REFERENCE: BR-0042

PROJECT: 67042

SEE SHEET 3 FOR PLAN SHEET LAYOUT AT TIME OF INVESTIGATION

CONTENTS

LINE	STATION	PLAN
-L-	11+54.68 - 29+04.98	4-5
-Y-	10+00.00 - 18+00.00	4-5
-Y1-	11+70.00 - 12+80.97	4
-Y2-	10+12.08 - 11+45.00	4
-Y3-	10+18.54 - 12+55.00	4
-Y4-	11+50.00 - 14+08.71	4

CROSS SECTIONS

LINE	STATION	SHEETS
-L-	12+50.00 - 28+50.00	6-15
-Y-	11+00.00 - 16+50.00	16-24
-Y1-	11+70.00 - 12+50.00	25
-Y2-	10+50.00 - 12+50.00	26-27
-Y3-	10+50.00 - 12+50.00	28
-Y4-	13+50.00	29

APPENDICES

APPENDIX	TITLE	SHEETS
A	LABORATORY RESULTS	30-43

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

ROADWAY SUBSURFACE INVESTIGATION

COUNTY *ROCKINGHAM COUNTY*

PROJECT DESCRIPTION *REPLACE BRIDGE NO. 116 ON SR 2600 OVER US 29*

INVENTORY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0042	1	45

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 EXPLORATIONS

INVESTIGATED BY *C. DRISCOLL*

DRAWN BY *T. WELLS*

CHECKED BY *T. WELLS*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *AUGUST 2019*

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
7345 WEST FRIENDLY AVE.
GREENSBORO, NC 27410
NC FIRM LICENSE NO. F-192

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells 8/27/2019
7DA5D2D05148F4B0...
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: N/A

ELEVATION: N/A FEET

NOTES:

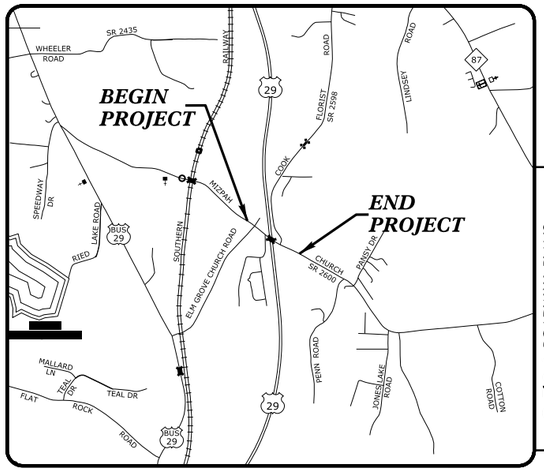
BORING ELEVATIONS OBTAINED FROM PROJECT TIN FILE BR0042.tin, RECEIVED ON MAY 3, 2019.

DATE: 8-15-14

09/08/99

TIP PROJECT: BR-0042

CONTRACT:



25% ROADWAY PLANS MARCH 20, 2019

VICINITY MAP

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

ROCKINGHAM COUNTY

LOCATION: SR 2600 (MIZPAH CHURCH RD) OVER US-29

TYPE OF WORK: GRADING, DRAINAGE, PAVING, AND STRUCTURES

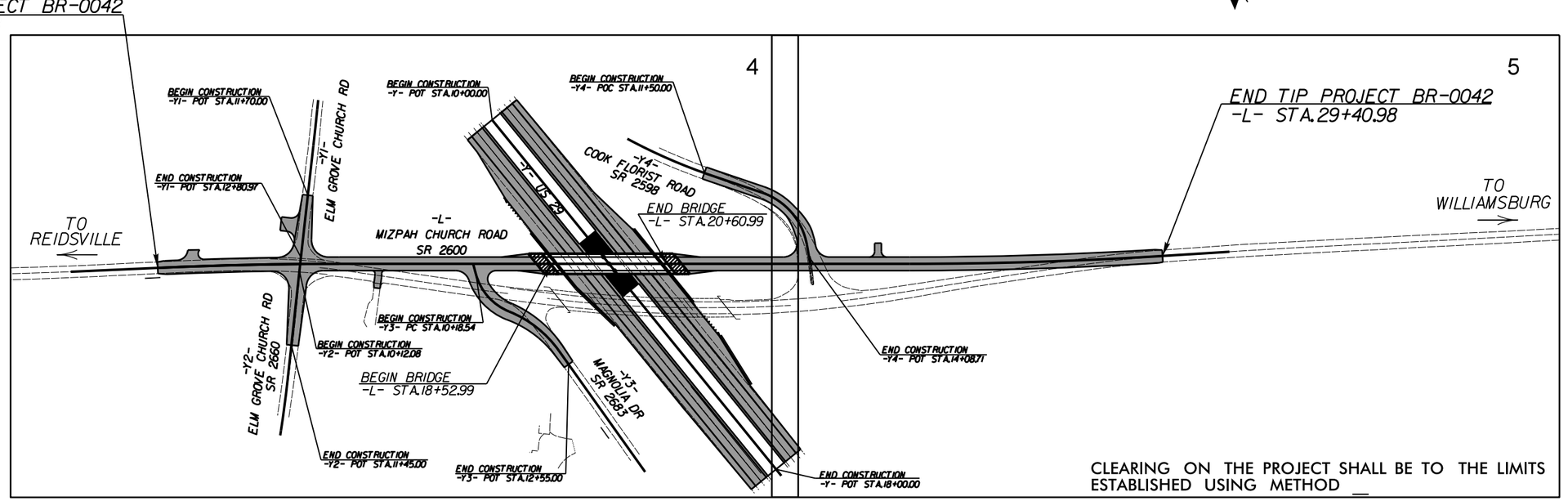
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	BR-0042	3	45

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
67042.1.1		PE

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83 NA 2011



CLEARING ON THE PROJECT SHALL BE TO THE LIMITS ESTABLISHED USING METHOD __

THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARIES

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

ADT 2020 = 1,530
ADT 2040 = 1,700
K = 8 %
D = 60 %
T = 4 %
V = 50 MPH
*(TTST= 1%+ DUAL 3%)
FUNC CLASS= MINOR COLLECTOR
SUB-REGIONAL TIER

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT BR-0042 = 0.299 MI
LENGTH STRUCTURE TIP PROJECT BR-0042 = 0.039 MI
TOTAL LENGTH TIP PROJECT BR-0042 = 0.338 MI

AECOM
NC FIRM LICENSE No: F-0342
701 Corporate Center Drive, Suite 475
Raleigh, NC 27607
(919) 854-6200 - (919) 854-6259(FAX)

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE: MAY 21, 2019

LETTING DATE: MAY 21, 2020

NEIL J. DEAN, P.E. — *PROJECT ENGINEER*

RADHA ATTALURI, P.E. — *PROJECT DESIGN ENGINEER*

TIERRE PETERSON, P.E. — *NCDOT PROJECT MANAGER*

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

27-AUG-2019 09:22
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TWells AT KA2I387

August 20, 2019

STATE PROJECT: 67042.1.1 (BR-0042)
COUNTY: Rockingham
DESCRIPTION: Replace Bridge No. 116 on SR 2600 over US 29

SUBJECT: GEOTECHNICAL REPORT - INVENTORY

PROJECT DESCRIPTION

This project consists of a realignment of existing SR 2600 (-L-) and replacement of Bridge No. 116 over US 29. Retaining walls will be constructed at each end bent for Bridge No. 116. This project will also include a widening of US 29 (-Y-), Elm Grove Church Road (-Y1-, -Y2-), Magnolia Drive (-Y3-), and Cook Florist Road (-Y4-).

The geotechnical investigation was conducted between May and June 2019. Standard Penetration Test borings were advanced with a CME-55 drill rig with an automatic hammer. Hand Augers were also performed in areas where the use of a drill rig was restricted due to underground and overhead utility conflicts. Representative soil samples were collected for visual classification in the field and selected samples were submitted for laboratory analysis by Geotechnics, Inc.

The following alignments, totaling 0.63 miles, were investigated. Plan sheets and cross sections of these alignments are included in this report.

LINE	STATIONS
-L-	11+55 to 29+41
-Y-	10+00 to 18+00
-Y1-	11+70 to 12+81
-Y2-	10+12 to 11+45
-Y3-	10+18 to 12+55
-Y4-	11+50 to 14+09

PHYSIOGRAPHY AND GEOLOGY

The project is located in the Piedmont Physiographic Province. The project corridor is comprised primarily of residential properties, agricultural fields, and undeveloped wooded areas. The general topography along the project is generally flat to gently sloping.

Geologically, the project is located within the Milton Belt. Soils are derived from the underlying metamorphic bedrock primarily consisting of biotite gneiss.

Surface water is drained from the corridor by the existing roadway ditches.

7343 West Friendly Avenue | Suite B, Greensboro, NC 27409 p| 336.668.0093 f| 336.668.3868

SOIL PROPERTIES

Soils encountered during this investigation are separated into two categories based on origin. They consist of roadway embankment and residual soils.

Roadway Embankment soils are present along the existing roadways on the project. The roadway embankment encountered generally consist of dry to moist, loose, gravels and moist, medium stiff to stiff, coarse to fine sandy silts and clayey silts (A-4, A-5) with trace gravel and moist, medium stiff, highly plastic, coarse to fine sandy, silty clays (A-7). The plasticity index of the roadway embankment clays tested is 27.

Residual soils are derived from the weathering of underlying biotite gneiss. The majority of the residual soils encountered consist of dry to moist, medium stiff to hard, sandy silts (A-4), moist, medium stiff to very stiff, slightly plastic, sandy, clayey silts (A-5), dry to moist, soft to very stiff, slightly to highly plastic, sandy, silty clays (A-7),and dry to moist, loose to very dense, silty sands (A-2-4) with variable amounts of mica. The plasticity index of the residual silt tested was 9. The plasticity index of the residual clays tested ranged from 12 to 48.

ROCK PROPERTIES

Weathered rock was encountered along the existing roadways (-L-, -Y-) at elevations ranging from 697.8 to 724.5 feet (MSL). Crystalline bedrock was encountered along the existing roadways (-L-) at elevations ranging from 697.6 to 710.7 feet (MSL). The weathered rock and crystalline bedrock consists of biotite gneiss.

GROUNDWATER

Groundwater was encountered at elevations ranging from 724.6 to 732.5 feet and typically ranges from 14.5 to 29.9 feet below the existing ground surface.

AREAS OF SPECIAL GEOTECHNICAL INTEREST

1) Highly Plastic Clays: Highly plastic clays (PI > 25) were encountered on the project at the following locations:

LINE	STATIONS	OFFSETS
-L-	23+75 to 25+75	LT, RT
-Y-	14+25 to 15+75	RT
-Y1-	11+85 to 12+25	LT, RT
-Y2-	10+75 to 11+25	LT, RT
-Y3-	10+75 to 12+25	LT

A discussion of these highly plastic clay soils is located in the section titled “Soil Properties.”

Prepared by,
KLEINFELDER, INC.
NC License No. F-1312

Daniel H. Kubinski, PE
Staff Professional

Thomas R. Wells, PE
Senior Professional

DHK/TRW

Bulk Sample
Shelby Tube

Sample No.	Alignment	STA.	Offset	Depth (ft)	Tests Performed
ST-1	-L-	18+77	7’ RT	5.0 – 7.0	Consolidation
BS-1	-Y-	14+81	142’ RT	8.5 – 18.5	Standard Proctor, CBR

20190942.017A
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PROJECT REFERENCE NO.	SHEET NO.
BR-0042	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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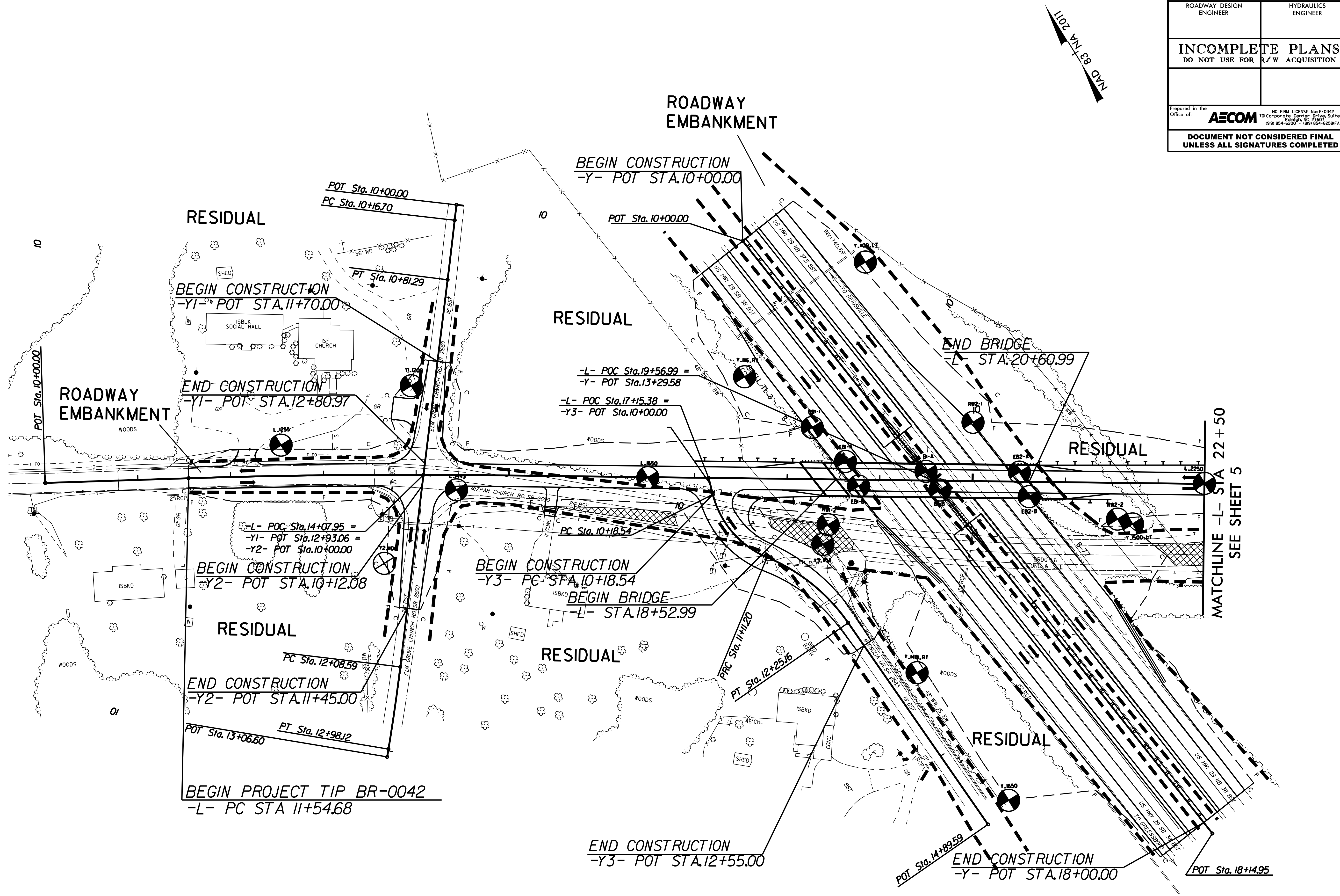

NAD 83 NA 2011
ROADWAY EMBANKMENT
BEGIN CONSTRUCTION -Y- POT STA.10+00.00
POT Sta. 10+00.00
PC Sta. 10+16.70
PT Sta. 10+81.29
RESIDUAL
BEGIN CONSTRUCTION -Y1- POT STA.11+70.00
END CONSTRUCTION -Y1- POT STA.12+80.97
ROADWAY EMBANKMENT
POT Sta. 10+00.00
END BRIDGE -L- STA.20+60.99
-L- POC Sta.19+56.99 = -Y- POT Sta.13+29.58
-L- POC Sta.17+15.38 = -Y3- POT Sta.10+00.00
MATCHLINE -L- STA 22+50 SEE SHEET 5
-L- POC Sta.14+07.95 = -Y1- POT Sta.12+93.06 = -Y2- POT Sta.10+00.00
BEGIN CONSTRUCTION -Y2- POT STA.10+12.08
BEGIN CONSTRUCTION -Y3- PC STA.10+18.54
PC Sta. 10+18.54
BEGIN BRIDGE -L- STA.18+52.99
PRC Sta. 11+11.20
PT Sta. 12+25.16
PC Sta. 12+08.59
END CONSTRUCTION -Y2- POT STA.11+45.00
PT Sta. 12+98.12
POT Sta. 13+06.60
BEGIN PROJECT TIP BR-0042 -L- PC STA 11+54.68
END CONSTRUCTION -Y3- POT STA.12+55.00
POT Sta. 14+89.59
END CONSTRUCTION -Y- POT STA.18+00.00
POT Sta. 18+14.95
ISBLK SOCIAL HALL
ISF CHURCH
SHED
ISBKD
WOODS
MIZPAH CHURCH RD. SR 2600
ELM GROVE CHURCH RD. SR 2660
US HWY 29 NB
US HWY 29 SB
TO REIDSVILLE
TO GREENSBORO

PROJECT REFERENCE NO.	SHEET NO.
BR-0042	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
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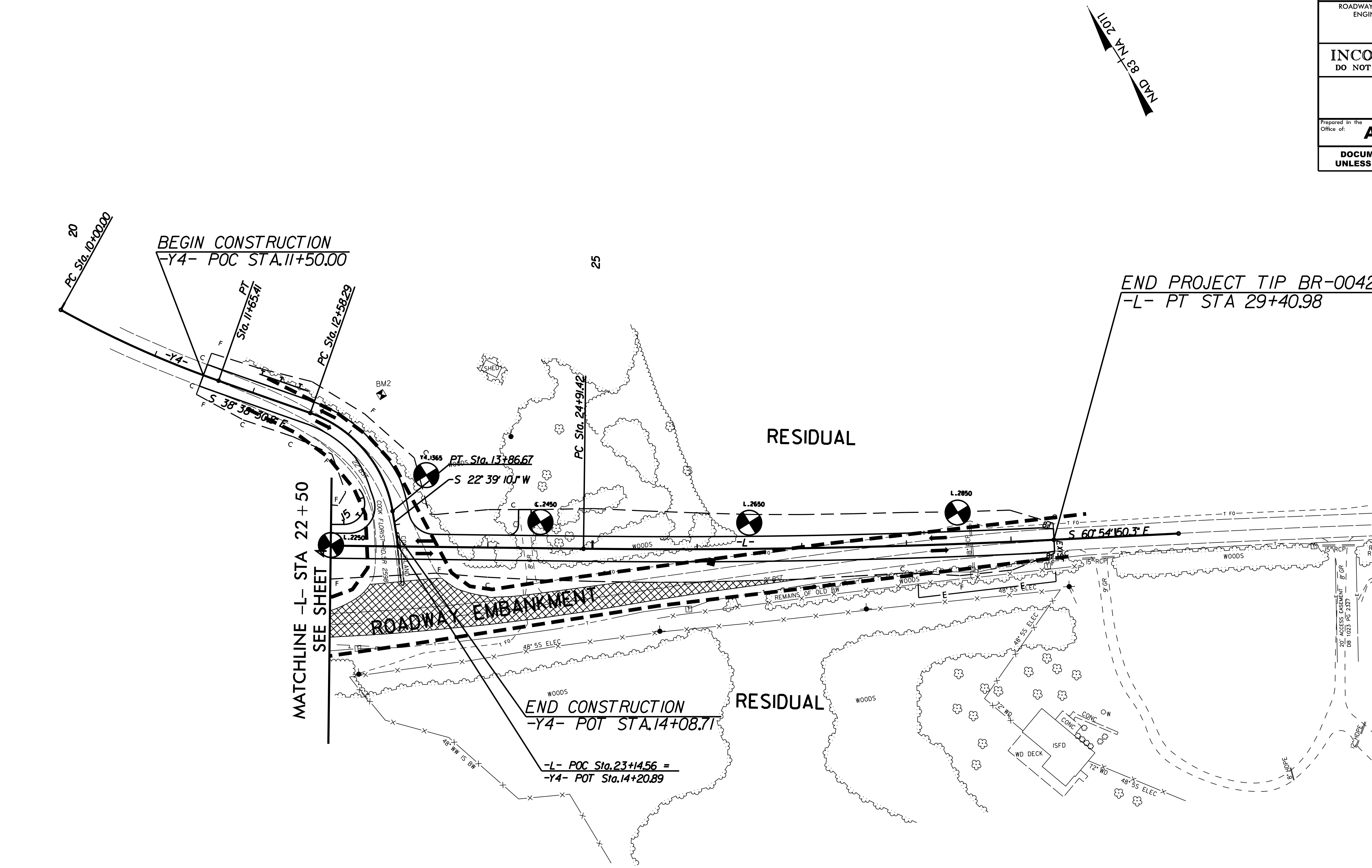

REVISIONS

5/14/99

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	6

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740 730 720 710 700 690 680 670 660 650

L_1255
12+55

Ⓐ **RESIDUAL:** DRY, LOOSE, BROWN, SILTY COARSE TO FINE SAND (A_2-4)

Ⓐ 2:1 4:1 4:1

Ⓑ 24 11 7

RESIDUAL: MOIST, VERY STIFF TO MEDIUM STIFF, RED TO BROWN, SILTY CLAY (A-7) TO COARSE TO FINE SANDY SILT (A-4)

BT
DRY
05/19

12 + 50.00

—L—

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	7

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650

Ⓐ **ROADWAY EMBANKMENT:** GRAVEL

Ⓑ **RESIDUAL:** MOIST, STIFF, HIGHLY PLASTIC, RED, SILTY CLAY (A-7)

L_1443
14+43

4:1 4:1 2:1

Ⓐ Ⓑ

9 16 12

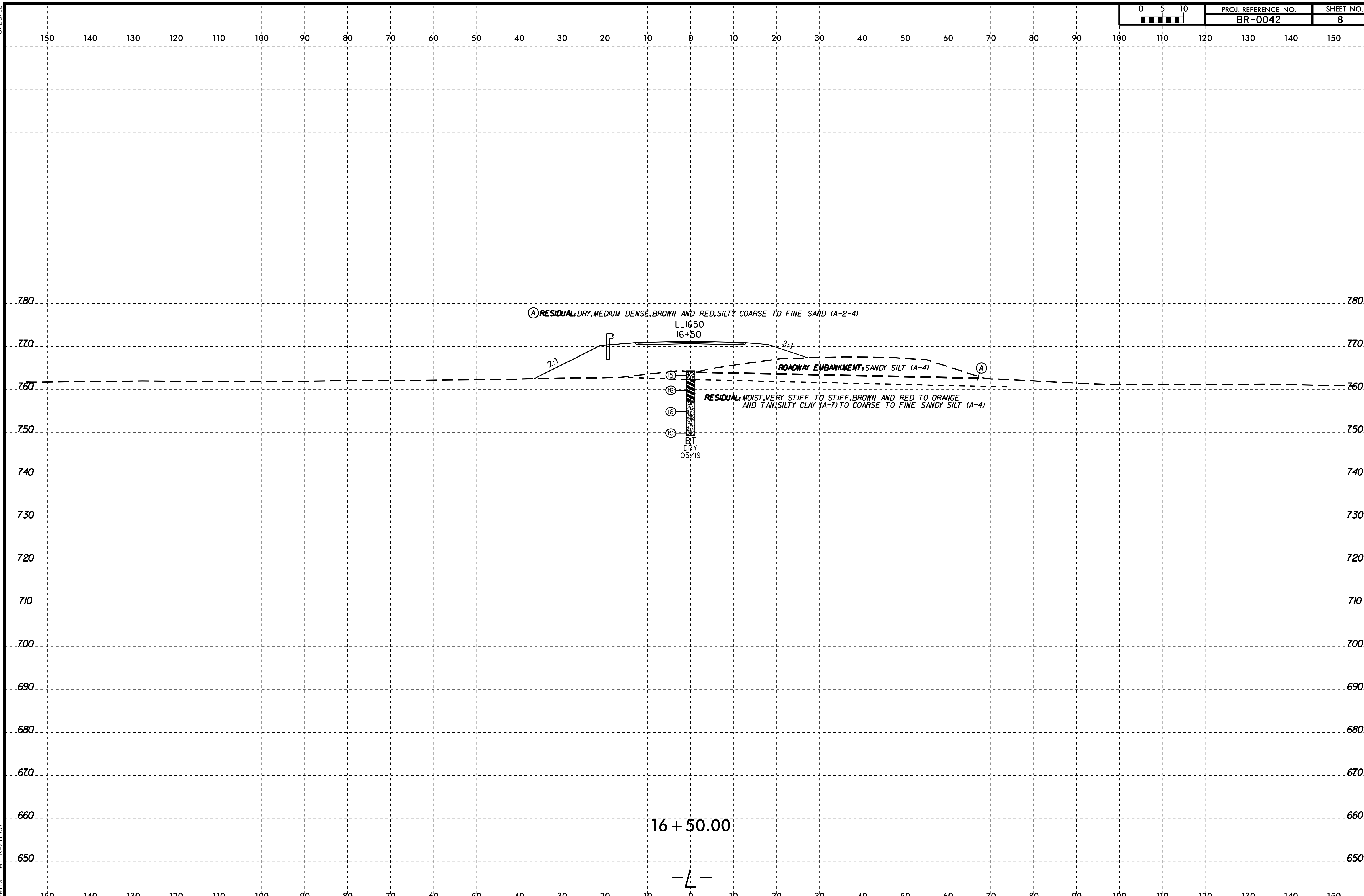
BT
DRY
05/19

RESIDUAL: MOIST, VERY STIFF TO STIFF, ORANGE, RED, AND WHITE, COARSE TO FINE SANDY SILT, (A-4)

14+50.00

—L—

PROJ. REFERENCE NO.	SHEET NO.
BR-0042	8



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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	9

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640

(A) **ROADWAY EMBANKMENT:** MOIST, MEDIUM STIFF, HIGHLY PLASIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7)

2:1

2:1

ASPHALT

Y3_1153
18+39

6
4
12
7

BT
DRY
05/19

EBI-A
18+62

6
5
8
5
9
12
13
14
20
36
50
100/0.7
100/0.8
100/0.3

05/19

BT

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

WEATHERED ROCK: BROWN, WHITE, AND BLACK BIOTITE GNEISS

18+50.00

—L—

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	10

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740 730 720 710 700

2:1

2:1

RW2-2
21+56

5 7 8 8 10 11 10 8 15 17 72

06/19

BT

RESIDUAL: DRY TO MOIST, MEDIUM STIFF TO STIFF, BROWN AND GRAY TO ORANGE AND TAN, FINE SANDY SILT AND COARSE TO FINE SANDY SILT (A-4) TO CLAYEY SILT (A-5) WITH LITTLE MICA AND TRACE MANGANESE.

MOIST, BLACK, WHITE, AND TAN, MEDIUM DENSE TO VERY DENSE SILTY COARSE TO FINE SAND (A-2-4)

21+50.00

—L—

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	11

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780
770
760
750
740
730

Ⓐ **RESIDUAL:** DRY, LOOSE TO MEDIUM DENSE, BROWN, SILTY FINE SAND (A-2-4) WITH LITTLE MICA

2:1

2:1

Y_1500_LT
21+73

6
10
Ⓐ
9
10
8
14
13

BT
DRY
06/19

RESIDUAL: MOIST, STIFF, BROWN, GRAY, AND ORANGE, FINE SANDY SILT (A-4) WITH LITTLE TO HIGHLY MICA

22+00.00

-L-

780
770
760
750
740
730

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	12

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)
Ⓑ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7-5)

2:1 4:1 Ⓐ 4:1 2:1 Ⓑ

RESIDUAL: MOIST, STIFF, TAN AND RED, COARSE TO FINE SANDY SILT (A-4)

25+00.00

SS-1
L_2450
24+50

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)
Ⓑ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7-5)

2:1 (2) (7) 4:1 Ⓐ Ⓑ 4:1 2:1

(9) (9)

RESIDUAL: MOIST, STIFF, TAN AND RED, COARSE TO FINE SANDY SILT (A-4)

BT
DRY
05/19

24+50.00

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)
Ⓑ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7-5)

2:1 4:1 Ⓐ Ⓑ 4:1 2:1

RESIDUAL: MOIST, STIFF, TAN AND RED, COARSE TO FINE SANDY SILT (A-4)

24+00.00

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)
Ⓑ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7-5)

Ⓐ 2:1 4:1 Ⓑ 3:1

RESIDUAL: MOIST, STIFF, TAN AND RED, COARSE TO FINE SANDY SILT (A-4)

23+50.00

—L—

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	13

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 790 780 770 760 750

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, BROWN AND RED, SILTY COARSE TO FINE SAND (A-2-4)

2:1 Ⓐ 4:1 4:1 2:1

RESIDUAL: MOIST, VERY STIFF TO STIFF, RED TO TAN, COARSE TO FINE SANDY SILTY CLAY (A-7-5) AND COARSE TO FINE SANDY SILT (A-4)

26+00.00

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

Ⓑ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY SILTY CLAY (A-7-5)

2:1 Ⓐ 4:1 4:1 2:1 Ⓑ

RESIDUAL: MOIST, STIFF, TAN AND RED, COARSE TO FINE SANDY SILT (A-4)

25+50.00

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	14

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740 730 720 710 700 690 680 670 660 650

Ⓐ **RESIDUAL:** DRY, MEDIUM DENSE, BROWN AND RED, SILTY COARSE TO FINE SAND (A-2-4)

SS-2
L 2650
26+50

2
12
18
6
8

4:1 4:1

RESIDUAL: MOIST, VERY STIFF TO STIFF, RED TO TAN, COARSE TO FINE SANDY SILTY CLAY (A-7-5) AND COARSE TO FINE SANDY SILT (A-4)

BT
DRY
05/19

26+50.00

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	15

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

770 760 750 740 730 720 710 700 690 680 670 660 650 640

SS-3
L_2850
28+50

(A) **RESIDUAL:** MOIST, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

ROADWAY EMBANKMENT

2:1 4:1 VAR.

(A)
19
20
11
6

MOIST, VERY STIFF TO MEDIUM STIFF, RED TO BROWN AND TAN, COARSE TO FINE SANDY, SILTY CLAY (A-7-5) TO SILT (A-4)

BT
DRY
05/19

28+50.00

—L—

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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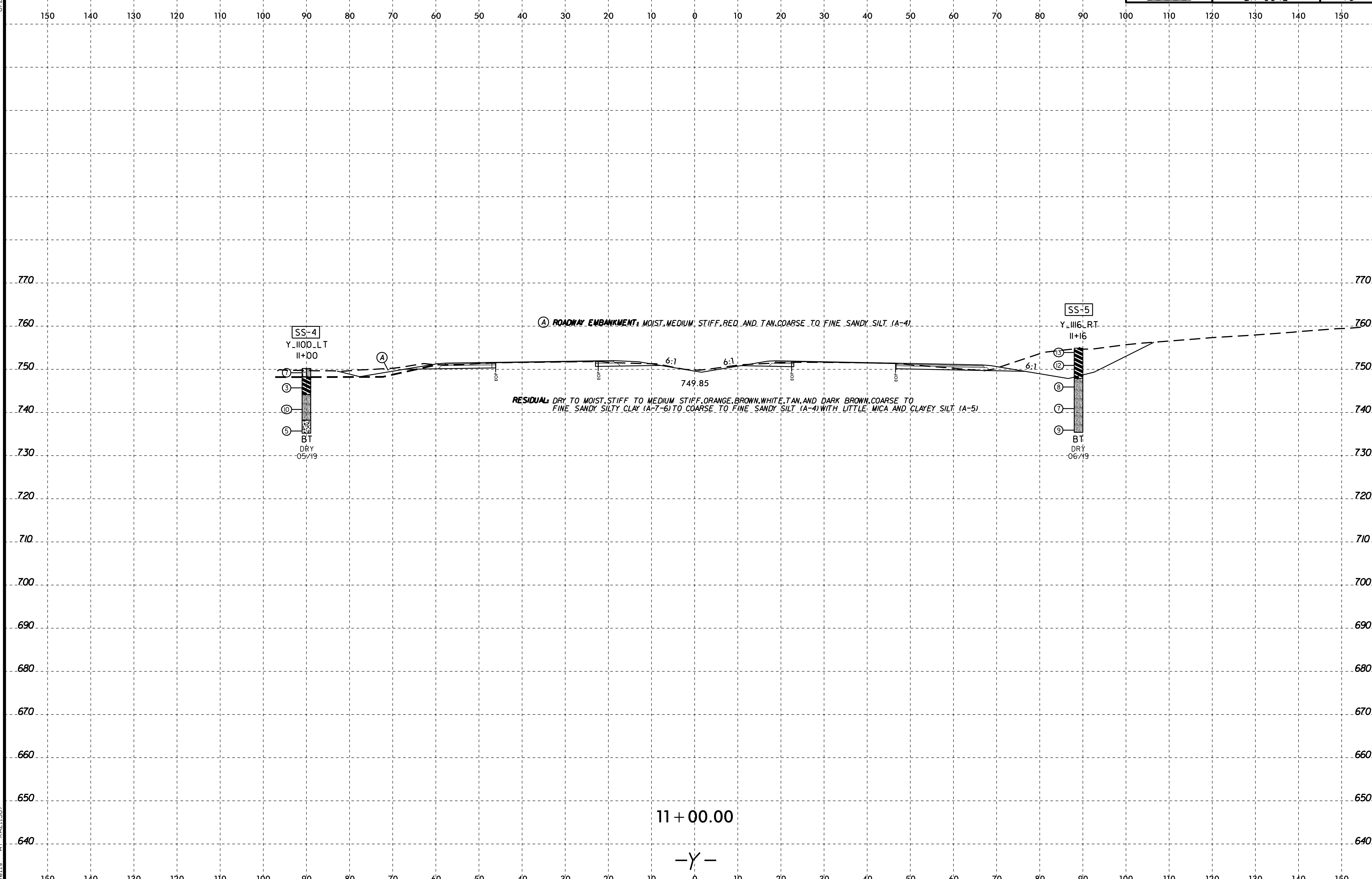

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TWells AT KA211387

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	17

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

770 760 750 740 730 720 710 700 690 680 670 660 650 640

6:1 6:1

749.06

EOP EOP EOP EOP

RWI-1
12+04

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

7 4 5 8 5 6 9 9 12 18

BT
DRY
06/19

12+00.00

-Y-

19-AUG-2019 18:07
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6/23/16

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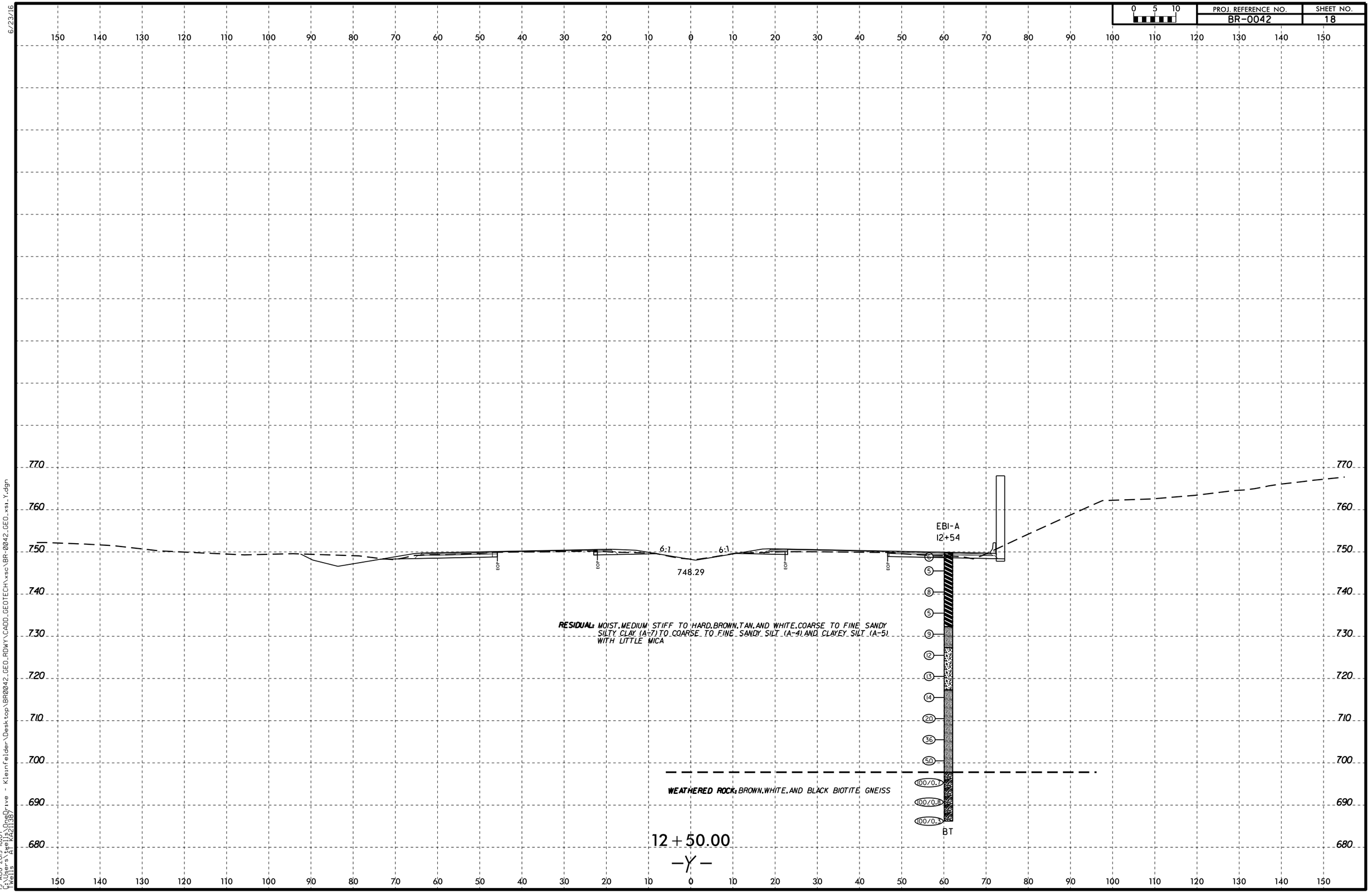
	BR-0042	18



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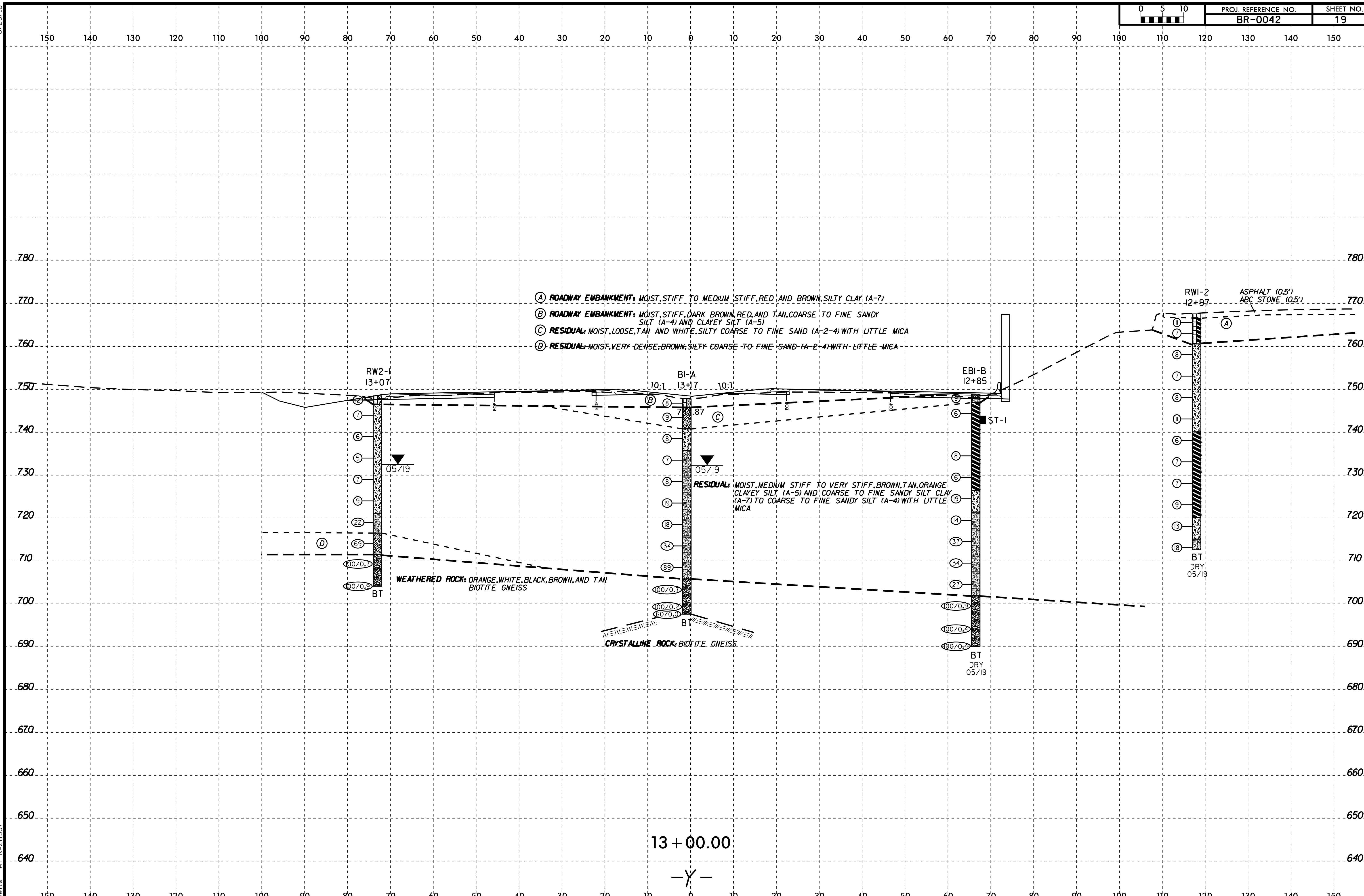
tyell
AT KA21387


(A) ROADWAY EMBANKMENT: MOIST, STIFF TO MEDIUM STIFF, RED AND BROWN, SILTY CLAY (A-7)
(B) ROADWAY EMBANKMENT: MOIST, STIFF, DARK BROWN, RED, AND TAN, COARSE TO FINE SANDY SILT (A-4) AND CLAYEY SILT (A-5)
(C) RESIDUAL: MOIST, LOOSE, TAN AND WHITE, SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE MICA
(D) RESIDUAL: MOIST, VERY DENSE, BROWN, SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE MICA
RW2-1
13+07
BI-A
13+17
EBI-B
12+85
RWI-2
12+97
ASPHALT (0.5')
ABC STONE (0.5')
10:1
ST-1
05/19
RESIDUAL: MOIST, MEDIUM STIFF TO VERY STIFF, BROWN, TAN, ORANGE CLAYEY SILT (A-5) AND COARSE TO FINE SANDY SILT CLAY (A-7) TO COARSE TO FINE SANDY SILT (A-4) WITH LITTLE MICA
WEATHERED ROCK: ORANGE, WHITE, BLACK, BROWN, AND TAN BIOTITE GNEISS
CRYSTALLINE ROCK: BIOTITE GNEISS
BT
DRY
05/19
13+00.00
-Y-

19-AUG-2019 18:07
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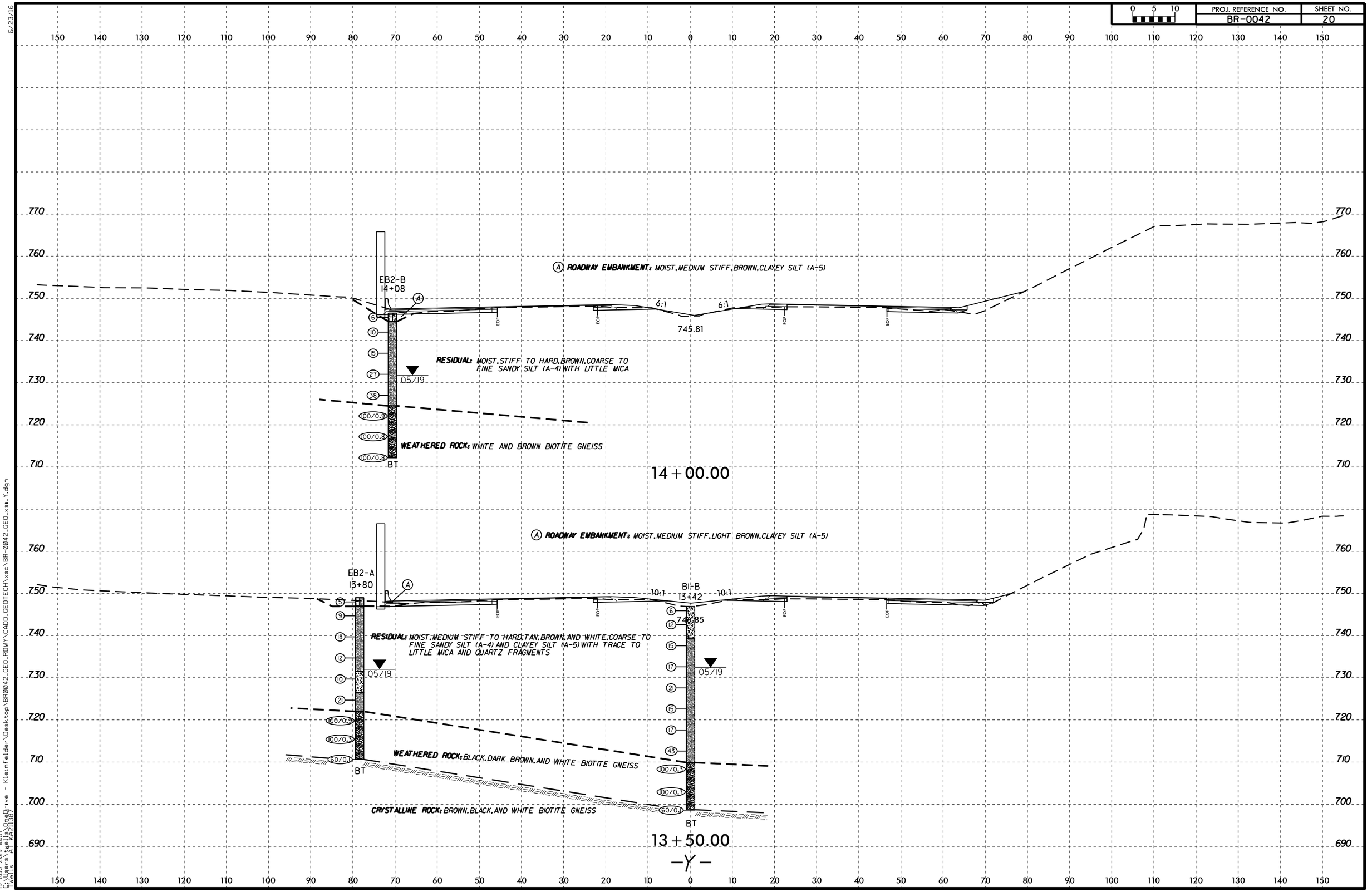

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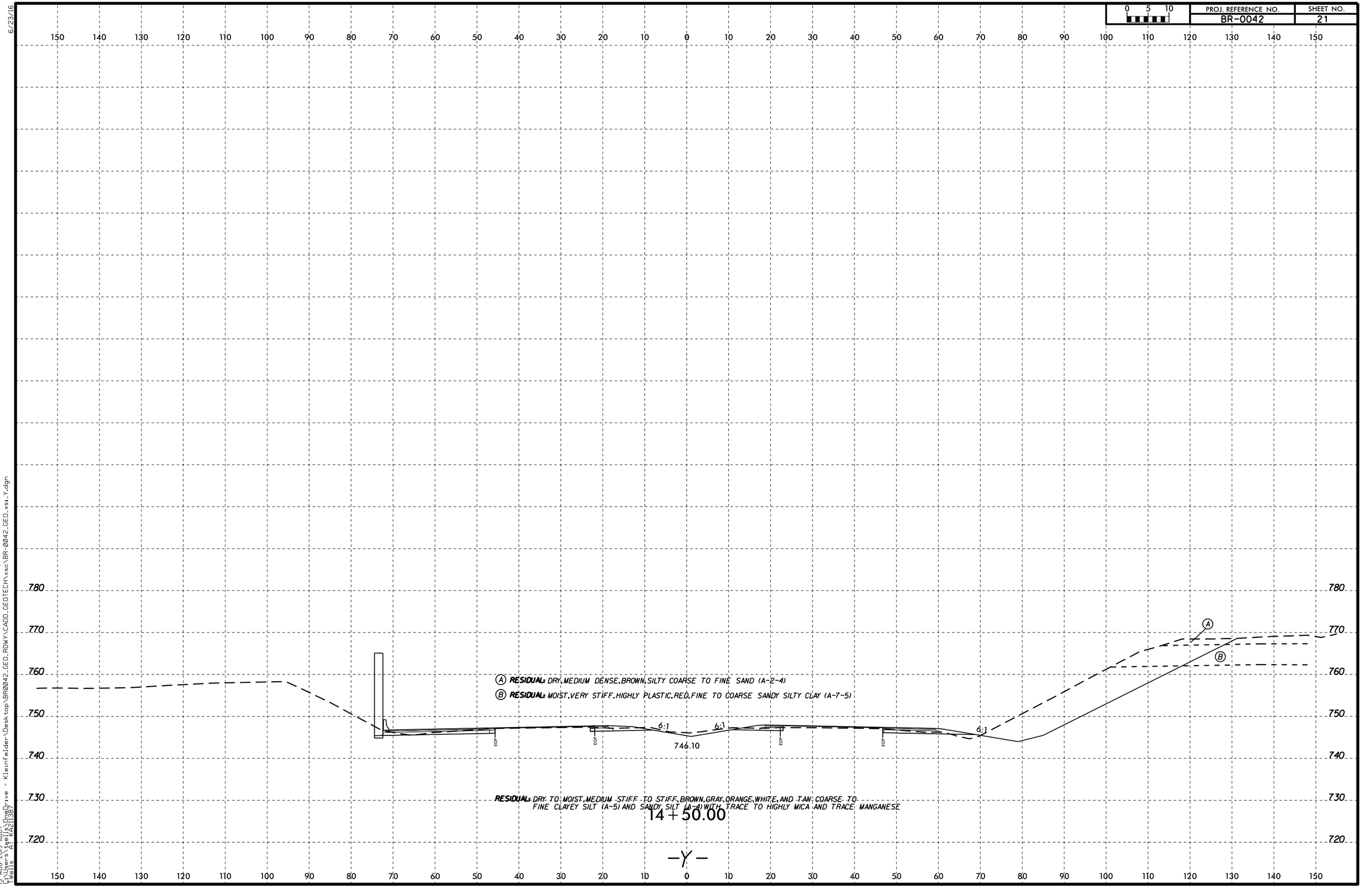

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0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	22

Y-1500_LT
15+00

RW2-2
14+86

BS-1
SS-6
Y-1481_RT
14+81

(A) **ROADWAY EMBANKMENT:** SILTY SAND (A-2-4)

(B) **RESIDUAL:** DRY, LOOSE TO VERY DENSE, BROWN, WHITE, AND TAN, SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE MICA

(C) **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, FINE TO COARSE SANDY SILTY CLAY (A-7-5)

6:1 6:1 6:1

744.89

EOP EOP EOP

RESIDUAL: DRY TO MOIST, MEDIUM STIFF TO STIFF, BROWN, GRAY, ORANGE, WHITE, AND TAN COARSE TO FINE CLAYEY SILT (A-5) AND SANDY SILT (A-4) WITH TRACE TO HIGHLY MICA AND TRACE MANGANESE

BT
DRY
05/19

06/19

BT

BT
DRY
05/19

15+00.00
-Y-

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

6/23/16

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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740 730

Ⓐ **ROADWAY EMBANKMENT:** DRY, MEDIUM STIFF, ORANGE, FINE SANDY SILT WITH TRACE GRAVEL

Ⓑ **RESIDUAL:** MOIST, LOOSE TO MEDIUM DENSE, ORANGE, WHITE, AND TAN, SILTY COARSE TO FINE SAND WITH LITTLE MICA

6:1 6:1

EOP EOP EOP EOP

743.51

RESIDUAL: MOIST, SOFT TO STIFF, ORANGE, WHITE, PINK, GRAY AND TAN COARSE TO FINE SANDY, SILTY CLAY TO COARSE TO FINE SANDY SILT WITH TRACE TO HIGHLY MICA

16+00.00

Ⓐ **ROADWAY EMBANKMENT:** SILTY SAND (A-2-4)

Ⓑ **RESIDUAL:** DRY, MEDIUM DENSE TO VERY DENSE, BROWN, WHITE, AND TAN, SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE MICA

Ⓒ **RESIDUAL:** MOIST, VERY STIFF, HIGHLY PLASTIC, RED, FINE TO COARSE, SANDY SILTY CLAY (A-7-5)

6:1 6:1

EOP EOP EOP EOP

744.05

RESIDUAL: DRY TO MOIST, MEDIUM STIFF TO STIFF, BROWN, GRAY, ORANGE, WHITE, AND TAN COARSE TO FINE CLAYEY SILT (A-5) AND SANDY SILT (A-4) WITH TRACE TO HIGHLY MICA AND TRACE MANGANESE

15+50.00

−Y−

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	24

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640

Ⓐ **ROADWAY EMBANKMENT:** DRY, MEDIUM STIFF, ORANGE, FINE SANDY SILT (A-4) WITH TRACE GRAVEL

Ⓑ **RESIDUAL:** MOIST, LOOSE TO MEDIUM DENSE, ORANGE, WHITE, AND TAN, SILTY COARSE TO FINE SAND (A-2-4) WITH LITTLE MICA

6:1 6:1 6:1 6:1 6:1

EOP EOP EOP EOP

742.71

RESIDUAL: MOIST, SOFT TO STIFF, ORANGE, WHITE, PINK, GRAY AND TAN COARSE TO FINE SANDY SILTY CLAY (A-7-5) TO COARSE TO FINE SANDY SILT (A-4) WITH TRACE TO HIGHLY MICA

SS-7
Y_1650
16+50

Ⓐ 6 3
Ⓑ 6 5 6 6 8 15 11 13

BT
DRY
05/19

16+50.00

–Y–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750

Ⓐ ROADWAY EMBANKMENT: GRAVEL

2:1 4:1 4:1 2:1

RESIDUAL: MOIST, VERY STIFF, HIGHLY PLASTIC, BROWN AND RED FINE TO COARSE SANDY SILTY CLAY (A-7-6)

MOIST, MEDIUM STIFF, RED, BROWN, AND WHITE, COARSE TO FINE SANDY SILT (A-4)

12+50.00

Ⓐ ROADWAY EMBANKMENT: GRAVEL

SS-8
YI_1200
12+00

2:1 4:1 4:1 2:1

16 17 7 6

RESIDUAL: MOIST, VERY STIFF, HIGHLY PLASTIC, BROWN AND RED FINE TO COARSE SANDY SILTY CLAY (A-7-6)

MOIST, MEDIUM STIFF, RED, BROWN, AND WHITE, COARSE TO FINE SANDY SILT (A-4)

BT
DRY
05/19

12+00.00

RESIDUAL: MOIST, VERY STIFF, HIGHLY PLASTIC, BROWN AND RED FINE TO COARSE SANDY SILTY CLAY (A-7-6)

MOIST, MEDIUM STIFF, RED, BROWN, AND WHITE, COARSE TO FINE SANDY SILT (A-4)

11+70.00
-Y/-

790 780 770 760 750

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	26

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740

Ⓐ **RESIDUAL:** MOIST, STIFF, HIGHLY PLASTIC, RED COARSE TO FINE SANDY SILTY CLAY (A-7-6)

6:1 4:1 2:1

Ⓐ

RESIDUAL: MOIST, WHITE AND TAN, COARSE TO FINE SANDY SILT (A-4)

10+50.00

-Y2-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	27

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 790 780 770 760 750 740 730 720 710 700 690 680 670 660 650

(A) **RESIDUAL:** MOIST, STIFF, HIGHLY PLASTIC, RED COARSE TO FINE SANDY SILTY CLAY (A-7-6)

RESIDUAL: MOIST, WHITE AND TAN, COARSE TO FINE SANDY SILT (A-4)

11+45.00

(A) **RESIDUAL:** MOIST, STIFF, HIGHLY PLASTIC, RED COARSE TO FINE SANDY SILTY CLAY (A-7-6)

S-9
Y2_1100
11+00

2:1 4:1 4:1 2:1

RESIDUAL: MOIST, WHITE AND TAN, COARSE TO FINE SANDY SILT (A-4)

BT
DRY
06/19

11+00.00

-Y2-

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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	28

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

790 780 770 760 750 740 730 720 710 700 690 680 670 660 650 640

Ⓐ **ROADWAY EMBANKMENT:** MOIST, MEDIUM STIFF, HIGHLY PLASTIC, RED, COARSE TO FINE SANDY, SILTY CLAY (A-7)

SS-10
Y3_1153
11+53

ASPHALT AND ABC STONE

2:1 4:1 4:1

RESIDUAL: MOIST, MEDIUM STIFF, HIGHLY PLASTIC, RED, SILTY CLAY (A-7-5)

MOIST, STIFF TO MEDIUM STIFF, ORANGE AND TAN, COARSE TO FINE SANDY SILT (A-4)

Ⓐ 6 4 12 7

BT
DRY
05/19

11+50.00

-Y3-

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	BR-0042	29

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

780 770 760 750 740 730 720 710 700 690 680 670 660 650

Y4_1365
13+65

Ⓐ **RESIDUAL:** MOIST, MEDIUM DENSE, TAN, SILTY COARSE TO FINE SAND (A-2-4)

Ⓐ 13 20 7 7

2:1 4:1 4:1

RESIDUAL: MOIST, VERY STIFF TO MEDIUM STIFF, TAN, RED, AND ORANGE, AND WHITE, COARSE TO FINE SANDY SILT (A-4)

BT
DRY
05/19

13+50.00

–Y4–

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

PROJECT REFERENCE NO.	SHEET NO.
BR–0042	30

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX A
LABORATORY RESULTS

REFERENCE: BR–0042

PROJECT: 67042

DS
JRW

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
7345 WEST FRIENDLY AVE.
GREENSBORO, NC 27410
NC FIRM LICENSE NO. F-132

LABORATORY SUMMARY SHEET FOR SOIL SAMPLES

PROJECT NO.: 67042.1.1 (BR-0042)
COUNTY: ROCKINGHAM
REPLACE BRIDGE NO. 116 ON SR 2600 over US 29

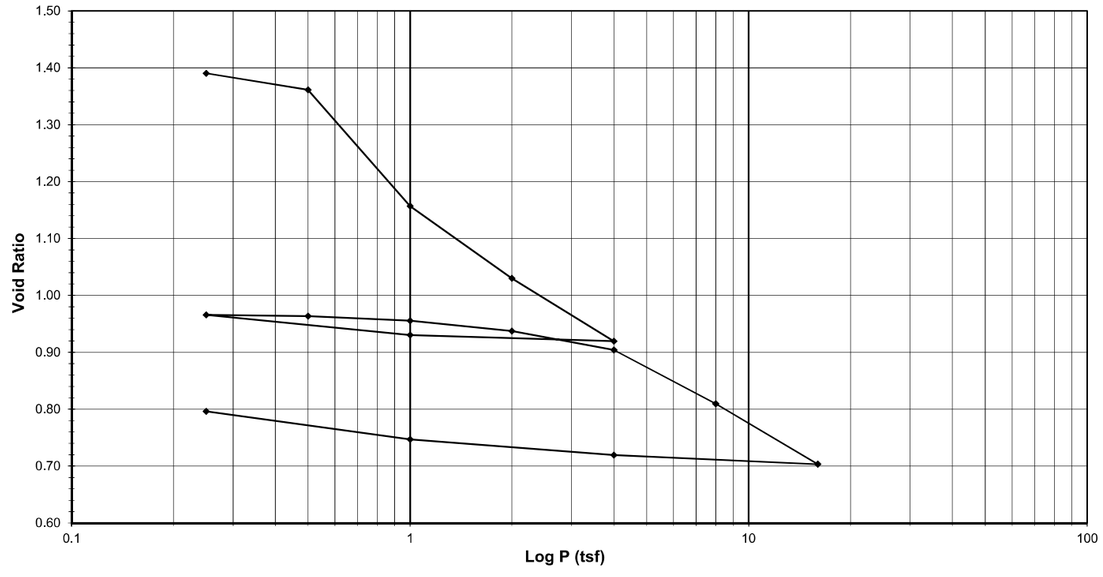
								Atterberg Limits			Gradation Results							
Sample No.	Boring Number	Alignment	Station	Offset	Sample Depth (ft.)	Natural Moisture Content (%)	AASHTO Class.	L.L.	P.L.	P.I.	Retained #4 Sieve	Pass #10 Sieve	Pass #40 Sieve	Pass #200 Sieve	Coarse Sand (%)	Fine Sand (%)	Silt (%)	Clay (%)
ST-1	EB1-B	-L-	18+77	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
SS-1	L_2450	-L-	24+50	25' LT	3.5 - 5.0	24.0	A-7-5	58	31	27	0.0	99.9	90.1	68.7	17.3	18.7	29.2	34.9
SS-2	L_2650	-L-	26+50	25' LT	3.5 - 5.0	27.2	A-7-5	55	32	23	0.0	100.0	89.6	70.2	16.0	18.4	20.4	45.2
SS-3	L_2850	-L-	28+50	30' LT	3.5 - 5.0	31.9	A-7-5	71	46	25	0.0	100.0	97.1	87.8	5.2	9.6	26.6	58.7
SS-4	Y_1100_LT	-Y-	11+00	90' LT	3.5 - 5.0	28.6	A-7-6	45	24	21	0.0	99.6	91.6	59.7	16.0	27.6	15.8	40.7
SS-5	Y_1116_RT	-Y-	11+16	89' RT	3.0 - 4.5	34.6	A-7-5	67	49	18	0.0	99.7	93.0	70.2	15.0	15.9	18.2	50.9
SS-6	Y_1481_RT	-Y-	14+81	142' RT	3.5 - 5.0	25.4	A-7-5	83	35	48	0.9	98.5	90.7	76.9	12.3	11.7	16.5	59.4
BS-1	Y_1481_RT	-Y-	14+81	142' RT	8.5 - 18.5	19.0	A-5	45	36	9	0.0	99.6	95.9	87.3	6.3	8.1	53.3	32.4
SS-7	Y_1650	-Y-	16+50	150' RT	3.5 - 5.0	20.7	A-7-5	62	38	24	0.0	99.9	93.2	67.8	12.5	23.4	17.6	46.5
SS-8	Y1_1200	-Y1-	12+00	25' RT	1.0 - 2.5	27.5	A-7-6	59	28	31	0.0	99.7	89.1	71.7	16.5	13.9	15.7	53.9
S-9	Y2_1100	-Y2-	11+00	30' RT	0.0 - 3.5	27.2	A-7-6	54	25	29	0.0	99.7	95.0	79.3	9.2	13.5	14.2	63.1
SS-10	Y3_1153	-Y3-	11+53	41' LT	1.0 - 2.5	28.8	A-7-5	63	36	27	0.0	99.3	92.2	73.3	12.8	16.9	22.1	48.3

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

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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

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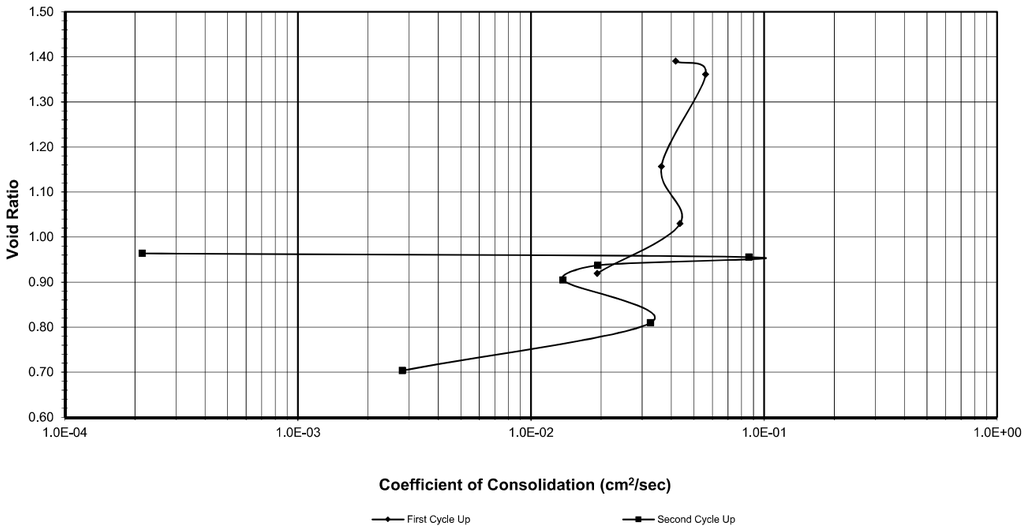
ONE DIMENSIONAL CONSOLIDATION

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*

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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
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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 (tsf)	Dial Reading @ t_{50} (div)	Machine Deflection (div)	Corrected Dial Reading @ t_{50} (div)	Sample Height @ t_{50} (cm)	Time t_{50} (min.)	C_v (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*

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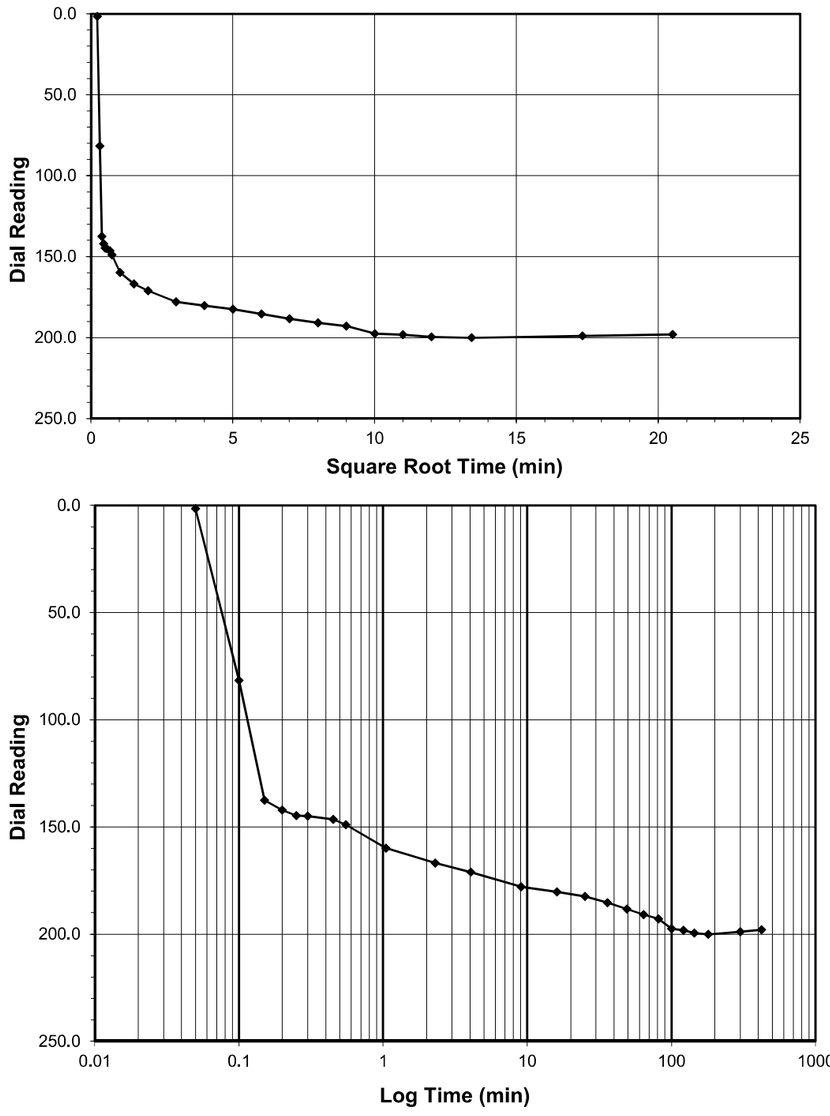
ONE DIMENSIONAL CONSOLIDATION

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

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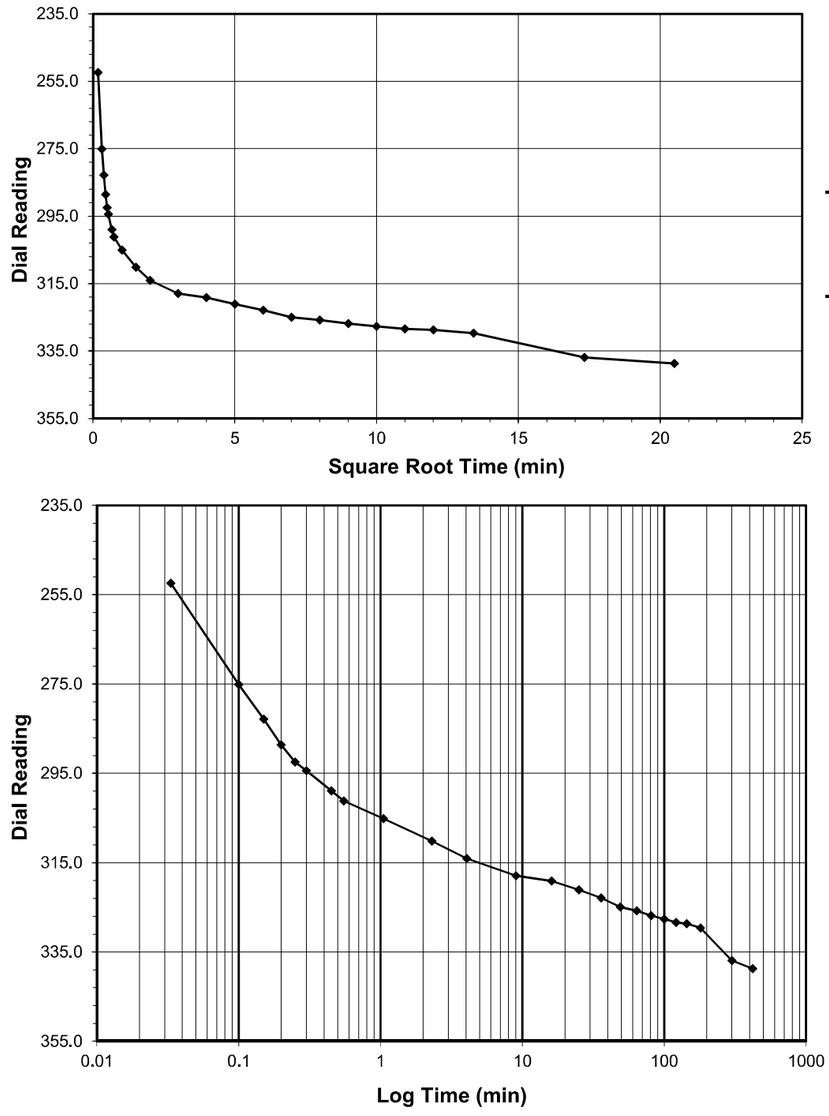
ONE DIMENSIONAL CONSOLIDATION

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

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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

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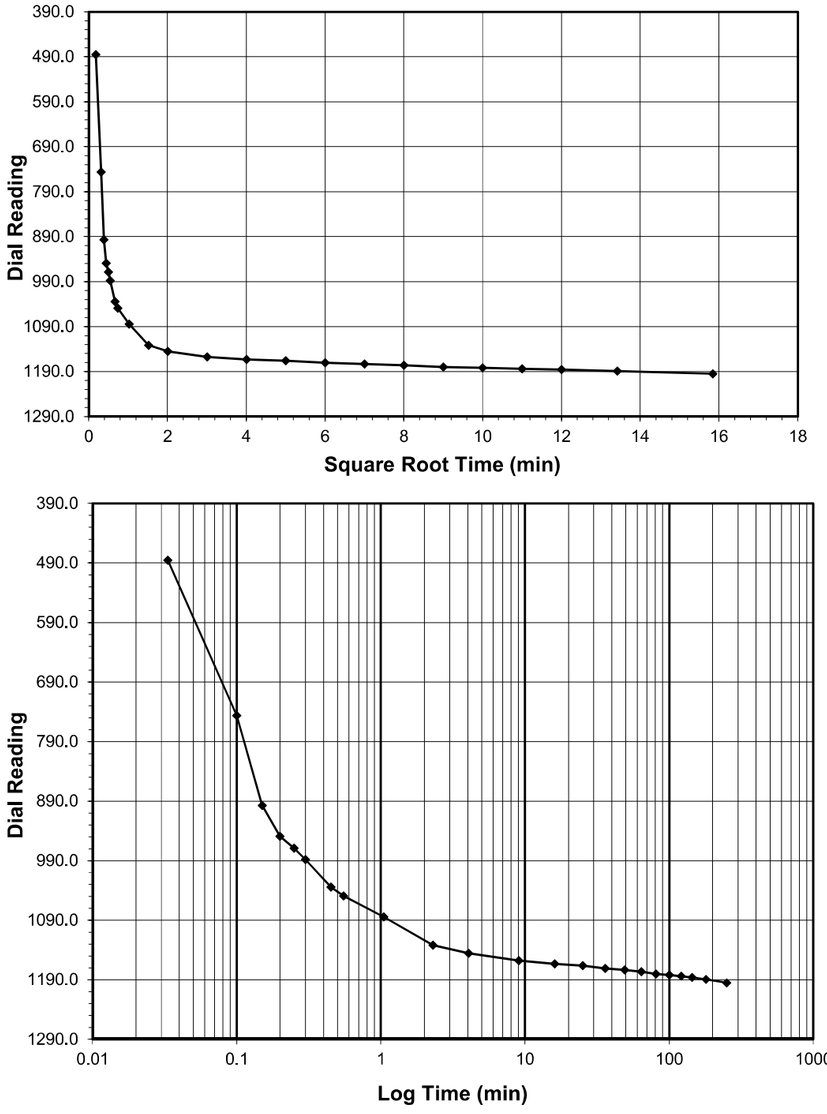
ONE DIMENSIONAL CONSOLIDATION

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

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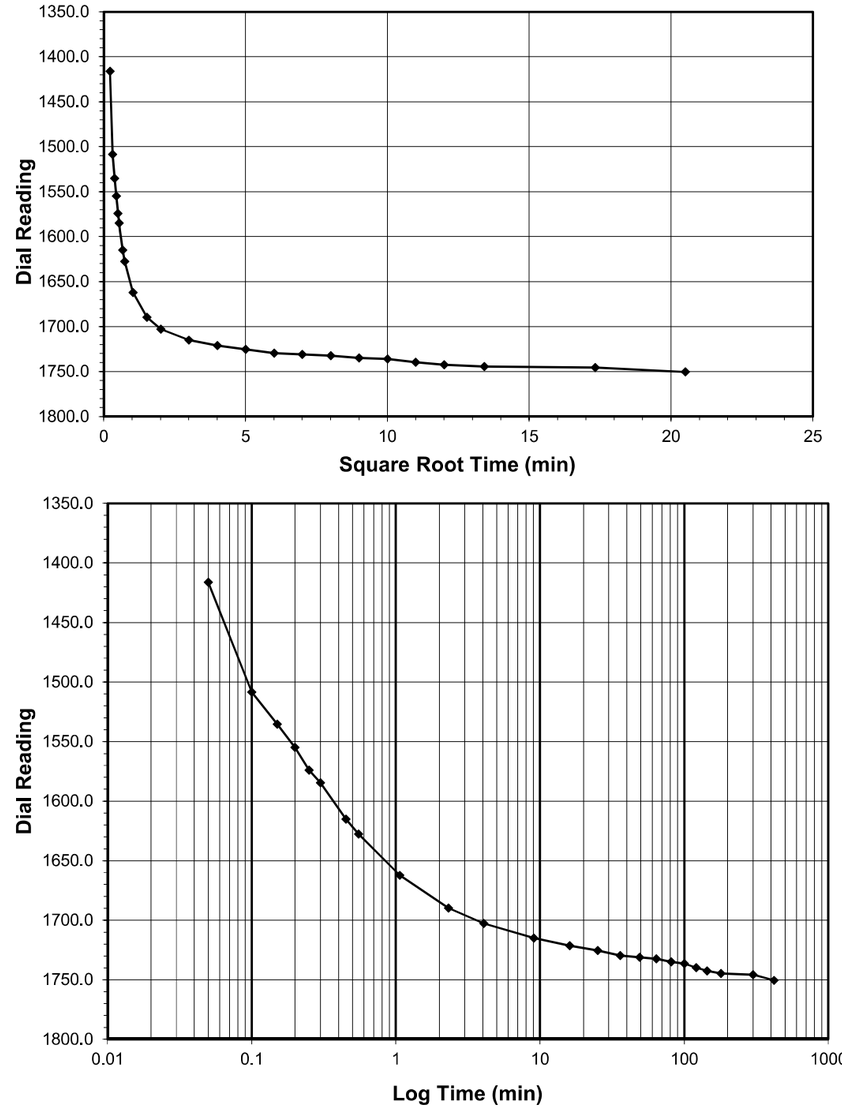
ONE DIMENSIONAL CONSOLIDATION

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

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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

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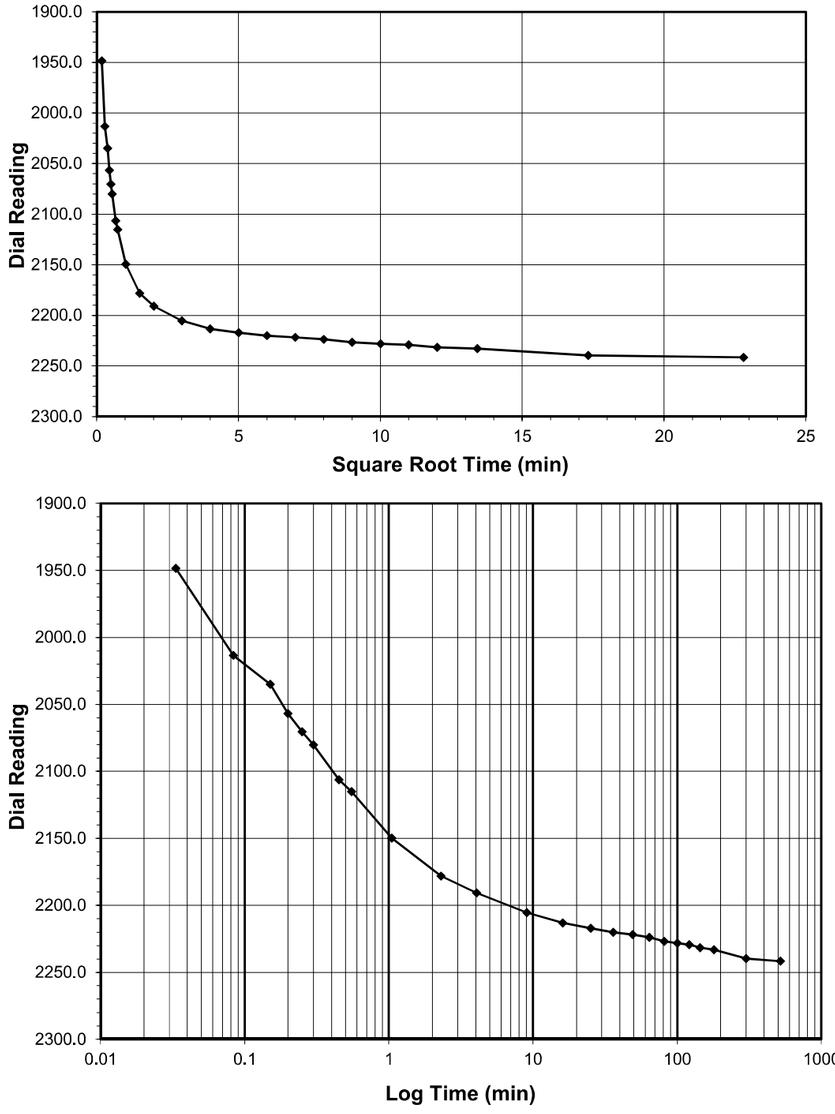
ONE DIMENSIONAL CONSOLIDATION

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

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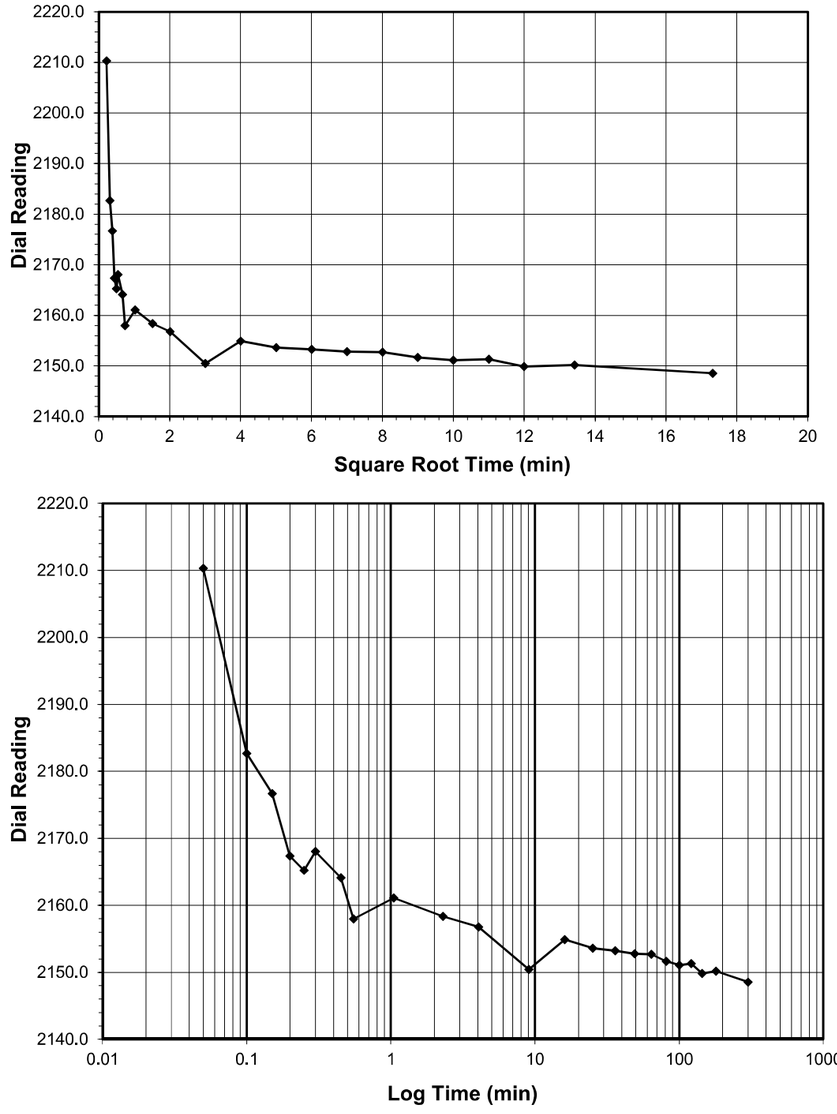
ONE DIMENSIONAL CONSOLIDATION

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

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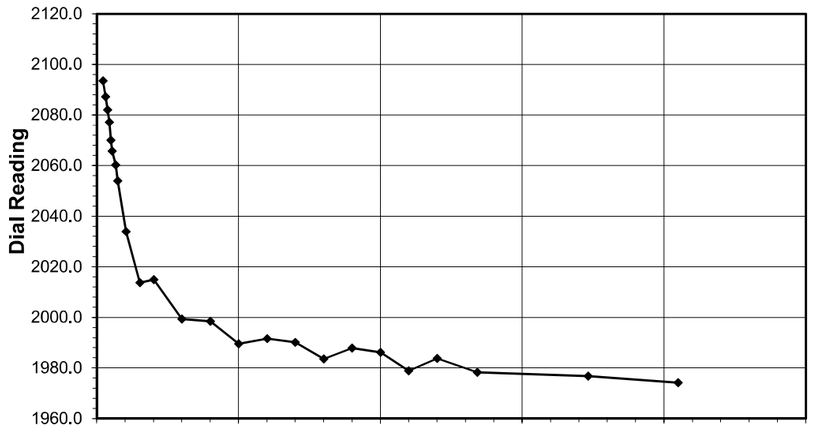
ONE DIMENSIONAL CONSOLIDATION

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

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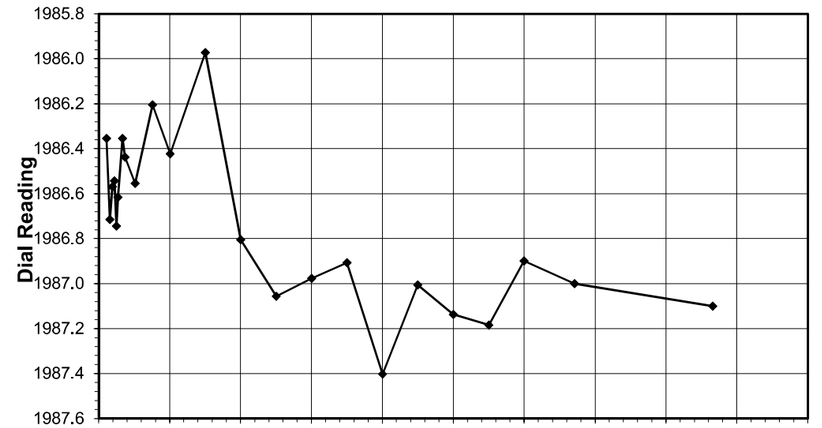
ONE DIMENSIONAL CONSOLIDATION

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

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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

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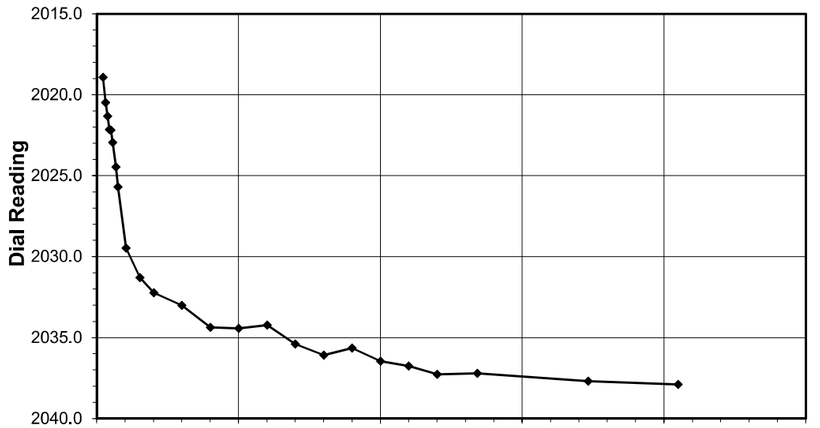
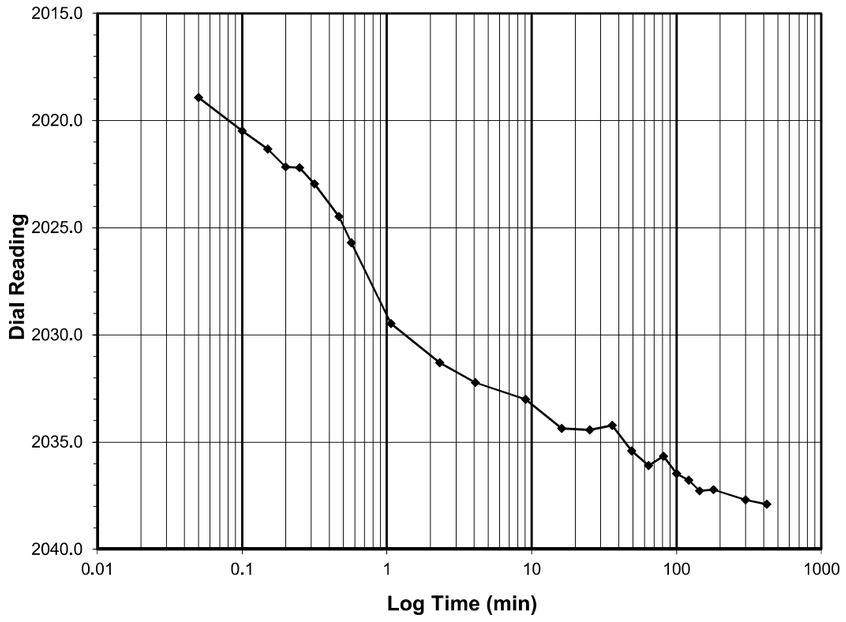
ONE DIMENSIONAL CONSOLIDATION

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

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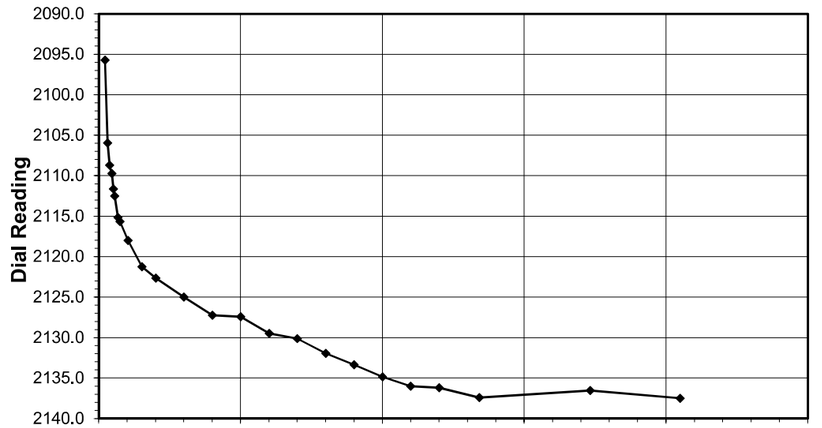
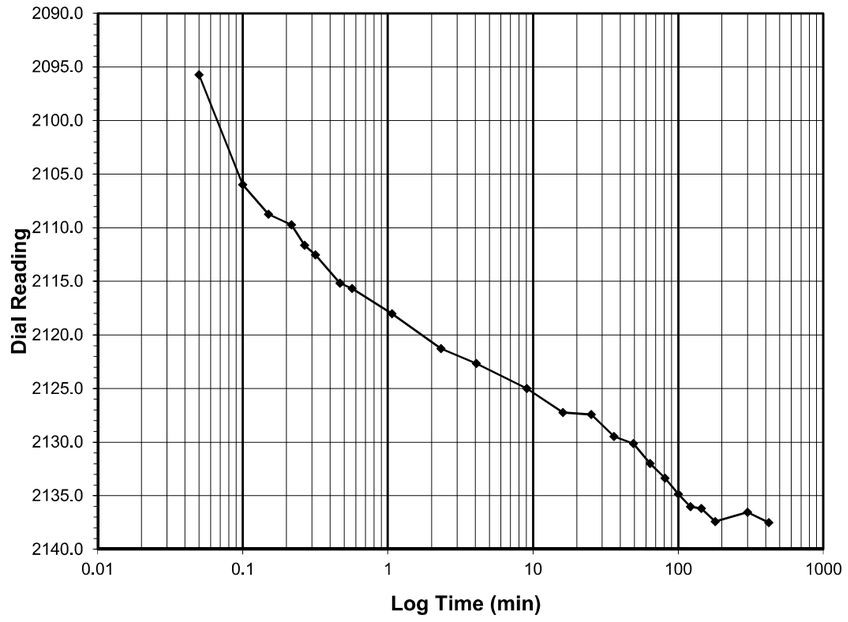
ONE DIMENSIONAL CONSOLIDATION

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

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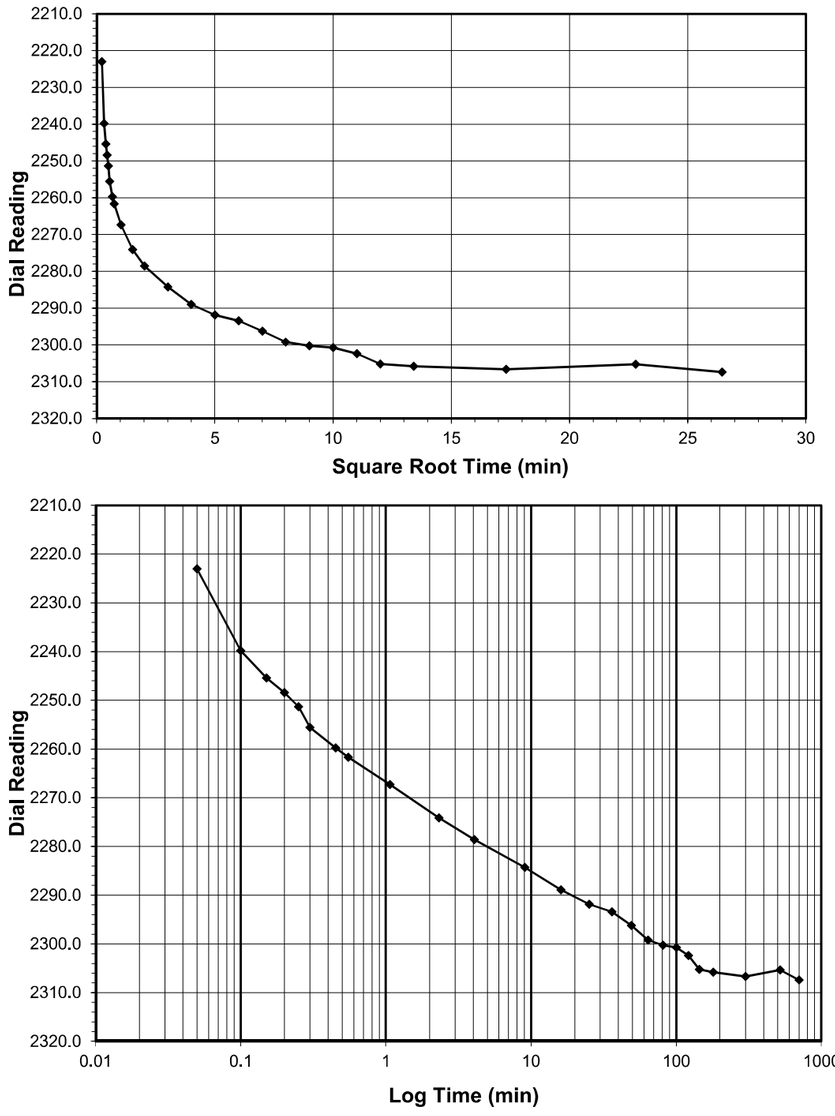
ONE DIMENSIONAL CONSOLIDATION

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

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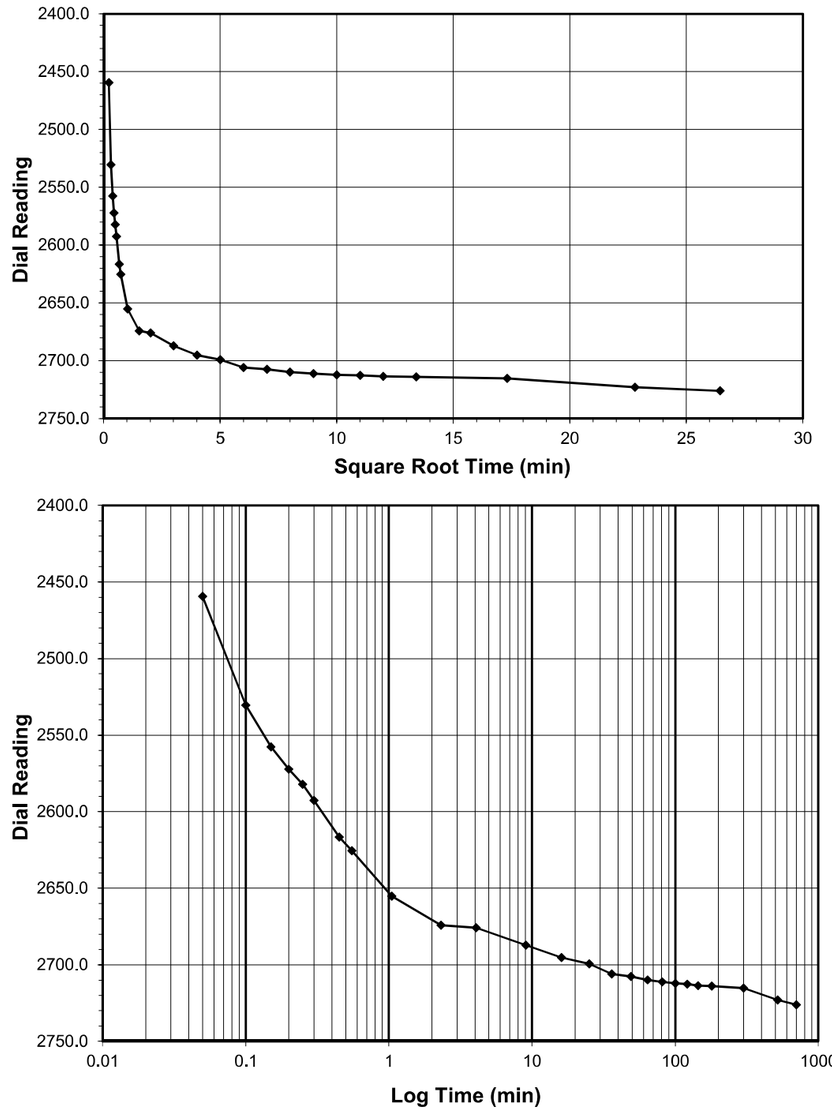
ONE DIMENSIONAL CONSOLIDATION

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

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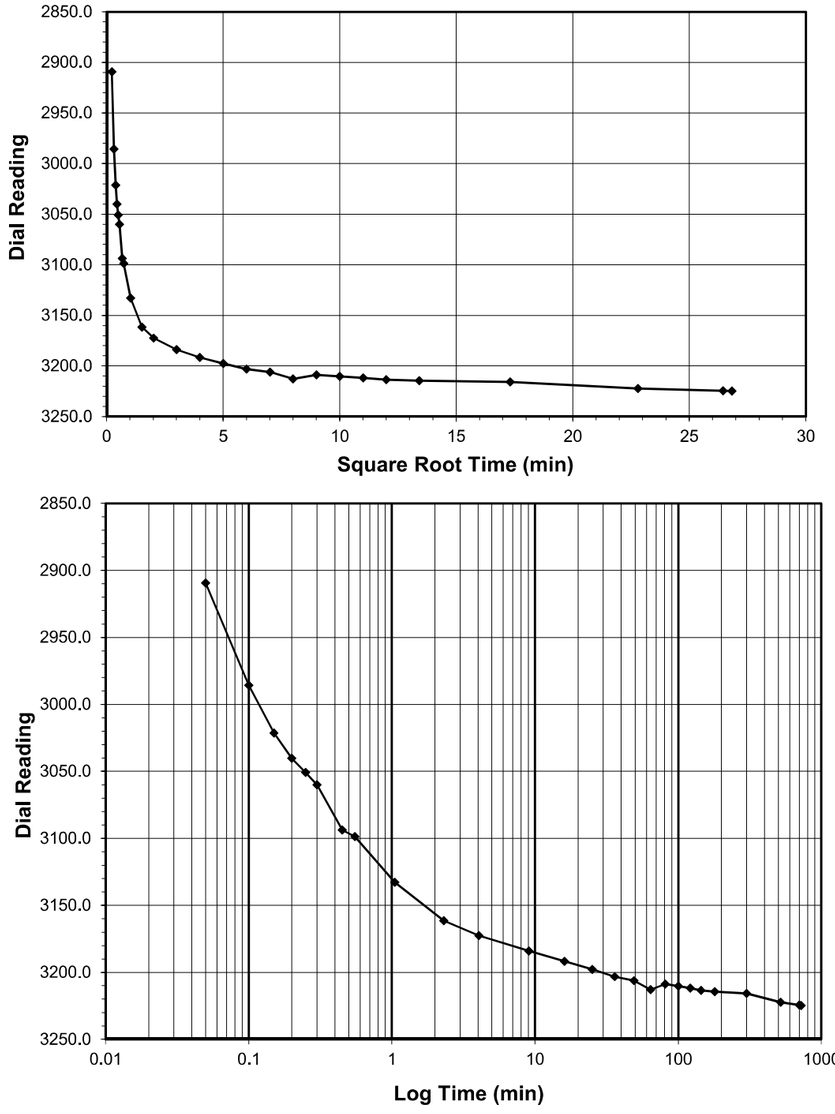
ONE DIMENSIONAL CONSOLIDATION

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

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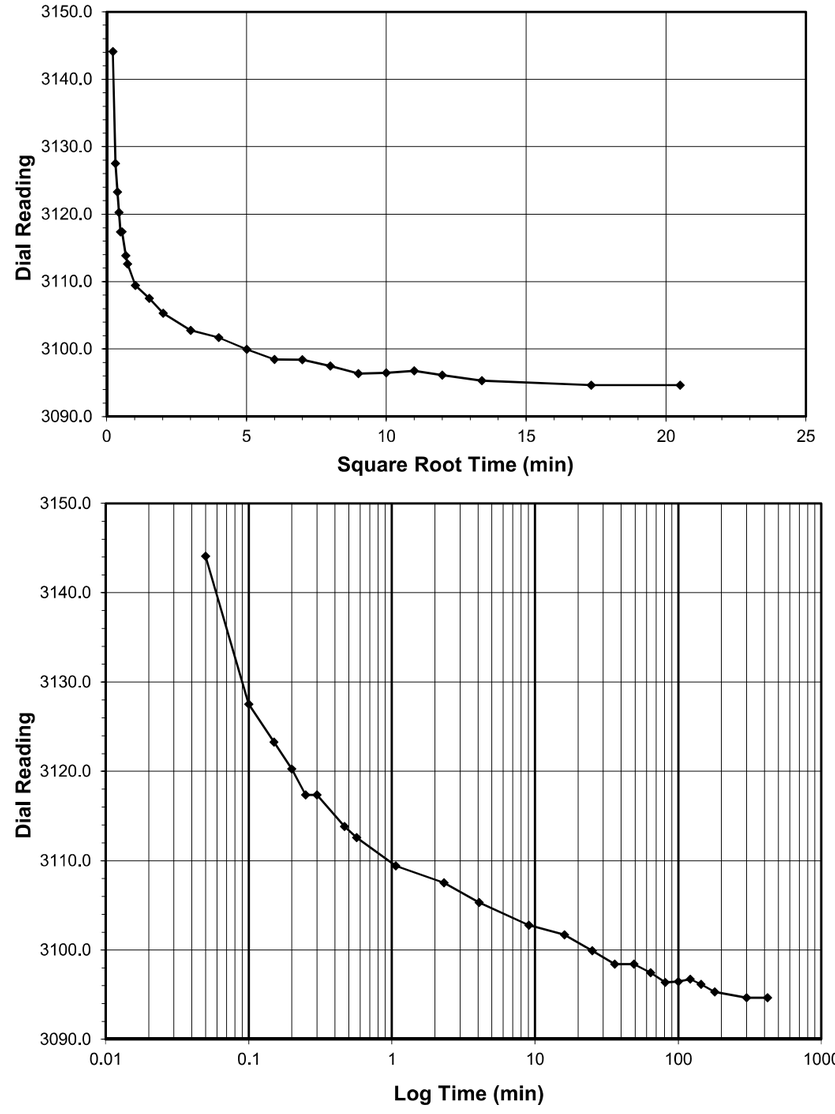
ONE DIMENSIONAL CONSOLIDATION

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

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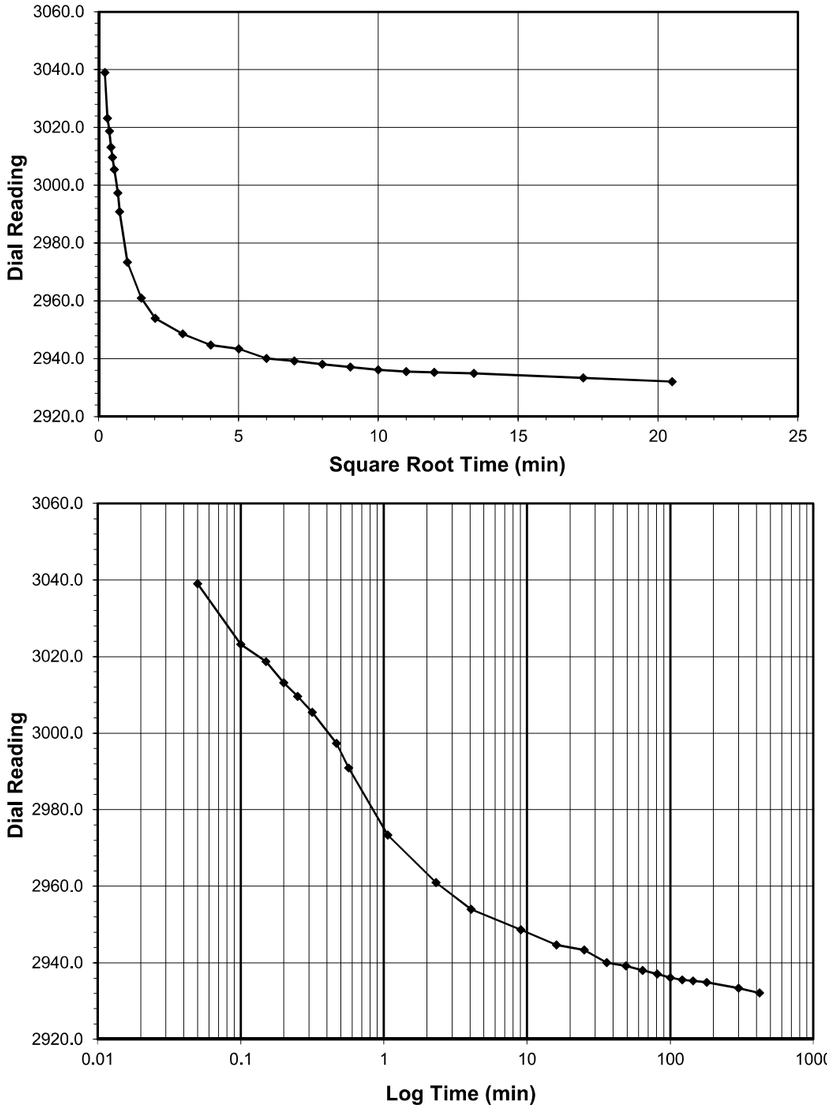
ONE DIMENSIONAL CONSOLIDATION

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

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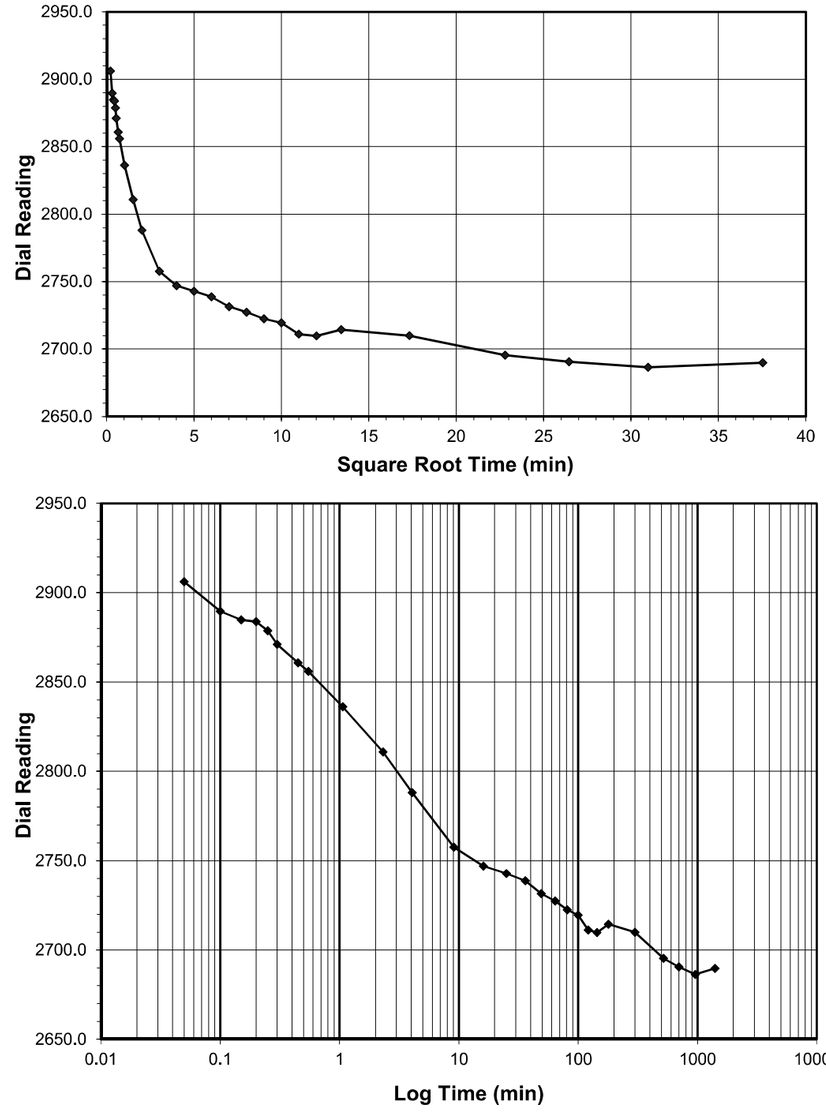
ONE DIMENSIONAL CONSOLIDATION

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

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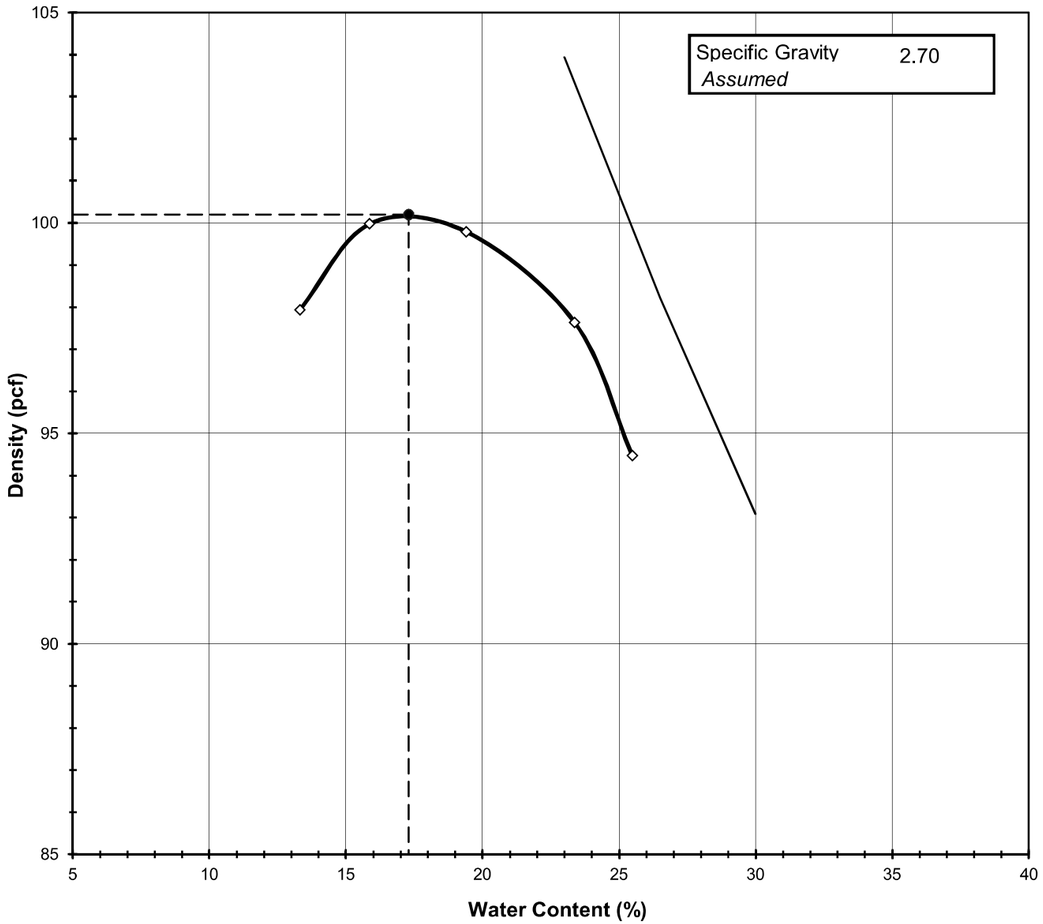
MOISTURE DENSITY RELATIONSHIP

AASHTO T99-18

Client:	Kleinfelder	Boring No.:	Y_1500_RT
Client Reference:	BR-0042 Roadway	Depth (ft):	8.5-18.5
Project No.:	R-2019-178-001	Sample No.:	BS-1
Lab ID:	R-2019-178-001-003	Test Method	**STANDARD**

Visual Description: Tan Silt

Optimum Water Content **17.3**
Maximum Dry Density **100.2**



Tested By 129-05-0411 *Date* 6/19/19 *Checked By* GEM *Date* 6/20/19

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MOISTURE - DENSITY RELATIONSHIP

AASHTO T99-18

Client:	Kleinfelder	Boring No.:	Y_1500_RT
Client Reference:	BR-0042 Roadway	Depth (ft):	8.5-18.5
Project No.:	R-2019-178-001	Sample No.:	BS-1
Lab ID:	R-2019-178-001-003		

Visual Description: Tan Silt

Total Weight of the Sample (g)	16950
As Received Water Content (%)	NA
Assumed Specific Gravity	2.70
Percent Retained on 3/4"	0
Percent Retained on 3/8"	0
Percent Retained on #4	NA
Oversize Material	Not included
Procedure Used	A

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	174
Mold ID	R	607
Mold diameter		4"
Weight of the Mold (g)		4291
Volume of the Mold (cm^3)		940

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	5962	6035	6085	6105	6076
Wt.of Mold (g)	4291	4291	4291	4291	4291
Wt. of Wet Sample (g)	1671	1744	1794	1814	1785
Mold Volume (cm^3)	940	940	940	940	940

Moisture Content / Density

Tare Number	SS-4	SS-0	SS-5	902	911
Wt. of Tare & Wet Sample (g)	397.20	346.50	320.70	337.60	373.70
Wt. of Tare & Dry Sample (g)	362.20	312.85	284.80	292.30	318.55
Wt. of Tare (g)	99.50	100.80	99.80	98.50	102.20
Wt. of Water (g)	35.00	33.65	35.90	45.30	55.15
Wt. of Dry Sample (g)	262.70	212.05	185.00	193.80	216.35

Wet Density (g/cm^3)	1.78	1.86	1.91	1.93	1.90
Wet Density (pcf)	111.0	115.8	119.2	120.5	118.6
Moisture Content (%)	**13.3**	**15.9**	**19.4**	**23.4**	**25.5**
Dry Density (pcf)	**97.9**	**100.0**	**99.8**	**97.6**	**94.5**

Zero Air Voids

Moisture Content (%)	23.0	26.5	30.0
Dry Unit Weight (pcf)	103.9	98.2	93.1

Tested By 129-05-0411 *Date* 6/19/19 *Checked By* GEM *Date* 6/20/19

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SINGLE POINT CBR TEST
ASTM D 1883-16

Client	Kleinfelder	Boring No.	Y_1500_RT
Client Reference	BR-0042 Roadway	Depth(ft.)	8.5-18.5
Project No.	2019-178-001	Sample No.	BS-1
Lab ID	2019-178-001-003	Visual Description	Tan Silt

Test Type	**STANDARD**
Molding Method	C
Mold ID	R-356
Wt. of Mold (gm.)	4148
Mold Volume (cc)	2114
Surcharge (lbs.)	**10**
Piston Area (in^2)	3
Sample Height	4.58
Sample Conditions	Soaked
Blows per Layer	**60**

Density Measurement	**Before Soaking**	**After Soaking**
Wt. Mold & WS (gm.)	8140	8458.8
Wt. WS (gm.)	3992	4311
Sample Volume (cc)	2114	2238
Wet Density (gm./cc)	1.89	1.93
Wet Density (pcf)	117.8	120.2
Dry Density (pcf)	**100.2**	**95.4**
Dry Density (gm./cc)	**1.61**	**1.53**

Water Contents	**As Rec'd**	**Begining Compaction**	**After Compaction**	**Before Soaking**	**After Soaking**	**Top 1" After Soak**
Tare No.	855	841	842		ADF03	SS-2
Wt. of T+WS (gm.)	392.28	993.4	1049.2		1182.2	571.4
Wt. of T+DS (gm.)	351.29	883.56	930.13		985.74	444.7
Wt of Tare (gm.)	135.82	260.2	256.6		229.4	100.4
Moisture Content(%)	19.0	17.6	17.7	17.6	26.0	36.8

Piston Displacement (in.)	**Load (lbs.)**	**Penetration Stress (psi.)**
0	3.93	1.3
0.025	37.79	12.6
0.050	56.36	18.8
0.075	70.54	23.5
0.100	84.60	28.2
0.125	99.14	33.0
0.150	113.39	37.8
0.175	127.23	42.4
0.200	141.02	47.0
0.250	167.85	56.0
0.300	192.52	64.2
0.350	216.03	72.0
0.400	238.62	79.5
0.450	262.21	87.4
0.500	285.67	95.2
0.550	309.54	103.2
0.600	332.61	110.9

Swell Measurement

Elapsed Time (hrs)	Dial Gauge (Div)	Percent Swell
0.00	300	0.00%
70.42	582	6.16%
94.83	580	6.11%

1Division = 0.001 in.

Tested By 129-05-0411 *Date* 6/25/2019 *Checked By* GEM *Date* 7/3/2019

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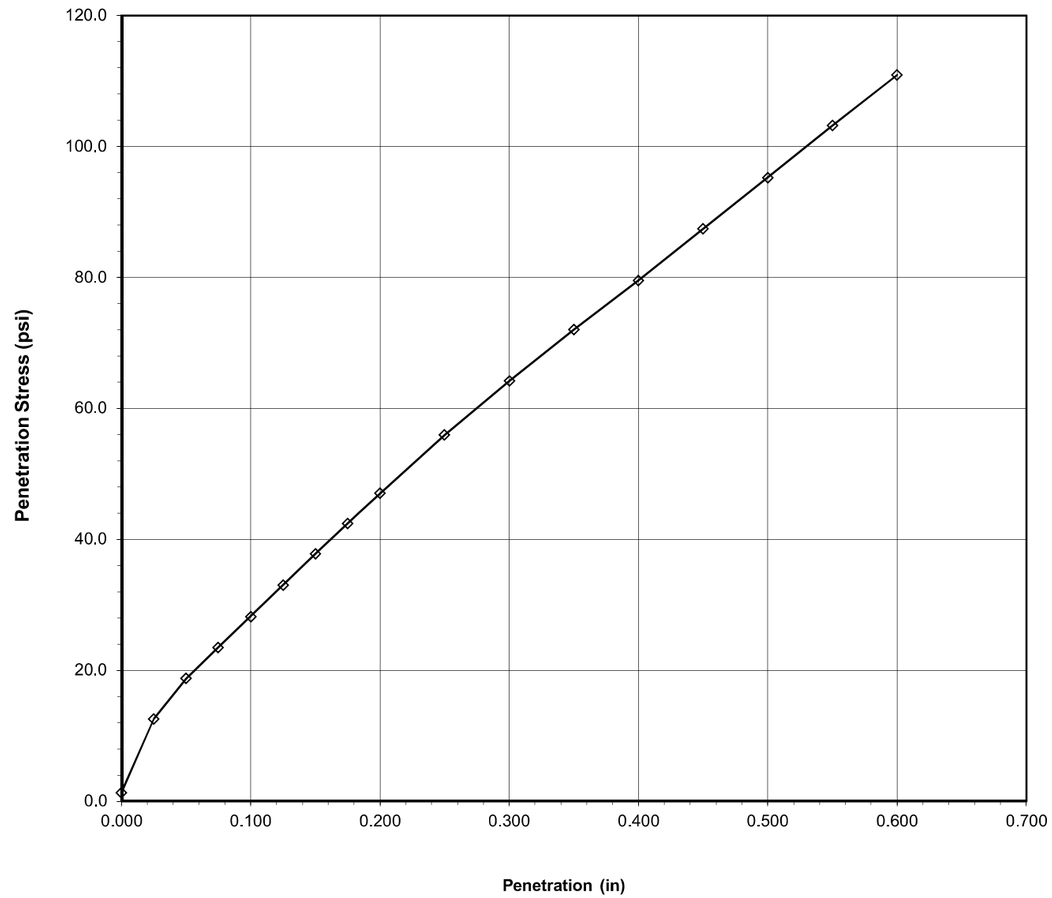
SINGLE POINT CBR TEST
ASTM D 1883-16

Client	Kleinfelder	Boring No.	Y_1500_RT
Client Reference	BR-0042 Roadway	Depth(ft.)	8.5-18.5
Project No.	2019-178-001	Sample No.	BS-1
Lab ID	2019-178-001-003	Visual Description	Tan Silt

CBR VALUE (0.1") **2.8 %**
CBR VALUE (0.2") **3.1 %**

Penetration Stress vs. Penetration



Tested By 129-05-0411 *Date* 6/25/2019 *Approved By* MPS *Date* 7/3/2019

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