REFERENCE: BR-0042

PROJECT: 67042

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0042	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *ROCKINGHAM*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 116 ON SR 2600 (MIZPAH CHURCH ROAD) OVER US 29*

SITE DESCRIPTION *MSE WALLS AT END BENT NO. 1 AND END BENT NO. 2*

CONTENTS

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF STUDY, PLANNING AND DESIGN, AND NOT FOR CONSTRUCTION OR PAY PURPOSES. THE VARIOUS FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA AVAILABLE MAY BE REVIEWED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT (919) 707-6850. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

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

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

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

PERSONNEL

C. DRISCOLL

TRIGON EXPLORATION

INVESTIGATED BY *C. DRISCOLL*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *AUGUST 2019*

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
7343 WEST FRIENDLY AVE.
GREENSBORO, NC 27410
NC FIRM LICENSE NO. F-1312

NORTH CAROLINA PROFESSIONAL SEAL 015741 ENGINEER XAVIER C. BARRETT

DocuSigned by:
Xavier Barrett 9/9/2019
2D00374FA68B407...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BR-0042	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

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

SOIL LEGEND AND AASHTO CLASSIFICATION

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

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

CONSISTENCY OR DENSENESS

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

TEXTURE OR GRAIN SIZE

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

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

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

SOIL MOISTURE - CORRELATION OF TERMS

SOIL MOISTURE SCALE (ATTERBERG LIMITS)	FIELD MOISTURE DESCRIPTION	GUIDE FOR FIELD MOISTURE DESCRIPTION
	- SATURATED - (SAT.)	USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE
LL — LIQUID LIMIT		
PLASTIC RANGE (PI)	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PL — PLASTIC LIMIT		
OM — OPTIMUM MOISTURE 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 24 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
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [X] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" 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: DROP INLET AT STA. 20+01.95 -L- 55' RT (924,137 FT. N., 1,811,070 FT. E.)

ELEVATION: 745.44 FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

RETAINING WALL BORING ELEVATIONS TAKEN FROM PROJECT TIN FILE, BR-0042.TIN RECIVED ON MAY 3, 2019.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
BR-0042	3

SITE PLAN

0 50 100

FEET

-L- POC Sta.17+15.38 =
-Y3- POT Sta.10+00.00

-L- POC Sta.23+14.56 =
-Y4- POT Sta.14+20.89

MIZPAH CHURCH ROAD, -L-

US 29

-Y3-

-Y4-

END WALL #1
-Y- STA. 11+84.35, 72.50' RT.
-W1- 01+43.17

BEGIN WALL #1
-Y- STA. 13+01.02, 99.00' RT.
-W1- 00+00.00

BEGIN WALL #2
-Y- STA. 13+06.98, 72.50' LT.
-W1- 00+00.00

END WALL #2
-Y- STA. 14+85.05, 109.59' LT.
-W1- 01+88.00

RW1-1
EB1-A
EB1-B
RW1-2
RW2-1
EB2-A
EB2-B
RW2-2

NC GRID
NAD 83 NA 2011

BM2

18+00
20+00
12+00
15+00

24" BST
22" BST
19 BST
48" WW IS BW
48" W/W IS BW
15" RCP
12" RCP
BRDG W6 S/L
COOK FLORIST
COOK ISLAND
SR 2368
MAGNOLIA DR. SR 2683
WOODS
GAZEBO
BIRD BATH
48"CHL
ISBKD
SHED
CONC
GR
BST
AT&T Corp., COPPER
AT&T Corp., CONDUIT FO
CONC TELE CABINET W/ POST
INV=164.46'
INV=165.68'
DI TOP=143.86' INV=141.46' INV=140.96'
DI TOP=144.44' INV=142.24'

0	20	40

FEET

VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
BR-0042	5

PROFILE ALONG RETAINING WALL 2

835
815
795
775
755
735
715
695
675
655
635

-00+40 -00+20 00+00 00+20 00+40 00+60 00+80 01+00 01+20 01+40 01+60 01+80 02+00 02+20

END WALL #2
-Y- STA. 14+85.05, 109.59' LT.
-W1- 01+88.00
EL. 758.61

Ⓐ **RESIDUAL:**
MOIST, MEDIUM DENSE TO VERY DENSE, BROWN, BLACK, AND WHITE, SILTY COARSE TO FINE SAND (A-2-4)

TOP OF WALL

BEGIN WALL #2
-Y- STA. 13+06.98, 72.50' LT.
-W1- 00+00.00
EL. 748.77

EXISTING GROUNDLINE

TOP OF LEVELING PAD

RW2-1
-Y-
13+07
73' LT

EB2-A
-Y-
13+80
79' LT

EB2-B
-Y-
14+08
71' LT

RW2-2
-Y-
14+86
130' LT

RESIDUAL:
MOIST, MEDIUM STIFF TO HARD, BROWN, TAN, ORANGE, GRAY, AND WHITE, COARSE TO FINE SANDY SILT (A-4) TO CLAYEY SILT (A-5) WITH TRACE TO LITTLE MICA AND TRACE QUARTZ FRAGMENTS

12 7 6 5 7 9 22 69 100/0.7 100/0.9 BT — 05/19

5 9 18 12 10 21 100/0.9 100/0.3 60/0.1 BT — 05/19

6 10 15 27 38 100/0.9 100/0.8 100/0.8 BT — 05/19

5 7 8 8 10 11 10 8 15 17 72 BT — 06/19

Ⓐ

CRYSTALLINE ROCK:
BROWN BIOTITE GNEISS

0	20	40

FEET

VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
BR-0042	4

PROFILE ALONG RETAINING WALL 1

BEGIN WALL #1
-Y- STA. 13+01.02, 99.00' RT
-W1- 00+00.00
ELEV. 764.04

EXISTING GROUNDLINE

Ⓐ **ROADWAY EMBANKMENT:**
MOIST, MEDIUM STIFF TO MEDIUM STIFF, RED-BROWN, SILTY CLAY (A-7)

TOP OF WALL

END WALL #1
-Y- STA. 11+84.35, 72.50' RT
-W1- 01+43.17
ELEV. 751.62

TOP OF LEVELING PAD

RESIDUAL:
MOIST, SOFT TO HARD, WHITE TO BROWN TO TAN TO ORANGE, SILTY CLAY (A-7-5) TO COARSE TO FINE SANDY SILT (A-4) TO CLAYEY SILT (A-5) WITH LITTLE MICA

WEATHERED ROCK:
BROWN AND WHITE BIOTITE GNEISS

RWI-2
-Y-
12+97
118' RT

BT
DRY
5/19

EBI-B
-Y-
12+85
66' RT

ST-1

BT
DRY
5/19

EBI-A
-Y-
12+55
61' RT

BT
DRY
5/19

RWI-1
-Y-
12+04
66' RT

05/19

BT

835
815
795
775
755
735
715
695
675
655
635

-00+80 -00+60 -00+40 -00+20 00+00 00+20 00+40 00+60 00+80 01+00 01+20 01+40 01+60 01+80

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. RW1-2	**STATION** 12+97	**OFFSET** 118 ft RT	**ALIGNMENT** -Y-	**0 HR.** Dry
COLLAR ELEV. 767.6 ft	**TOTAL DEPTH** 55.0 ft	**NORTHING** 924,226	**EASTING** 1,810,943	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/29/19	**COMP. DATE** 05/29/19	**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)
770										
	766.6	1.0								767.6 0.0 GROUND SURFACE
			2	2	9	11		M		766.6 1.0 **ROADWAY EMBANKMENT** Asphalt (0.0 - 0.5 Foot) ABC Stone (0.5 - 1.0 Foot) Red and Brown, Silty CLAY
765	764.1	3.5	5	3	4	7		M		
										760.6 7.0 **RESIDUAL** Orange and Tan, Clayey SILT with Little Mica
760	759.1	8.5	2	4	4	8		M		
755	754.1	13.5	2	3	4	7		M		
750	749.1	18.5	2	3	5	8		M		
745	744.1	23.5	3	5	6	11		M		
740	739.1	28.5	2	3	3	6		M		740.1 27.5 Orange, Tan, and Brown, Silty CLAY with Little Mica
735	734.1	33.5	3	3	4	7		M		
730	729.1	38.5	3	3	4	7		M		
725	724.1	43.5	2	4	5	9		M		
720	719.1	48.5	2	5	8	13		M		720.1 47.5 Brown, Clayey SILT with Little Mica
715	714.1	53.5	7	6	12	18		M		715.1 52.5 Brown, Coarse to Fine Sandy SILT with Little Mica
										712.6 55.0 Boring Terminated at Elevation 712.6 ft in RESIDUAL: Sandy SILT
										NOTE: -W1-, -00+14, 4 ft LT

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 12+85	**OFFSET** 66 ft RT	**ALIGNMENT** -Y-	**0 HR.** 17.3
COLLAR ELEV. 748.9 ft	**TOTAL DEPTH** 58.8 ft	**NORTHING** 924,244	**EASTING** 1,810,993	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/28/19	**COMP. DATE** 05/28/19	**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
750										
	748.9	0.0	1	3	6	9		M		748.9 0.0 GROUND SURFACE
745	745.4	3.5	2	3	3	6		M		746.9 2.0 **RESIDUAL** Tan and White, Silty Fine to Coarse SAND Slightly Plastic, Brown, Tan, and Orange, Coarse to Fine Sandy, Silty CLAY (A-7-5) with Little Mica
740								29%		
735	735.5	13.4	3	4	4	8		M		
730	730.5	18.4	2	2	4	6		M		
725	725.5	23.4	2	7	12	19		M		726.4 22.5 Orange and Brown, Clayey SILT with Little Mica
720	720.5	28.4	3	6	8	14		M		721.4 27.5 Brown and Orange, Coarse to Fine Sandy SILT with Little Mica
715	715.5	33.4	9	16	21	37		M		
710	710.5	38.4	8	12	22	34		M		
705	705.5	43.4	3	12	15	27		M		
700	700.5	48.4	25	41	59/0.4	100/0.9		M		701.9 47.0 **WEATHERED ROCK** Brown and White BIOTITE GNEISS
695	695.5	53.4	100/0.4			100/0.4				
	690.5	58.4	100/0.4			100/0.4				690.1 58.8 Boring Terminated at Elevation 690.1 ft in WEATHERED ROCK: BIOTITE GNEISS
										NOTE: -W1-, 00+43, 6 ft RT
										Other Samples: ST-1 (5.0 - 7.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 12+55	**OFFSET** 61 ft RT	**ALIGNMENT** -Y-	**0 HR.** 19.5
COLLAR ELEV. 749.8 ft	**TOTAL DEPTH** 63.6 ft	**NORTHING** 924,274	**EASTING** 1,810,995	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/28/19	**COMP. DATE** 05/28/19	**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)
750											
	749.8	0.0	1	3	3	6		M		749.8 GROUND SURFACE	0.0
	746.5	3.3								**RESIDUAL** Brown, Silty CLAY with Little Mica	
745			2	2	3	5		M			
	741.5	8.3									
740			2	3	5	8		M			
	736.5	13.3									
735			3	2	3	5		M			
	731.5	18.3								732.3	17.5
730			3	4	5	9		M		Tan and White, Coarse to Fine Sandy SILT with Little Mica	
	726.5	23.3								727.3	22.5
725			3	6	6	12		M		Tan and White, Clayey SILT with Little Mica	
	721.5	28.3									
720			3	5	8	13		M			
	716.5	33.3								717.3	32.5
715			6	6	8	14		M		Tan, White, and Brown, Coarse to Fine Sandy SILT with Little Mica	
	711.5	38.3									
710			4	9	11	20		M			
	706.5	43.3									
705			11	17	19	36		M			
	701.5	48.3									
700			15	22	28	50		M			
	696.5	53.3								697.8	52.0
695			16	65	35/0.2	100/0.7				**WEATHERED ROCK** Brown, White, and Black BIOTITE GNEISS	
	691.5	58.3									
690			57	43/0.3		100/0.8					
	686.5	63.3	100/0.3			100/0.3				686.2	63.6
										Boring Terminated at Elevation 686.2 ft in WEATHERED ROCK: BIOTITE GNEISS	
										NOTE: -W1-, 00+73, 12 ft RT	

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. RW1-1	**STATION** 12+04	**OFFSET** 66 ft RT	**ALIGNMENT** -Y-	**0 HR.** 25.0
COLLAR ELEV. 749.6 ft	**TOTAL DEPTH** 45.2 ft	**NORTHING** 924,324	**EASTING** 1,810,984	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 06/03/19	**COMP. DATE** 06/03/19	**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
750										
	749.6	0.0	2	4	3	7		M		749.6 GROUND SURFACE 0.0
	745.9	3.7								**RESIDUAL** Brown and Orange, Silty CLAY with Little Mica
745			2	2	2	4		M		
	740.9	8.7								
740			2	2	3	5		M		
	735.9	13.7								737.1 12.5
735			3	3	5	8		M		Tan, Clayey SILT with Little Mica
	730.9	18.7								
730			2	2	3	5		M		
	725.9	23.7								
725			2	3	3	6		M		
	720.9	28.7								
720			2	3	6	9		M		
	715.9	33.7								
715			2	3	6	9		M		
	710.9	38.7								
710			2	5	7	12		M		
	705.9	43.7								707.1 42.5
705			3	6	12	18		M		White and Black, Coarse to Fine Sandy SILT with Little Mica
										704.4 45.2
										Boring Terminated at Elevation 704.4 ft in RESIDUAL: Sandy SILT
										NOTE: -W1-, 01+23, 6 ft RT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. RW2-1	**STATION** 13+07	**OFFSET** 73 ft LT	**ALIGNMENT** -Y-	**0 HR.** 19.0
COLLAR ELEV. 748.5 ft	**TOTAL DEPTH** 44.4 ft	**NORTHING** 924,237	**EASTING** 1,811,134	**24 HR.** 16.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/23/19	**COMP. DATE** 05/23/19	**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))
750										
	748.5	0.0								748.5 / 0.0 GROUND SURFACE
			5	7	5	12		M		**ROADWAY EMBANKMENT**
745	745.0	3.5								746.5 / 2.0 Red and Tan, Clayey SILT
			2	2	5	7		M		**RESIDUAL**
740	740.0	8.5								Brown, Tan, and Orange, Clayey SILT with Little Mica
			2	3	3	6		M		
735	735.0	13.5								
			2	2	3	5		M		
730	730.0	18.5								
			2	3	4	7		M		
725	725.0	23.5								
			2	4	5	9		M		
720	720.0	28.5								
			5	7	15	22		M		721.0 / 27.5 Tan, Coarse to Fine Sandy SILT with Little Mica
715	715.0	33.5								716.5 / 32.0 Brown, Silty Coarse to Fine SAND with Little Mica
			20	33	36	69		M		
710	710.0	38.5								711.5 / 37.0 **WEATHERED ROCK**
			63	37/0.2		100/0.7				Brown and White BIOTITE GNEISS
705	705.0	43.5								
			30	70/0.4		100/0.9				704.1 / 44.4 Boring Terminated at Elevation 704.1 ft in WEATHERED ROCK: BIOTITE GNEISS

NOTE:
-W2- 00+00, 0 ft CL

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 13+83	**OFFSET** 68 ft LT	**ALIGNMENT** -Y-	**0 HR.** 17.5
COLLAR ELEV. 749.0 ft	**TOTAL DEPTH** 38.4 ft	**NORTHING** 924,165	**EASTING** 1,811,148	**24 HR.** 17.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/23/19	**COMP. DATE** 05/23/19	**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))
750										
	749.0	0.0								749.0 / 0.0 GROUND SURFACE
			2	2	3	5		M		**ROADWAY EMBANKMENT**
745	745.7	3.3								747.0 / 2.0 Light Brown, Clayey SILT
			3	4	5	9		M		**RESIDUAL**
740	740.7	8.3								Brown, Coarse to Fine Sandy SILT with Little Mica
			8	9	9	18		M		
735	735.7	13.3								
			3	6	6	12		M		
730	730.7	18.3								731.5 / 17.5 Brown, Clayey SILT with Trace Mica
			3	3	7	10		M		
725	725.7	23.3								726.5 / 22.5 Brown, Coarse to Fine Sandy SILT with Quartz Fragments
			8	9	12	21		M		
720	720.7	28.3								722.0 / 27.0 **WEATHERED ROCK**
			25	75/0.4		100/0.9				Dark Brown and White BIOTITE GNEISS
715	715.7	33.3								
			100/0.3			100/0.3				
	710.7	38.3								710.7 / 38.3
			60/0.1			60/0.1				710.6 / 38.4 **CRYSTALLINE ROCK** Brown BIOTITE GNEISS

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 710.6 ft in CRYSTALLINE ROCK: BIOTITE GNEISS

NOTE:
-W2- 00+73, 6 ft LT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** C. Driscoll	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 14+08	**OFFSET** 71 ft LT	**ALIGNMENT** -Y-	**0 HR.** 17.3
COLLAR ELEV. 746.5 ft	**TOTAL DEPTH** 34.3 ft	**NORTHING** 924,137	**EASTING** 1,811,143	**24 HR.** 14.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/23/19	**COMP. DATE** 05/23/19	**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)
750											
	746.5	0.0	2	3	3	6		M		746.5 GROUND SURFACE	0.0
745										744.5 **ROADWAY EMBANKMENT** Brown, Clayey SILT	2.0
	743.0	3.5	2	4	6	10		M		**RESIDUAL** Brown, Coarse to Fine Sandy SILT with Little Mica	
740											
	738.0	8.5	7	7	8	15		M			
735											
	733.0	13.5	7	7	20	27					
730											
	728.0	18.5	13	22	16	38		M			
725										724.5 **WEATHERED ROCK** White and Brown BIOTITE GNEISS	22.0
	723.0	23.5	32	68/0.4		100/0.9					
720											
	718.0	28.5	30	70/0.3		100/0.8					
715											
	713.0	33.5	60	40/0.3		100/0.8				712.2 Boring Terminated at Elevation 712.2 ft in WEATHERED ROCK: BIOTITE GNEISS	34.3
										NOTE: -W2- 01+00, 2 ft RT	

WBS 67042.1.1	**TIP** BR-0042	**COUNTY** ROCKINGHAM	**GEOLOGIST** S. Papke	
SITE DESCRIPTION Retaining Walls for Bridge on SR 2600 (Mizpah Church Rd.) over US 29 Between SR 2683 and SR 2598				**GROUND WTR (ft)**
BORING NO. RW2-2	**STATION** 14+86	**OFFSET** 130 ft LT	**ALIGNMENT** -Y-	**0 HR.** 29.9
COLLAR ELEV. 761.5 ft	**TOTAL DEPTH** 49.6 ft	**NORTHING** 924,066	**EASTING** 1,811,211	**24 HR.** 29.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 87% 03/21/2019		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 05/31/19	**COMP. DATE** 05/31/19	**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	
765											
	761.5	0.0	2	2	3	5		D		761.5 GROUND SURFACE	0.0
760										**RESIDUAL** Brown, Gray, and Orange, Coarse to Fine Sandy SILT with Trace to Little Mica and Trace Manganese	
	758.4	3.1	2	3	4	7		D			
755											
	753.4	8.1	3	3	5	8		M			
750											
	748.4	13.1	2	4	4	8		M			
745											
	743.4	18.1	3	4	6	10		M			
740											
	738.4	23.1	3	4	7	11		M			
735											
	733.4	28.1	2	4	6	10					
730											
	728.4	33.1	3	3	5	8		M		729.0 Orange and Tan, Clayey Silt with Little Mica	32.5
725											
	723.4	38.1	4	7	8	15		M		724.0 Black, White, and Tan, Silty Coarse to Fine SAND	37.5
720											
	718.4	43.1	5	7	10	17		M			
715											
	713.4	48.1	15	28	44	72		M		711.9 Boring Terminated at Elevation 711.9 ft in RESIDUAL: Silty SAND	49.6
										NOTE: -W2- 01+86, 17 ft LT	

LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

PROJECT NO.: 67042.1.1 (BR-0042)
COUNTY: ROCKINGHAM
RETAINING WALLS FOR BRIDGE ON SR 2600 (MIZPAH CHURCH RD.) OVER US 29 BETWEEN SR 2683 AND SR 2598

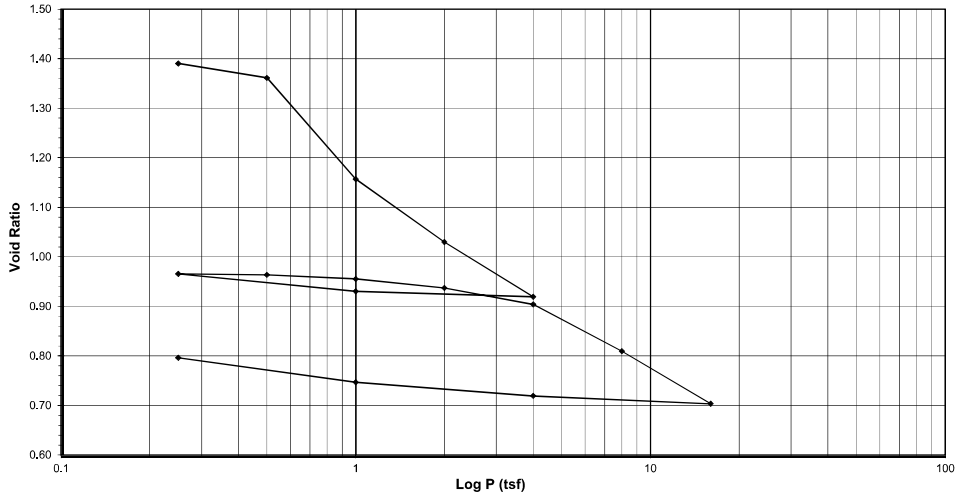
								Atterberg Limits			Gradation Results							
Sample No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class.	L.L.	P.L.	P.I.	Retained #4 Sieve	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
ST-1	EB1-B	-L-	18+77	7' RT	5.0 - 7.0	28.6	A-7-5	48	36	12	0.2	99.2	85.5	52.0	22.3	34.1	31.7	11.9

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Reference	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-0411 *Date* 6/18/2019 *Approved By* MPS *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]FINAL PLOT

2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Reference	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED
Consolidometer No. R470
1 Division = 0.0001 (in.)

Sample Properties	**Initial**	**Final**
Water Content		
Tare Number	TB-10	TB-04
Wt. Tare & WS (g)	365.64	250.68
Wt. Tare & DS (g)	314.24	226.31
Wt. Water (g)	51.40	24.37
Wt. Tare (g)	134.65	135.15
Wt. DS (g)	179.59	91.16
Water Content (%)	28.62	26.73
Sample Parameters		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.7383
Sample Volume (cc)	80.44	59.39
Wt. Wet Sample + Ring (g)	332.88	331.15
Wt. of Ring (g)	214.66	214.66
Wt. of Wet Sample (g)	118.22	116.49
Wet Density (pcf)	91.71	122.39
Wet Density (g/cc)	1.47	1.96
Water Content (%)	28.62	26.73
Wt. of Dry Sample (g)	91.91	91.91
Dry Density (pcf)	71.30	96.57
Dry Density (g/cc)	1.14	1.55
Void Ratio	1.4330	0.7963
Saturation (%)	55.53	93.33
Specific Gravity	2.78	*Measured*

Test Data Summary

Applied Pressure (tsf)	Final Dial Reading (div)	Machine Deflection (div)	Corrected Reading (div)	Height of Sample (mm)	Volume (cc)	Dry Density (g/cc)	Void Ratio
Seating	0	0	0	25.400	80.440	1.14264	**1.43297**
0.25	197.9	22.8	175.1	24.955	79.031	1.16300	**1.39037**
0.5	338.7	44.2	294.5	24.652	78.071	1.17731	**1.36131**
1	1195.1	60.5	1134.6	22.518	71.313	1.28888	**1.15692**
2	1750.5	93.6	1656.9	21.192	67.112	1.36956	**1.02985**
4	2241.6	130.5	2111.2	20.038	63.458	1.44842	**0.91933**
1	2148.5	83.0	2065.5	20.154	63.825	1.44010	**0.93043**
0.25	1974.2	52.7	1921.5	20.519	64.984	1.41441	**0.96548**
0.5	1987.1	58.3	1928.8	20.501	64.924	1.41570	**0.96369**
1	2037.9	74.9	1963.0	20.414	64.649	1.42172	**0.95537**
2	2137.5	100.0	2037.5	20.225	64.050	1.43502	**0.93726**
4	2307.4	133.4	2174.0	19.878	62.952	1.46006	**0.90404**
8	2731.7	169.9	2561.8	18.893	59.832	1.53618	**0.80968**
16	3224.8	226.1	2998.7	17.783	56.318	1.63204	**0.70339**
4	3094.6	161.7	2933.0	17.950	56.847	1.61686	**0.71938**
1	2932.1	111.7	2820.3	18.236	57.753	1.59149	**0.74679**
0.25	2689.8	73.0	2616.8	18.753	59.390	1.54762	**0.79631**

Tested By 129-0411 *Date* 6/18/2019 *Input Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]FINAL PLOT

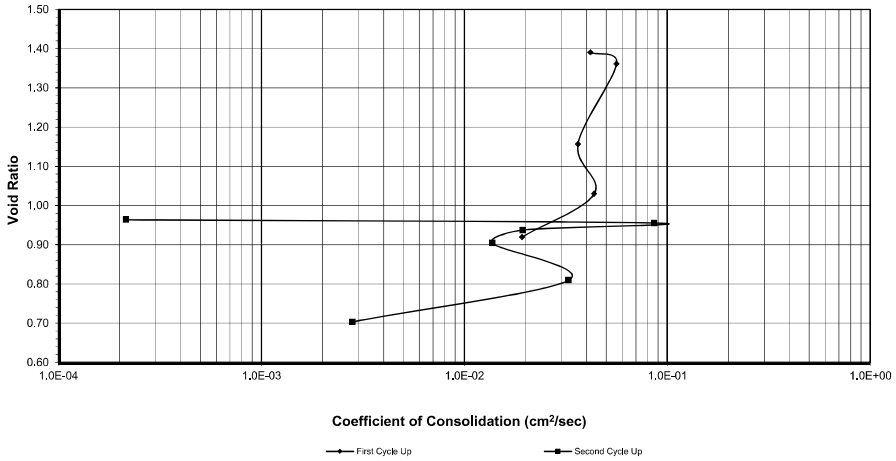
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Reference	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Tested By 129-0411 *Date* 6/18/2019 *Input Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6 *Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\(2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm)FINAL PLOT*

2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Reference	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED
Consolidometer No. R470
1 Division = 0.0001 (in.)

Sample Properties	**Initial**	**Final**
Water Content		
Tare Number	TB-10	TB-04
Wt. Tare & WS (g)	365.64	250.68
Wt. Tare & DS (g)	314.24	226.31
Wt. Water (g)	51.40	24.37
Wt. Tare (g)	134.65	135.15
Wt. DS (g)	179.59	91.16
Water Content (%)	28.62	26.73
Sample Parameters		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.000	0.738
Sample Volume (cc)	80.44	59.39
Wt. Wet Sample + Ring (g)	332.88	331.15
Wt. of Ring (g)	214.66	214.66
Wt. of Wet Sample (g)	118.22	116.49
Wet Density (pcf)	91.71	122.39
Wet Density (g/cc)	1.47	1.96
Water Content (%)	28.62	26.73
Wt. of Dry Sample (g)	91.91	91.91
Dry Density (pcf)	71.30	96.57
Dry Density (g/cc)	1.14	1.55
Void Ratio	1.4330	0.7963
Saturation (%)	55.53	93.33
Specific Gravity	2.78	*Measured*

C_v Test Data Summary

Load Increment	**Dial Reading @ t_{50}**	**Machine Deflection**	**Corrected Dial Reading @ t_{50}**	**Sample Height @ t_{50}**	**Time t_{50}**	**C_v**
(tsf)	(div)	(div)	(div)	(cm)	(min.)	**(cm²/sec)**
0 - 0.25	100.0	22.8	77.2	2.520	**0.13**	**0.04171**
0.25 - 0.5	273.4	44.2	229.2	2.482	**0.09**	**0.05617**
0.5 - 1.0	806.5	60.5	746.0	2.351	**0.13**	**0.03628**
1.0 - 2.0	1488.8	93.6	1395.2	2.186	**0.09**	**0.04357**
2.0 - 4.0	2048.5	130.5	1918.0	2.053	**0.18**	**0.01922**
4.0 - 1.0	NA	83.0	NA	NA	**NA**	**NA**
1.0 - 0.25	NA	52.7	NA	NA	**NA**	**NA**
0.25 - 0.5	1986.8	58.3	1928.5	2.050	**16.07**	**0.00021**
0.5 - 1.0	2015.6	74.9	1940.7	2.047	**0.04**	**0.08599**
1.0 - 2.0	2109.1	100.0	2009.1	2.030	**0.18**	**0.01932**
2.0 - 4.0	2250.9	133.4	2117.5	2.002	**0.24**	**0.01371**
4.0 - 8.0	2523.3	169.9	2353.4	1.942	**0.10**	**0.03259**
8.0 - 16.0	2984.4	226.1	2758.3	1.839	**0.99**	**0.00281**
16.0 - 4.0	NA	161.7	NA	NA	**NA**	**NA**
4.0 - 1.0	NA	111.7	NA	NA	**NA**	**NA**
1.0 - 0.25	NA	73.0	NA	NA	**NA**	**NA**

Tested By 129-0411 *Date* 6/18/2019 *Input Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 6 *Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\(2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm)FINAL PLOT*

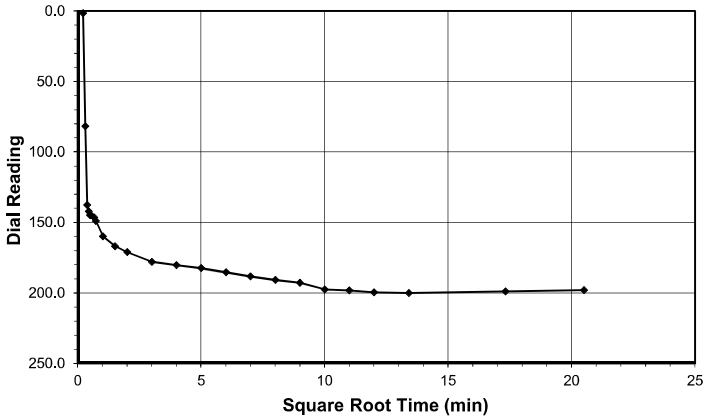
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

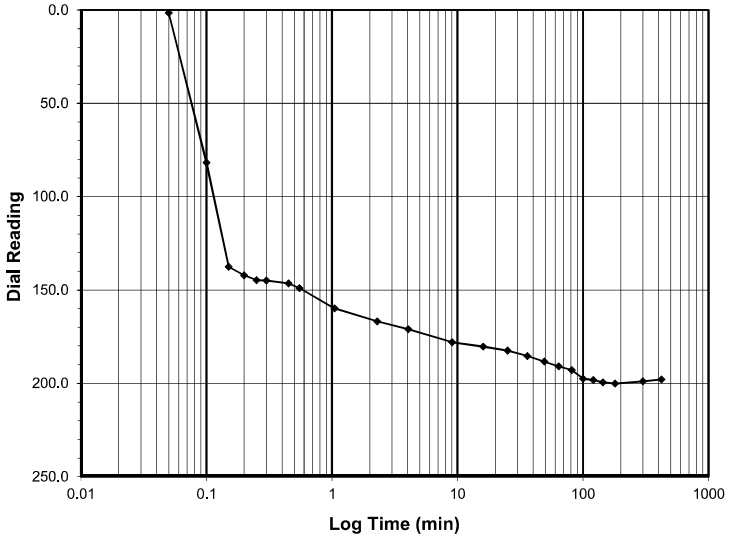
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**0.0-0.25**
Final Reading	**(div)**	**197.9**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/18/2019
Start Time		13:32:51

Elapsed Time (min)	Dial Reading (div)
Initial	**0.0**
0.05	1.5
0.10	81.7
0.15	137.6
0.20	142.1
0.25	144.7
0.30	145.0
0.45	146.5
0.55	148.9
1.05	159.9
2.30	166.8
4.05	171.1
9.05	178.0
16.05	180.3
25.07	182.4
36.07	185.4
49.07	188.3
64.07	190.9
81.07	192.9
100.07	197.5
121.07	198.1
144.07	199.5
180.07	200.1
300.07	198.9
420.45	197.9

Tested By 129-0411 *Date* 6/18/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 1

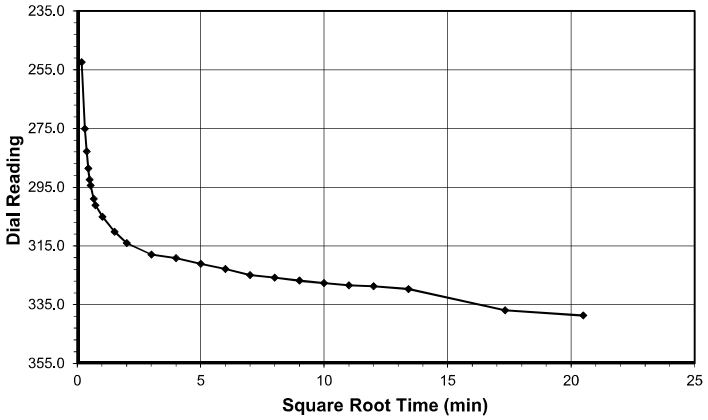
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

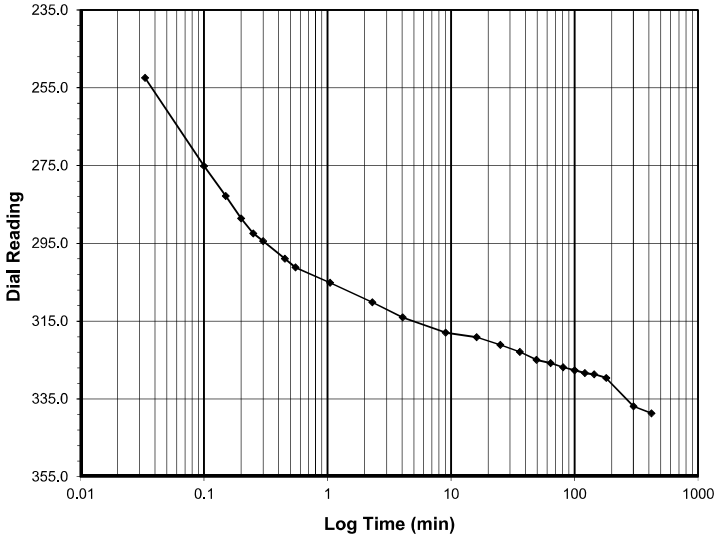
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**0.25-0.5**
Final Reading	**(div)**	**338.7**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/18/2019
Start Time		20:33:18

Elapsed Time (min)	Dial Reading (div)
Initial	**197.9**
0.03	252.4
0.10	275.1
0.15	282.8
0.20	288.6
0.25	292.4
0.30	294.4
0.45	298.9
0.55	301.2
1.05	305.1
2.30	310.1
4.05	314.0
9.05	317.9
16.05	319.1
25.05	321.1
36.05	322.9
49.05	324.9
64.05	325.8
81.05	326.8
100.05	327.6
121.05	328.4
144.05	328.7
180.05	329.6
300.07	336.9
420.12	338.7

Tested By 129-0411 *Date* 6/18/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 2

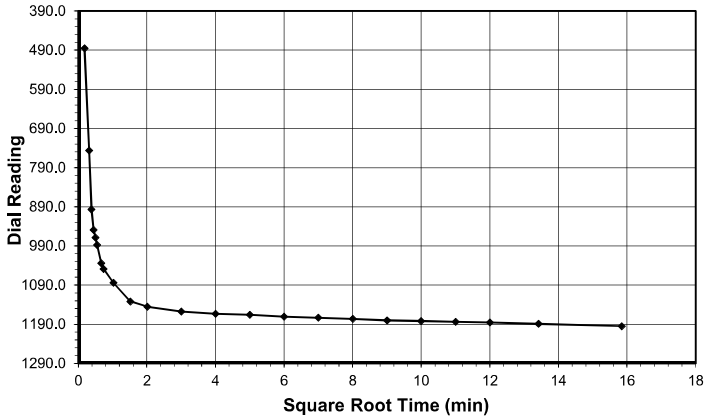
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

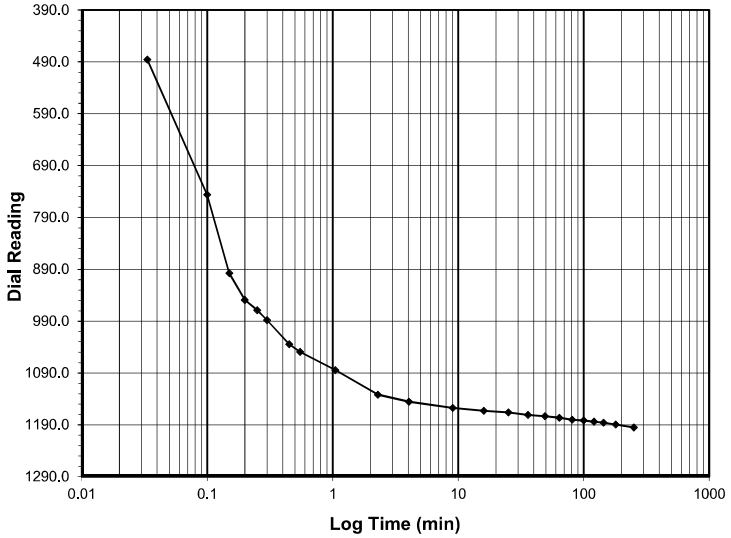
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**0.5-1.0**
Final Reading	**(div)**	**1195.1**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/19/2019
Start Time		3:33:26

Elapsed Time (min)	Dial Reading (div)
Initial	**338.7**
0.03	485.5
0.10	746.5
0.15	897.3
0.20	949.0
0.25	968.9
0.30	987.9
0.45	1034.6
0.55	1049.2
1.05	1084.3
2.30	1131.7
4.05	1145.5
9.05	1157.6
16.05	1163.2
25.05	1166.2
36.05	1170.6
49.05	1173.3
64.05	1176.1
81.05	1180.2
100.05	1181.9
121.05	1183.8
144.05	1185.9
180.05	1189.3
251.08	1195.1

Tested By 129-0411 *Date* 6/19/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 3

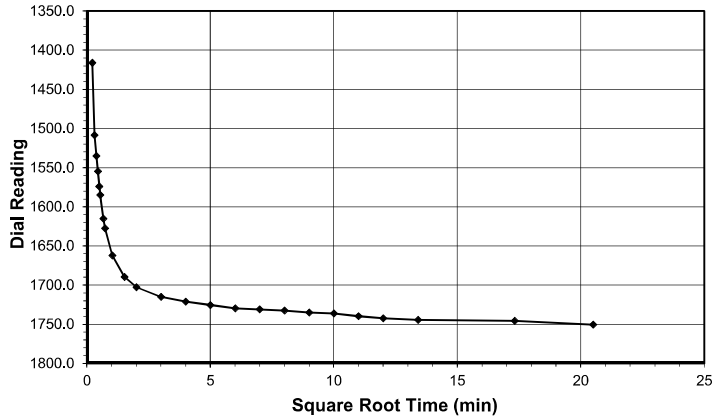
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

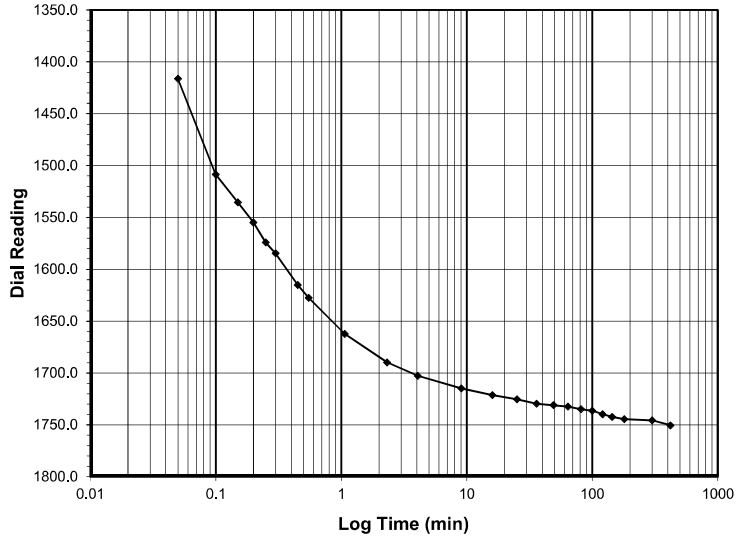
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**1.0-2.0**
Final Reading	**(div)**	**1750.5**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/19/2019
Start Time		7:44:32

Elapsed Time (min)	Dial Reading (div)
Initial	**1195.1**
0.05	1416.2
0.10	1508.5
0.15	1535.2
0.20	1554.8
0.25	1574.1
0.30	1584.7
0.45	1615.1
0.55	1627.6
1.07	1662.3
2.32	1689.7
4.07	1702.8
9.07	1715.0
16.07	1721.3
25.07	1725.4
36.07	1729.6
49.07	1731.0
64.07	1732.4
81.07	1734.9
100.07	1736.2
121.07	1739.7
144.07	1742.5
180.07	1744.6
300.07	1745.6
420.37	1750.5

Tested By 129-0411 *Date* 6/19/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 4

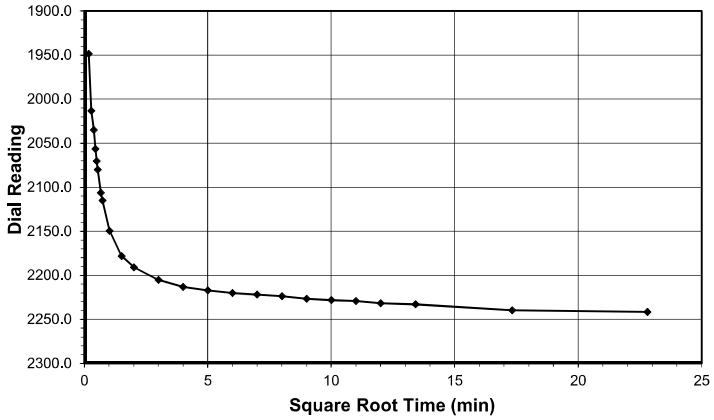
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

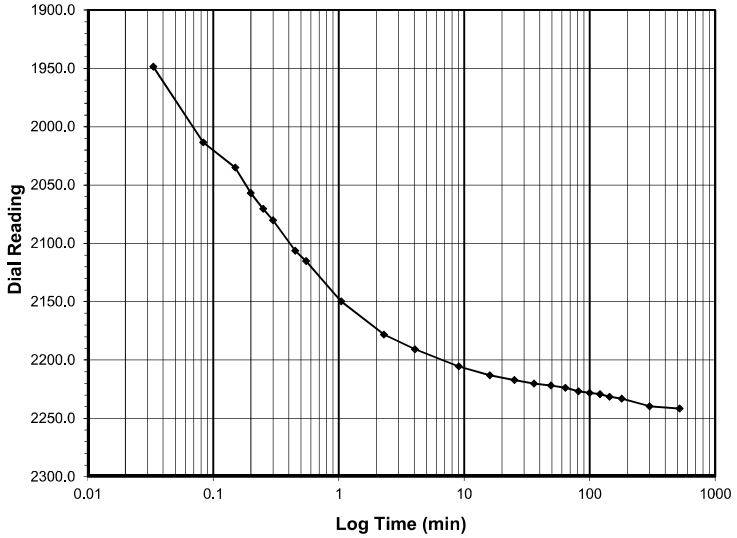
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**2.0-4.0**
Final Reading	**(div)**	**2241.6**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/19/2019
Start Time		14:44:54

Elapsed Time (min)	Dial Reading (div)
Initial	**1750.5**
0.03	1948.5
0.08	2013.4
0.15	2035.0
0.20	2056.8
0.25	2070.4
0.30	2080.1
0.45	2106.4
0.55	2115.2
1.05	2149.7
2.30	2178.2
4.05	2190.8
9.05	2205.3
16.05	2213.2
25.05	2217.1
36.05	2220.1
49.07	2221.8
64.07	2223.8
81.07	2226.8
100.07	2228.2
121.07	2229.3
144.07	2231.6
180.07	2233.0
300.07	2239.7
520.07	2241.6

Tested By 129-0411 *Date* 6/19/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 5

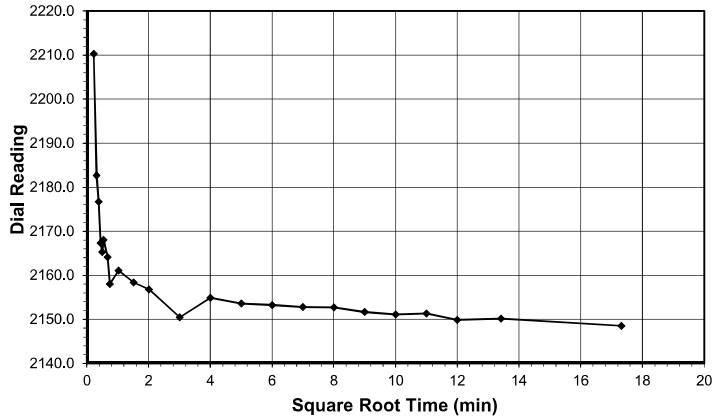
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

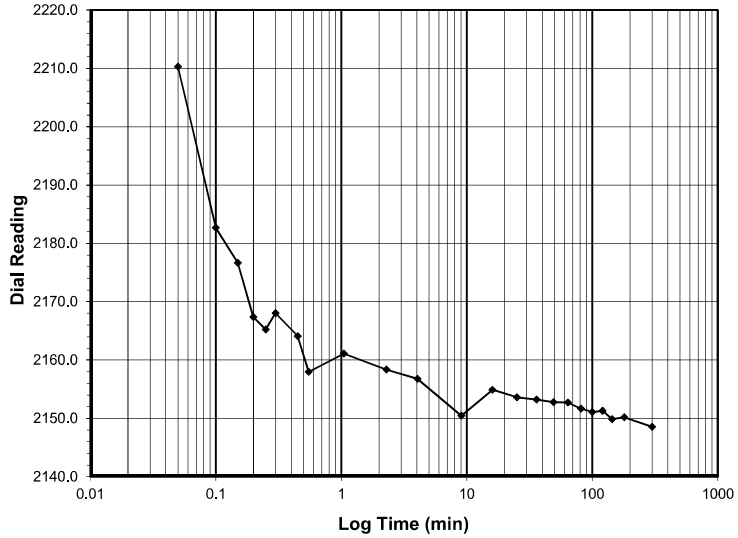
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**4.0-1.0**
Final Reading	**(div)**	**2148.5**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/20/2019
Start Time		2:45:06

Elapsed Time (min)	Dial Reading (div)
Initial	**2241.6**
0.05	2210.3
0.10	2182.7
0.15	2176.7
0.20	2167.4
0.25	2165.2
0.30	2168.0
0.45	2164.1
0.55	2158.0
1.05	2161.1
2.30	2158.4
4.05	2156.8
9.07	2150.4
16.07	2154.9
25.07	2153.6
36.07	2153.2
49.07	2152.8
64.07	2152.7
81.07	2151.7
100.07	2151.1
121.07	2151.3
144.07	2149.9
180.08	2150.2
300.08	2148.5

Tested By 129-0411 *Date* 6/20/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 6

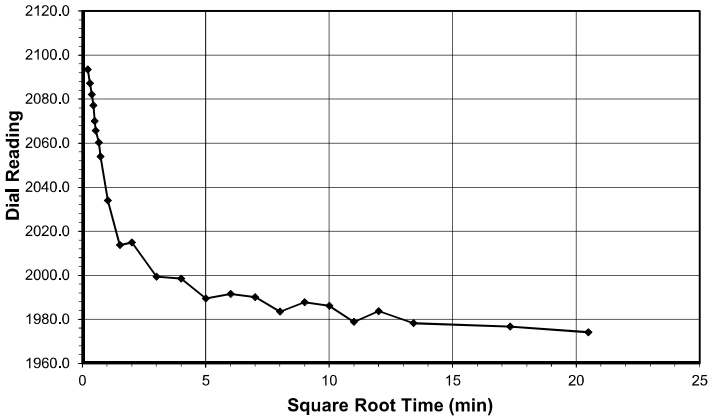
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

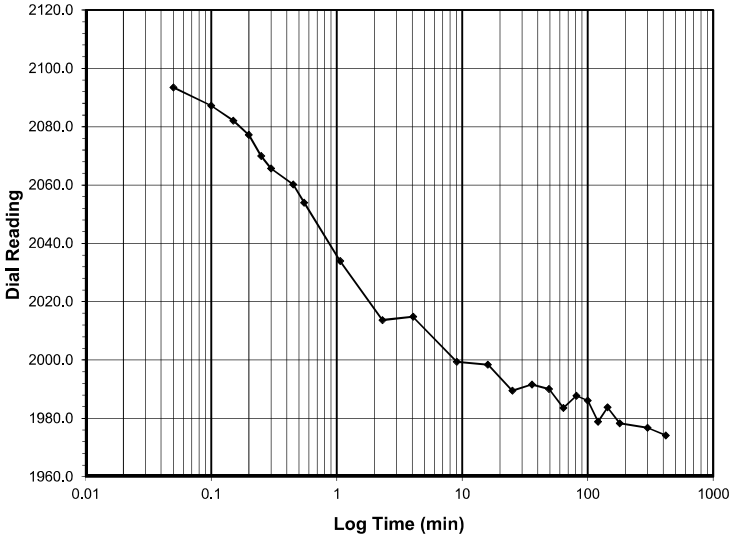
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**1.0-0.25**
Final Reading	**(div)**	**1974.2**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/20/2019
Start Time		9:45:33

Elapsed Time (min)	Dial Reading (div)
Initial	**2148.5**
0.05	2093.5
0.10	2087.2
0.15	2082.1
0.20	2077.2
0.25	2070.0
0.30	2065.7
0.45	2060.2
0.55	2053.9
1.07	2033.9
2.32	2013.7
4.07	2014.9
9.07	1999.4
16.07	1998.5
25.07	1989.5
36.07	1991.6
49.07	1990.1
64.07	1983.5
81.07	1987.8
100.07	1986.1
121.07	1978.9
144.07	1983.7
180.07	1978.3
300.07	1976.8
420.00	1974.2

Tested By 129-0411 *Date* 6/20/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 7

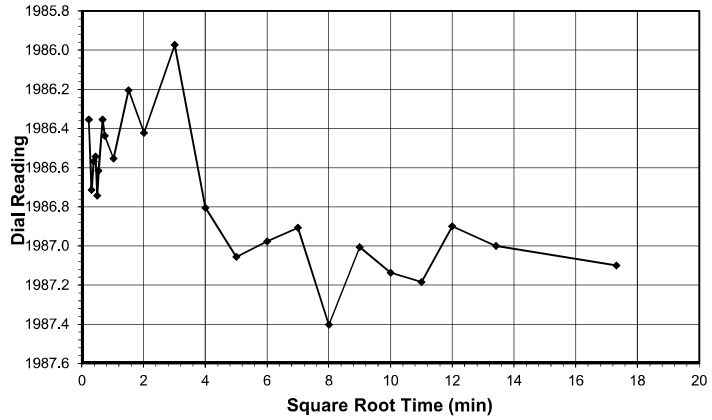
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED



Test Load	**(tsf)**	**0.25-0.5**
Final Reading	**(div)**	**1987.1**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/20/2019
Start Time		16:45:33

Elapsed Time (min)	Dial Reading (div)
Initial	**1974.2**
0.05	1986.4
0.10	1986.7
0.15	1986.6
0.20	1986.5
0.25	1986.7
0.30	1986.6
0.45	1986.4
0.55	1986.4
1.05	1986.6
2.30	1986.2
4.05	1986.4
9.05	1986.0
16.07	1986.8
25.07	1987.1
36.07	1987.0
49.07	1986.9
64.07	1987.4
81.07	1987.0
100.07	1987.1
121.07	1987.2
144.07	1986.9
180.07	1987.0
300.07	1987.1

Tested By 129-0411 *Date* 6/20/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 8

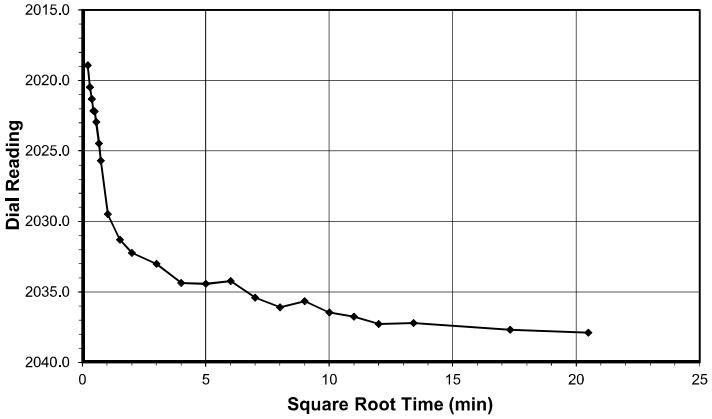
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

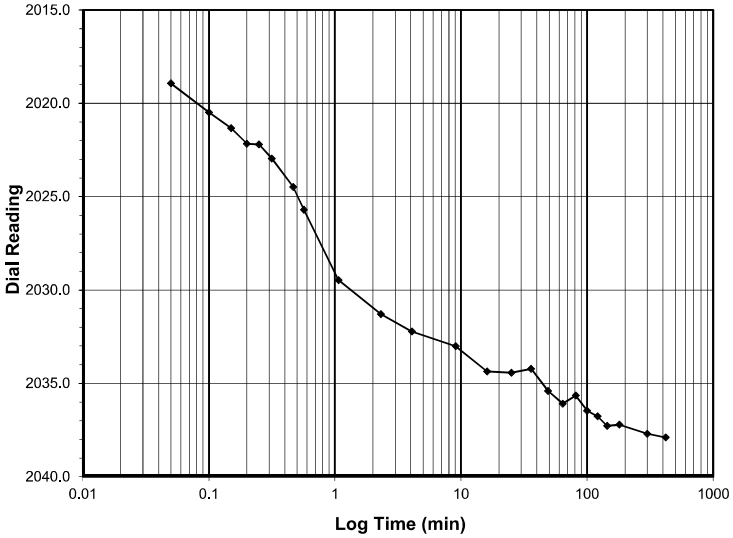
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**0.5-1.0**
Final Reading	**(div)**	**2037.9**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/20/2019
Start Time		23:46:03

Elapsed Time (min)	Dial Reading (div)
Initial	**1987.1**
0.05	2018.9
0.10	2020.5
0.15	2021.3
0.20	2022.2
0.25	2022.2
0.32	2023.0
0.47	2024.5
0.57	2025.7
1.07	2029.5
2.32	2031.3
4.07	2032.2
9.07	2033.0
16.07	2034.4
25.07	2034.4
36.07	2034.2
49.07	2035.4
64.07	2036.1
81.07	2035.6
100.07	2036.5
121.07	2036.8
144.07	2037.3
180.07	2037.2
300.07	2037.7
420.07	2037.9

Tested By 129-0411 *Date* 6/20/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 9

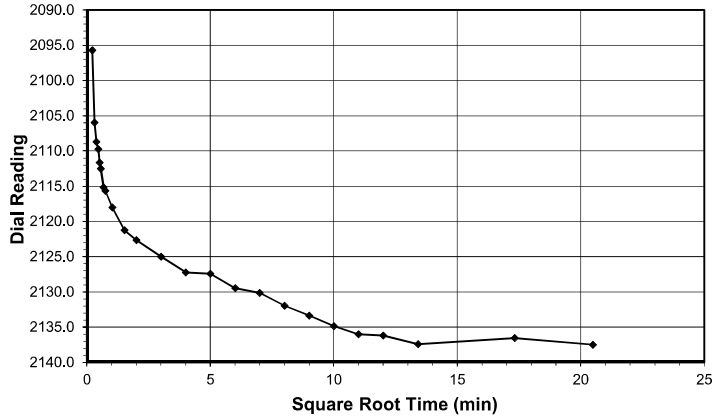
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

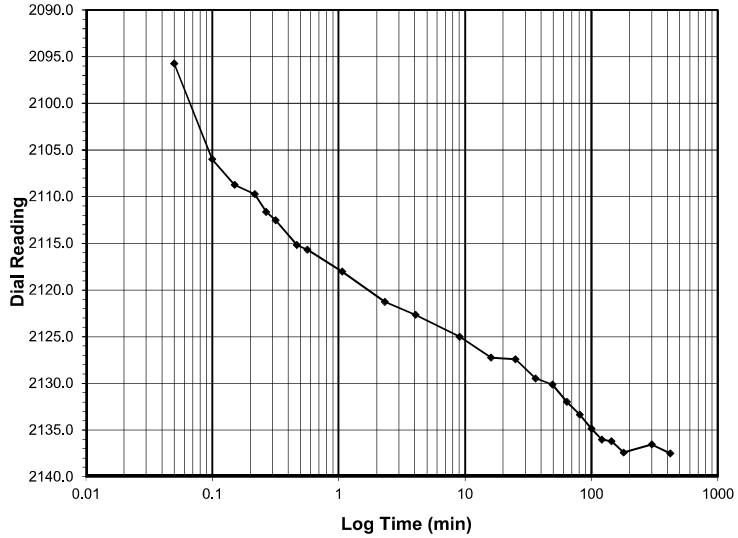
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**1.0-2.0**
Final Reading	**(div)**	**2137.5**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/21/2019
Start Time		6:46:07

Elapsed Time (min)	Dial Reading (div)
Initial	**2037.9**
0.05	2095.7
0.10	2106.0
0.15	2108.7
0.22	2109.7
0.27	2111.6
0.32	2112.5
0.47	2115.2
0.57	2115.7
1.07	2118.0
2.32	2121.3
4.07	2122.7
9.07	2125.0
16.07	2127.2
25.07	2127.4
36.07	2129.5
49.07	2130.1
64.07	2132.0
81.07	2133.4
100.07	2134.9
121.08	2136.0
144.08	2136.2
180.08	2137.4
300.08	2136.5
420.08	2137.5

Tested By 129-0411 *Date* 6/21/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 10

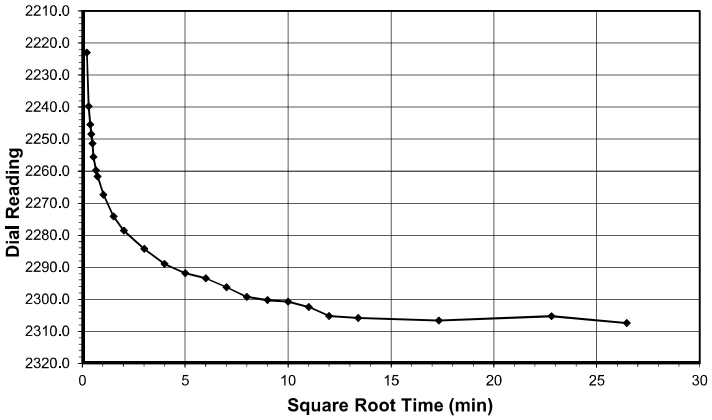
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

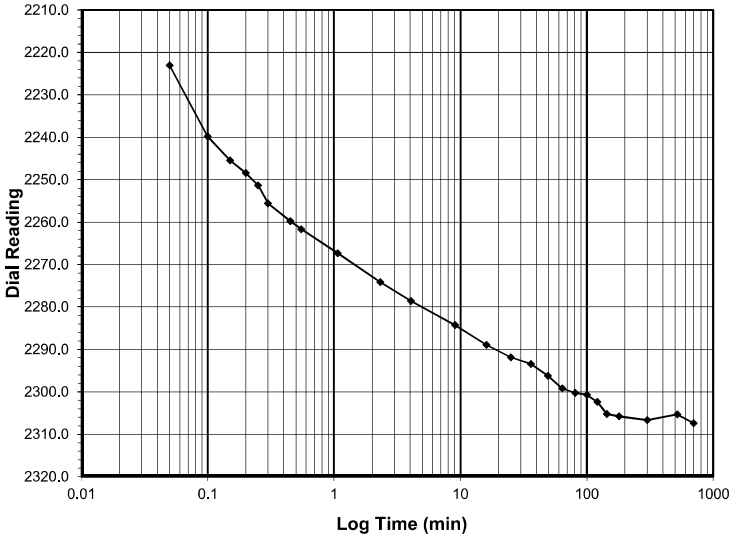
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**2.0-4.0**
Final Reading	**(div)**	**2307.4**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/21/2019
Start Time		13:46:12

Elapsed Time (min)	Dial Reading (div)
Initial	**2137.5**
0.05	2223.1
0.10	2239.8
0.15	2245.4
0.20	2248.4
0.25	2251.3
0.30	2255.6
0.45	2259.7
0.55	2261.6
1.07	2267.3
2.32	2274.1
4.07	2278.6
9.07	2284.3
16.07	2288.9
25.07	2291.9
36.07	2293.4
49.07	2296.2
64.07	2299.2
81.07	2300.3
100.07	2300.7
121.07	2302.4
144.07	2305.2
180.07	2305.8
300.07	2306.7
520.07	2305.3
700.07	2307.4

Tested By 129-0411 *Date* 6/21/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 11

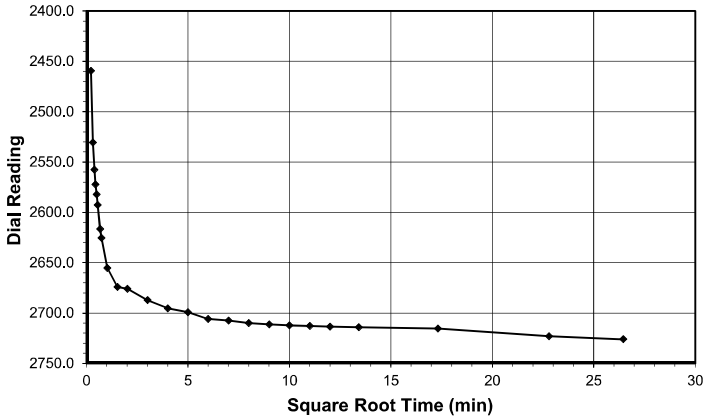
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

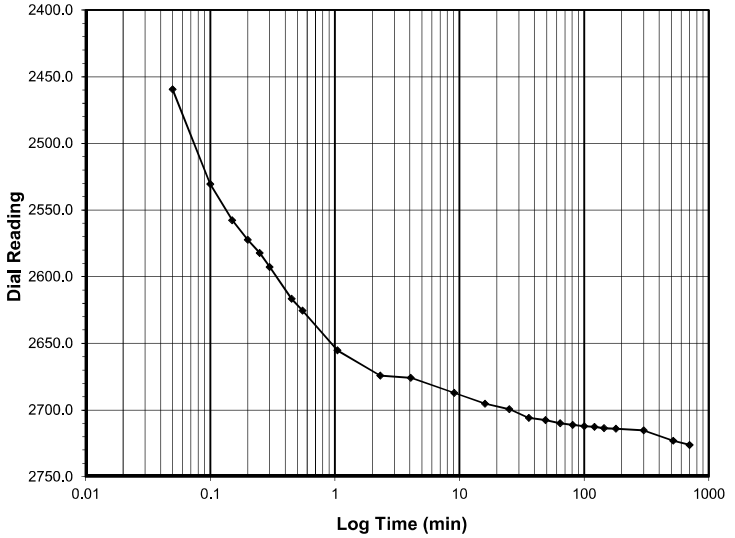
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**4.0-8.0**
Final Reading	**(div)**	**2731.7**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/22/2019
Start Time		1:46:23

Elapsed Time (min)	Dial Reading (div)
Initial	**2307.4**
0.05	2459.4
0.10	2530.4
0.15	2557.6
0.20	2572.2
0.25	2582.1
0.30	2592.7
0.45	2616.6
0.55	2625.4
1.05	2655.2
2.32	2674.2
4.07	2675.8
9.07	2687.2
16.07	2695.2
25.07	2699.3
36.07	2705.9
49.07	2707.5
64.07	2709.9
81.07	2711.1
100.07	2712.2
121.07	2712.7
144.07	2713.7
180.07	2714.0
300.07	2715.3
520.07	2723.0
700.08	2731.7

Tested By 129-0411 *Date* 6/22/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 12

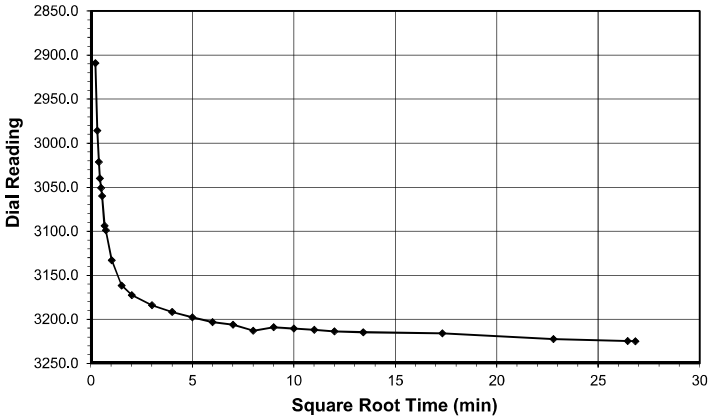
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

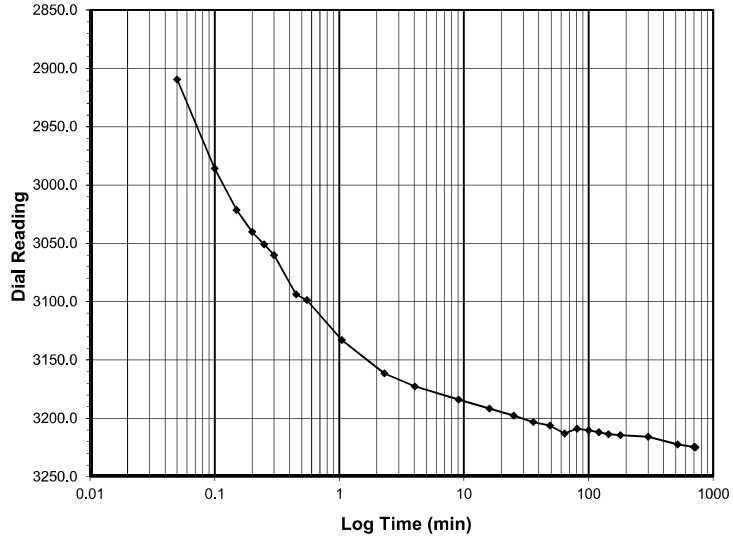
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**8.0-16.0**
Final Reading	**(div)**	**3224.8**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/22/2019
Start Time		13:46:32

Elapsed Time (min)	Dial Reading (div)
Initial	**2731.7**
0.05	2909.4
0.10	2985.9
0.15	3021.3
0.20	3040.1
0.25	3050.8
0.30	3060.0
0.45	3093.7
0.55	3098.7
1.05	3132.9
2.30	3161.5
4.05	3172.5
9.05	3184.1
16.05	3191.7
25.05	3197.6
36.07	3203.2
49.07	3206.3
64.07	3212.9
81.07	3208.8
100.07	3210.3
121.07	3211.9
144.07	3213.6
180.07	3214.5
300.07	3215.8
520.07	3222.3
700.07	3224.5
720.20	3224.8

Tested By 129-0411 *Date* 6/22/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 13

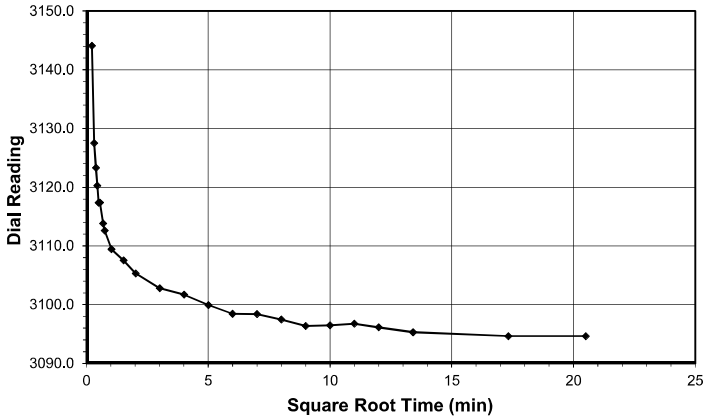
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

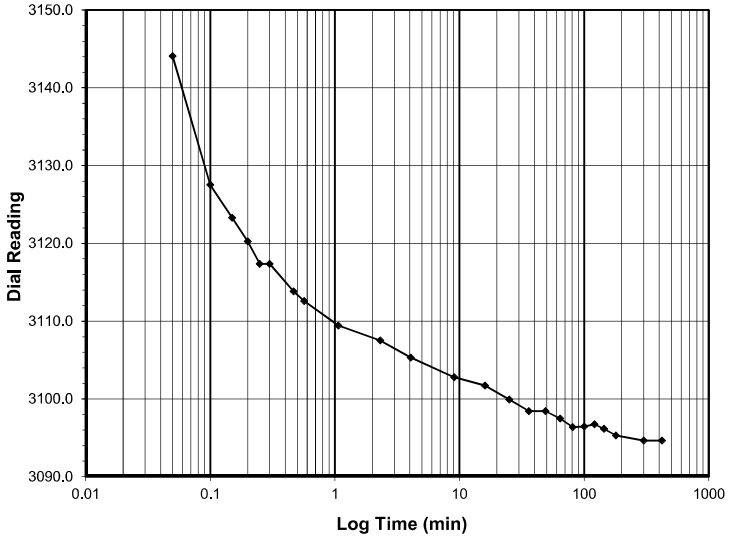
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**16.0-4.0**
Final Reading	**(div)**	**3094.6**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/23/2019
Start Time		1:46:44

Elapsed Time (min)	Dial Reading (div)
Initial	**3224.8**
0.05	3144.1
0.10	3127.5
0.15	3123.3
0.20	3120.3
0.25	3117.4
0.30	3117.4
0.47	3113.8
0.57	3112.6
1.07	3109.4
2.32	3107.5
4.07	3105.3
9.07	3102.8
16.07	3101.7
25.07	3099.9
36.07	3098.4
49.07	3098.4
64.08	3097.5
81.08	3096.4
100.08	3096.5
121.08	3096.7
144.08	3096.1
180.08	3095.3
300.08	3094.6
420.50	3094.6

Tested By 129-0411 *Date* 6/23/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 14

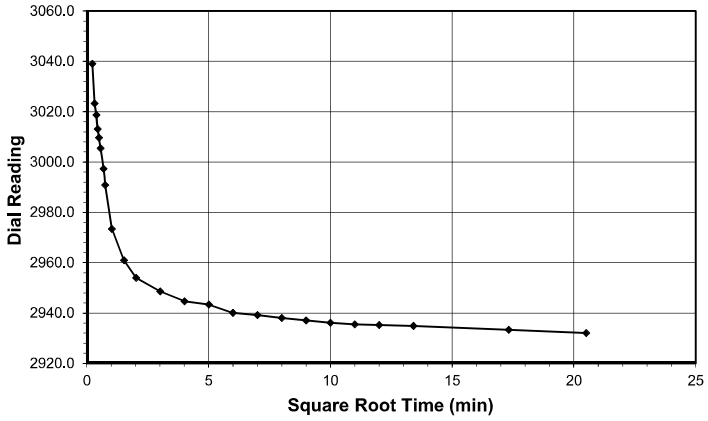
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

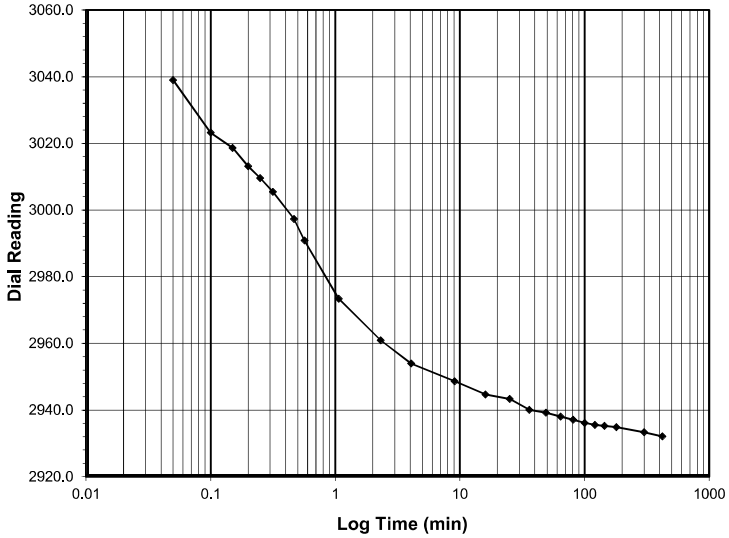
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**4.0-1.0**
Final Reading	**(div)**	**2932.1**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/23/2019
Start Time		8:47:14

Elapsed Time (min)	Dial Reading (div)
Initial	**3094.6**
0.05	3039.0
0.10	3023.2
0.15	3018.6
0.20	3013.1
0.25	3009.6
0.32	3005.4
0.47	2997.3
0.57	2990.9
1.07	2973.4
2.32	2960.9
4.07	2954.0
9.07	2948.6
16.07	2944.7
25.07	2943.3
36.07	2940.1
49.07	2939.2
64.07	2938.0
81.07	2937.1
100.07	2936.1
121.07	2935.5
144.07	2935.3
180.07	2934.9
300.07	2933.3
420.48	2932.1

Tested By 129-0411 *Date* 6/23/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 15

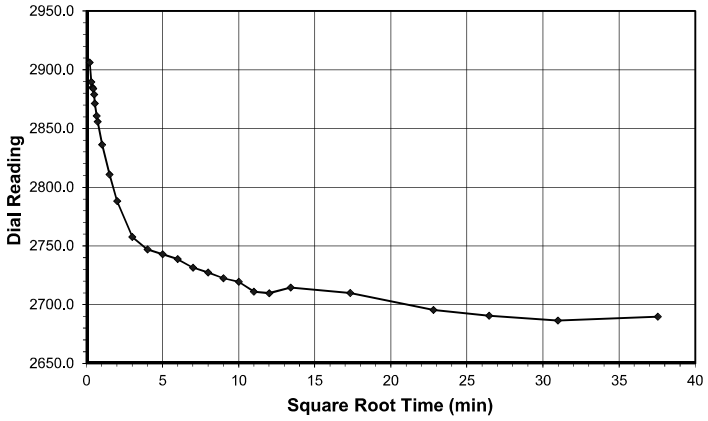
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

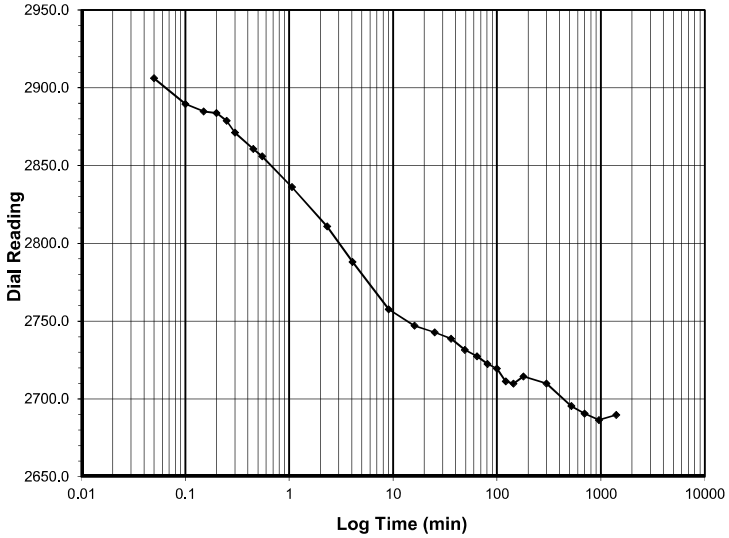
ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client	Kleinfelder	Boring No.	EB1-B
Client Project	BR-0042 Roadway	Depth (ft)	5.0-7.0
Project No.	R-2019-178-001	Sample No.	ST-1
Lab ID	R-2019-178-001-001	Visual Description	TAN SILT

Sample Conditions: UNDISTURBED, INUNDATED AND DOUBLE DRAINED





Test Load	**(tsf)**	**1.0-0.25**
Final Reading	**(div)**	**2689.8**
Consolidometer No.		**R470**
1 Division	(in)	0.0001
Start Date		6/23/2019
Start Time		15:47:43

Elapsed Time (min)	Dial Reading (div)
Initial	**2932.1**
0.05	2906.1
0.10	2889.7
0.15	2884.8
0.20	2883.8
0.25	2878.8
0.30	2871.1
0.45	2860.7
0.55	2855.9
1.07	2836.1
2.32	2810.9
4.07	2788.1
9.07	2757.6
16.07	2747.0
25.07	2742.9
36.07	2738.7
49.07	2731.5
64.07	2727.4
81.07	2722.5
100.07	2719.6
121.07	2711.2
144.07	2709.9
180.07	2714.5
300.07	2710.0
520.07	2695.5
700.07	2690.6
960.07	2686.4
1409.47	2689.8

Tested By 129-0411 *Date* 6/23/2019 *Checked By* GEM *Date* 6/25/2019

DCN: CT-24E Date: 5/3/12 Revision: 3

Z:\2019 PROJECTS\KLEINFELDER\2019-178- KLEINFELDER - BR-0042 ROADWAY\[2019-178-001-001 DOT GEOJAC-16TSF1 Cv.xlsm]STEP 16

2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net