REFERENCE: BR-0097

PROJECT: 67097

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0097	1	29

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY ROCKINGHAM

PROJECT DESCRIPTION REPLACE BRIDGE NO. 178 ON SR 1929 (ESTES ROAD) OVER US 29

CONTENTS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	LEGEND (SOIL & ROCK)
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-12	BORE LOGS
13-28	SOIL TEST RESULTS
29	SITE PHOTOGRAPHS

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

D. KUBINSKI

TRIGON EXPLORATION

INVESTIGATED BY D. KUBINSKI

DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

DATE JULY 2022

Prepared in the Office of:

KLEINFELDER

Bright People. Right Solutions.

422 GALLIMORE DAIRY ROAD, SUITE B
GREENSBORO, NORTH CAROLINA 27409
NC ENGINEERING FIRM LICENSE NO. F-1312

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells 07/06/2022
7DA5D2D05C0F4E9...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
BR-0097	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	50 MX													
#40	30 MX		50 MX	51 MN										
#200	15 MX		25 MX	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, CPT, 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
- [X] MOBILE B-57
- [ ] _____

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
- [X] TRICONE 2-15/16" 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: N/A

ELEVATION: N/A FEET

NOTES:

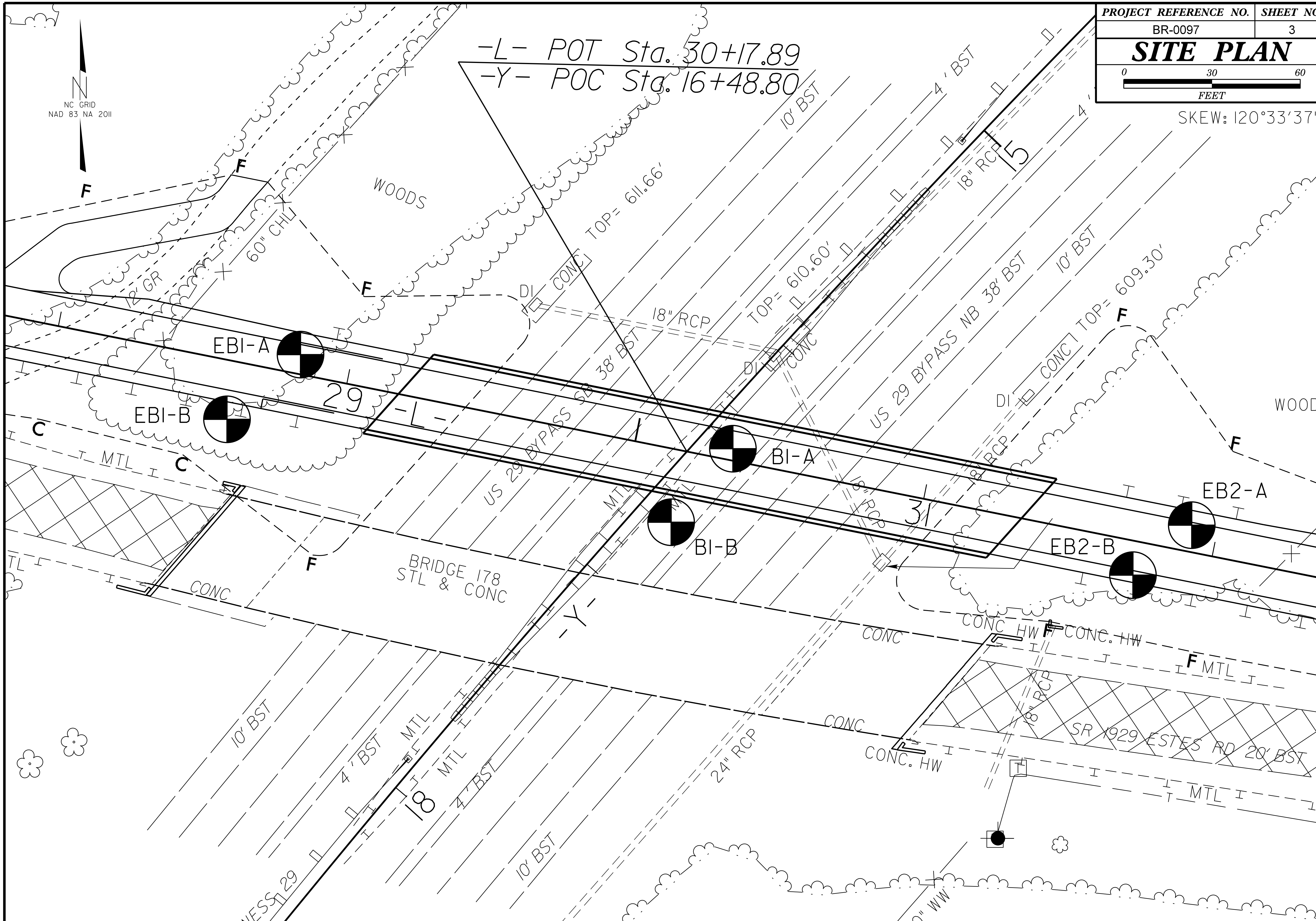
FIAD - FILLED IMMEDIATELY AFTER DRILLING

THE BORINGS WERE SURVEYED BY SEPI ENGINEERING & CONSTRUCTION, INC. USING A SUB CENTIMETER GPS.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
BR-0097	3

SITE PLAN



PROJECT REFERENCE NO.	SHEET NO.
BR-0097	4

CENTERLINE PROFILE ON BRIDGE NO. 178 ON SR 1929 (–L–) OVER US 29 (–Y–)

0 50 100
FEET
VE = 2.5

Ⓐ **RESIDUAL:** MOIST TO SATURATED, SOFT TO VERY STIFF, BROWN, RED, YELLOWISH BROWN, AND OLIVE, SILTY CLAY (A-7) AND CLAYEY SILT (A-5) TO COARSE TO FINE SANDY SILT (A-4) WITH TRACE TO LITTLE MICA

Ⓑ **RESIDUAL:** SATURATED, MEDIUM DENSE TO VERY DENSE, OLIVE, YELLOWISH BROWN, WHITE, SILTY, COARSE TO FINE SAND (A-2-4) WITH TRACE ROCK FRAGMENTS AND MICA

Ⓒ **RESIDUAL:** SATURATED, MEDIUM DENSE TO VERY DENSE, OLIVE TO GREENISH BLACK SILTY, COARSE TO FINE SAND (A-2-4) WITH TRACE ROCK FRAGMENTS

EB1-A
28+83
7' LT

14 14 8 6 7 5 7 — ST-1 — 8 8 15 19 42 76 79 100/0.9 23 100/0.9 100/0.8 — BT

04/22

SS-5
SS-6
B1-A
30+33
4' LT

7 4 5 6 10 12 17 14 22 24 35 20 100/0.7 62 100/0.2 100/0.3 100/0.3 100/0.3 100/0.3 — BT

03/22

SS-9
EB2-A
31+91
9' LT

7 7 7 7 7 9 7 8 7 12 15 12 20 35 76 100/0.7 100/0.7 100/0.7 — BT

04/22

Ⓐ Ⓑ Ⓒ

WEATHERED ROCK:
OLIVE, YELLOWISH BROWN, GRAY AND GREENISH BLACK SCHIST AND GNEISS

NOTES:

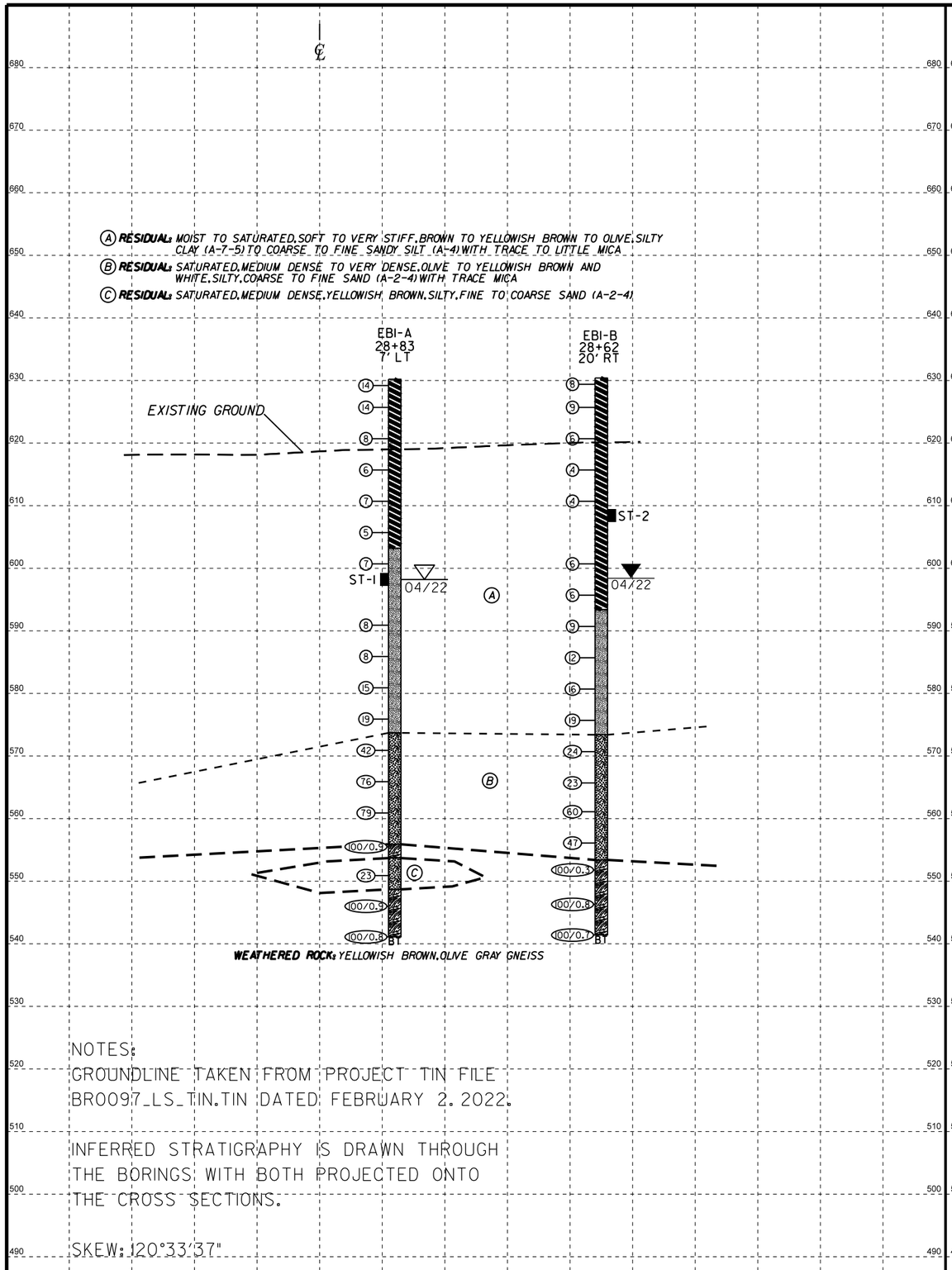
GROUNDLINE TAKEN FROM PROJECT ROADWAY FILES DATED FEBRUARY 18, 2022

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

690 670 650 630 610 590 570 550 530 510

27+00 27+50 28+00 28+50 29+00 29+50 30+00 30+50 31+00 31+50 32+00 32+50 33+00 33+50

PROJECT REFERENCE NO.	SHEET NO.
BR-0097	5



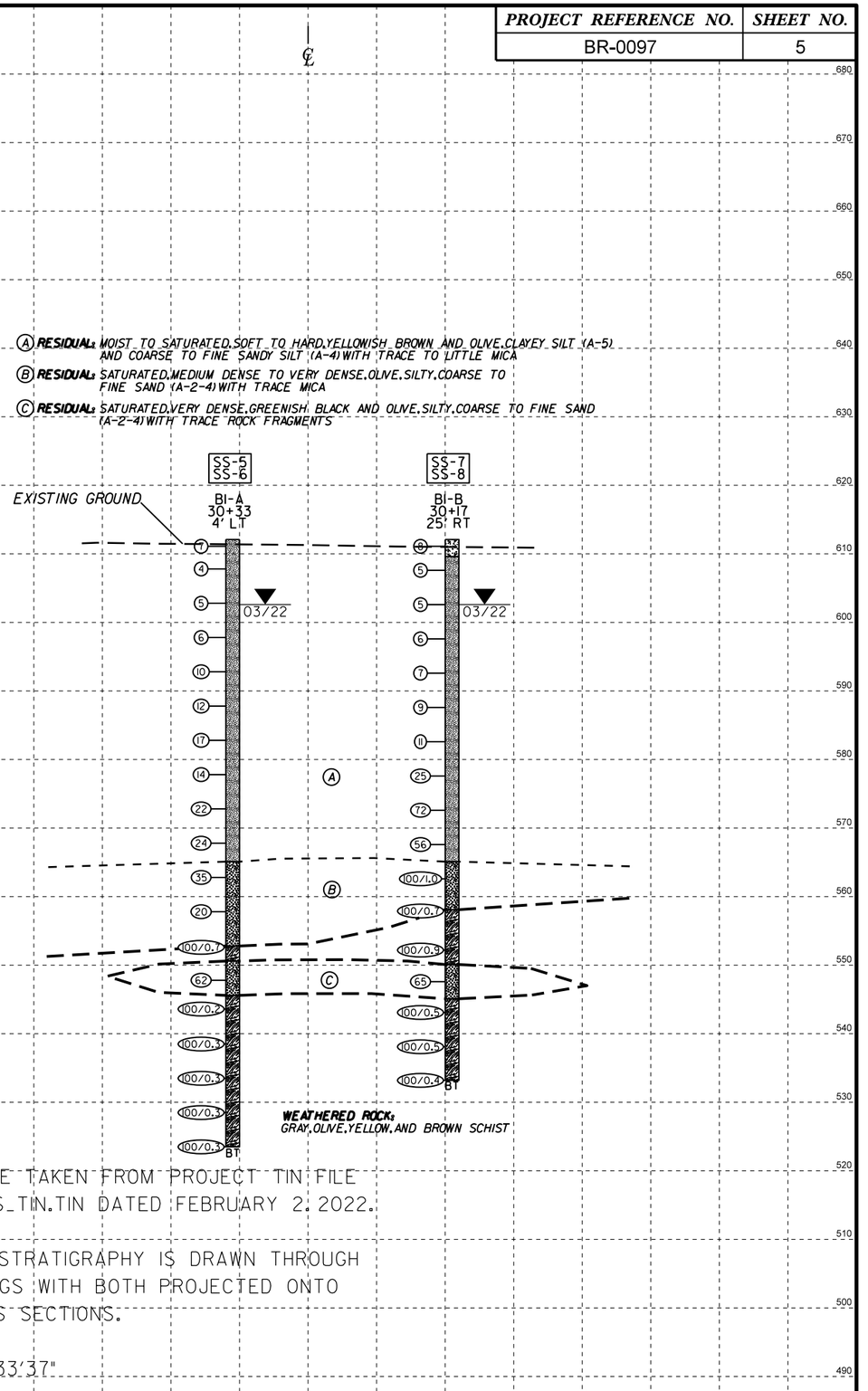
NOTES:
GROUNDLINE TAKEN FROM PROJECT TIN FILE BR0097_LS_TIN.TIN DATED FEBRUARY 2, 2022.

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

SKEW: 120°33'37"

HORIZ. SCALE (FEET) 0 20 40 | VE = 1

CROSS SECTION ALONG END BENT NO. 1 AT STA. 29+18



NOTES:
GROUNDLINE TAKEN FROM PROJECT TIN FILE BR0097_LS_TIN.TIN DATED FEBRUARY 2, 2022.

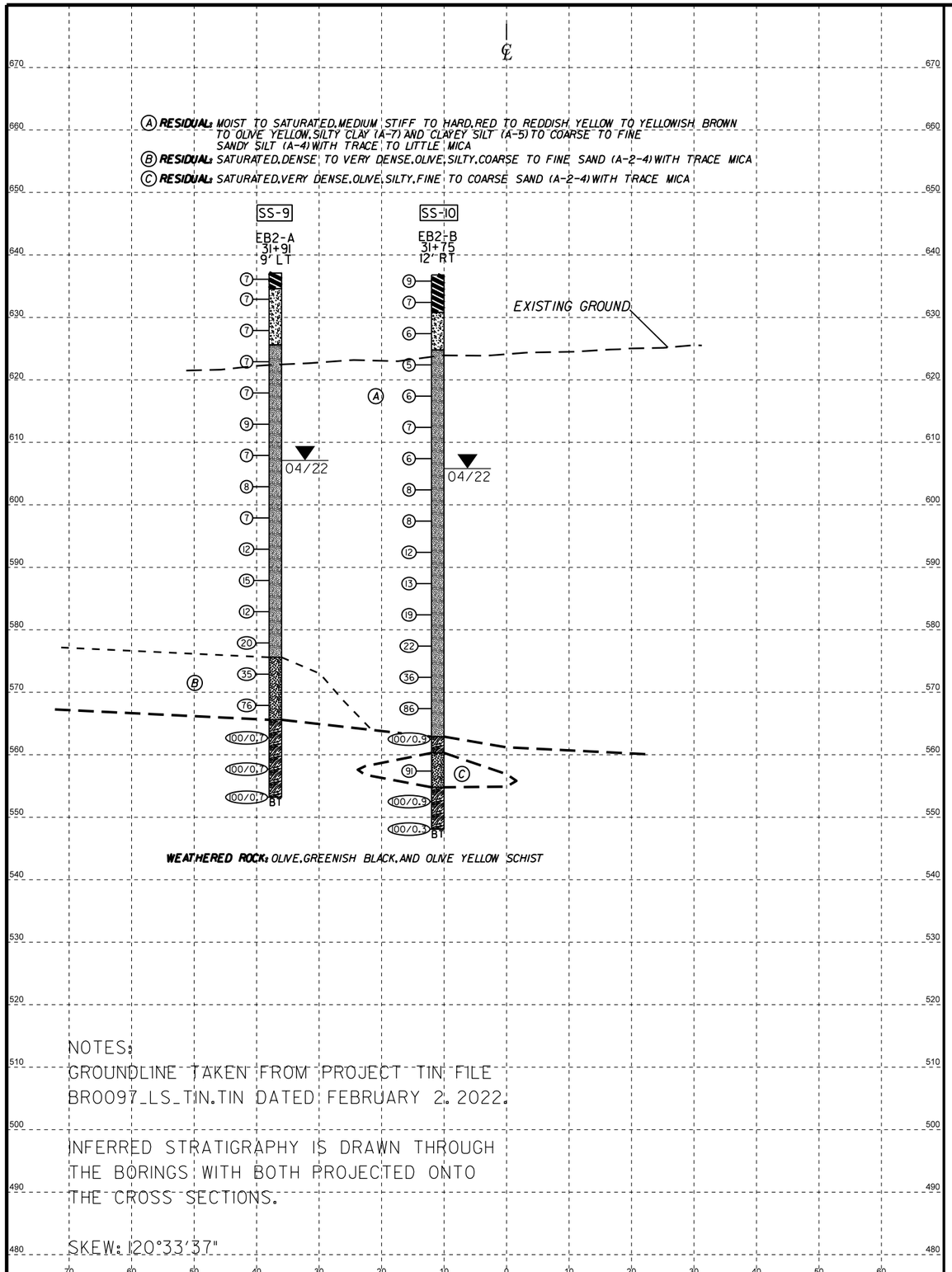
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTIONS.

SKEW: 120°33'37"

HORIZ. SCALE (FEET) 0 20 40 | VE = 1

CROSS SECTION ALONG BENT NO. 1 AT STA. 30+18

PROJECT REFERENCE NO.	SHEET NO.
BR-0097	6



NOTES:
GROUNDLINE TAKEN FROM PROJECT TIN FILE BR0097_LS_TIN.TIN DATED FEBRUARY 2, 2022.

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

SKEW: 120°33'37"

HORIZ. SCALE (FEET) 0 20 40

VE = 1

CROSS SECTION ALONG END BENT NO. 2 AT STA. 31+34

THIS PAGE INTENTIONALLY LEFT BLANK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 28+83	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 32.0
COLLAR ELEV. 630.2 ft	**TOTAL DEPTH** 89.1 ft	**NORTHING** 980,998	**EASTING** 1,832,538	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/05/22	**COMP. DATE** 04/06/22	**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))
635										
630	630.2	0.0	3	5	9	14		M		630.2 / 0.0 GROUND SURFACE
										RESIDUAL Brown to Red to Yellowish Brown, Silty CLAY (A-7) with Trace Mica
	626.7	3.5	4	6	8	14		M		
625										
	621.7	8.5	3	4	4	8		M		
620										
	616.7	13.5	3	2	4	6		M		
615										
	611.7	18.5	2	3	4	7		M		
610										
	606.7	23.5	2	2	3	5		M		
605										
	601.7	28.5	2	2	5	7		W		
600								54%		
595										
	591.9	38.3	2	3	5	8		Sat.		
590										
	586.9	43.3	2	3	5	8		Sat.		
585										
	581.9	48.3	3	6	9	15		Sat.		
580										
	576.9	53.3	5	8	11	19		Sat.		
575										
	571.9	58.3	15	22	20	42		Sat.		603.2 / 27.0 Olive Yellowish Brown, Coarse to Fine Sandy SILT (A-4), with Trace to Little Mica
570										
	566.9	63.3	10	28	48	76		Sat.		
565										
	561.9	68.3	50	46	33	79		Sat.		
560										
	556.9	73.3	32	44	56/0.4	100/0.9				573.7 / 56.5 Olive to Yellowish Brown, Olive, and White, Silty, Coarse to Fine SAND (A-2-4) with Trace Rock Fragments
555										555.9 / 74.3

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 28+83	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 32.0
COLLAR ELEV. 630.2 ft	**TOTAL DEPTH** 89.1 ft	**NORTHING** 980,998	**EASTING** 1,832,538	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/05/22	**COMP. DATE** 04/06/22	**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
555						Match Line				
	551.9	78.3	7	13	10	23		Sat.		553.7 / 76.5 **WEATHERED ROCK** Olive GNEISS *(continued)*
550										**RESIDUAL** Yellowish Brown, Silty, Fine to Coarse SAND (A-2-4)
	546.9	83.3	29	71/0.4		100/0.9				548.7 / 81.5 **WEATHERED ROCK** Yellowish Brown GNEISS
545										
	541.9	88.3	52	48/0.3		100/0.8				541.1 / 89.1 Boring Terminated at Elevation 541.1 ft in WEATHERED ROCK: GNEISS

Other Samples:
ST-1 (31.0 - 33.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 28+62	**OFFSET** 20 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 630.4 ft	**TOTAL DEPTH** 89.0 ft	**NORTHING** 980,976	**EASTING** 1,832,513	**24 HR.** 32.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/01/22	**COMP. DATE** 04/04/22	**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)
635										
630	630.4	0.0	1	3	5	8		M		630.4 0.0 GROUND SURFACE **RESIDUAL** Red to Reddish Yellow to Brown, Silty CLAY (A-7-5)
625	626.7	3.7	3	4	5	9		M		
620	621.7	8.7	2	3	3	6		M		
615	616.7	13.7	4	2	2	4		M		
610	611.7	18.7	2	2	2	4		M		
605								51%		
600	601.7	28.7	2	2	4	6		W		
595	596.7	33.7	2	2	4	6		Sat.		593.4 37.0 Yellowish Brown, Coarse to Fine Sandy SILT (A-4)
590	591.7	38.7	2	4	5	9		Sat.		
585	586.7	43.7	3	4	8	12		Sat.		
580	581.7	48.7	3	6	10	16		Sat.		
575	576.7	53.7	4	8	11	19		Sat.		
570	571.7	58.7	5	10	14	24		Sat.		573.4 57.0 Olive to Brown, Silty, Coarse to Fine SAND (A-2-4), Trace Mica
565	566.7	63.7	6	9	14	23		Sat.		
560	562.1	68.3	21	28	32	60		Sat.		
555	557.1	73.3	20	25	22	47		Sat.		

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 28+62	**OFFSET** 20 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 630.4 ft	**TOTAL DEPTH** 89.0 ft	**NORTHING** 980,976	**EASTING** 1,832,513	**24 HR.** 32.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 04/01/22	**COMP. DATE** 04/04/22	**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
555						Match Line				553.4 77.0 **WEATHERED ROCK** Yellowish Brown to Olive GNEISS
550	552.1	78.3	100/0.3			100/0.3				
545	547.1	83.3	38	62/0.3		100/0.8				
	542.1	88.3	60	40/0.2		100/0.7				541.4 89.0 Boring Terminated at Elevation 541.4 ft in WEATHERED ROCK: GNEISS Other Samples: ST-2 (21.0 - 23.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 30+33	**OFFSET** 4 ft LT	**ALIGNMENT** -L-	**0 HR.** 9.5
COLLAR ELEV. 612.1 ft	**TOTAL DEPTH** 88.6 ft	**NORTHING** 980,966	**EASTING** 1,832,685	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/22/22	**COMP. DATE** 03/24/22	**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)
615										
	612.1	0.0	4	4	3	7		M		612.1 0.0 GROUND SURFACE
610	608.8	3.3	2	2	2	4		M		**RESIDUAL** Yellowish Brown and Olive, Coarse to Fine Sandy SILT (A-4) with Trace to Little Mica
605	603.8	8.3	1	2	3	5				
600	598.8	13.3	2	2	4	6	SS-5	W		
595	593.8	18.3	4	4	6	10		Sat.		
590	588.8	23.3	2	5	7	12		Sat.		
585	583.8	28.3	4	7	10	17	SS-6	Sat.		
580	578.8	33.3	3	6	8	14		Sat.		
575	573.8	38.3	6	9	13	22		Sat.		
570	568.8	43.3	5	10	14	24		Sat.		
565	563.8	48.3	10	14	21	35		Sat.		565.1 47.0 Olive, Silty, Coarse to Fine SAND (A-2-4) with Trace Mica
560	558.8	53.3	6	8	12	20		Sat.		
555	553.8	58.3	23	52	48/0.2	100/0.7				552.8 59.3 **WEATHERED ROCK** Olive SCHIST
550	548.8	63.3	33	36	26	62		Sat.		550.6 61.5 **RESIDUAL** Greenish Black and Olive, Silty, Fine to Coarse SAND (A-2-4) with Trace Rock Fragments
545	543.8	68.3	100/0.2			100/0.2				545.6 66.5 **WEATHERED ROCK** Gray and Olive Yellow SCHIST
540	538.8	73.3	100/0.3			100/0.3				
535										

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 30+33	**OFFSET** 4 ft LT	**ALIGNMENT** -L-	**0 HR.** 9.5
COLLAR ELEV. 612.1 ft	**TOTAL DEPTH** 88.6 ft	**NORTHING** 980,966	**EASTING** 1,832,685	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/22/22	**COMP. DATE** 03/24/22	**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
535						Match Line				
	533.8	78.3	100/0.3			100/0.3				**WEATHERED ROCK** Gray and Olive Yellow SCHIST *(continued)*
530	528.8	83.3	100/0.3			100/0.3				
525	523.8	88.3	100/0.3			100/0.3				523.5 88.6 Boring Terminated at Elevation 523.5 ft in WEATHERED ROCK: SCHIST

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 30+17	**OFFSET** 25 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.0
COLLAR ELEV. 612.1 ft	**TOTAL DEPTH** 78.9 ft	**NORTHING** 980,941	**EASTING** 1,832,664	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/21/22	**COMP. DATE** 03/22/22	**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)
615										
	612.1	0.0	3	3	5	8		M		612.1 GROUND SURFACE 0.0
610	608.6	3.5	2	2	3	5		M		**RESIDUAL** Yellowish Brown, Clayey SILT (A-5), Trace Mica 609.6 2.5 Yellowish Brown to Olive, Coarse to Fine Sandy SILT (A-4), Trace Mica
605	603.6	8.5	2	2	3	5				
600	598.6	13.5	2	3	3	6		M		
595	593.6	18.5	3	3	4	7	SS-7	W		
590	588.6	23.5	2	4	5	9		W		
585	583.6	28.5	3	4	7	11		Sat.		
580	578.6	33.5	7	10	15	25		Sat.		
575	573.6	38.5	17	34	38	72	SS-8	Sat.		
570	568.6	43.5	12	22	34	56		Sat.		
565	563.6	48.5	24	44	56	100/1.0		Sat.		565.1 47.0 Olive, Silty, Coarse to Fine SAND (A-2-4), Trace Mica
560	558.6	53.5	13	87/0.2		100/0.7				558.1 54.0 **WEATHERED ROCK** Olive and Greenish Black SCHIST
555	553.6	58.5	37	28	72/0.4	100/0.9				
550	548.6	63.5	32	24	41	65		Sat.		550.1 62.0 **RESIDUAL** Olive, Silty, Fine to Coarse SAND (A-2-4)
545	543.6	68.5	100/0.5			100/0.5				545.1 67.0 **WEATHERED ROCK** Yellowish Brown to Olive SCHIST
540	538.6	73.5	100/0.5			100/0.5				
535										

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 30+17	**OFFSET** 25 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.0
COLLAR ELEV. 612.1 ft	**TOTAL DEPTH** 78.9 ft	**NORTHING** 980,941	**EASTING** 1,832,664	**24 HR.** 9.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 04/23/2021		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/21/22	**COMP. DATE** 03/22/22	**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
535						Match Line				
	533.6	78.5	100/0.4			100/0.4				533.2 78.9 Boring Terminated at Elevation 533.2 ft in WEATHERED ROCK: SCHIST

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 31+91	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 30.0
COLLAR ELEV. 637.1 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 980,940	**EASTING** 1,832,841	**24 HR.** 30.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/30/22	**COMP. DATE** 04/01/22	**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)
640											
	637.1	0.0	2	3	4	7		M		637.1 GROUND SURFACE	0.0
635	633.9	3.2	2	3	4	7		M		**RESIDUAL** Red, Silty CLAY (A-7) 634.6	2.5
630	628.9	8.2	2	3	4	7		M		Red to Reddish Brown, Clayey SILT (A-5) with Trace Mica	
625	623.9	13.2	2	3	4	7		M		625.6 Brown to Olive Yellow, Coarse to Fine Sandy SILT (A-4) with Trace to Little Mica	11.5
620	618.9	18.2	2	2	5	7		M			
615	613.9	23.2	3	5	4	9		M			
610	608.9	28.2	1	3	4	7	SS-9				
605	603.9	33.2	1	3	5	8		Sat.			
600	598.9	38.2	2	3	4	7		Sat.			
595	593.9	43.2	3	4	8	12		Sat.			
590	588.9	48.2	3	6	9	15		Sat.			
585	583.9	53.2	WOH	4	8	12		Sat.			
580	578.9	58.2	4	9	11	20		Sat.			
575	573.9	63.2	6	13	22	35		Sat.		575.6 Olive, Silty, Coarse to Fine SAND (A-2-4) with Trace Mica	61.5
570	568.9	68.2	25	31	45	76		Sat.			
565	563.9	73.2	31	55	45/0.2	100/0.7				565.6 **WEATHERED ROCK** Olive to Greenish Black SCHIST	71.5
560											

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 31+91	**OFFSET** 9 ft LT	**ALIGNMENT** -L-	**0 HR.** 30.0
COLLAR ELEV. 637.1 ft	**TOTAL DEPTH** 83.9 ft	**NORTHING** 980,940	**EASTING** 1,832,841	**24 HR.** 30.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/30/22	**COMP. DATE** 04/01/22	**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
560						Match Line				
555	558.9	78.2	30	60	40/0.2	100/0.7				**WEATHERED ROCK** Olive to Greenish Black SCHIST *(continued)*
	553.9	83.2	38	62/0.2		100/0.7				553.2 Boring Terminated at Elevation 553.2 ft in WEATHERED ROCK: SCHIST 83.9

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 31+75	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 30.9
COLLAR ELEV. 636.8 ft	**TOTAL DEPTH** 88.7 ft	**NORTHING** 980,923	**EASTING** 1,832,821	**24 HR.** 31.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/29/22	**COMP. DATE** 03/30/22	**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))
640										
	636.8	0.0								636.8 / 0.0 GROUND SURFACE
635			2	4	5	9		M		**RESIDUAL** Red to Orange, Silty CLAY (A-7)
	633.4	3.4								
			2	3	4	7		M		
630										630.8 / 6.0 Reddish Yellow, Clayey SILT (A-5) with Trace Mica
	628.4	8.4								
			2	3	3	6		M		
625										624.8 / 12.0 Reddish Yellow to Yellowish Brown to Olive, Coarse to Fine Sandy SILT (A-4) with Trace to Little Mica
	623.4	13.4								
			2	2	3	5	SS-10	M		
620										
	618.4	18.4								
			1	3	3	6		M		
615										
	613.4	23.4								
			3	4	3	7		M		
610										
	608.4	28.4								
			1	3	3	6		M		
605										
	603.4	33.4								
			2	3	5	8		Sat.		
600										
	598.4	38.4								
			1	3	5	8		Sat.		
595										
	593.4	43.4								
			2	5	7	12		Sat.		
590										
	588.4	48.4								
			4	5	8	13		Sat.		
585										
	583.4	53.4								
			6	7	12	19		Sat.		
580										
	578.4	58.4								
			6	9	13	22		Sat.		
575										
	573.4	63.4								
			10	16	20	36		Sat.		
570										
	568.4	68.4								
			15	26	60	86		Sat.		
565										
	563.4	73.4								562.9 / 73.9 **WEATHERED ROCK** Olive SCHIST
			22	78/0.4		100/0.9				560.3 / 76.5
560										

WBS 67097.1.1	**TIP** BR-0097	**COUNTY** ROCKINGHAM	**GEOLOGIST** D. Kubinski	
SITE DESCRIPTION Replace Bridge No. 178 on SR 1929 (Estes Road) over US 29				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 31+75	**OFFSET** 12 ft RT	**ALIGNMENT** -L-	**0 HR.** 30.9
COLLAR ELEV. 636.8 ft	**TOTAL DEPTH** 88.7 ft	**NORTHING** 980,923	**EASTING** 1,832,821	**24 HR.** 31.0
DRILL RIG/HAMMER EFF./DATE TRI8016 MOBILE B-57 82% 04/23/2021		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER R. Toothman	**START DATE** 03/29/22	**COMP. DATE** 03/30/22	**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
560						Match Line				
	558.4	78.4								
			12	35	56	91		Sat.		**RESIDUAL** Olive, Silty, Fine to Coarse SAND (A-2-4) with Trace Mica *(continued)*
555										554.8 / 82.0
	553.4	83.4								**WEATHERED ROCK** Olive Yellow SCHIST
			29	71/0.4		100/0.9				
550										
	548.4	88.4								548.1 / 88.7
			100/0.3			100/0.3				Boring Terminated at Elevation 548.1 ft in WEATHERED ROCK: SCHIST

LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

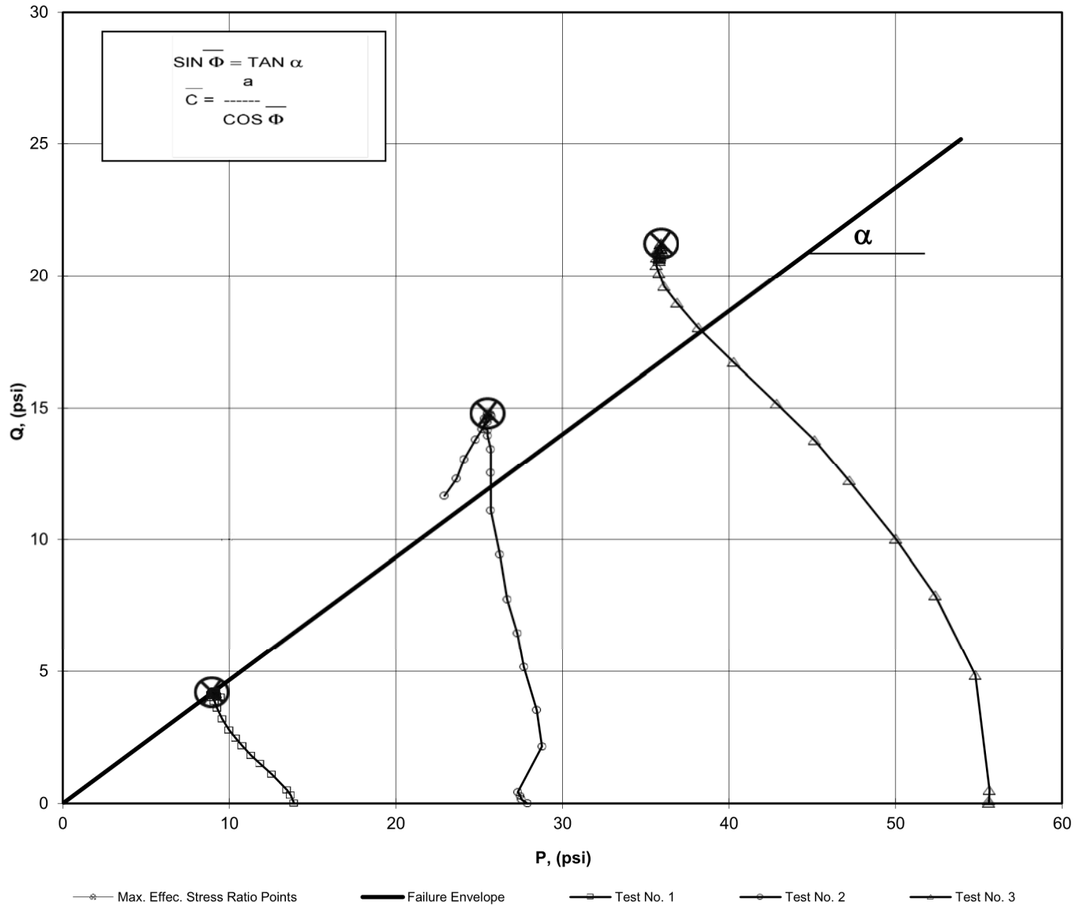
WBS NO. (TIP NO.): 67097.1.1 (BR-0097)
PROJECT ID: 39271
COUNTY: ROCKINGHAM
DESCRIPTION: REPLACE BRIDGE NO. 178 ON SR 1929 (ESTES ROAD) OVER US 29

									Atterberg Limits			Gradation Results							
Sample No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class.	N-Value (blows/ ft.)	L.L.	P.L.	P.I.	Retained #4 Sieve	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
SS-5	B1-A	-L-	30+33	4' LT	13.3 - 14.8	--	A-4	6	NP	NP	NP	0.0	99.0	97.4	62.7	4.9	62.3	18.4	14.3
SS-6	B1-A	-L-	30+33	4' LT	28.3 - 29.8	--	A-4	17	NP	NP	NP	1.0	96.0	89.1	55.0	17.3	38.6	31.8	12.4
SS-7	B1-B	-L-	30+17	25' RT	18.5 - 20.0	--	A-4	7	NP	NP	NP	1.0	98.0	96.1	64.5	7.2	42.4	38.2	12.1
SS-8	B1-B	-L-	30+17	25' RT	38.5 - 40.0	--	A-4	72	NP	NP	NP	3.0	89.0	82.8	42.7	22.4	48.0	19.6	10.0
SS-9	EB2-A	-L-	31+91	9' LT	28.2 - 29.7	--	A-4	7	NP	NP	NP	0.0	98.0	96.3	50.0	9.6	67.5	8.6	14.2
SS-10	EB2-B	-L-	31+75	12' RT	13.4 - 14.9	--	A-4	5	NP	NP	NP	1.0	97.0	96.3	72.6	6.0	33.9	42.0	18.2
ST-1	EB1-A	-L-	28+83	7' LT	31.0 - 33.0	53.8	A-4	--	NP	NP	NP	0.0	99.9	97.0	49.0	7.9	52.0	23.3	16.8
ST-2	EB1-B	-L-	28+62	20' RT	21.0 - 23.0	50.5	A-7-5	--	64	46	18	0.2	99.8	97.0	70.5	5.4	31.7	39.5	23.4

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Consolidated Undrained Triaxial Test with Pore Pressure



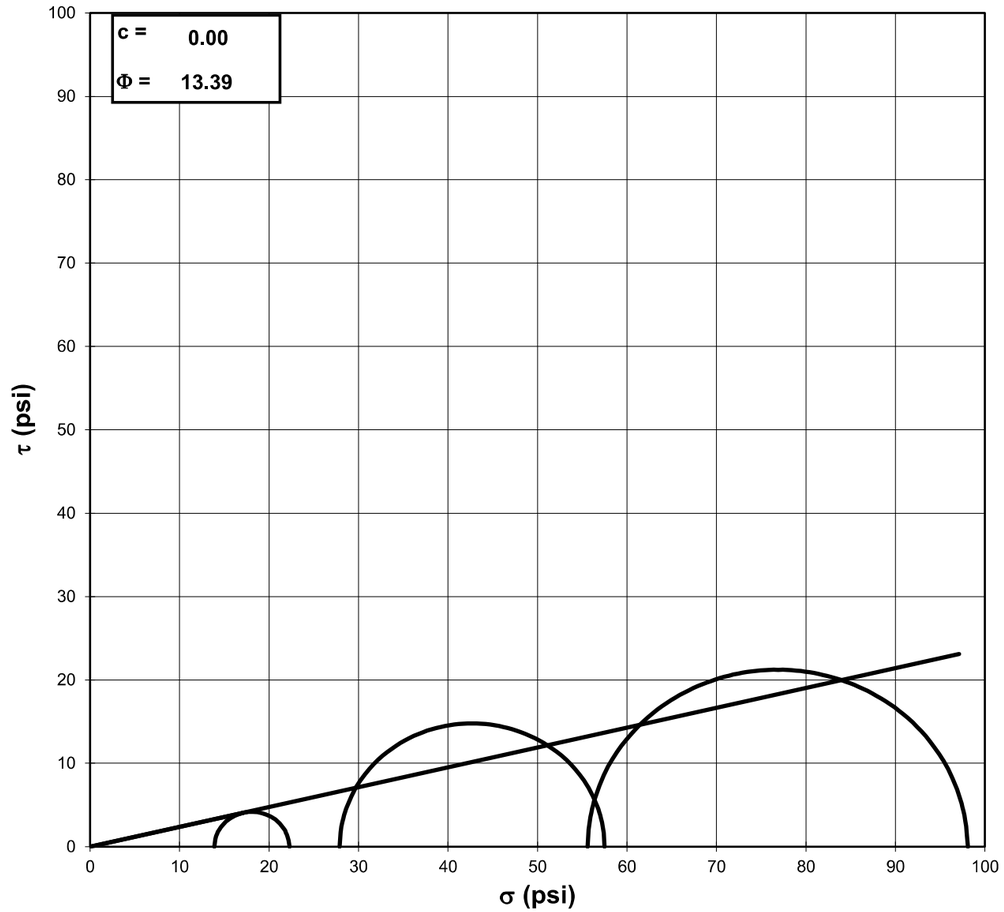
a	=	0.00	c̄	=	0.00
α	=	25.0	Φ̄	=	27.82

Tested By: 129-07-0411 Date: 4/27/22 Approved By: MPS Date: 5/5/22

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

MOHR TOTAL STRENGTH ENVELOPE
AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		
Visual Description:	Orange Clayey Silt (UNDISTURBED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-07-0411 *Date:* 4/27/22 *Approved By:* MPS *Date:* 5/5/22

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Visual Description: Orange Clayey Silt (UNDISTURBED)

Stage No.	0
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	63.89
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	13.9
Pore Pressure Response (%)	99

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	8.97
Q	=	4.18

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.962	Diameter 1:	2.833
Length 2:	5.971	Diameter 2:	2.836
Length 3:	5.994	Diameter 3:	2.846
Length 4:	5.999	Diameter 4:	2.848
Avg. Length:	5.982	*Avg. Diam.:*	2.841

VOLUME CHANGE

Initial Burette Reading (ml)	46.7
Final Burette Reading (ml)	26.7
Final Change (ml)	20.0
Initial Dial Reading (mil)	308
Dial Reading After Saturation (mil)	308
Dial Reading After Consolidation (mil)	389

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
6.3	0.000	50.0
10.0	0.001	50.5
12.6	0.003	50.9
20.0	0.009	52.4
24.9	0.014	53.5
28.8	0.020	54.4
33.4	0.030	55.3
37.0	0.039	56.0
41.0	0.051	56.7
46.4	0.072	57.5
51.7	0.103	58.2
55.4	0.140	58.6
57.5	0.175	58.9
58.9	0.217	59.1
59.6	0.246	59.1
60.4	0.289	59.1
61.6	0.346	59.1
62.4	0.407	59.1
63.0	0.451	59.1
63.8	0.512	59.0
64.4	0.558	59.0
64.6	0.603	59.0
65.1	0.649	58.9
65.3	0.678	58.9
65.3	0.708	58.9
65.2	0.738	58.9
65.3	0.768	58.8
65.4	0.813	58.8
65.1	0.858	58.7
64.9	0.888	58.4
64.4	0.918	58.3

Tested By: 129-07-0411 Date: 4/27/22 Input Checked By: GEM Date: 5/5/22

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Visual Description: Orange Clayey Silt (UNDISTURBED)

Effective Confining Pressure (psi)	13.9	*Stage No.*	0
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	5.98
Initial Sample Diameter (in)	2.84
Initial Sample Area (in^2)	6.34
Initial Sample Volume (in^3)	37.91

VOLUME CHANGE

Volume After Consolidation (in^3)	36.69
Length After Consolidation (in)	5.90
Area After Consolidation (in^2)	6.218

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio $\overline{A}$	$\overline{P}$	Q
0.03	0.60	0.50	13.99	13.4	1.045	0.84	13.69	0.30
0.06	1.02	0.94	13.97	13.0	1.079	0.93	13.46	0.51
0.15	2.20	2.44	13.65	11.5	1.192	1.12	12.55	1.10
0.24	3.00	3.54	13.34	10.3	1.289	1.19	11.85	1.50
0.34	3.61	4.38	13.13	9.5	1.380	1.22	11.32	1.81
0.50	4.34	5.28	12.95	8.6	1.504	1.23	10.78	2.17
0.66	4.91	5.96	12.84	7.9	1.619	1.23	10.39	2.45
0.87	5.53	6.66	12.76	7.2	1.764	1.22	10.00	2.76
1.22	6.37	7.50	12.77	6.4	1.997	1.19	9.58	3.19
1.74	7.18	8.21	12.86	5.7	2.263	1.15	9.27	3.59
2.37	7.72	8.64	12.97	5.3	2.470	1.13	9.11	3.86
2.97	7.99	8.93	12.95	5.0	2.610	1.13	8.96	3.99
3.68	8.15	9.06	12.98	4.8	2.686	1.12	8.91	4.07
4.18	8.22	9.11	13.01	4.8	2.720	1.12	8.89	4.11
4.89	8.28	9.08	13.10	4.8	2.720	1.11	8.96	4.14
5.87	8.37	9.11	13.15	4.8	2.750	1.10	8.97	4.18
6.89	8.40	9.08	13.22	4.8	2.746	1.09	9.01	4.20
7.65	8.43	9.06	13.26	4.8	2.746	1.09	9.04	4.21
8.68	8.44	9.01	13.32	4.9	2.730	1.08	9.10	4.22
9.45	8.47	8.98	13.37	4.9	2.726	1.07	9.14	4.23
10.22	8.43	8.96	13.36	4.9	2.708	1.07	9.15	4.21
10.99	8.42	8.92	13.39	5.0	2.692	1.07	9.18	4.21
11.50	8.39	8.91	13.38	5.0	2.684	1.07	9.18	4.20
12.00	8.35	8.88	13.37	5.0	2.665	1.07	9.19	4.18
12.51	8.30	8.85	13.33	5.0	2.648	1.08	9.19	4.15
13.02	8.26	8.82	13.33	5.1	2.628	1.08	9.20	4.13
13.78	8.19	8.78	13.31	5.1	2.603	1.08	9.21	4.10
14.55	8.08	8.66	13.32	5.2	2.545	1.08	9.27	4.04
15.06	8.01	8.40	13.49	5.5	2.460	1.06	9.49	4.00
15.57	7.89	8.31	13.47	5.6	2.414	1.06	9.52	3.94

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Visual Description: Orange Clayey Silt (UNDISTURBED)

Stage No.	0
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	77.89
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	27.9
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	25.52
Q	=	14.80

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.228	Diameter 1:	2.851
Length 2:	6.143	Diameter 2:	2.857
Length 3:	6.228	Diameter 3:	2.853
Length 4:	6.195	Diameter 4:	2.836
Avg. Length	6.199	*Avg. Diam.:*	2.849

VOLUME CHANGE

Initial Burette Reading (ml)	46.0
Final Burette Reading (ml)	15.6
Final Change (ml)	30.4
Initial Dial Reading (mil)	365
Dial Reading After Saturation (mil)	375
Dial Reading After Consolidation (mil)	528

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
12.2	0.000	50.0
14.1	0.001	50.5
15.7	0.003	50.7
17.6	0.009	51.0
39.0	0.014	51.3
56.2	0.020	53.0
76.5	0.029	55.4
92.8	0.038	57.0
109.1	0.052	58.9
130.7	0.073	61.1
152.3	0.104	63.3
171.6	0.142	64.7
184.1	0.179	65.6
192.0	0.222	66.3
195.8	0.253	66.5
199.2	0.297	66.9
204.3	0.357	67.0
209.7	0.418	67.2
210.4	0.465	67.0
211.0	0.527	67.2
213.2	0.574	67.1
215.8	0.621	66.9
218.2	0.667	67.0
218.3	0.698	66.8
216.6	0.729	66.9
213.9	0.760	66.9
209.6	0.791	66.9
200.5	0.838	66.8
191.2	0.885	66.5
182.9	0.917	66.6
175.9	0.948	66.5

Tested By: 129-07-0411 Date: 4/27/22 Input Checked By: GEM Date: 5/5/22

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Visual Description: Orange Clayey Silt (UNDISTURBED)

Effective Confining Pressure (psi)	27.9	*Stage No.*	0
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.20
Initial Sample Diameter (in)	2.85
Initial Sample Area (in^2)	6.38
Initial Sample Volume (in^3)	39.52

VOLUME CHANGE

Volume After Consolidation (in^3)	37.48
Length After Consolidation (in)	6.04
Area After Consolidation (in^2)	6.209

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.30	0.50	27.69	27.4	1.011	1.72	27.54	0.15
0.05	0.56	0.70	27.75	27.2	1.021	1.28	27.47	0.28
0.15	0.86	1.00	27.75	26.9	1.032	1.20	27.32	0.43
0.24	4.30	1.27	30.92	26.6	1.162	0.30	28.77	2.15
0.34	7.06	2.96	31.99	24.9	1.283	0.43	28.46	3.53
0.48	10.30	5.35	32.84	22.5	1.457	0.54	27.69	5.15
0.64	12.90	7.04	33.75	20.8	1.619	0.56	27.30	6.45
0.86	15.47	8.94	34.42	19.0	1.816	0.60	26.69	7.73
1.21	18.85	11.07	35.67	16.8	2.121	0.61	26.24	9.43
1.73	22.17	13.28	36.79	14.6	2.517	0.62	25.70	11.09
2.34	25.07	14.72	38.24	13.2	2.903	0.61	25.71	12.53
2.97	26.86	15.62	39.13	12.3	3.189	0.60	25.70	13.43
3.69	27.89	16.33	39.44	11.6	3.413	0.60	25.50	13.94
4.19	28.32	16.55	39.66	11.3	3.497	0.60	25.50	14.16
4.92	28.63	16.94	39.59	11.0	3.614	0.61	25.27	14.32
5.91	29.10	17.01	39.98	10.9	3.676	0.60	25.43	14.55
6.93	29.60	17.17	40.31	10.7	3.762	0.60	25.52	14.80
7.71	29.46	17.04	40.31	10.9	3.714	0.60	25.58	14.73
8.73	29.21	17.17	39.93	10.7	3.724	0.61	25.33	14.61
9.51	29.30	17.06	40.13	10.8	3.704	0.60	25.48	14.65
10.28	29.42	16.91	40.39	11.0	3.679	0.59	25.69	14.71
11.05	29.51	16.96	40.44	10.9	3.701	0.59	25.68	14.76
11.57	29.35	16.82	40.42	11.1	3.650	0.59	25.75	14.67
12.08	28.94	16.88	39.96	11.0	3.628	0.60	25.48	14.47
12.59	28.39	16.91	39.37	11.0	3.586	0.61	25.17	14.20
13.11	27.62	16.92	38.58	11.0	3.518	0.63	24.78	13.81
13.89	26.11	16.85	37.15	11.0	3.364	0.67	24.10	13.05
14.66	24.60	16.54	35.95	11.3	3.168	0.69	23.65	12.30
15.19	23.31	16.62	34.58	11.3	3.069	0.74	22.92	11.65
15.70	22.23	16.52	33.59	11.4	2.955	0.77	22.48	11.11

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		

Visual Description: Orange Clayey Silt (UNDISTURBED)

Stage No.	0
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	105.6
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	55.6
Pore Pressure Response (%)	97

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	35.93
Q	=	21.22

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	6.113	Diameter 1:	2.811
Length 2:	6.133	Diameter 2:	2.840
Length 3:	6.132	Diameter 3:	2.835
Length 4:	6.164	Diameter 4:	2.827
Avg. Length:	6.136	*Avg. Diam.:*	2.828

VOLUME CHANGE

Initial Burette Reading (ml)	92.8
Final Burette Reading (ml)	21.7
Final Change (ml)	71.1
Initial Dial Reading (mil)	240
Dial Reading After Saturation (mil)	248
Dial Reading After Consolidation (mil)	534

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
18.4	0.000	50.0
19.6	0.001	50.1
24.2	0.002	50.4
75.0	0.008	55.6
110.6	0.014	61.1
135.6	0.020	65.6
161.7	0.030	70.6
180.1	0.039	74.2
196.7	0.051	77.9
215.8	0.072	82.0
232.3	0.102	85.4
245.0	0.140	87.7
254.1	0.177	89.1
261.8	0.220	89.9
266.9	0.251	90.4
272.6	0.294	90.6
278.9	0.353	90.9
284.3	0.414	90.9
287.0	0.460	90.9
288.7	0.522	90.8
290.2	0.568	90.7
292.0	0.614	90.7
293.5	0.660	90.5
294.3	0.691	90.6
295.7	0.722	90.6
296.6	0.753	90.5
297.5	0.783	90.5
299.3	0.830	90.4
301.4	0.876	90.4
302.0	0.908	90.3
302.7	0.938	90.3

Tested By: 129-07-0411 Date: 4/27/22 Input Checked By: GEM Date: 5/5/22

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client: Kleinfelder | Boring No.: EB1-B
Client Reference: BR-0097 | Depth (ft): 21.0-23.0
Project No.: R-2022-091-002 | Sample No.: ST-1
Lab ID: R-2022-091-002-001

Visual Description: Orange Clayey Silt (UNDISTURBED)

Effective Confining Pressure (psi)	55.6	*Stage No.*	0
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.14
Initial Sample Diameter (in)	2.83
Initial Sample Area (in^2)	6.28
Initial Sample Volume (in^3)	38.55

VOLUME CHANGE

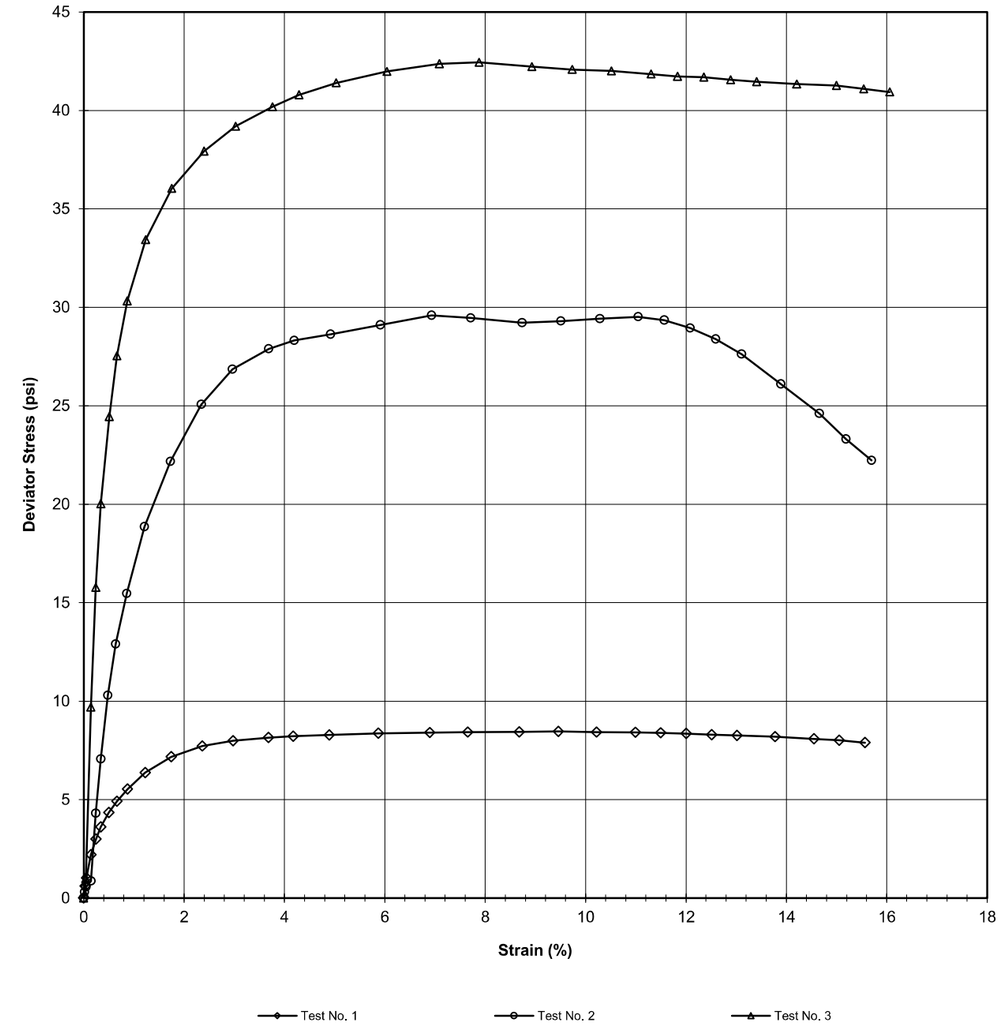
Volume After Consolidation (in^3)	34.06
Length After Consolidation (in)	5.84
Area After Consolidation (in^2)	5.830

Strain (%)	Deviator Stress PSI	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principal Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.20	0.09	55.71	55.5	1.004	0.48	55.61	0.10
0.04	0.99	0.45	56.14	55.2	1.018	0.47	55.65	0.49
0.14	9.69	5.64	59.65	50.0	1.194	0.60	54.80	4.84
0.24	15.77	11.10	60.27	44.5	1.354	0.73	52.39	7.88
0.34	20.03	15.58	60.05	40.0	1.501	0.80	50.03	10.01
0.51	24.45	20.60	59.45	35.0	1.699	0.87	47.22	12.23
0.66	27.54	24.22	58.92	31.4	1.878	0.91	45.15	13.77
0.87	30.32	27.88	58.04	27.7	2.094	0.95	42.88	15.16
1.23	33.43	32.02	57.01	23.6	2.418	0.99	40.29	16.71
1.75	36.04	35.45	56.19	20.2	2.788	1.01	38.17	18.02
2.40	37.93	37.69	55.84	17.9	3.117	1.02	36.88	18.96
3.03	39.20	39.08	55.72	16.5	3.373	1.03	36.12	19.60
3.76	40.17	39.88	55.90	15.7	3.555	1.02	35.81	20.09
4.29	40.78	40.35	56.03	15.2	3.675	1.02	35.64	20.39
5.03	41.40	40.63	56.37	15.0	3.765	1.01	35.67	20.70
6.04	41.98	40.85	56.73	14.7	3.846	1.00	35.74	20.99
7.09	42.37	40.90	57.07	14.7	3.884	1.00	35.88	21.19
7.88	42.44	40.89	57.15	14.7	3.886	0.99	35.93	21.22
8.93	42.23	40.76	57.07	14.8	3.845	1.00	35.96	21.11
9.73	42.08	40.73	56.96	14.9	3.829	1.00	35.92	21.04
10.51	42.00	40.67	56.93	14.9	3.814	1.00	35.93	21.00
11.31	41.84	40.52	56.92	15.1	3.775	1.00	36.00	20.92
11.83	41.72	40.60	56.73	15.0	3.781	1.00	35.86	20.86
12.35	41.69	40.59	56.70	15.0	3.778	1.00	35.85	20.85
12.89	41.56	40.53	56.63	15.1	3.758	1.01	35.85	20.78
13.41	41.45	40.47	56.58	15.1	3.740	1.01	35.86	20.73
14.21	41.34	40.45	56.49	15.2	3.729	1.01	35.82	20.67
15.00	41.26	40.38	56.47	15.2	3.711	1.01	35.85	20.63
15.54	41.09	40.32	56.36	15.3	3.689	1.01	35.82	20.54
16.06	40.93	40.28	56.26	15.3	3.672	1.01	35.79	20.47

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

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297

Client:	Kleinfelder	Boring No.:	EB1-B
Client Reference:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001		
Visual Description:	Orange Clayey Silt (UNDISTURBED)		



Tested By: 129-07-0411 Date: 4/27/22 Approved By: MPS Date: 5/5/22

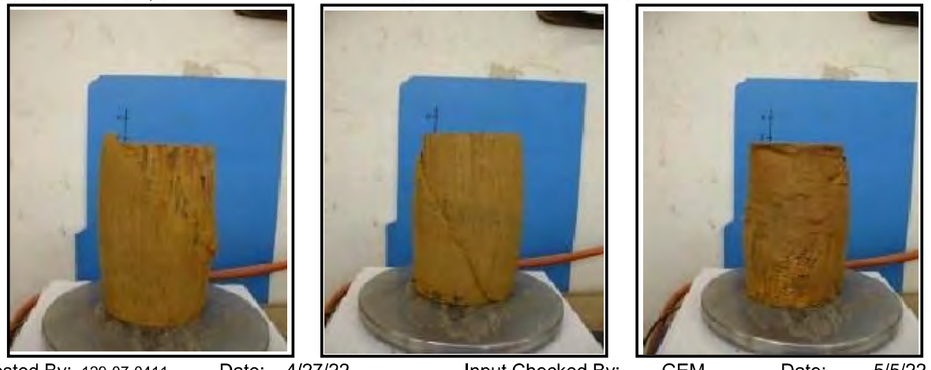
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
ASTM D4767-11

Client:	Kleinfelder		
Client Reference:	BR-0097		
Project No.:	R-2022-091-002		
Lab ID:	R-2022-091-002-001	Specific Gravity (assumed)	2.68
Visual Description:	Orange Clayey Silt (UNDISTURBED)		

SAMPLE CONDITION SUMMARY

Boring No.:	EB1-B	EB1-B	EB1-B
Depth (ft):	21.0-23.0	21.0-23.0	21.0-23.0
Sample No.:	ST-1	ST-1	ST-1
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	47.8	47.8	47.8
Total Unit Weight (pcf)	100.6	103.9	108.5
Dry Unit Weight (pcf)	68.0	70.3	73.4
Moisture Content (%) (FINAL)	58.9	45.6	42.6
Initial State Void Ratio,e	1.459	1.381	1.279
Void Ratio at Shear, e	1.380	1.258	1.014



Tested By: 129-07-0411 Date: 4/27/22 Input Checked By: GEM Date: 5/5/22

DCN: CT-S28 DATE: 4/12/13 REVISION: 3

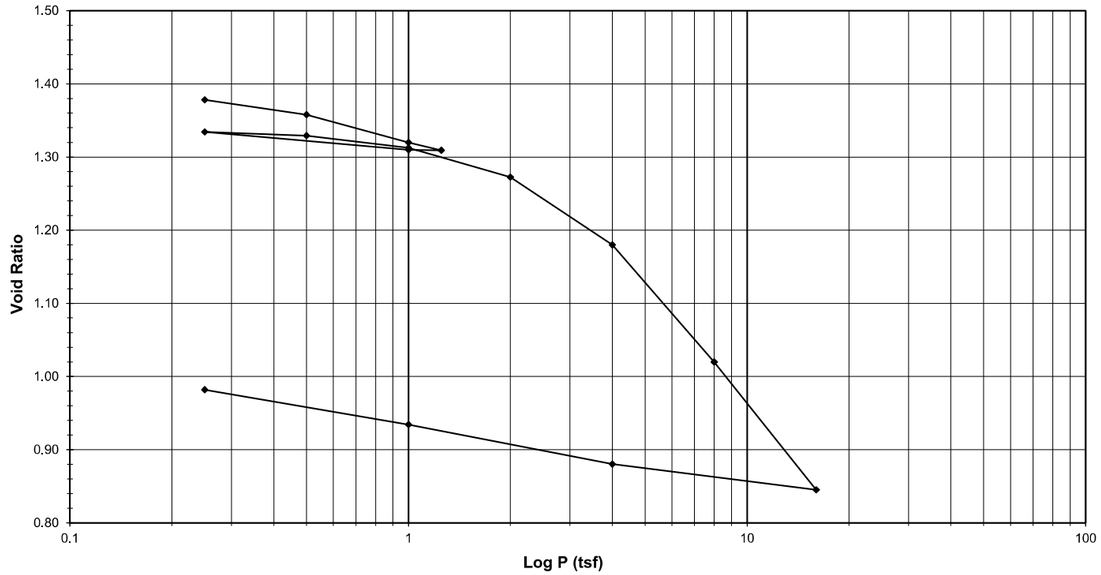
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Tested By MY *Date* 4/27/22 *Approved By* MPS *Date* 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2 GeoJac-16tsf.xlt

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-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained
Consolidometer No. R-409
1 Division = 0.0001 (in.)

Sample Properties	**Initial**	**Final**
Water Content		
Tare Number	485	473
Wt. of Tare & WS (g)	412.41	222.53
Wt. of Tare & DS (g)	311.15	189.13
Wt. of Water (g)	101.26	33.40
Wt. of Tare (g)	99.33	97.81
Wt. of DS (g)	211.82	91.32
Water Content (%)	47.80	36.57
Sample Parameters		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.8286
Sample Volume (cm^3)	80.44	66.65
Wt. of Wet Sample + Ring (g)	347.89	337.77
Wt. of Ring (g)	214.67	214.67
Wt. of Wet Sample (g)	133.22	123.10
Wet Density (pcf)	103.34	115.24
Wet Density (g/cm^3)	1.66	1.85
Water Content (%)	47.80	36.57
Wt. of Dry Sample (g)	90.13	90.13
Dry Density (pcf)	69.92	84.38
Dry Density (g/cm^3)	1.12	1.35
Void Ratio	1.3918	0.9819
Saturation (%)	92.05	99.83
Specific Gravity	2.68	*Assumed*

Test Data Summary

Applied Pressure (tsf)	**Final Dial Reading** (div)	**Machine Deflection** (div)	**Corrected Reading** (div)	**Height of Sample** (mm)	**Volume** (cm^3)	**Dry Density** (g/cm^3)	**Void Ratio**
Seating	0	0	0	25.400	80.440	1.12050	**1.39180**
0.25	106.2	49.4	56.8	25.256	79.983	1.12689	**1.37822**
0.5	208.6	67.4	141.2	25.041	79.304	1.13655	**1.35802**
1	385.6	84.9	300.7	24.636	78.021	1.15523	**1.31988**
1.25	437.7	92.9	344.8	24.524	77.666	1.16051	**1.30933**
1	435.2	91.7	343.5	24.528	77.677	1.16035	**1.30965**
0.25	313.4	73.2	240.2	24.790	78.507	1.14808	**1.33434**
0.5	341.4	79.5	261.9	24.735	78.333	1.15063	**1.32915**
1	420.8	89.0	331.8	24.557	77.771	1.15895	**1.31244**
2	612.9	114.4	498.5	24.134	76.430	1.17929	**1.27256**
4	1033.5	148.1	885.5	23.151	73.317	1.22935	**1.18001**
8	1742.6	188.0	1554.6	21.451	67.934	1.32676	**1.01996**
16	2520.6	234.8	2285.7	19.594	62.053	1.45250	**0.84510**
4	2314.8	175.5	2139.3	19.966	63.232	1.42543	**0.88013**
1	2054.7	142.1	1912.6	20.542	65.055	1.38549	**0.93434**
0.25	1823.7	109.9	1713.8	21.047	66.654	1.35225	**0.98188**

Tested By MY *Date* 4/27/22 *Checked By* MPS *Date* 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2 GeoJac-16tsf.xlt

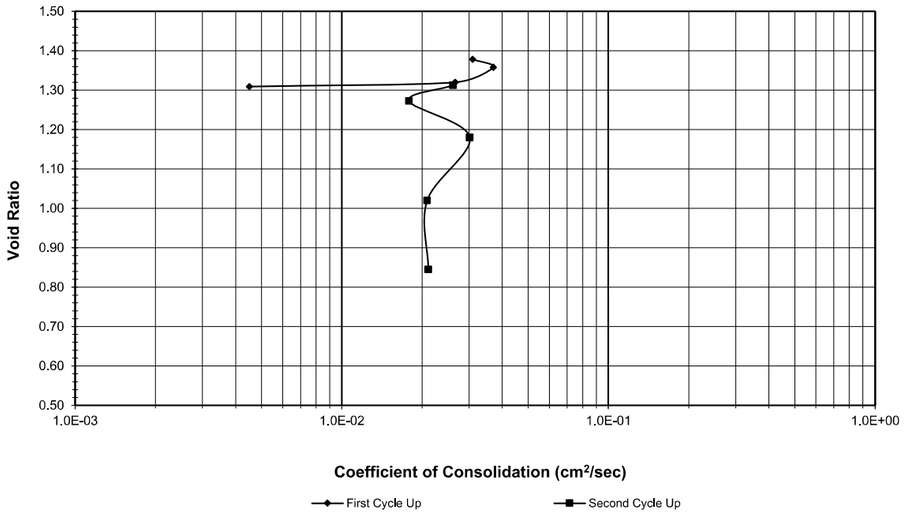
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-25.0
Project No.:	R-2022-091-002	Sample No.:	ST-1 & ST-2
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Tested By MY *Date* 4/27/22 *Checked By* MPS *Date* 5/6/22

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-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained
Consolidometer No. R-409
1 Division = 0.0001 (in.)

Sample Properties	**Initial**	**Final**
Water Content		
Tare Number	485	473
Wt. of Tare & WS (g)	412.41	222.53
Wt. of Tare & DS (g)	311.15	189.13
Wt. of Water (g)	101.26	33.40
Wt. of Tare (g)	99.33	97.81
Wt. of DS (g)	211.82	91.32
Water Content (%)	47.80	36.57
Sample Parameters		
Sample Diameter (in)	2.5	2.5
Sample Height (in)	1.0000	0.8286
Sample Volume (cm^3)	80.44	66.65
Wt. of Wet Sample + Ring (g)	347.89	337.77
Wt. of Ring (g)	214.67	214.67
Wt. of Wet Sample (g)	133.22	123.10
Wet Density (pcf)	103.34	115.24
Wet Density (g/cm^3)	1.66	1.85
Water Content (%)	47.80	36.57
Wt. of Dry Sample (g)	90.13	90.13
Dry Density (pcf)	69.92	84.38
Dry Density (g/cm^3)	1.12	1.35
Void Ratio	1.3918	0.9819
Saturation (%)	92.05	99.83
Specific Gravity	2.68	*Assumed*

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.)	**(cm^2/sec)**
0 - 0.25	77.9	49.4	28.5	2.533	**0.17**	**0.0310**
0.25 - 0.5	176.6	67.4	109.1	2.512	**0.14**	**0.0370**
0.5 - 1	314.6	84.9	229.7	2.482	**0.19**	**0.0266**
1 - 1.25	421.6	92.9	328.7	2.457	**1.10**	**0.0045**
1.25 - 1	NA	91.7	NA	NA	**NA**	**NA**
1 - 0.25	NA	NA	NA	NA	**NA**	**NA**
0.25 - 0.5	NA	NA	NA	NA	**NA**	**NA**
0.5 - 1	405.7	89.0	316.7	2.460	**0.19**	**0.0261**
1 - 2	573.0	114.4	458.6	2.424	**0.27**	**0.0179**
2 - 4	899.1	148.1	751.0	2.349	**0.15**	**0.0302**
4 - 8	1532.2	188.0	1344.2	2.199	**0.19**	**0.0209**
8 - 16	2247.9	234.8	2013.1	2.029	**0.16**	**0.0211**
16 - 4	NA	175.5	NA	NA	**NA**	**NA**
4 - 1	NA	NA	NA	NA	**NA**	**NA**
1 - 0.25	NA	NA	NA	NA	**NA**	**NA**
0.25 - 0	NA	NA	NA	NA	**NA**	**NA**

Tested By MY *Date* 4/27/22 *Checked By* MPS *Date* 5/6/22

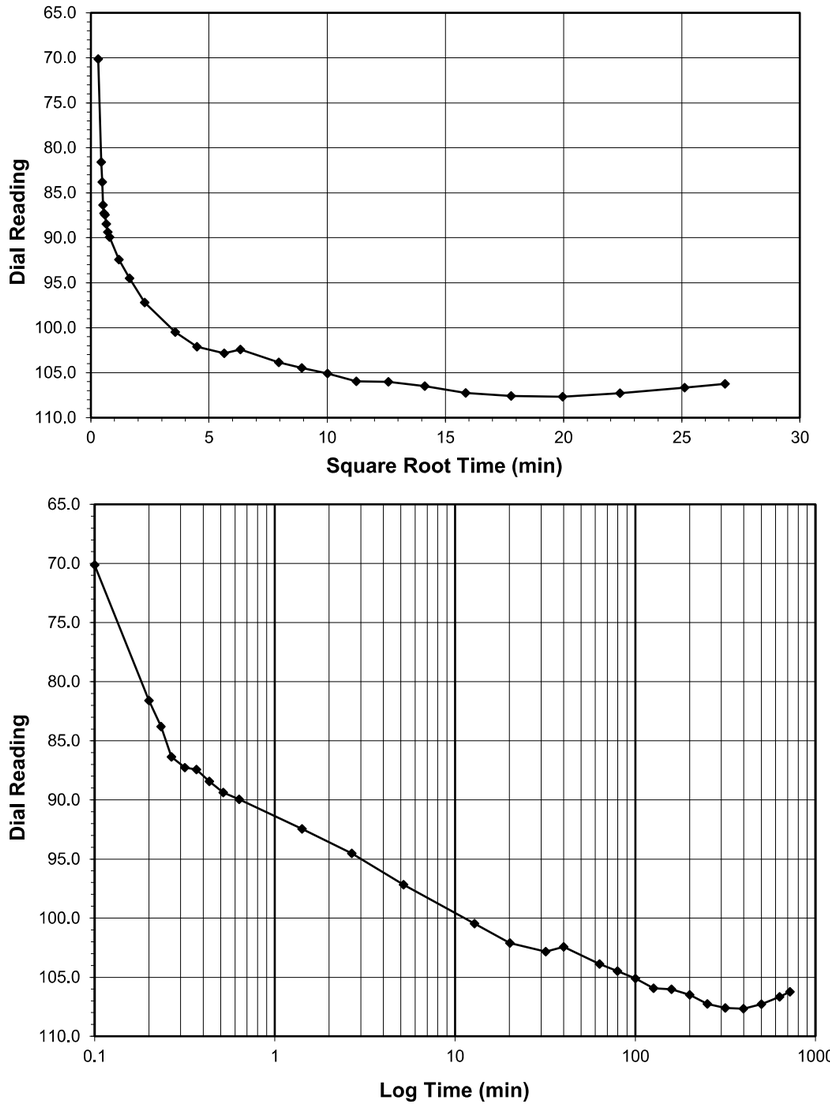
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**0 - 0.25**
Final Reading	**(div)**	**106.2**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/27/22
Start Time		10:41:22

Elapsed Time (min)	Dial Reading (div)
Initial	**0.0**
0.10	70.1
0.20	81.6
0.23	83.8
0.27	86.4
0.32	87.3
0.37	87.4
0.43	88.4
0.52	89.4
0.63	89.9
1.42	92.4
2.67	94.5
5.18	97.2
12.78	100.5
20.15	102.1
31.83	102.8
40.02	102.4
63.32	103.9
79.65	104.5
100.23	105.1
126.13	106.0
158.72	106.0
199.77	106.5
251.43	107.3
316.47	107.6
398.35	107.7
501.43	107.3
631.22	106.7
720.17	106.2

Tested By 129-07-0411 *Date* 4/27/22 *Checked By* MPS *Date* 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2

GeoJac-16tsf.xlt

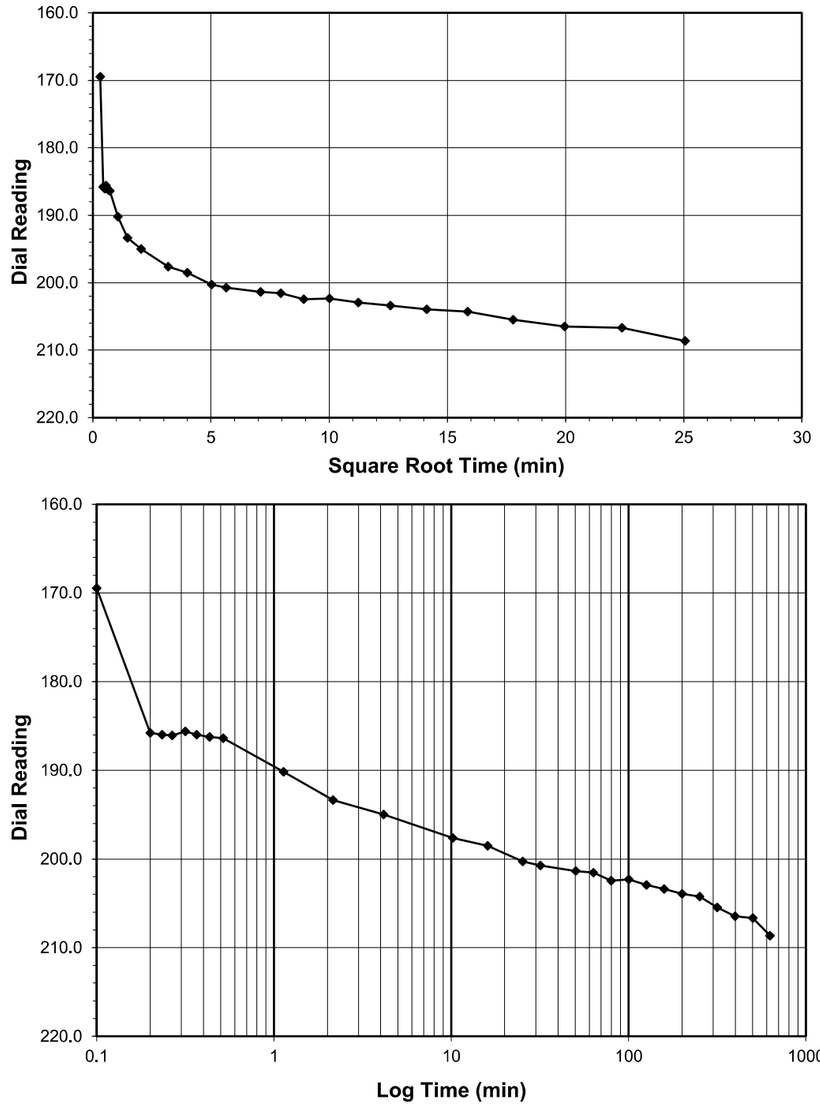
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**0.25 - 0.5**
Final Reading	**(div)**	**208.6**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/27/22
Start Time		22:41:32

Elapsed Time (min)	Dial Reading (div)
Initial	**106.2**
0.10	169.4
0.20	185.8
0.23	186.0
0.27	186.1
0.32	185.6
0.37	186.0
0.43	186.2
0.52	186.4
1.13	190.2
2.15	193.4
4.15	195.0
10.18	197.6
16.05	198.5
25.32	200.3
31.83	200.7
50.33	201.4
63.32	201.6
79.67	202.5
100.23	202.3
126.13	202.9
158.73	203.4
199.78	203.9
251.45	204.3
316.48	205.5
398.37	206.5
501.45	206.7
627.53	208.6

Tested By 129-07-041 *Date* 4/27/22 *Checked By* MPS *Date* 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2

GeoJac-16tsf.xlt

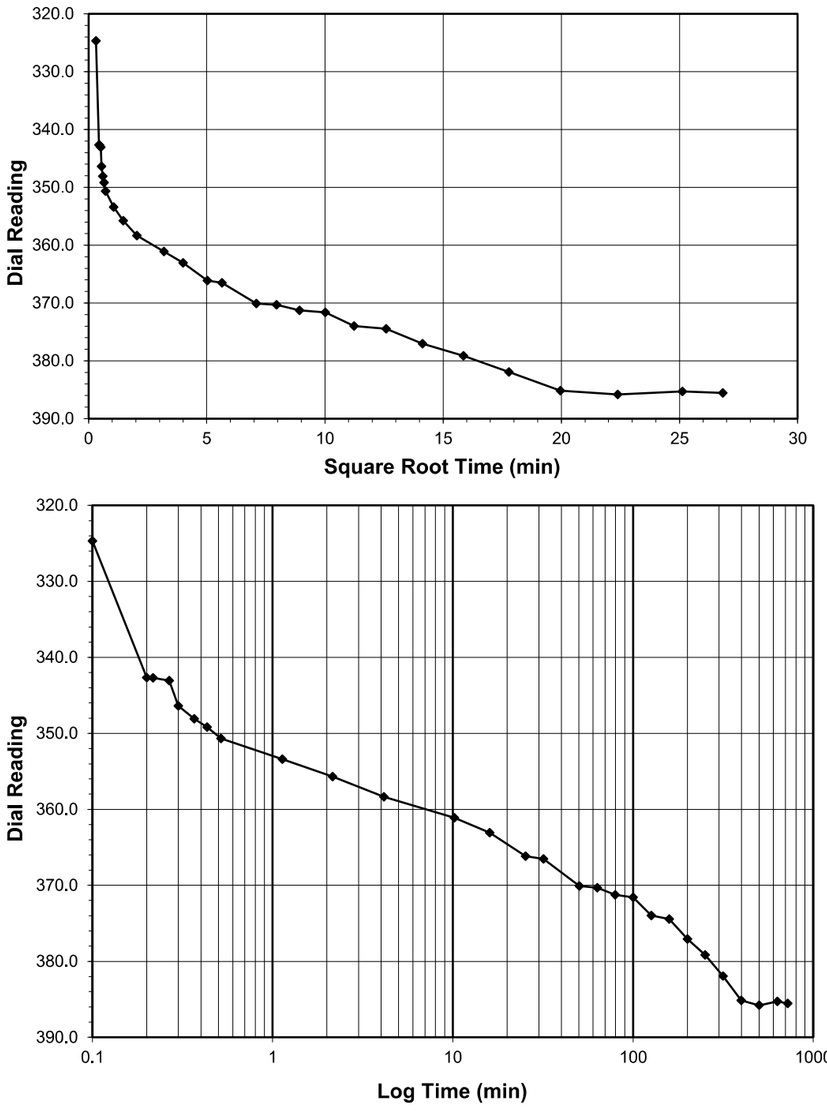
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**0.5 - 1**
Final Reading	**(div)**	**385.6**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/28/22
Start Time		9:09:05

Elapsed Time (min)	Dial Reading (div)
Initial	**208.6**
0.10	324.7
0.20	342.7
0.22	342.7
0.27	343.1
0.30	346.4
0.37	348.1
0.43	349.2
0.52	350.7
1.13	353.4
2.15	355.7
4.15	358.3
10.17	361.1
16.03	363.1
25.30	366.1
31.82	366.5
50.32	370.1
63.30	370.3
79.63	371.3
100.22	371.6
126.12	374.0
158.72	374.4
199.75	377.1
251.42	379.1
316.47	381.9
398.35	385.2
501.43	385.8
631.20	385.3
720.37	385.6

Tested By '29-07-041' Date 4/28/22 Checked By MPS Date 5/6/22

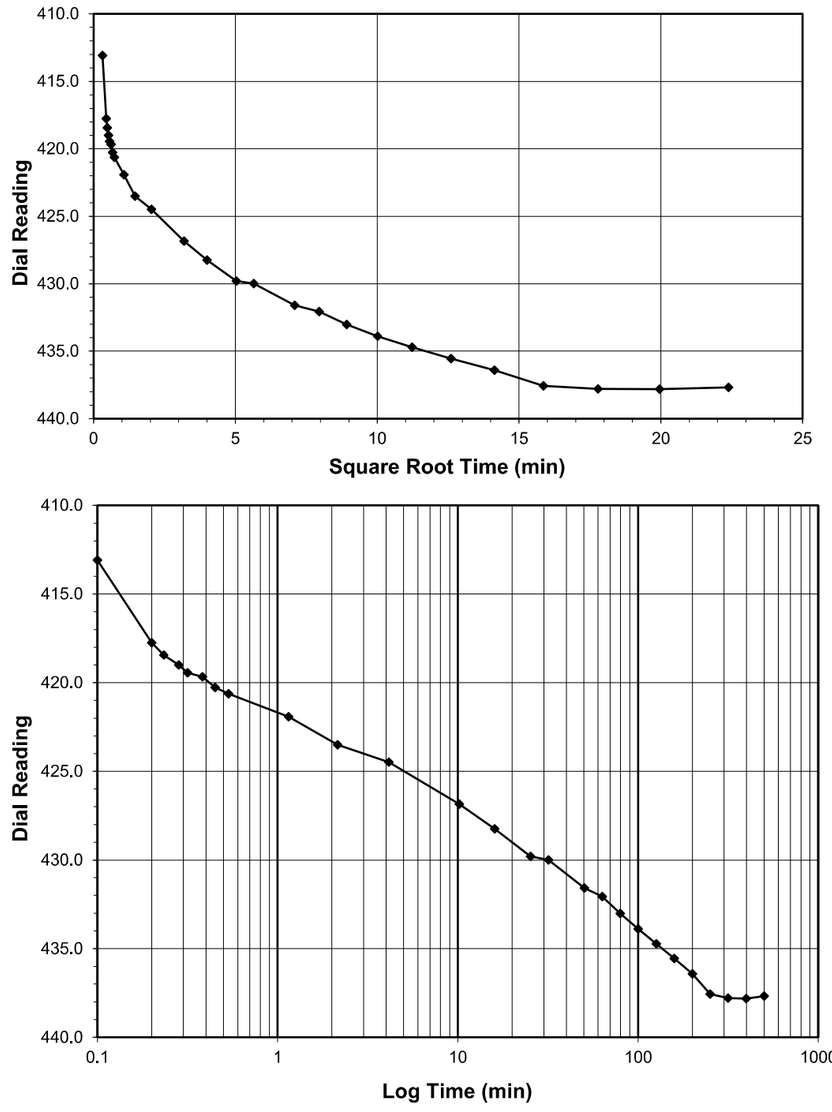
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**1 - 1.25**
Final Reading	**(div)**	**437.7**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/28/22
Start Time		21:09:27

Elapsed Time (min)	Dial Reading (div)
Initial	**385.6**
0.10	413.1
0.20	417.7
0.23	418.4
0.28	419.0
0.32	419.4
0.38	419.7
0.45	420.3
0.53	420.6
1.15	421.9
2.15	423.5
4.15	424.5
10.18	426.8
16.05	428.2
25.32	429.8
31.83	430.0
50.33	431.6
63.32	432.1
79.65	433.0
100.23	433.9
126.13	434.7
158.73	435.6
199.77	436.4
251.43	437.6
316.48	437.8
398.37	437.8
501.45	437.7

Tested By '29-07-041' Date 4/28/22 Checked By MPS Date 5/6/22

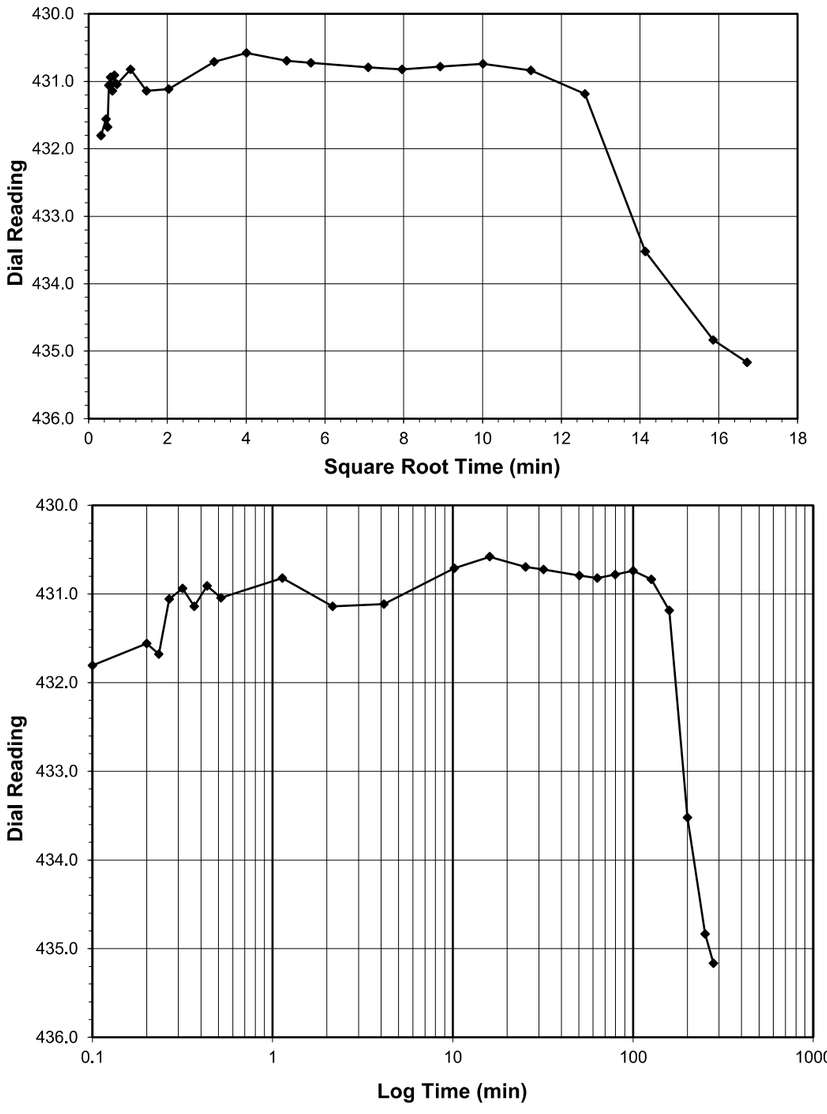
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**1.25 - 1**
Final Reading	**(div)**	**435.2**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/29/22
Start Time		8:56:26

Elapsed Time (min)	Dial Reading (div)
Initial	**437.7**
0.10	431.8
0.20	431.6
0.23	431.7
0.27	431.1
0.32	430.9
0.37	431.1
0.43	430.9
0.52	431.0
1.13	430.8
2.15	431.1
4.15	431.1
10.18	430.7
16.05	430.6
25.32	430.7
31.83	430.7
50.33	430.8
63.32	430.8
79.65	430.8
100.23	430.7
126.13	430.8
158.73	431.2
199.77	433.5
251.43	434.8
279.33	435.2

Tested By '29-07-041' Date 4/29/22 Checked By MPS Date 5/6/22

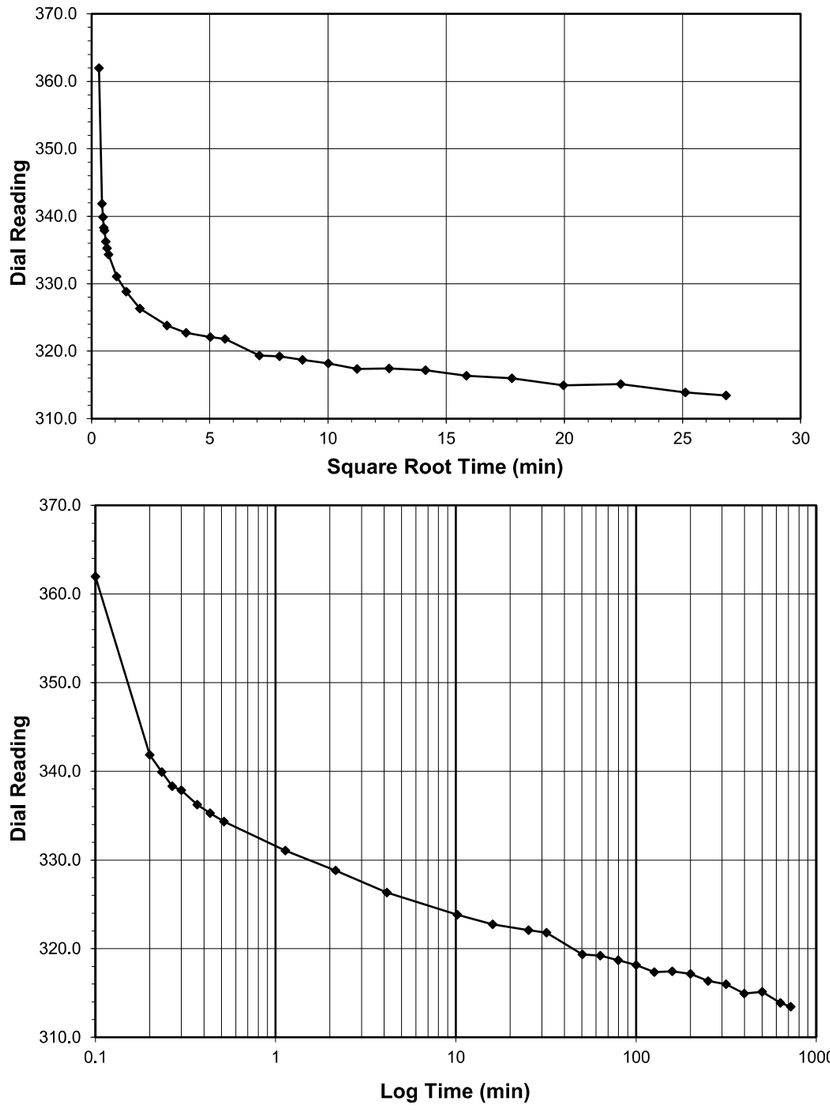
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**1 - 0.25**
Final Reading	**(div)**	**313.4**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/29/22
Start Time		13:35:47

Elapsed Time (min)	Dial Reading (div)
Initial	**435.2**
0.10	362.0
0.20	341.9
0.23	339.9
0.27	338.3
0.30	337.9
0.37	336.2
0.43	335.3
0.52	334.3
1.13	331.1
2.15	328.8
4.15	326.3
10.18	323.8
16.03	322.7
25.32	322.1
31.82	321.8
50.33	319.4
63.32	319.2
79.65	318.7
100.23	318.2
126.13	317.4
158.73	317.4
199.77	317.2
251.43	316.3
316.48	316.0
398.37	314.9
501.45	315.1
631.22	313.9
720.48	313.4

Tested By '29-07-041' Date 4/29/22 Checked By MPS Date 5/6/22

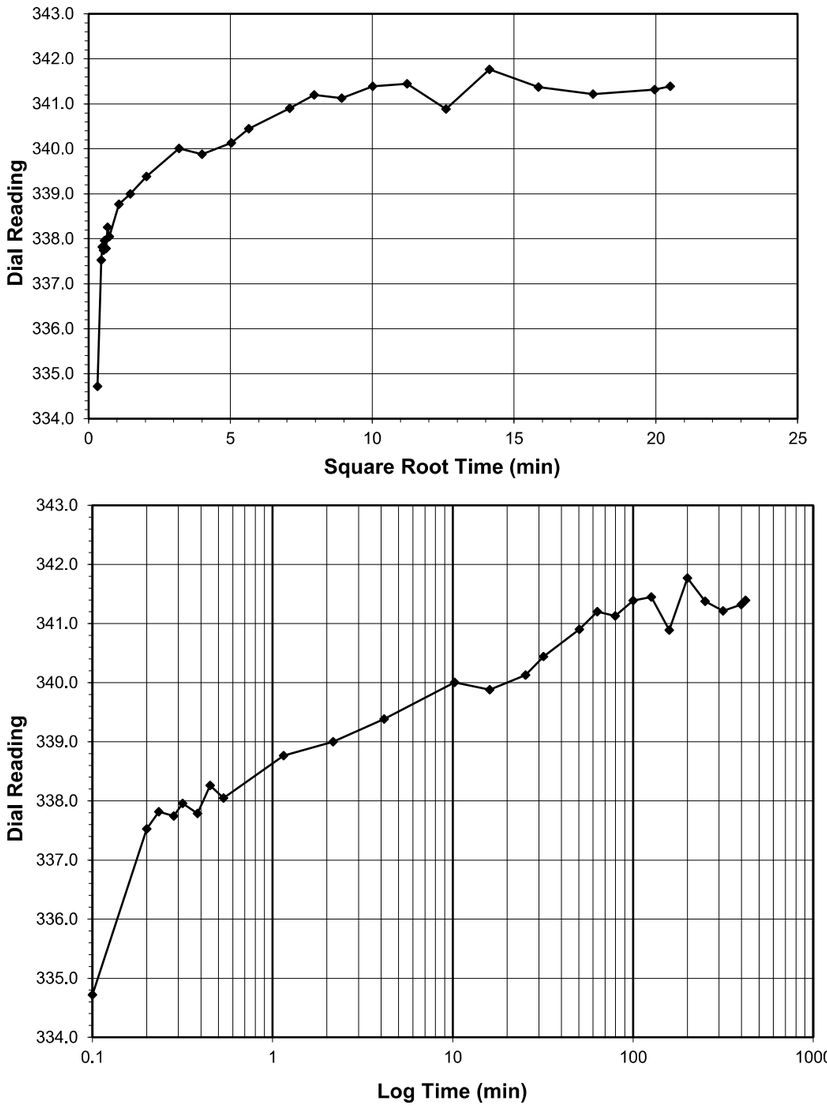
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**0.25 - 0.5**
Final Reading	**(div)**	**341.4**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/30/22
Start Time		1:36:16

Elapsed Time (min)	Dial Reading (div)
Initial	**313.4**
0.10	334.7
0.20	337.5
0.23	337.8
0.28	337.7
0.32	338.0
0.38	337.8
0.45	338.3
0.53	338.0
1.15	338.8
2.17	339.0
4.17	339.4
10.20	340.0
16.05	339.9
25.33	340.1
31.83	340.4
50.33	340.9
63.32	341.2
79.67	341.1
100.23	341.4
126.13	341.4
158.73	340.9
199.78	341.8
251.45	341.4
316.48	341.2
398.37	341.3
420.42	341.4

Tested By '29-07-041' Date 4/30/22 Checked By MPS Date 5/6/22

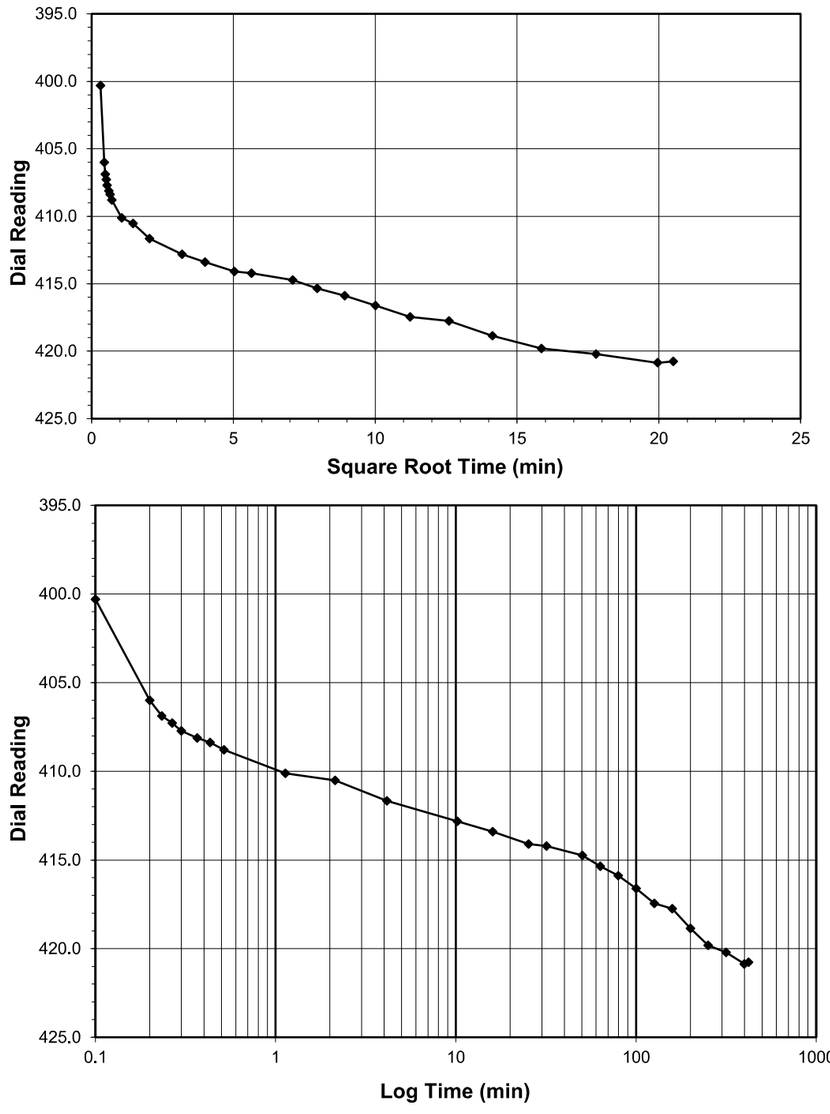
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**0.5 - 1**
Final Reading	**(div)**	**420.8**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/30/22
Start Time		8:36:42

Elapsed Time (min)	Dial Reading (div)
Initial	**341.4**
0.10	400.3
0.20	406.0
0.23	406.9
0.27	407.3
0.30	407.7
0.37	408.1
0.43	408.4
0.52	408.8
1.13	410.1
2.13	410.5
4.15	411.7
10.18	412.8
16.03	413.4
25.32	414.1
31.82	414.2
50.32	414.7
63.30	415.3
79.65	415.9
100.22	416.6
126.12	417.5
158.72	417.7
199.77	418.9
251.43	419.8
316.47	420.2
398.35	420.9
420.50	420.8

Tested By '29-07-041' Date 4/30/22 Checked By MPS Date 5/6/22

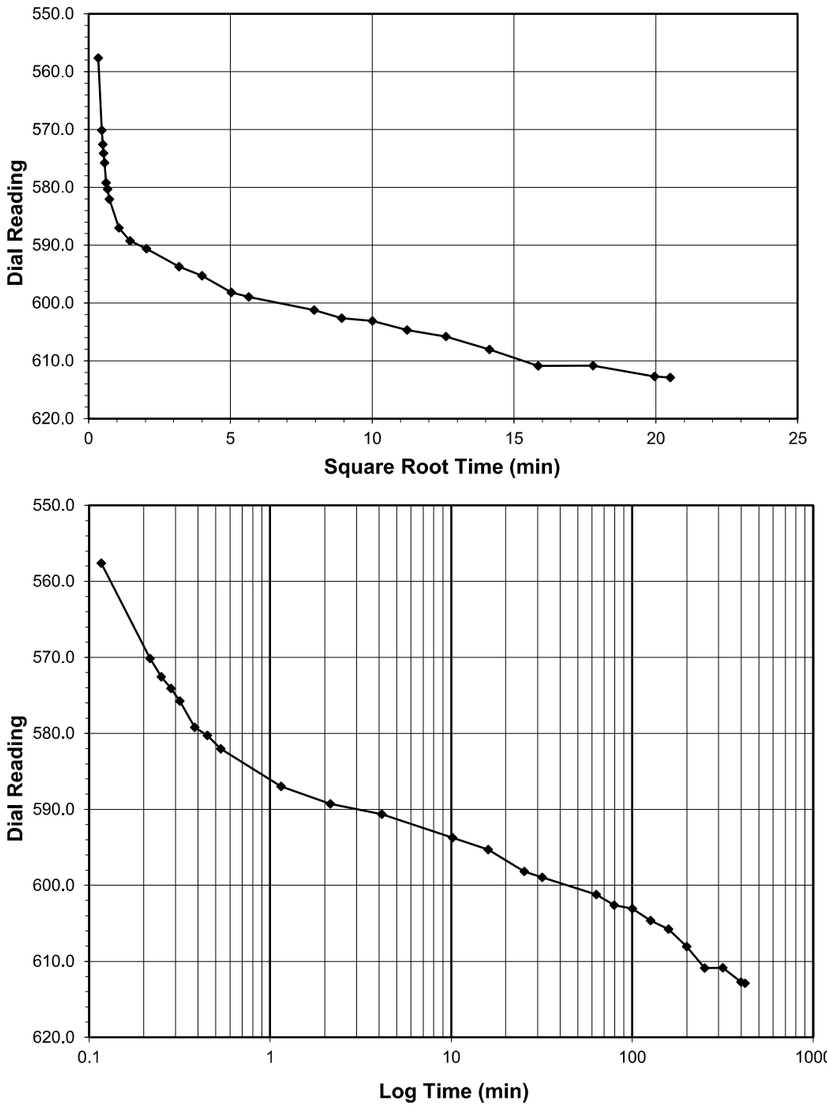
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**1 - 2**
Final Reading	**(div)**	**612.9**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/30/22
Start Time		15:37:13

Elapsed Time (min)	Dial Reading (div)
Initial	**420.8**
0.12	557.6
0.22	570.1
0.25	572.6
0.28	574.1
0.32	575.7
0.38	579.2
0.45	580.3
0.53	582.0
1.15	587.0
2.15	589.3
4.15	590.6
10.18	593.7
16.05	595.3
25.32	598.2
31.83	599.0
63.30	601.2
79.65	602.6
100.22	603.1
126.12	604.6
158.72	605.8
199.75	608.1
251.42	610.9
316.47	610.9
398.35	612.7
420.48	612.9

Tested By '29-07-041: Date 4/30/22 Checked By MPS Date 5/6/22

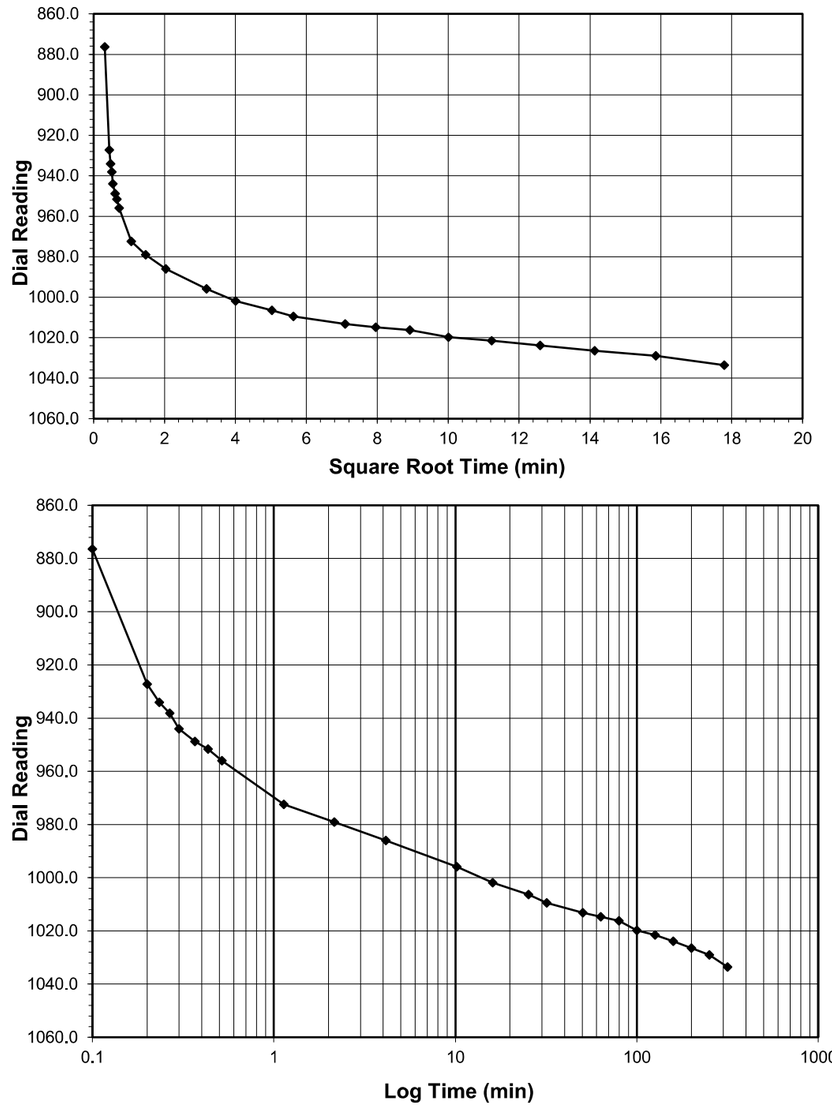
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**2 - 4**
Final Reading	**(div)**	**1033.5**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		4/30/22
Start Time		22:37:41

Elapsed Time (min)	Dial Reading (div)
Initial	**612.9**
0.10	876.4
0.20	927.3
0.23	934.1
0.27	938.1
0.30	944.0
0.37	948.8
0.43	951.6
0.52	955.9
1.13	972.5
2.15	979.1
4.15	986.0
10.18	995.9
16.05	1001.9
25.32	1006.4
31.83	1009.5
50.33	1013.2
63.32	1014.7
79.65	1016.2
100.23	1019.8
126.13	1021.5
158.73	1023.9
199.77	1026.4
251.43	1029.0
316.48	1033.5

Tested By '29-07-041: Date 4/30/22 Checked By MPS Date 5/6/22

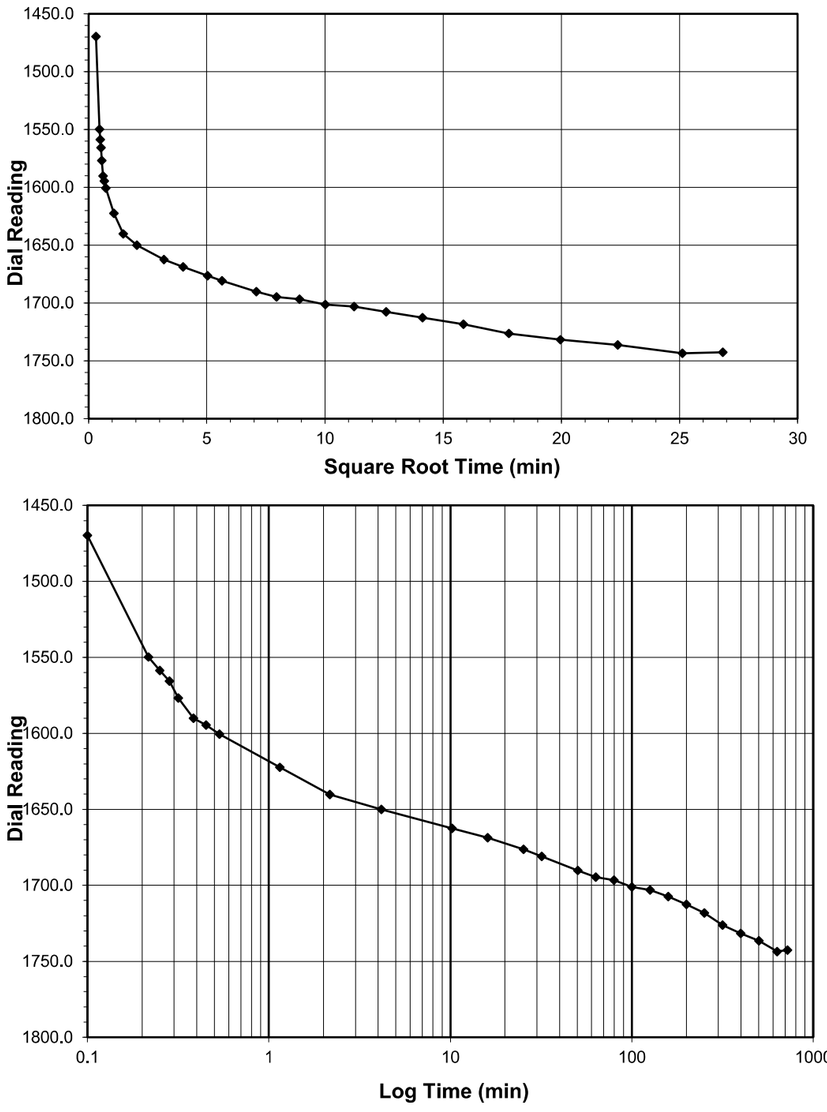
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**4 - 8**
Final Reading	**(div)**	**1742.6**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		5/1/22
Start Time		5:38:00

Elapsed Time (min)	Dial Reading (div)
Initial	**1033.5**
0.10	1469.7
0.22	1549.8
0.25	1558.6
0.28	1565.7
0.32	1576.8
0.38	1590.1
0.45	1594.6
0.53	1600.5
1.15	1622.4
2.17	1640.3
4.17	1650.1
10.20	1662.4
16.05	1668.7
25.33	1676.4
31.85	1680.9
50.35	1690.2
63.33	1694.7
79.67	1696.7
100.25	1701.2
126.15	1703.1
158.75	1707.5
199.78	1712.5
251.45	1718.2
316.50	1726.2
398.38	1731.7
501.47	1736.4
631.23	1743.5
720.22	1742.6

Tested By '29-07-041' Date 5/1/22 Checked By MPS Date 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2 GeoJac-16tsf.xlt

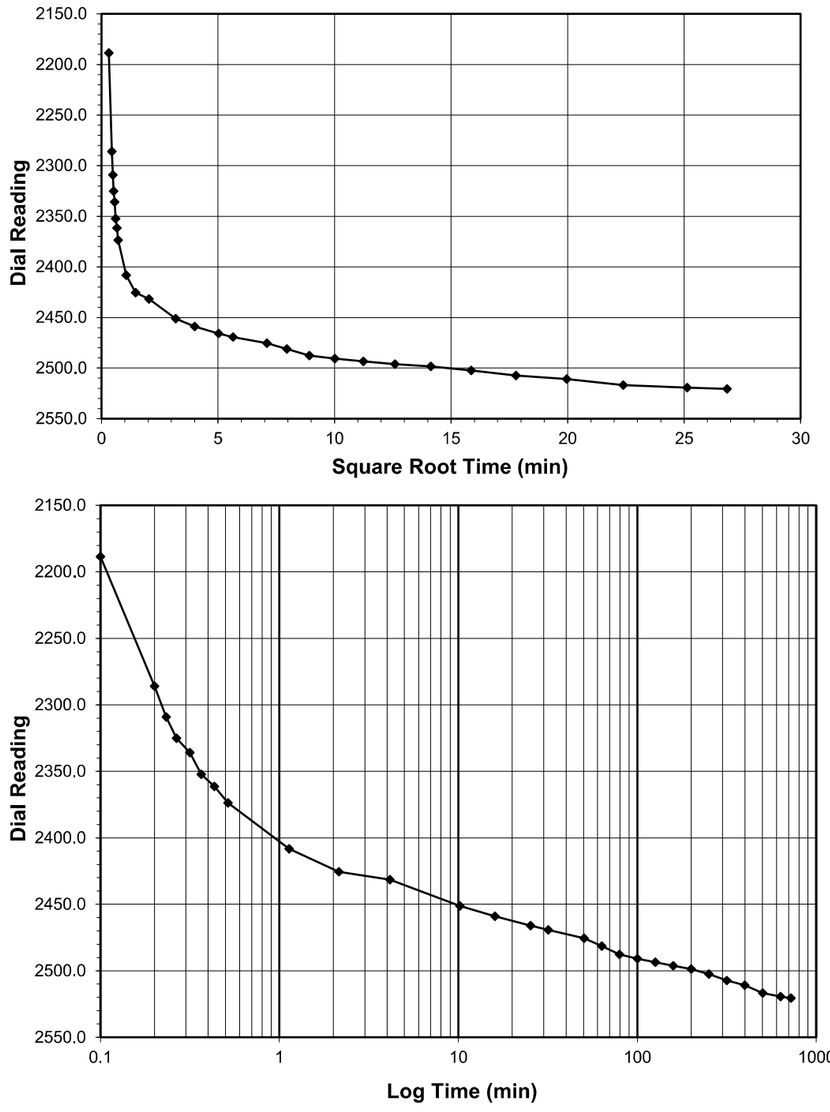
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**8 - 16**
Final Reading	**(div)**	**2520.6**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		5/1/22
Start Time		17:38:13

Elapsed Time (min)	Dial Reading (div)
Initial	**1742.6**
0.10	2188.6
0.20	2285.9
0.23	2309.2
0.27	2325.1
0.32	2335.8
0.37	2352.4
0.43	2361.4
0.52	2373.7
1.13	2408.3
2.15	2425.5
4.15	2431.6
10.18	2451.2
16.05	2458.9
25.32	2465.9
31.83	2469.3
50.33	2475.5
63.32	2481.3
79.67	2487.6
100.23	2490.8
126.13	2493.4
158.73	2496.2
199.78	2498.5
251.45	2502.4
316.48	2507.3
398.37	2510.9
501.45	2516.8
631.23	2519.4
720.37	2520.6

Tested By '29-07-041' Date 5/1/22 Checked By MPS Date 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2 GeoJac-16tsf.xlt

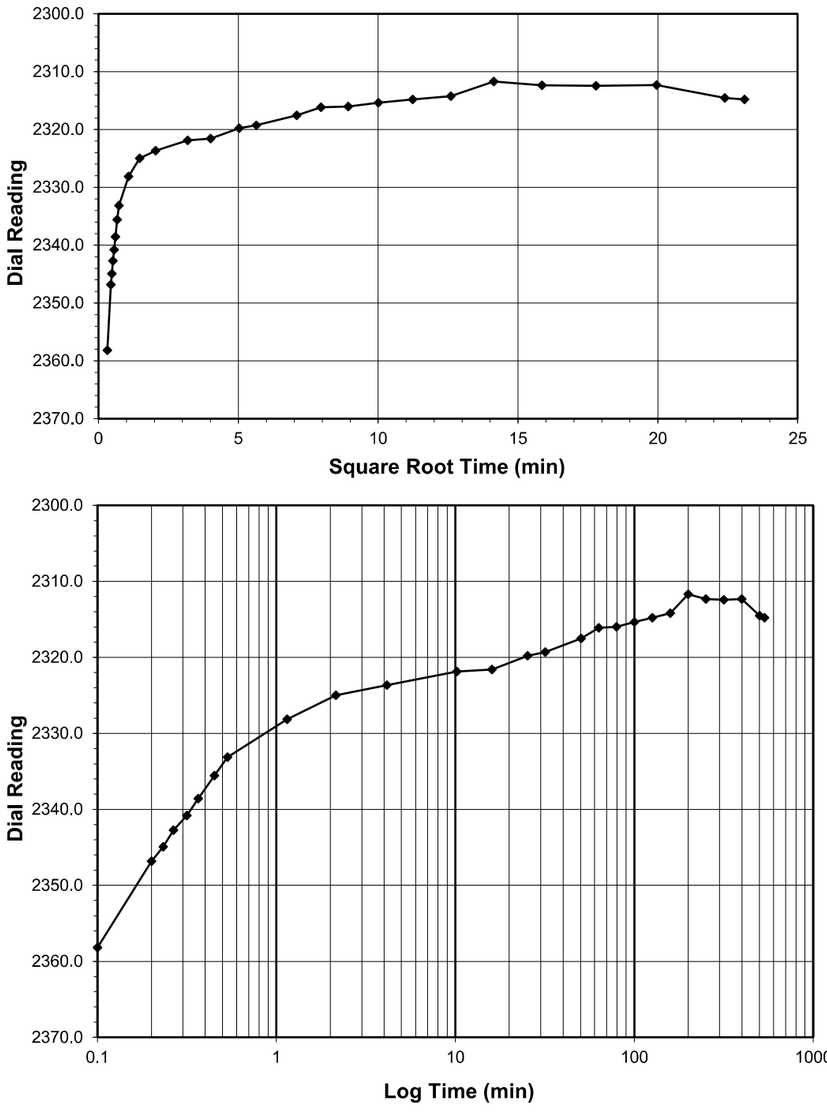
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**16 - 4**
Final Reading	**(div)**	**2314.8**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		5/2/22
Start Time		5:38:36

Elapsed Time (min)	Dial Reading (div)
Initial	**2520.6**
0.10	2358.2
0.20	2346.8
0.23	2344.9
0.27	2342.7
0.32	2340.8
0.37	2338.6
0.45	2335.6
0.53	2333.1
1.15	2328.1
2.15	2325.0
4.15	2323.7
10.18	2321.9
16.05	2321.6
25.32	2319.8
31.83	2319.3
50.33	2317.5
63.32	2316.1
79.65	2316.0
100.23	2315.4
126.13	2314.8
158.73	2314.2
199.77	2311.7
251.43	2312.3
316.48	2312.4
398.37	2312.3
501.45	2314.5
533.77	2314.8

Tested By '29-07-041' Date 5/2/22 Checked By MPS Date 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2

GeoJac-16tsf.xlt

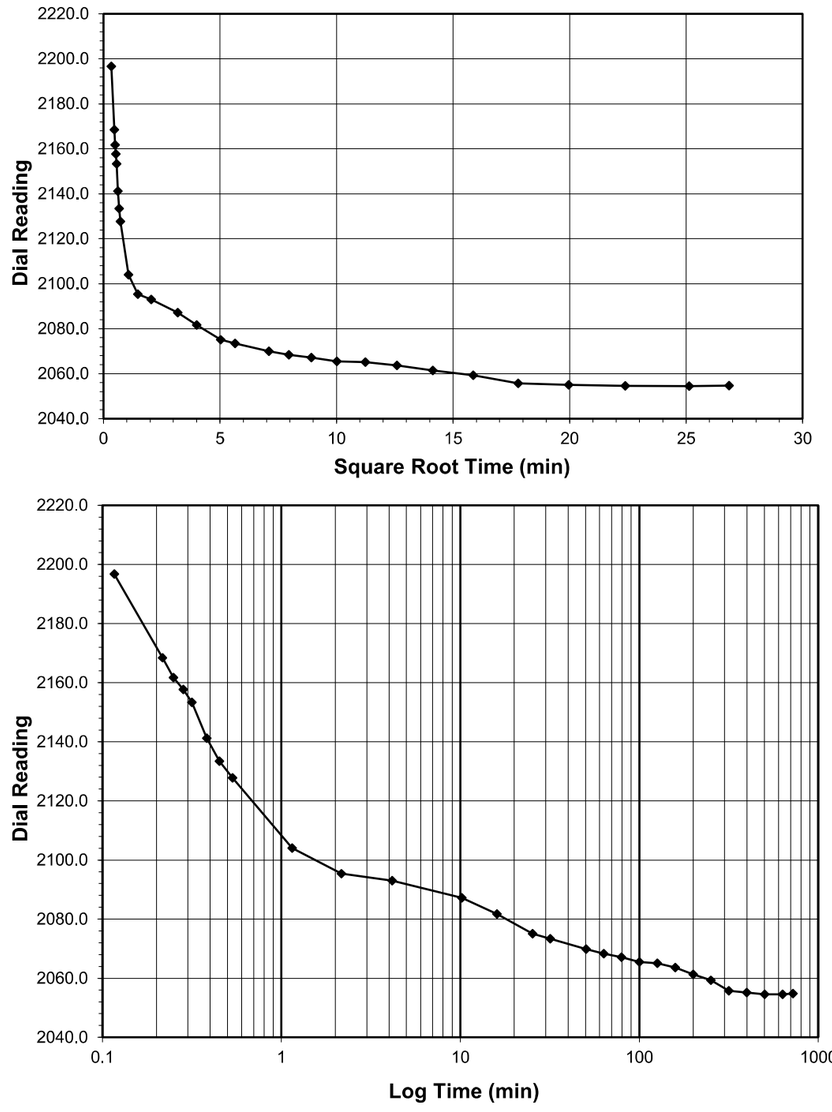
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

AASHTO T-216

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**4 - 1**
Final Reading	**(div)**	**2054.7**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		5/2/22
Start Time		14:32:23

Elapsed Time (min)	Dial Reading (div)
Initial	**2314.8**
0.12	2196.7
0.22	2168.5
0.25	2161.7
0.28	2157.7
0.32	2153.3
0.38	2141.3
0.45	2133.5
0.53	2127.7
1.15	2104.0
2.17	2095.4
4.17	2093.0
10.20	2087.1
16.05	2081.8
25.33	2075.1
31.83	2073.4
50.35	2069.9
63.33	2068.3
79.67	2067.2
100.25	2065.5
126.15	2065.1
158.75	2063.6
199.78	2061.4
251.45	2059.3
316.50	2055.7
398.38	2055.1
501.47	2054.5
631.23	2054.5
720.35	2054.7

Tested By '29-07-041' Date 5/2/22 Checked By MPS Date 5/6/22

DCN: CT-24E Date: 8/15/12 Revision: 2

GeoJac-16tsf.xlt

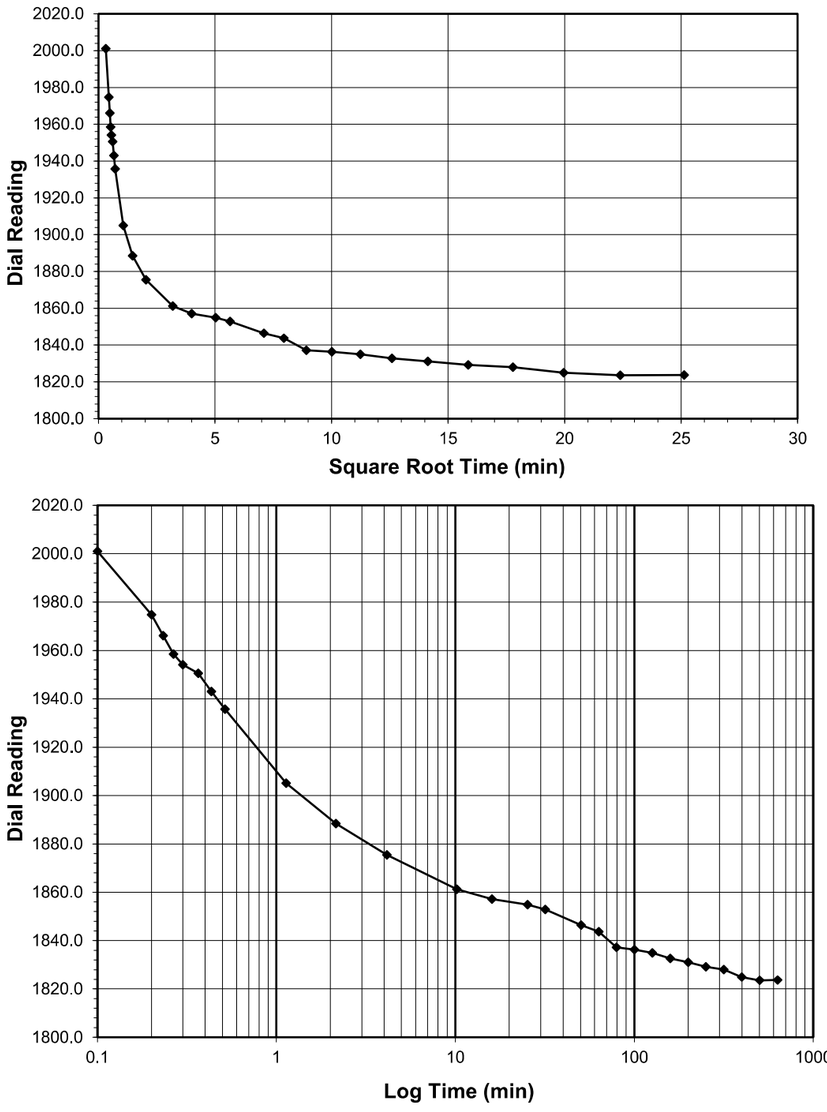
2200 Westinghouse Blvd., Suite 103 • Raleigh, NC 27604 • Phone (919) 876-0405 • Fax (919) 876-0460 • www.geotechnics.net

ONE DIMENSIONAL CONSOLIDATION

ASTM D 2435-96 (SOP-S24A)

Client:	Kleinfelder	Boring No.:	EB1-B
Client Project:	BR-0097	Depth (ft):	21.0-23.0
Project No.:	R-2022-091-002	Sample No.:	ST-1
Lab ID:	R-2022-091-002-001	Visual Description:	Orange Elastic Silt

Sample Conditions: Undisturbed, Inundated, Double Drained



Test Load	**(tsf)**	**1 - 0.25**
Final Reading	**(div)**	**1823.7**
Consolidometer No.		**R-409**
1 Division	(in)	0.0001
Start Date		5/3/22
Start Time		2:32:43

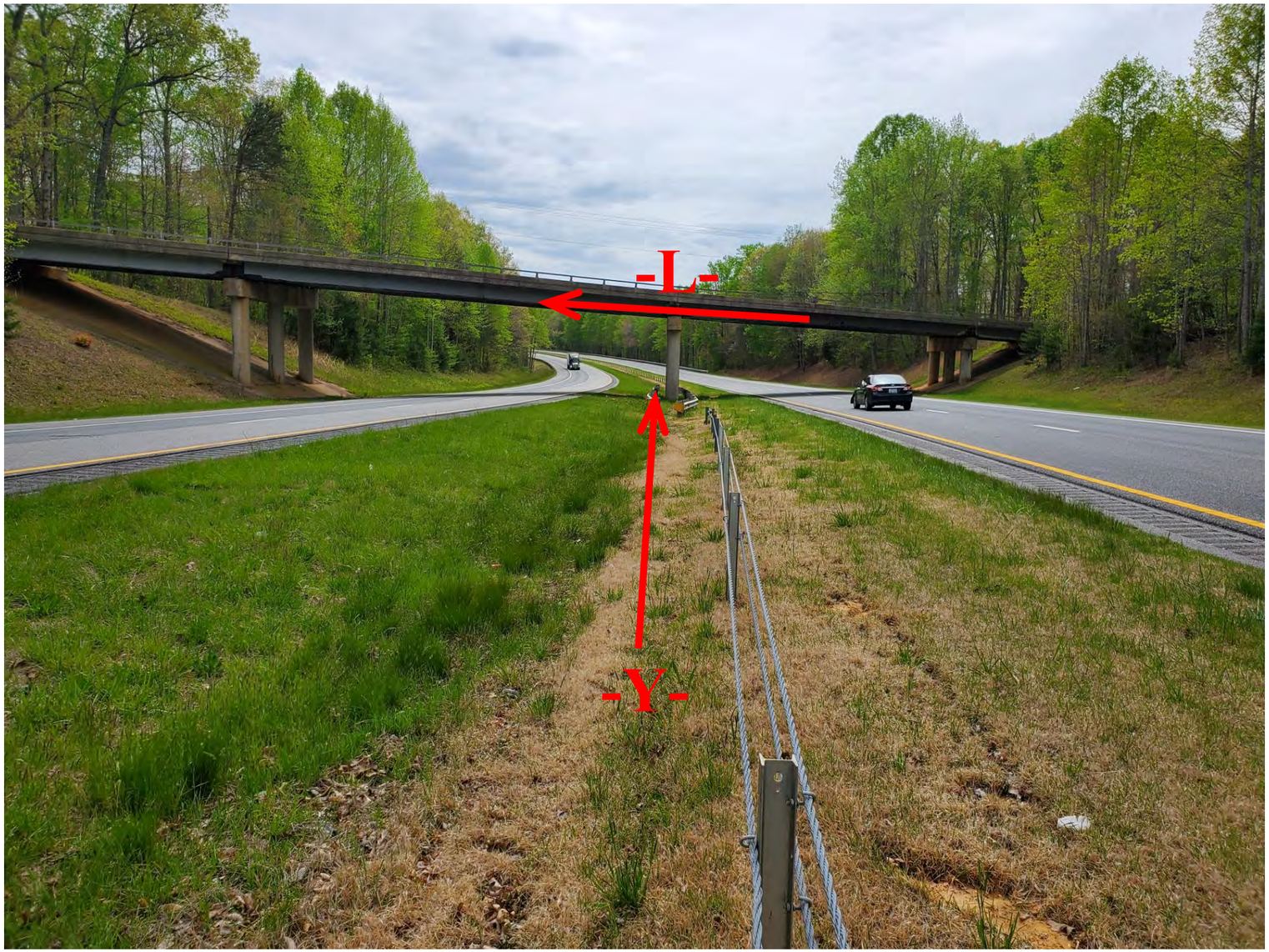
Elapsed Time (min)	Dial Reading (div)
Initial	**2054.7**
0.10	2001.0
0.20	1974.8
0.23	1966.2
0.27	1958.5
0.30	1954.1
0.37	1950.6
0.43	1943.0
0.52	1935.7
1.13	1905.0
2.15	1888.4
4.15	1875.5
10.18	1861.2
16.05	1857.1
25.32	1854.9
31.83	1852.9
50.33	1846.4
63.32	1843.7
79.65	1837.2
100.23	1836.3
126.12	1834.9
158.72	1832.7
199.77	1831.0
251.43	1829.2
316.48	1828.0
398.35	1824.9
501.43	1823.6
631.22	1823.7

Tested By '29-07-041' Date 5/3/22 *Checked By MPS* *Date 5/6/22*

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

SITE PHOTOGRAPH

Bridge No. 178 on –L– (SR 1929) over US 29



Looking Southwest Towards Bent No. 1 at Bridge No. 178