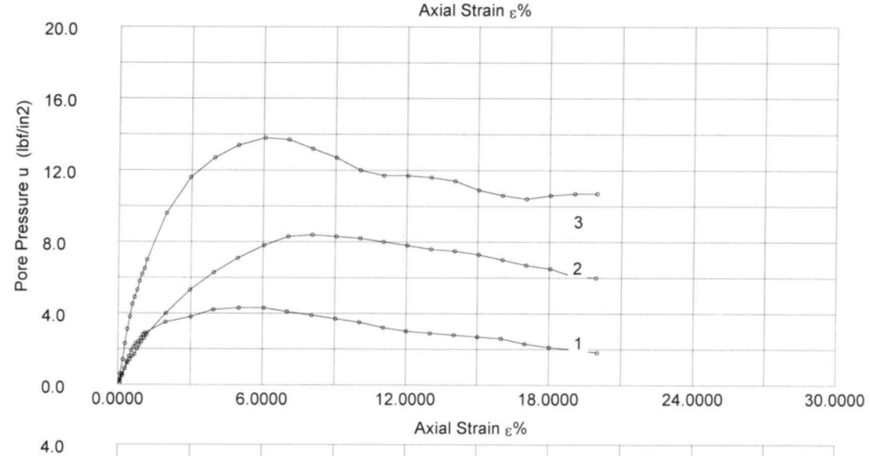
Surface Inclination

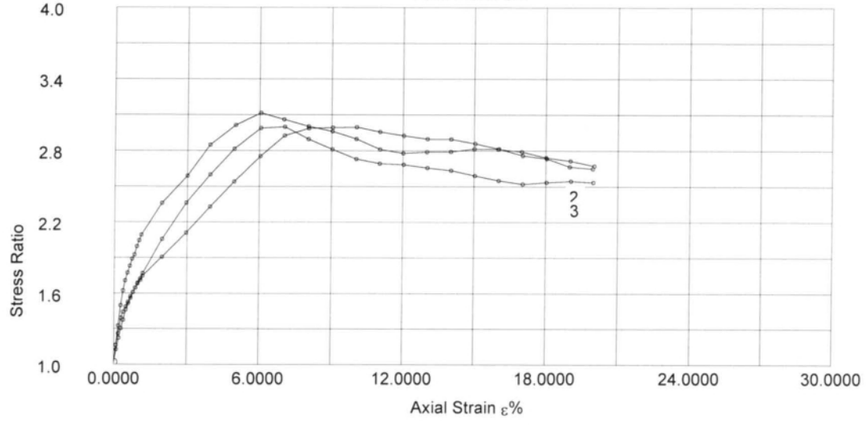
S&ME	Test Method: ASTM D4767-95	Test name	CU Triaxial (SS, MS)
		Date of Test:	12-14-16
	Site Reference: C.F. Harvey	Sample:	ST-3
	Jobfile: E:\16010.JOB	Borehole:	EB1-B RT LN
	Operator: MK	*Checked:* MK	*Approved:*

Effective Stress Triaxial Compression

Consolidated Undrained



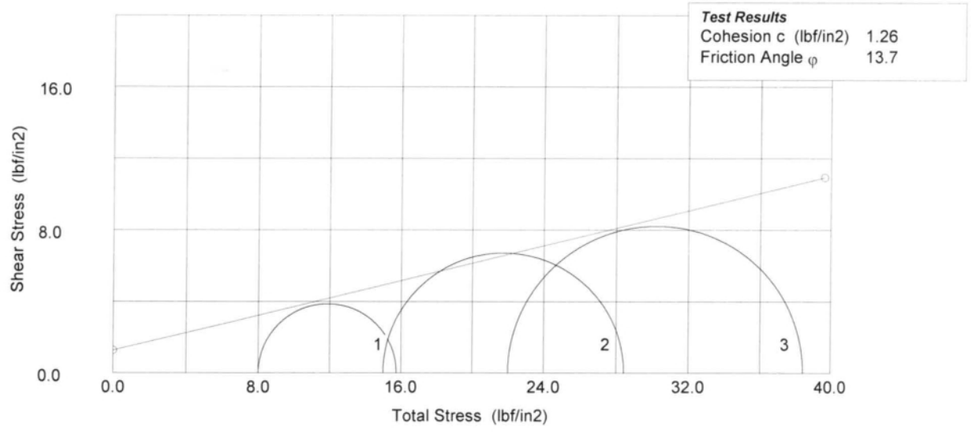




S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)	
	Site Reference: C.F. Harvey	Date of Test: 12-14-16	
	Jobfile: E:\16010.JOB	Sample: ST-3	
		Borehole: EB1-B RT LN	
	Operator: MLC	Checked: MLC	Approved:

Effective Stress Triaxial Compression

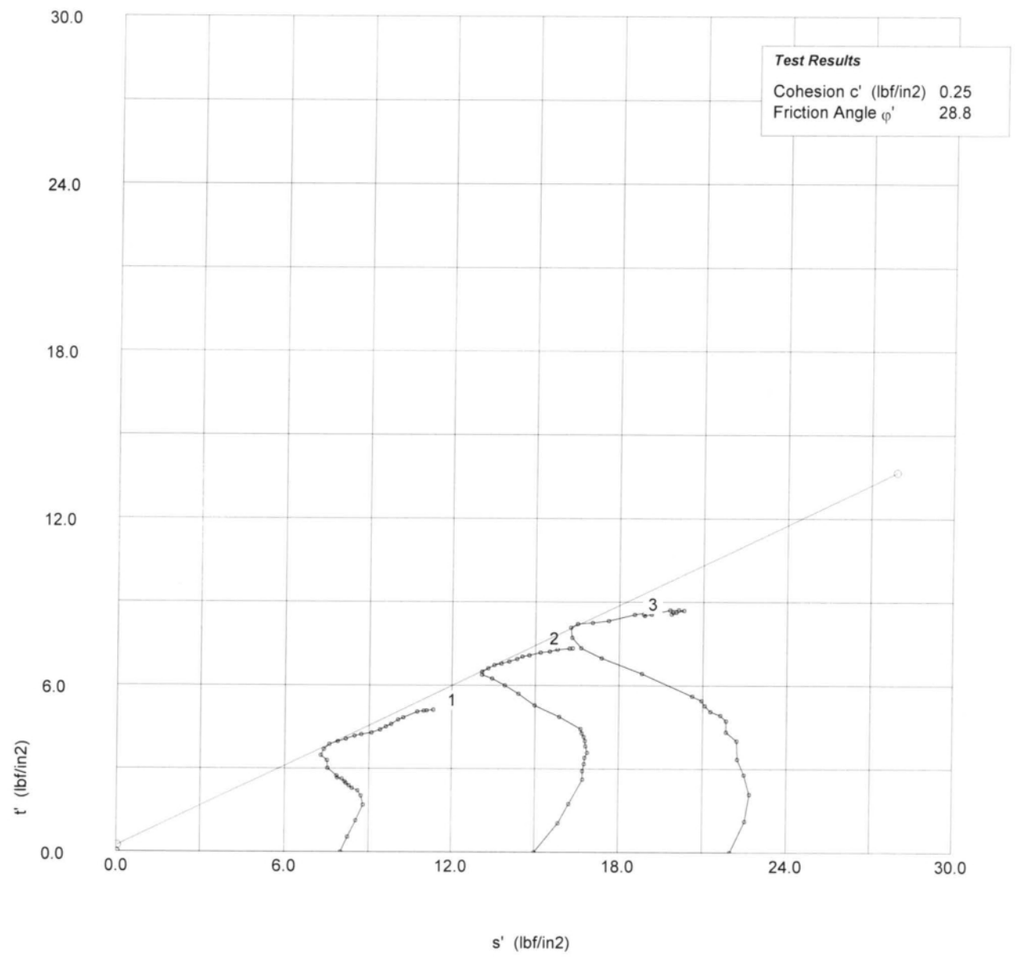
Consolidated Undrained



S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)	
	Site Reference: C.F. Harvey	Date of Test: 12-14-16	
	Jobfile: E:\16010.JOB	Sample: ST-3	
		Borehole: EB1-B RT LN	
	Operator: MLC	Checked: MLC	Approved:

Effective Stress Triaxial Compression

Consolidated Undrained



S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS)	
		Date of Test: 12-14-16	
	Site Reference: C.F. Harvey	Sample: ST-3	
	Jobfile: E:\16010.JOB	Borehole: EB1-B RT LN	
	Operator: MK	Checked: MK	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	24	0.00	589	0.0	0	0.0	0.0	0.0	8.00	8.00	1.00
2	73	0.08	658	6.9	3	0.3	1.1	1.1	7.70	8.80	1.14
3	128	0.18	732	14.3	6	0.6	2.3	2.3	7.40	9.67	1.31
4	183	0.27	803	21.4	9	0.9	3.4	3.4	7.10	10.50	1.48
5	240	0.37	844	25.5	13	1.3	4.0	4.0	6.70	10.74	1.60
6	294	0.46	867	27.8	16	1.6	4.4	4.4	6.40	10.80	1.69
7	346	0.55	889	30.0	19	1.9	4.7	4.6	6.10	10.69	1.75
8	405	0.65	901	31.2	21	2.1	4.9	4.8	5.90	10.67	1.81
9	458	0.74	913	32.4	23	2.3	5.1	5.0	5.70	10.66	1.87
10	513	0.83	920	33.1	24	2.4	5.2	5.1	5.60	10.66	1.90
11	572	0.93	933	34.4	26	2.6	5.4	5.3	5.40	10.66	1.97
12	625	1.02	938	34.9	28	2.8	5.5	5.3	5.20	10.54	2.03
13	680	1.11	947	35.8	29	2.9	5.6	5.5	5.10	10.57	2.07
14	1177	1.96	993	40.4	35	3.5	6.3	6.0	4.50	10.52	2.34
15	1793	3.01	1039	45.0	38	3.8	6.9	6.6	4.20	10.79	2.57
16	2348	3.95	1075	48.6	42	4.2	7.4	7.0	3.80	10.75	2.83
17	2966	5.00	1114	52.5	43	4.3	7.9	7.4	3.70	11.08	2.99
18	3582	6.05	1150	56.1	43	4.3	8.4	7.8	3.70	11.45	3.09
19	4150	7.01	1175	58.6	41	4.1	8.7	8.0	3.90	11.85	3.04
20	4752	8.03	1199	61.0	39	3.9	8.9	8.1	4.10	12.23	2.98
21	5340	9.03	1226	63.7	37	3.7	9.2	8.3	4.30	12.64	2.94
22	5930	10.04	1246	65.7	35	3.5	9.4	8.4	4.50	12.95	2.88
23	6518	11.03	1269	68.0	32	3.2	9.6	8.6	4.80	13.39	2.79
24	7096	12.02	1297	70.8	30	3.0	9.9	8.8	5.00	13.80	2.76
25	7684	13.02	1326	73.7	29	2.9	10.2	9.0	5.10	14.12	2.77
26	8273	14.02	1354	76.5	28	2.8	10.5	9.2	5.20	14.41	2.77
27	8857	15.01	1389	80.0	27	2.7	10.8	9.5	5.30	14.81	2.79
28	9437	16.00	1416	82.7	26	2.6	11.1	9.7	5.40	15.08	2.79
29	10026	17.00	1463	87.4	23	2.3	11.5	10.1	5.70	15.79	2.77
30	10622	18.01	1484	89.5	21	2.1	11.7	10.2	5.90	16.06	2.72
31	11218	19.02	1499	91.0	20	2.0	11.7	10.2	6.00	16.17	2.70
32	11807	20.02	1519	93.0	18	1.8	11.8	10.2	6.20	16.44	2.65

S&ME	Test Method: ASTM D4767-95	Test name: CU Triaxial (SS, MS) Shear (Specimen 1)	
		Date of Test: 12-14-16	
	Site Reference: C.F. Harvey	Sample: ST-3	
	Jobfile: E:\16010.JOB	Borehole: EB1-B RT LN	
	Operator: MK	Checked: MK	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	70	0.00	666	0.0	0	0.0	0.0	0.0	15.00	15.00	1.00
2	118	0.08	797	13.1	2	0.2	2.1	2.1	14.80	16.90	1.14
3	175	0.18	883	21.7	5	0.5	3.5	3.5	14.50	17.98	1.24
4	230	0.28	994	32.8	9	0.9	5.2	5.2	14.10	19.35	1.37
5	286	0.38	1031	36.5	12	1.2	5.8	5.8	13.80	19.64	1.42
6	345	0.48	1064	39.8	14	1.4	6.4	6.4	13.60	19.96	1.47
7	399	0.58	1102	43.6	16	1.6	7.0	6.8	13.40	20.20	1.51
8	454	0.67	1126	46.0	17	1.7	7.3	7.2	13.30	20.47	1.54
9	514	0.78	1156	49.0	20	2.0	7.8	7.6	13.00	20.64	1.59
10	567	0.87	1180	51.4	22	2.2	8.2	8.0	12.80	20.82	1.63
11	622	0.97	1199	53.3	24	2.4	8.5	8.3	12.60	20.91	1.66
12	684	1.08	1216	55.0	26	2.6	8.7	8.6	12.40	20.97	1.69
13	739	1.17	1236	57.0	28	2.8	9.0	8.9	12.20	21.08	1.73
14	1191	1.96	1303	63.7	40	4.0	10.0	9.7	11.00	20.74	1.89
15	1757	2.96	1367	70.1	53	5.3	10.9	10.6	9.70	20.26	2.09
16	2325	3.95	1436	77.0	63	6.3	11.9	11.4	8.70	20.09	2.31
17	2894	4.95	1489	82.3	71	7.1	12.6	12.0	7.90	19.90	2.52
18	3518	6.04	1536	87.0	78	7.8	13.1	12.5	7.20	19.68	2.73
19	4091	7.05	1569	90.3	83	8.3	13.5	12.8	6.70	19.46	2.90
20	4659	8.04	1599	93.3	84	8.4	13.8	13.0	6.60	19.57	2.97
21	5227	9.04	1631	96.5	83	8.3	14.1	13.2	6.70	19.91	2.97
22	5800	10.04	1663	99.7	82	8.2	14.4	13.4	6.80	20.24	2.98
23	6367	11.04	1688	102.2	80	8.0	14.6	13.6	7.00	20.56	2.94
24	6937	12.04	1716	105.0	78	7.8	14.8	13.7	7.20	20.91	2.90
25	7510	13.04	1745	107.9	76	7.6	15.1	13.9	7.40	21.28	2.88
26	8079	14.04	1776	111.0	75	7.5	15.3	14.1	7.50	21.56	2.87
27	8647	15.03	1800	113.4	73	7.3	15.5	14.2	7.70	21.85	2.84
28	9222	16.04	1834	116.8	70	7.0	15.7	14.4	8.00	22.36	2.80
29	9791	17.04	1859	119.3	67	6.7	15.9	14.4	8.30	22.74	2.74
30	10362	18.04	1889	122.3	65	6.5	16.1	14.6	8.50	23.08	2.71
31	10906	18.99	1912	124.6	61	6.1	16.2	14.6	8.90	23.55	2.65
32	11456	19.96	1932	126.6	60	6.0	16.3	14.7	9.00	23.67	2.63

S&ME

Test Method: ASTM D4767-95

Test name: CU Triaxial (SS, MS) Shear (Specimen 2)
Date of Test: 12-14-16

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

Sample: ST-3
Borehole: EB1-B RT LN

Operator: MLC | Checked: MLC | Approved:

Effective Stress Triaxial Compression

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	72	0.00	689	0.0	0	0.0	0.0	0.0	22.00	22.00	1.00
2	126	0.09	828	13.9	6	0.6	2.3	2.3	21.40	23.65	1.11
3	184	0.20	947	25.8	14	1.4	4.2	4.2	20.60	24.78	1.20
4	237	0.29	1034	34.5	23	2.3	5.6	5.6	19.70	25.28	1.28
5	290	0.38	1103	41.4	31	3.1	6.7	6.7	18.90	25.59	1.35
6	350	0.49	1186	49.7	38	3.8	8.0	8.0	18.20	26.22	1.44
7	403	0.58	1236	54.7	45	4.5	8.8	8.7	17.50	26.16	1.50
8	458	0.68	1286	59.7	49	4.9	9.6	9.5	17.10	26.56	1.55
9	518	0.78	1311	62.2	53	5.3	10.0	9.9	16.70	26.55	1.59
10	571	0.88	1329	64.0	58	5.8	10.3	10.1	16.20	26.33	1.63
11	625	0.97	1355	66.6	62	6.2	10.7	10.5	15.80	26.34	1.67
12	685	1.08	1379	69.0	65	6.5	11.1	10.9	15.50	26.41	1.70
13	739	1.17	1400	71.1	70	7.0	11.4	11.2	15.00	26.24	1.75
14	1193	1.97	1514	82.5	96	9.6	13.1	12.8	12.40	25.24	2.04
15	1756	2.96	1598	90.9	116	11.6	14.3	14.0	10.40	24.35	2.34
16	2320	3.95	1662	97.3	127	12.7	15.2	14.7	9.30	23.98	2.58
17	2889	4.95	1726	103.7	134	13.4	16.0	15.4	8.60	24.03	2.79
18	3510	6.04	1790	110.1	138	13.8	16.8	16.1	8.20	24.34	2.97
19	4080	7.05	1826	113.7	137	13.7	17.1	16.4	8.30	24.73	2.98
20	4645	8.04	1848	115.9	132	13.2	17.3	16.5	8.80	25.29	2.87
21	5210	9.03	1876	118.7	127	12.7	17.5	16.6	9.30	25.94	2.79
22	5782	10.04	1926	123.7	120	12.0	18.1	17.1	10.00	27.10	2.71
23	6349	11.03	1954	126.5	117	11.7	18.3	17.2	10.30	27.52	2.67
24	6916	12.03	1967	127.8	117	11.7	18.2	17.1	10.30	27.42	2.66
25	7487	13.03	1979	129.0	116	11.6	18.2	17.0	10.40	27.42	2.64
26	8055	14.03	2006	131.7	114	11.4	18.4	17.1	10.60	27.71	2.61
27	8623	15.03	2048	135.9	109	10.9	18.7	17.4	11.10	28.52	2.57
28	9194	16.04	2070	138.1	106	10.6	18.8	17.4	11.40	28.83	2.53
29	9762	17.03	2089	140.0	104	10.4	18.8	17.4	11.60	28.99	2.50
30	10331	18.03	2101	141.2	106	10.6	18.8	17.3	11.40	28.66	2.51
31	10905	19.04	2120	143.1	107	10.7	18.8	17.2	11.30	28.54	2.53
32	11433	19.97	2131	144.2	107	10.7	18.7	17.1	11.30	28.43	2.52

S&ME

Test Method: ASTM D4767-95

Test name: CU Triaxial (SS, MS) Shear (Specimen 3)
Date of Test: 12-14-16

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

Sample: ST-3
Borehole: EB1-B RT LN

Operator: MLC | Checked: MLC | Approved:

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 #:	EB2-B RT LN	Sample #:	SS-21	Sample Date:	9/6/16
Location:	167+05	Offset:	36 RT	Depth (ft):	0.5 - 2.0
Sample Description:	Light 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)	***30.02***
Distilled Water (g)	***30.04***
Temperature ^{0}C	***21.7***
pH Readings	***5.43***

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

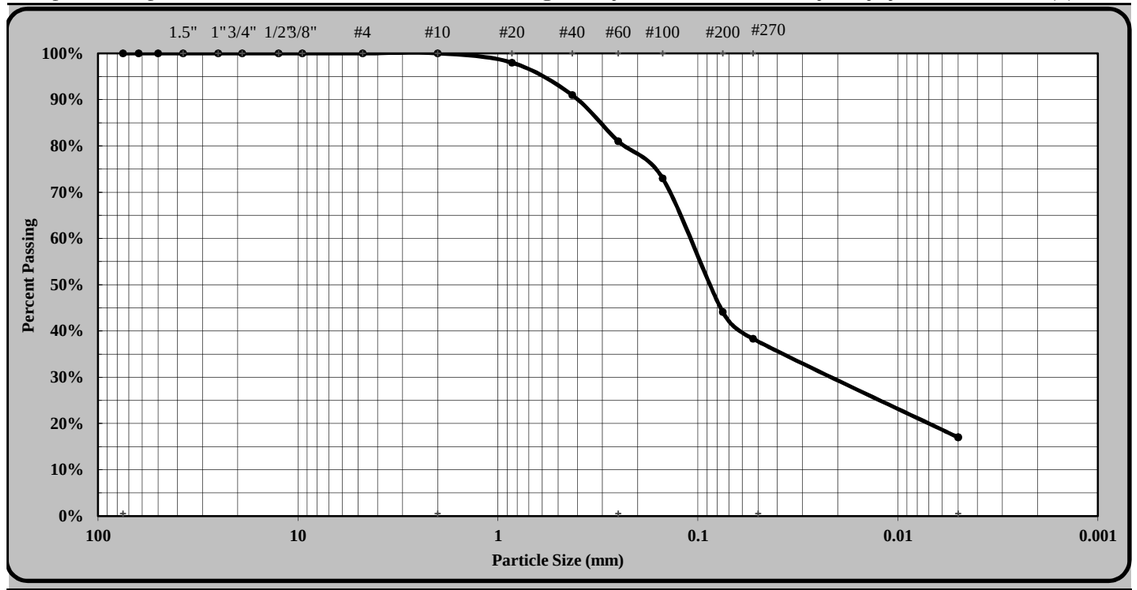
Particle Size Analysis of Soils

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 #:	EB2-B RT LN	Sample #:	SS-21	Sample Date:	9/6/16
Location:	167+05	Offset:	36 RT	Depth (ft):	0.5 - 2.0
Sample Description:	Light 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	19%	Silt	21%
Gravel	0%	Fine Sand	43%	Clay	17%
Apparent Relative Density	ND	Moisture Content	18%	% Passing #200	44.1%
Liquid Limit	19	Plastic Limit	12	Plastic Index	7

Soil Mortar (-#10 Sieve)

Coarse Sand	19%	Fine Sand	43%	Silt	21%	Clay	17%

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 #:	EB2-B RT LN	Sample #:	SS-21	Sample Date:	9/6/16
Location:	167+05	Offset:	36 RT	Depth (ft):	0.5 - 2.0
Sample Description:	Light 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 #*	v
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	47.97
a	Mass of ***As-Received*** Specimen + Tare Wt.	*grams*	99.48
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	91.78
w	Water Weight	*(a-b)*	7.70
A	Mass of As-Received Specimen	*(a-t)*	51.51
B	Mass of Oven Dry Specimen	*(b-t)*	43.81
	% Moisture Content as a % of As Received or Total Mass	*(w/A)*100*	**14.9%**
	% Moisture Content as a % of Oven-dried Mass	*(w/B)*100*	**17.6%**

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 #*	30
t	Tare Weight *(Dish plus Aluminum Foil Cover)*	*grams*	49.02
b	Mass of Oven Dry Specimen + Tare Wt.	*grams*	87.18
c	Ash Weight + Tare Wt.	*grams*	86.87
C	Ash Weight	*c-t*	37.85
B	Mass of Oven Dry Specimen	*(b-t)*	38.16
D	***% Ash Content***	*(C/B)*100*	**99.2%**
	% Organic Matter	*100-D*	**0.8%**

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

Notes / Deviations / References:

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