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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	12

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP I-85 BYPASS (-L-)FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE

PROJECT DESCRIPTION SITE NO. 1, STRUCTURE NO. 1 (BRIDGE NO. 1240) ON SR 2526 (SUMMIT AVE) OVER GREENSBORO EASTERN LOOP I-85 BYPASS (-L-)

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CAUTION NOTICE

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PERSONNEL

C. TANG, EI

CAROLINA DRILLING

J. ANDERSON

J. COLLINS

INVESTIGATED BY C. TANG, EI

DRAWN BY D. BROWN, PE

CHECKED BY E. MAYR, PE

SUBMITTED BY D. BROWN, PE

DATE OCTOBER 2017

NORTH CAROLINA PROFESSIONAL SEAL 028422 ENGINEER DONALD W. BROWN JR.

DocuSigned by:
Donald W. Brown Jr. 10/9/2017
SIGNATURE DATE
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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:
- [X] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

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: BL-70 - N:872842, E:1780684

ELEVATION: 860.80 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 50 100

FEET

52° 20' 50.2" E

N 29° 18' 08.9" E

SKEW = 86° 38' 16.1"

NAD 83/95

EBI-A

BI-A

BI-C

EBI-B

BI-B

EB2-A

EB2-B

PROPOSED BRIDGE
(STRUCTURE NO.1)

SUMMIT AVE

PINDALS ROAD

EXISTING R/W

EX. R/W
50.00

-Y16-
-65.00

-L-

295

291

-Y16

20

17

ISBKD

CAR PORT

2SBKD

S ABAND

2SBKFBUS

ISFD

2SFD

PUE

FSS

FO

GR

5/14/99

PROFILE ALONG –Y16– CENTERLINE (STRUCTURE NO. 1)

0 50 100
FEET
VE = 5:1

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

EB1-A
16+42
38 FT LT

B1-A
17+39
50 FT LT

EB2-A
18+39
21 FT LT

BEGIN GRADE
–Y16– STA. 14+19.00
EL = 857.79'

EXISTING GROUND SURFACE

–Y16– STA. 17+38.28
–L– STA. 292+96.51

BEGIN BRIDGE
(STRUCTURE NO. 1)

END BRIDGE
(STRUCTURE. NO. 1)

END GRADE
BEGIN 3" OVERLAY
–Y16– STA. 20+62.00
EL = 861.82'

RESIDUAL
YELLOW, RED, TAN, AND ORANGE, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, CLAYEY SILT

RESIDUAL
TAN-ORANGE, YELLOW, AND BROWN, MEDIUM STIFF TO HARD, MOIST TO WET, SANDY SILT
AND
TAN-ORANGE, LOOSE, WET, CLAYEY SAND

WEATHERED ROCK
METAMORPHOSED GRANITE

CRYSTALLINE ROCK
METAMORPHOSED GRANITE

DRY

SKEW = 86° 38' 16.1"

NOTE: EXISTING GROUND SURFACE PROFILE OF –Y16– TAKEN FROM ELECTRONIC FILES (DATED 12/7/16) RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE CENTERLINE.

880 870 860 850 840 830 820 810 800 790

14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2525C	5

CROSS SECTION ALONG END BENT NO. 1 OF STRUCTURE NO. 1

℄

EBI-A
16+42
38 FT LT

EBI-B
16+41
38 FT RT

EXISTING GROUND SURFACE

RESIDUAL
YELLOW, RED, AND TAN, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, CLAYEY SILT

RESIDUAL
TAN-ORANGE AND YELLOW, STIFF TO VERY STIFF, MOIST TO WET, SANDY SILT

RESIDUAL
TAN-BLACK, MEDIUM DENSE, WET, SILTY SAND

WEATHERED ROCK
METAMORPHOSED GRANITE

EBI-A	EBI-B
15	11
10	19
12	9
28	8
15	7
20	6
100/0.9	6
100/0.3	16
100/0.4	20
100/0.9	100/0.6
DRY	100/0.8
	100/0.3
	DRY

16+45
-Y16-

NOTE: EXISTING GROUND SURFACE PROFILE OF -Y16- TAKEN FROM ELECTRONIC FILES (DATED 12/7/16) RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2525C	6

CROSS SECTION ALONG BENT NO. 1 OF STRUCTURE NO. 1

℄

BI-A
17+39
50 FT LT

BI-C
17+37
3 FT LT

BI-B
17+39
54 FT RT

EXISTING GROUND SURFACE

RESIDUAL
ORANGE, RED, AND TAN, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, CLAYEY SILT

RESIDUAL
TAN, ORANGE AND BROWN, STIFF TO HARD, MOIST TO WET, SANDY SILT
AND
TAN-ORANGE, LOOSE, WET, CLAYEY SAND

RESIDUAL
YELLOW-TAN, HARD, MOIST, SANDY SILT

CRYSTALLINE ROCK
METAMORPHOSED GRANITE

WEATHERED ROCK
METAMORPHOSED GRANITE

BI-A		BI-C		BI-B	
8		12		17	
13		18		21	
10		7		9	
9		10		9	
9		9		10	
11		10		6	
27		13		9	
18		28		8	
13		23		27	
70		25		19	
34		36		32	
100/0.2		70		64	
60/0	DRY	100/0.5		100/0.3	
		97		100/0.4	
		60/0.1	DRY	100/0.3	DRY

NOTE: EXISTING GROUND SURFACE PROFILE OF -Y16- TAKEN FROM ELECTRONIC FILES (DATED 12/7/16) RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

17+38

-Y16-

6/23/16

0 2.5 5	PROJ. REFERENCE NO.	SHEET NO.
	U-2525C	7

CROSS SECTION ALONG END BENT NO. 2 OF STRUCTURE NO. 1

EB2-A
18+39
21FT LT

℄

EB2-B
18+67
37 FT RT

EXISTING GROUND SURFACE

RESIDUAL
RED, YELLOW, AND TAN, STIFF TO VERY STIFF, MOIST, CLAYEY SILT

RESIDUAL
TAN, ORANGE AND PINK, MEDIUM STIFF TO HARD, MOIST TO WET, SANDY SILT
AND
TAN-ORANGE, MEDIUM DENSE, WET, CLAYEY SAND

RESIDUAL
RED-BROWN, TAN, AND ORANGE, MEDIUM STIFF TO HARD, MOIST TO WET, CLAYEY SILT

12/16

WEATHERED ROCK
METAMORPHOSED GRANITE

DRY

CRYSTALLINE ROCK
METAMORPHOSED GRANITE

NOTE: EXISTING GROUND SURFACE PROFILE OF –Y16– TAKEN FROM ELECTRONIC FILES (DATED 12/7/16) RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

18+46

–Y16–

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 16+42	**OFFSET** 38 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 858.4 ft	**TOTAL DEPTH** 44.7 ft	**NORTHING** 872,870	**EASTING** 1,780,621	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
860											
	857.4	1.0								858.4 GROUND SURFACE	0.0
			4	6	9	15		M		**RESIDUAL** Yellow, Clayey Silt	
855	855.1	3.3								855.4	3.0
			6	5	5	10		M		Yellow and Orange-Tan, Sandy Silt, with Trace Rock Fragments	
850	850.1	8.3									
			3	5	7	12		M			
845	845.1	13.3									
			7	13	15	28		M			
840	840.1	18.3									
			4	7	8	15		M			
835	835.1	23.3									
			4	9	11	20		M			
830	830.1	28.3									
			17	46	54/0.4	100/0.9				829.6 **WEATHERED ROCK** (Metamorphosed Granite)	28.8
825	825.1	33.3	100/0.3			100/0.3					
820	820.1	38.3									
			52	100/0.4		100/0.4					
815	815.1	43.3									
			8	31	69/0.4	100/0.9				813.7 Boring Terminated at Elevation 813.7 ft in Weathered Rock (Metamorphosed Granite)	44.7

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+41	**OFFSET** 38 ft RT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 860.6 ft	**TOTAL DEPTH** 53.8 ft	**NORTHING** 872,818	**EASTING** 1,780,677	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/14/16	**COMP. DATE** 12/14/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
865											
	859.6	1.0								860.6 GROUND SURFACE	0.0
			3	3	8	11		M		**RESIDUAL** Red, Tan and Orange, Clayey Silt, with Trace Roots on top 2.5'	
860	857.1	3.5									
			3	7	12	19		M			
855	852.1	8.5									
			2	4	5	9		M			
850	847.1	13.5									
			2	3	5	8		M			
845	842.1	18.5									
			2	3	4	7		M			
840	837.1	23.5									
			2	2	4	6		W			
835	832.1	28.5									
			2	3	3	6		W			
830	827.1	33.5								828.6 Tan-Orange, Sandy Silt	32.0
			3	6	10	16		W		823.6 Tan-Black, Silty Sand	37.0
825	822.1	38.5									
			5	9	11	20		W			
820	817.1	43.5									
			21	48	52/0.1	100/0.6				816.6 **WEATHERED ROCK** (Metamorphosed Granite)	44.0
815	812.1	48.5									
			19	64	36/0.3	100/0.8					
810	807.1	53.5								806.8 Boring Terminated at Elevation 806.8 ft in Weathered Rock (Metamorphosed Granite)	53.8
			100/0.3			100/0.3					

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 17+39	**OFFSET** 50 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 859.4 ft	**TOTAL DEPTH** 58.3 ft	**NORTHING** 872,949	**EASTING** 1,780,670	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
860										859.4 GROUND SURFACE 0.0
	858.4	1.0	1	2	6	8		M		**RESIDUAL** Orange, Red and Tan, Clayey Silt, with Trace Roots
	856.1	3.3	3	5	8	13		M		
855										852.4 7.0
	851.1	8.3	3	5	5	10		M		Tan and Orange, Sandy Silt
850										
	846.1	13.3	4	4	5	9		M		
845										842.4 17.0
	841.1	18.3	3	4	5	9		W		Tan-Orange, Clayey Sand
840										
	836.1	23.3	3	5	6	11		W		837.4 22.0
835										Tan, Brown and Yellow, Sandy Silt (Saprolite)
	831.1	28.3	13	12	15	27		W		
830										
	826.1	33.3	6	9	9	18		W		
825										
	821.1	38.3	3	4	9	13		W		
820										
	816.1	43.3	15	29	41	70		W		
815										
	811.1	48.3	6	13	21	34		M		
810										807.4 52.0
	806.1	53.3	100/0.2			100/0.2				**WEATHERED ROCK** (Metamorphosed Granite)
805										
	801.1	58.3	60/0			60/0				801.1 58.3 Boring Terminated with Standard Penetration Test Refusal at Elevation 801.1 ft on Crystalline Rock (Metamorphosed Granite)

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 17+39	**OFFSET** 54 ft RT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 860.9 ft	**TOTAL DEPTH** 69.3 ft	**NORTHING** 872,886	**EASTING** 1,780,754	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/14/16	**COMP. DATE** 12/14/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
865										
860	859.9	1.0	2	5	12	17		M		860.9 GROUND SURFACE 0.0
	857.4	3.5	4	9	12	21		M		**RESIDUAL** Red, Tan, and Orange, Clayey Silt, with Trace Roots on Top 2.5'
855										
	852.4	8.5	3	4	5	9		M		
850										
	847.4	13.5	2	4	5	9		M		
845										
	842.4	18.5	3	4	6	10		M		
840										
	837.4	23.5	3	3	3	6		W		
835										
	832.4	28.5	2	4	5	9		W		
830										
	827.4	33.5	2	3	5	8		W		
825										823.9 37.0
	822.4	38.5	6	12	15	27		W		Tan, Sandy Silt
820										
	817.4	43.5	6	7	12	19		W		
815										
	812.4	48.5	7	13	19	32		W		
810										
	807.4	53.5	11	21	43	64		W		
805										
	802.4	58.5	37	100/0.3		100/0.3				801.9 59.0
800										**WEATHERED ROCK** (Metamorphosed Granite)
	797.4	63.5	31	100/0.4		100/0.4				
795										
	792.4	68.5	45	100/0.3		100/0.3				791.6 69.3 Boring Terminated at Elevation 791.6 ft in Weathered Rock (Metamorphosed Granite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 17+37	**OFFSET** 3 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 860.8 ft	**TOTAL DEPTH** 68.7 ft	**NORTHING** 872,918	**EASTING** 1,780,707	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/20/16	**COMP. DATE** 12/20/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
865										
860										860.8 GROUND SURFACE 0.0
	859.8	1.0								859.8 Asphalt (6 inches) over Concrete (6 inches) 1.0
			3	6	6	12		M		**RESIDUAL**
	857.2	3.6								Yellow-Brown and Red-Tan, Clayey Silt, with
855			5	8	10	18		M		Trace Rock Fragments and Some Mica
	852.2	8.6								
			3	3	4	7		M		
850										
	847.2	13.6								
			4	5	5	10		M		
845										
	842.2	18.6								
			3	4	5	9		M		
840										
	837.2	23.6								
			3	4	6	10		M		
835										
	832.2	28.6								
			3	5	8	13		M		
830										
	827.2	33.6								
			9	12	16	28		M		
825										
	822.2	38.6								
			10	10	13	23		M		
820										
	817.2	43.6								
			6	12	13	25		M		
815										
	812.2	48.6								
			13	14	22	36		M		
810										
	807.2	53.6								
			18	34	36	70		M		
805										
	802.2	58.6								803.8 57.0
			100/0.5			100/0.5				**WEATHERED ROCK**
800										(Metamorphosed Granite)
	797.2	63.6								798.8 62.0
			31	42	55	97		M		**RESIDUAL**
795										Yellow-Tan, Sandy Silt
	792.2	68.6								792.2 68.6
	792.1	68.7	60/0.1			60/0.1				792.1 68.7
										CRYSTALLINE ROCK
										(Metamorphosed Granite)
										Boring Terminated with Standard
										Penetration Test Refusal at Elevation 792.1
										ft in Crystalline Rock (Metamorphosed
										Granite)

828.8 32.0 Brown and Tan, Sandy Silt

NCDOT BORE DOUBLE U2525C_GEO_BRDG0004_BH.GPJ NC_DOT.GDT 10/3/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+39	**OFFSET** 21 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 861.0 ft	**TOTAL DEPTH** 53.7 ft	**NORTHING** 873,012	**EASTING** 1,780,750	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
865										
860	860.0	1.0	2	7	8	15		M		861.0 GROUND SURFACE 0.0 **RESIDUAL** Yellow and Red, Clayey Silt, with Trace Roots
	857.4	3.6	5	9	19	28		M		
855	852.4	8.6	3	7	11	18		M		
850	847.4	13.6	5	7	10	17		W		849.0 12.0 Tan, Orange and Black, Sandy Silt, with Trace Rock Fragments
845	842.4	18.6	3	3	5	8		W		
840	837.4	23.6	2	3	5	8		W		
835	832.4	28.6	5	8	11	19		W		
830	827.4	33.6	9	11	17	28		W		
825	822.4	38.6	14	17	16	33		W		
820	817.4	43.6	62	100/0.2		100/0.2		W		816.9 44.1 **WEATHERED ROCK** (Metamorphosed Granite)
815	812.4	48.6	24	40	60/0.4	100/0.9				
810	807.4	53.6	60/0.1			60/0.1				807.4 53.6 807.3 53.7 **CRYSTALLINE ROCK** (Metamorphosed Granite) Boring Terminated with Standard Penetration Test Refusal at Elevation 807.3 ft in Crystalline Rock (Metamorphosed Granite)

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+67	**OFFSET** 37 ft RT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 859.4 ft	**TOTAL DEPTH** 57.7 ft	**NORTHING** 873,007	**EASTING** 1,780,814	**24 HR.** 34.1
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/14/16	**COMP. DATE** 12/14/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
860										859.4 GROUND SURFACE 0.0
	858.4	1.0	7	10	14	24		M		**RESIDUAL** Red and Tan, Clayey Silt
855	855.8	3.6	4	7	10	17		M		852.4 7.0
850	850.8	8.6	3	5	6	11		M		Tan-Pink and Tan-Orange, Sandy Silt
845	845.8	13.6	3	4	6	10		M		
840	840.8	18.6	4	4	7	11		M		
835	835.8	23.6	3	4	5	9		M		
830	830.8	28.6	8	13	17	30		M		832.4 27.0 Red-Brown, Tan and Orange, Clayey Silt, with Some Mica and Quartz Fragments
825	825.8	33.6	3	3	4	7		W		
820	820.8	38.6	2	3	4	7		W		817.4 42.0 Tan-Orange, Clayey Sand
815	815.8	43.6	5	8	16	24		W		812.4 47.0 Tan, Sandy Silt
810	810.8	48.6	4	5	8	13		W		
805	805.8	53.6	39	100						805.3 54.1 **WEATHERED ROCK** (Metamorphosed Granite)
	801.7	57.7	60/0.0			60/0.0				801.7 57.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 801.7 ft on Crystalline Rock (Metamorphosed Granite)

PROJECT REFERENCE NO.	SHEET NO.
U–2525C	12

SITE PHOTOGRAPHS

PHOTOGRAPH #1: VIEW OF -Y16- LOOKING NORTH FROM NEAR CENTER OF PROPOSED BRIDGE.

PHOTOGRAPH 2: VIEW OF -Y16- LOOKING SOUTH FROM NEAR CENTER OF PROPOSED BRIDGE.

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	9

REFERENCE: U-2525C

PROJECT: 34821

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

RETAINING WALL SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *STRUCTURE NO. 1 ON SR2526 (SUMMIT AVE.) OVER GREENSBORO EASTERN LOOP I-86 BYPASS (-L-)*

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

CONTENTS

CAUTION NOTICE

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

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

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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. TANG, EI

CAROLINA DRILLING

J. ANDERSON

J. COLLINS

INVESTIGATED BY *C. TANG, EI*

DRAWN BY *D. BROWN, PE*

CHECKED BY *E. MAYR, PE*

SUBMITTED BY *D. BROWN, PE*

DATE *OCTOBER 2017*

NORTH CAROLINA PROFESSIONAL SEAL 028422 ENGINEER DONALD W. BROWN JR.

DocuSigned by:
Donald W. Brown Jr. 10/9/2017
SIGNATURE DATE
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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:
- [X] CME-45C
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

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: BL-70 - N:872842, E:1780684

ELEVATION: 860.80 FEET

NOTES:

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 50 100

FEET

EBI-W2

EBI-A

EBI-B

EBI-WI

EB2-WI

EB2-A

EB2-B

EB2-W2

PROPOSED BRIDGE (STRUCTURE NO.1)

PROPOSED RETAINING WALL

PROPOSED RETAINING WALL

N 29° 18' 08.9" E

NAD 83/95

SUMMIT AVE

PINDALS ROAD

EXISTING R/W

ISBKD

CAR PORT

2SBKD

CAR PORT

S ABAND

2SBKFBUS

ISFD

2SFD

10' CONC

12' CONC

22' BST

24" WD

36" WD

72" WD

36" LJ

4" PLASTIC

2" STEEL

PUE

GR

FSS

FO

-Y16-

-L-

295

291

6/23/16

VE = 2:1

0 5 10

PROJ. REFERENCE NO.	SHEET NO.
U-2525C	4

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

CROSS SECTION ALONG RETAINING WALL AT END BENT NO. 1

880 875 870 865 860 855 850 845 840 835 830 825 820 815 810 805 800 795

Ⓐ **RESIDUAL**
YELLOW, STIFF, MOIST, SANDY SILT

℄

EXISTING GROUND SURFACE

EBI-W2
16+41
79 FT LT

EBI-A
16+42
38 FT LT

EBI-B
16+41
38 FT RT

EBI-W1
16+64
89 FT RT

Ⓐ

(9) (15) (9) (10) (4) (28) (45) 12/16 (100/0.4) (100/0.3) (60/0.0)

(15) (10) (12) (28) (15) (20) (100/0.9) (100/0.3) (100/0.4) (100/0.9) DRY

(11) (19) (9) (8) (7) (6) (6) (16) (20) (100/0.6) (100/0.8) (100/0.3) DRY

(17) (19) (12) (11) (6) (8) (7) (18) (13) (37) (40) (33) (50)

RESIDUAL
YELLOW, RED, AND TAN, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, CLAYEY SILT

RESIDUAL
TAN-ORANGE AND YELLOW, STIFF TO HARD, MOIST TO WET, SANDY SILT AND TAN AND BLACK, MEDIUM DENSE TO DENSE, WET, SILTY SAND

CRYSTALLINE ROCK
METAMORPHOSED GRANITE

NOTE: EXISTING GROUND SURFACE CROSS SECTION OF RETAINING WALL NO. 1 TAKEN FROM ELECTRONIC FILES (DATED 12-7-16)RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

16+52.00

-Y16-

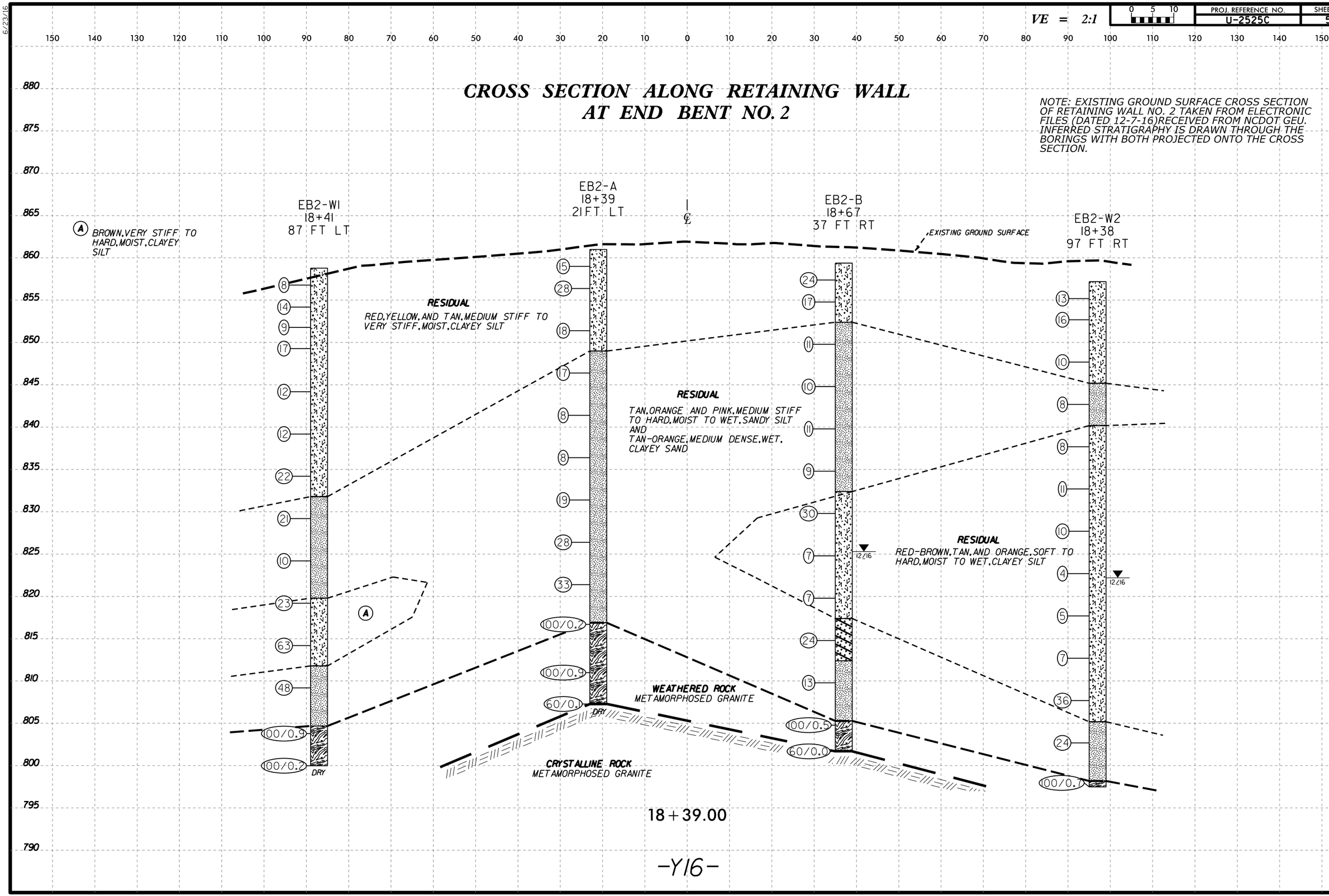
6/23/16

VE = 2:1

PROJ. REFERENCE NO.	SHEET NO.
U-2525C	5

CROSS SECTION ALONG RETAINING WALL AT END BENT NO. 2

NOTE: EXISTING GROUND SURFACE CROSS SECTION OF RETAINING WALL NO. 2 TAKEN FROM ELECTRONIC FILES (DATED 12-7-16)RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.



18+39.00

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 16+42	**OFFSET** 38 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 858.4 ft	**TOTAL DEPTH** 44.7 ft	**NORTHING** 872,870	**EASTING** 1,780,621	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
860										
	857.4	1.0								858.4 GROUND SURFACE 0.0
			4	6	9	15		M		**RESIDUAL** Yellow, Clayey Silt
855	855.1	3.3								855.4 3.0
			6	5	5	10		M		Yellow and Orange-Tan, Sandy Silt, with Trace Rock Fragments
850	850.1	8.3								
			3	5	7	12		M		
845	845.1	13.3								
			7	13	15	28		M		
840	840.1	18.3								
			4	7	8	15		M		
835	835.1	23.3								
			4	9	11	20		M		
830	830.1	28.3								
			17	46	54/0.4	100/0.9				
825	825.1	33.3								
			100/0.3			100/0.3				
820	820.1	38.3								
			52	100/0.4		100/0.4				
815	815.1	43.3								
			8	31	69/0.4	100/0.9				829.6 WEATHERED ROCK 28.8
										(Metamorphosed Granite)
										813.7 Boring Terminated at Elevation 813.7 ft in 44.7
										Weathered Rock (Metamorphosed Granite)

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 16+41	**OFFSET** 38 ft RT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 860.6 ft	**TOTAL DEPTH** 53.8 ft	**NORTHING** 872,818	**EASTING** 1,780,677	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/14/16	**COMP. DATE** 12/14/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
865										
										860.6 GROUND SURFACE 0.0
	859.6	1.0								**RESIDUAL**
			3	3	8	11		M		Red, Tan and Orange, Clayey Silt, with Trace
	857.1	3.5								Roots on top 2.5'
855			3	7	12	19		M		
	852.1	8.5								
			2	4	5	9		M		
850										
	847.1	13.5								
			2	3	5	8		M		
845										
	842.1	18.5								
			2	3	4	7		M		
840										
	837.1	23.5								
			2	2	4	6		W		
835										
	832.1	28.5								
			2	3	3	6		W		
830										
	827.1	33.5								
			3	6	10	16		W		
825										
	822.1	38.5								
			5	9	11	20		W		
820										
	817.1	43.5								
			21	48	52/0.1	100/0.6				
815										
	812.1	48.5								
			19	64	36/0.3	100/0.8				
810										
	807.1	53.5								
			100/0.3			100/0.3				
										828.6 Tan-Orange, Sandy Silt 32.0
										823.6 Tan-Black, Silty Sand 37.0
										816.6 **WEATHERED ROCK** 44.0
										(Metamorphosed Granite)
										806.8 Boring Terminated at Elevation 806.8 ft in 53.8
										Weathered Rock (Metamorphosed Granite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION End Bent No. 1 Retaining Wall on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-W1	**STATION** 16+64	**OFFSET** 89 ft RT	**ALIGNMENT** -Y16-	**0 HR.** Dry
COLLAR ELEV. 858.9 ft	**TOTAL DEPTH** 60.0 ft	**NORTHING** 872,802	**EASTING** 1,780,730	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/15/16	**COMP. DATE** 12/15/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
860											
	857.9	1.0								858.9	0.0
			4	5	12	17		M		GROUND SURFACE	
855	855.4	3.5								**RESIDUAL**	
			8	8	11	19		M		Yellow, Red and Tan, Clayey Silt	
850	850.4	8.5									
			3	5	7	12		M			
845	845.4	13.5									
			5	5	6	11		M			
840	840.4	18.5									
			2	2	4	6		M			
835	835.4	23.5									
			3	3	5	8		M			
830	830.4	28.5									
			2	2	5	7		M			
825	825.4	33.5									
			4	7	11	18		M			
820	820.4	38.5									
			3	6	7	13		M			
815	815.4	43.5								816.9	42.0
			8	16	21	37		M		Yellow, Sandy Silt	
810	810.4	48.5									
			6	18	22	40		M			
805	805.4	53.5									
			7	12	21	33		M			
800	800.4	58.5									
			10	24	26	50		M		798.9	60.0
										Boring Terminated at Elevation 798.9 ft in Sandy Silt	

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION End Bent No. 1 Retaining Wall on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB1-W2	**STATION** 16+41	**OFFSET** 79 ft LT	**ALIGNMENT** -Y16-	**0 HR.** 35.4
COLLAR ELEV. 855.4 ft	**TOTAL DEPTH** 41.0 ft	**NORTHING** 872,896	**EASTING** 1,780,589	**24 HR.** 27.8
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/12/16	**COMP. DATE** 12/12/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
860											
										855.4	0.0
855										GROUND SURFACE	
	854.4	1.0								**RESIDUAL**	
			3	4	5	9		M		853.4 Yellow, Sandy Silt, with Trace Roots	2.0
	851.9	3.5								Red and Yellow, Clayey Silt	
850			5	6	9	15		M			
	846.9	8.5									
			4	4	5	9		M			
845	841.9	13.5									
			2	5	5	10		M			
840	836.9	18.5									
			2	2	2	4		W			
835	831.9	23.5								831.4	24.0
			1	13	15	28		W		Tan, Sandy Silt	
830	826.9	28.5								828.4	27.0
			13	21	24	45		W		Tan, Silty Sand	
825	821.9	33.5									
			70	100/0.4		100/0.4				823.4	32.0
820	816.9	38.5								**WEATHERED ROCK**	
			100/0.3			100/0.3				(Metamorphosed Granite)	
815	814.4	41.0								814.4	41.0
			60/0.0			60/0.0				Boring Terminated with Standard Penetration Test Refusal at Elevation 814.4 ft on Crystalline Rock (Metamorphosed Granite)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 18+39	**OFFSET** 21 ft LT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 861.0 ft	**TOTAL DEPTH** 53.7 ft	**NORTHING** 873,012	**EASTING** 1,780,750	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/13/16	**COMP. DATE** 12/13/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
865										
860	860.0	1.0	2	7	8	15		M		861.0 GROUND SURFACE 0.0 **RESIDUAL** Yellow and Red, Clayey Silt, with Trace Roots
	857.4	3.6	5	9	19	28		M		
855	852.4	8.6	3	7	11	18		M		
850	847.4	13.6	5	7	10	17		W		849.0 12.0 Tan, Orange and Black, Sandy Silt, with Trace Rock Fragments
845	842.4	18.6	3	3	5	8		W		
840	837.4	23.6	2	3	5	8		W		
835	832.4	28.6	5	8	11	19		W		
830	827.4	33.6	9	11	17	28		W		
825	822.4	38.6	14	17	16	33		W		
820	817.4	43.6	62	100/0.2		100/0.2				816.9 44.1 **WEATHERED ROCK** (Metamorphosed Granite)
815	812.4	48.6	24	40	60/0.4	100/0.9				
810	807.4	53.6	60/0.1			60/0.1				807.4 53.6 807.3 53.7 **CRYSTALLINE ROCK** (Metamorphosed Granite) Boring Terminated with Standard Penetration Test Refusal at Elevation 807.3 ft in Crystalline Rock (Metamorphosed Granite)

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION Bridge No. 1240 on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 18+67	**OFFSET** 37 ft RT	**ALIGNMENT** -Y16-	**0 HR.** N/A
COLLAR ELEV. 859.4 ft	**TOTAL DEPTH** 57.7 ft	**NORTHING** 873,007	**EASTING** 1,780,814	**24 HR.** 34.1
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/14/16	**COMP. DATE** 12/14/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
860										859.4 GROUND SURFACE 0.0
	858.4	1.0	7	10	14	24		M		**RESIDUAL** Red and Tan, Clayey Silt
855	855.8	3.6	4	7	10	17		M		852.4 7.0
850	850.8	8.6	3	5	6	11		M		Tan-Pink and Tan-Orange, Sandy Silt
845	845.8	13.6	3	4	6	10		M		
840	840.8	18.6	4	4	7	11		M		
835	835.8	23.6	3	4	5	9		M		
830	830.8	28.6	8	13	17	30		M		832.4 27.0 Red-Brown, Tan and Orange, Clayey Silt, with Some Mica and Quartz Fragments
825	825.8	33.6	3	3	4	7		W		
820	820.8	38.6	2	3	4	7		W		817.4 42.0 Tan-Orange, Clayey Sand
815	815.8	43.6	5	8	16	24		W		812.4 47.0 Tan, Sandy Silt
810	810.8	48.6	4	5	8	13		W		
805	805.8	53.6	39	100						805.3 54.1 **WEATHERED ROCK** (Metamorphosed Granite)
	801.7	57.7	60/0.0			60/0.0				801.7 57.7 Boring Terminated with Standard Penetration Test Refusal at Elevation 801.7 ft on Crystalline Rock (Metamorphosed Granite)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION End Bent No. 2 Retaining Wall on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-W1	**STATION** 18+41	**OFFSET** 87 ft LT	**ALIGNMENT** -Y16-	**0 HR.** Dry
COLLAR ELEV. 858.8 ft	**TOTAL DEPTH** 58.8 ft	**NORTHING** 873,048	**EASTING** 1,780,695	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/12/16	**COMP. DATE** 12/12/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
860											
	857.8	1.0								858.8 GROUND SURFACE	0.0
			1	4	4	8		M		**RESIDUAL** Brown and Red, Clayey Silt, with Trace to Some Mica	
855	855.2	3.6									
			3	6	8	14		M			
	852.8	6.0									
			4	4	5	9		M			
850	850.3	8.5									
			5	8	9	17		M			
845	845.2	13.6									
			4	6	6	12		M			
840	840.2	18.6									
			3	6	6	12		M			
835	835.2	23.6									
			3	8	14	22		M			
830	830.2	28.6									
			6	10	11	21		M			
825	825.2	33.6									
			2	4	6	10		W			
820	820.2	38.6								819.8 Tan, Sandy Silt	39.0
			5	10	13	23		M			
815	815.2	43.6									
			12	21	42	63		M			
810	810.2	48.6								811.8 Tan, Sandy Silt	47.0
			9	19	29	48		W			
805	805.2	53.6								804.7 **WEATHERED ROCK** (Metamorphosed Granite)	54.1
			27	52	48/0.4	100/0.9					
800	800.2	58.6	100/0.2			100/0.2				800.0 Boring Terminated at Elevation 800.0 ft in Weathered Rock (Metamorphosed Granite)	58.8

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** C.T. Tang, EI	
SITE DESCRIPTION End Bent No. 2 Retaining Wall on SR2526 (Summit Ave.) over Greensboro Eastern Loop I-85 Bypass				**GROUND WTR (ft)**
BORING NO. EB2-W2	**STATION** 18+38	**OFFSET** 97 ft RT	**ALIGNMENT** -Y16-	**0 HR.** 37.0
COLLAR ELEV. 857.2 ft	**TOTAL DEPTH** 59.7 ft	**NORTHING** 872,949	**EASTING** 1,780,849	**24 HR.** 35.0
DRILL RIG/HAMMER EFF./DATE BRI8284 45 Track 89% 02/26/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER J. Anderson	**START DATE** 12/12/16	**COMP. DATE** 12/12/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	
860											
	856.2	1.0								857.2 GROUND SURFACE	0.0
			3	6	7	13		M		**RESIDUAL** Red, Clayey Silt	
855	853.7	3.5									
			4	8	8	16		M			
850	848.7	8.5									
			3	4	6	10		M			
845	843.7	13.5								845.2 Pink-Red, Sandy Silt	12.0
			2	4	4	8		M			
840	838.7	18.5								840.2 Red, Red-Pink, Orange and Brown, Clayey Silt	17.0
			2	3	5	8		M			
835	833.7	23.5									
			3	4	7	11		M			
830	828.7	28.5									
			3	5	5	10		M			
825	823.7	33.5									
			1	2	2	4		W			
820	818.7	38.5									
			1	2	3	5		W			
815	813.7	43.5									
			2	3	4	7		W			
810	808.7	48.5									
			8	15	21	36		W			
805	803.7	53.5								805.2 Tan-Brown, Sandy Silt	52.0
			6	10	14	24		W			
800	798.7	58.5								798.2	59.0
			19	49	51/0.2	100/0.7				797.5 **WEATHERED ROCK** (Metamorphosed Granite)	59.7
										Boring Terminated at Elevation 797.5 ft in Weathered Rock (Metamorphosed Granite)	

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	12

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNSDALE DRIVE)*

SITE DESCRIPTION *SITE #2 (STRUCTURE #2 AND #3) BRIDGE NO. 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)*

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

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SUBMITTED BY *KLEINFELDER, INC.*

DATE *SEPTEMBER 2017*

Prepared in the Office of:

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NORTH CAROLINA PROFESSIONAL SEAL 015741 ENGINEER XAVIER C. BARRETT

DocuSigned by:
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2D00374FA68F417...
SIGNATURE

10/9/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [X] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 2-15/16" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BYI-102: -YI- STA. 7+71.38, (874,678 FT. N, 1,777,494 FT. E)

ELEVATION: 874.57 FEET

NOTES:

FIAD: FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 40 80
FEET

RW1–1
RW2–1
EB1–A
EB2–A
EB1–C
EB2–C
EB1–B
EB2–B
RW1–2
RW2–2

-BL-17 PINC
41+25.62
3SELEC
-L1-
12
400PR
CB
15" CONC W/FES
12" CONC
48" WW
GR
RAMP
ISFD
TO SR 2526
(SUMMIT AVE.)
328
329
330
331
332
13
14
A
B
W
M
EBL -L-
TO SR 2523
(YANCEYVILLE RD.)
WBL
-BYI-102 PINC 7+71.38
29+95.42=
+07.82

SKEW:
A - 90°-09'-20"
B - 89°-27'-36"

6/23/16

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

END BENT NO. 1 CROSS SECTION AT STA. 329+44

0 20 40
FEET
VE = 1:1

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

910 900 890 880 870 860 850 840 830 820 810 800 790

Ⓐ **RESIDUAL:**
MOIST, MEDIUM DENSE TO VERY DENSE, YELLOW TO WHITE TO GRAY TO BROWN, SILTY, FINE TO COARSE SAND WITH ROCK FRAGMENTS

RW1–1
329+55
117' LT

8 24 16 27 68 43 36

BT
DRY
10/16

EB1–A
329+43
70' LT

7 16 10 9 16 22 18 35 100/0.6 100/0.4 100/0.2

BT
FIAD

RESIDUAL:
MOIST, MEDIUM STIFF TO HARD, REDDISH BROWN TO YELLOWISH BROWN TO RED TO YELLOW, FINE TO COARSE SANDY CLAY AND FINE TO COARSE SANDY SILT

WEATHERED ROCK:
LIGHT BROWNISH GRAY TO YELLOW AND WHITE, METAMORPHOSED GRANITE

EB1–C
329+46
1' LT

11 20 12 25 10 16 22 16 21 83 32 89 100/0.4 50/0.0

BT
DRY
10/16

EB1–B
329+40
65' RT

11 22 8 9 6 14 6 5 7 14 7 20 100/0.8 100/0.2 100/0.3

BT
DRY
10/16

RW1–2
329+56
139' RT

10 17 Ⓐ 13 8 9 6 11

BT
DRY
10/16

CRYSTALLINE ROCK:
GRAY, METAMORPHOSED GRANITE

NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 9/14/2016

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

SKEW: 90°09'20"

—℄—

10-NOV-2016 12:04
W:\share\GEOTECHNICAL\Projects\Active Projects\20151548.029A G U-2525 Dual Bridge Site 4\tip"GEO_BRDG****_modifier\CADD_GEOTECH\Site&Sub\u2525c_geo_xsc_sheet.dgn
BAJohnson AT KA20660

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	5

END BENT NO. 2 CROSS SECTION AT STA. 330+48

0 20 40
FEET
VE = 1:1

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

900 890 880 870 860 850 840 830 820 810 800 790 780 770

Ⓐ **RESIDUAL:**
MOIST, MEDIUM DENSE, BROWN, SILTY, FINE TO COARSE SAND

RW2–1
330+49
122' LT

EB2–A
330+52
73' LT

EB2–C
330+42
1' LT

EB2–B
330+44
64' RT

RW2–2
330+43
143' RT

RESIDUAL:
MOIST, MEDIUM STIFF TO HARD, REDDISH BROWN TO YELLOWISH BROWN TO RED TO YELLOW, FINE TO COARSE SANDY CLAY, FINE TO COARSE SANDY SILT

RESIDUAL:
MOIST, LOOSE TO VERY DENSE, GRAY TO WHITE TO BROWN, SILTY, FINE TO COARSE SAND

ST-1

WEATHERED ROCK:
LIGHT BROWNISH GRAY TO YELLOW AND WHITE, METAMORPHOSED GRANITE

CRYSTALLINE ROCK:
GRAY, METAMORPHOSED GRANITE

BT DRY 10/16

NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 9/14/2016

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

SKEW: 89°27'36"

—℄—

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 329+43	**OFFSET** 70 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 874.6 ft	**TOTAL DEPTH** 48.2 ft	**NORTHING** 874,587	**EASTING** 1,777,555	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/10/16	**COMP. DATE** 10/10/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
875										
	874.6	0.0	2	2	5	7 16		M		874.6 / 0.0 GROUND SURFACE
	871.6	3.0								**RESIDUAL** Brown and Yellowish Brown to Red, Fine Sandy CLAY
870			7	7	9			M		
	866.6	8.0								868.6 / 6.0 Yellowish Brown and Yellow to Gray to Olive Yellow, Fine to Coarse Sandy SILT
865			4	5	5	10		M		
	861.6	13.0								
860			3	4	5	9		M		
	856.6	18.0								
855			5	7	9	16		M		
	851.6	23.0								
850			5	10	12	22		M		
	846.6	28.0								
845			5	8	10	18		M		
	841.6	33.0								
840			12	15	20	35		M		
	836.6	38.0								
835			84	16/0.1		100/0.6				
	831.6	43.0	100/0.4			100/0.4				
830										
	826.6	48.0	100/0.2			100/0.2				826.4 / 48.2 Boring Terminated at Elevation 826.4 ft in WEATHERED ROCK: METAMORPHOSED GRANITE
										838.1 / 36.5 **WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.4 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 329+46	**OFFSET** 1 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 876.9 ft	**TOTAL DEPTH** 63.3 ft	**NORTHING** 874,656	**EASTING** 1,777,559	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
880										
	876.9	0.0								876.9 / 0.0 GROUND SURFACE
875			5	6	5	11		M		**RESIDUAL** Red, Fine Sandy CLAY with Trace Mica
	873.6	3.3								
			6	9	11	20		M		
870										870.4 / 6.5 Red, Fine Sandy SILT with Trace Mica
	868.6	8.3								
			5	5	7	12		M		
865										865.4 / 11.5 Red to Olive and Yellow to Light Brownish Gray, Fine Sandy SILT with Trace Mica
	863.6	13.3								
			8	11	14	25		M		
860										
	858.6	18.3								
			5	4	6	10		M		
855										
	853.6	23.3								
			4	6	10	16		M		
850										
	848.6	28.3								
			7	10	12	22		M		
845										
	843.6	33.3								
			8	7	9	16		M		
840										
	838.6	38.3								
			6	9	12	21		M		
835										835.4 / 41.5 Olive, Silty, Fine to Coarse SAND
	833.6	43.3								
			21	32	51	83		M		830.4 / 46.5 Olive and Yellow, Fine Sandy SILT with Trace Mica
830										
	828.6	48.3								
			13	14	18	32		M		
825										
	823.6	53.3								
			17	31	58	89		M		820.4 / 56.5 **WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE
820										
	818.6	58.3	100/0.4			100/0.4				
815										
	813.6	63.3	60/0.0			60/0.0				813.6 / 63.3 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 813.6 ft on CRYSTALLINE ROCK: METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.4 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 329+40	**OFFSET** 65 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 877.6 ft	**TOTAL DEPTH** 63.3 ft	**NORTHING** 874,721	**EASTING** 1,777,572	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
880										
	877.6	0.0								877.6 0.0 GROUND SURFACE
			5	5	6	11		M		**RESIDUAL**
875	874.6	3.0								875.1 2.5 Reddish Brown, Fine Sandy CLAY
			6	10	12	22		M		Reddish Brown to Gray and Yellow to Light Brownish Gray, Fine to Coarse Sandy SILT with Trace Mica
870	869.6	8.0								
			3	4	4	8		M		
865	864.6	13.0								
			3	4	5	9		M		
860	859.6	18.0								
			3	2	4	6		M		
855	854.6	23.0								
			5	6	8	14		M		
850	849.6	28.0								
			2	3	3	6		M		
845	844.6	33.0								
			2	2	3	5		M		
840	839.6	38.0								
			3	3	4	7		M		
835	834.6	43.0								
			3	6	8	14		M		
830	829.6	48.0								
			3	7	13	20		M		
825	824.6	53.0								826.6 51.0 **WEATHERED ROCK** Yellow and Gray, METAMORPHOSED GRANITE
			40	60/0.3		100/0.8				
820	819.6	58.0								
			100/0.2			100/0.2				
815	814.6	63.0								814.3 63.3 Boring Terminated at Elevation 814.3 ft in WEATHERED ROCK: METAMORPHOSED GRANITE
			100/0.3			100/0.3				Topsoil 0.0 to 0.5 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 330+52	**OFFSET** 73 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 873.1 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 874,594	**EASTING** 1,777,448	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/03/16	**COMP. DATE** 10/03/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
	873.1	0.0								873.1 0.0 GROUND SURFACE
			4	6	9	15		M		**RESIDUAL**
870	869.6	3.5								871.1 2.0 Brown to Tan, Silty, Fine SAND with Trace of Organic Matter
			6	7	6	13		M		Tan, Fine Sandy CLAY
865	864.6	8.5								866.6 6.5 Tan, Fine to Coarse Sandy SILT
			8	11	10	21		W		
860	859.6	13.5								
			17	19	20	39		W		
855	854.6	18.5								
			6	8	15	23		W		
850	849.6	23.5								
			3	6	8	14		W		
845	844.6	28.5								847.1 26.0 **WEATHERED ROCK** Tan, METAMORPHOSED GRANITE
			53	47/0.3		100/0.8				
840	839.6	33.5								841.6 31.5 **RESIDUAL** Brown and Tan, Fine Sandy SILT with Trace Mica
			20	33	62	95		W		
835	834.6	38.5								836.6 36.5 Tan, Silty, Fine to Coarse SAND
			35	27	36	63		W		
830	829.6	43.5								832.1 41.0 Brown, Fine Sandy SILT with Trace Mica
			14	20	31	51		W		
825	824.6	48.5								
			23	32	66	98		W		823.1 50.0 Boring Terminated at Elevation 823.1 ft in RESIDUAL: Sandy SILT
										Topsoil 0.0 to 0.3 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 330+42	**OFFSET** 1 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 873.7 ft	**TOTAL DEPTH** 58.6 ft	**NORTHING** 874,665	**EASTING** 1,777,464	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/04/16	**COMP. DATE** 10/04/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
875											
	873.7	0.0								873.7 GROUND SURFACE	0.0
			3	5	6	11		M		**RESIDUAL**	
870	870.2	3.5								871.2 Reddish Brown, Fine Sandy CLAY	2.5
			6	8	9	17		M		Red and Light Brown and Brown to Red to White, Fine to Coarse Sandy SILT with Trace Mica	
865	865.2	8.5									
			4	4	5	9		M			
860	860.2	13.5									
			3	3	4	7		M			
855	855.2	18.5									
			3	3	4	7		M			
850	850.2	23.5									
			3	3	4	7		M			
845	845.2	28.5								846.7 Light Brown to Gray, Silty, Fine to Coarse SAND	27.0
			4	4	6	10		M			
840	840.2	33.5									
			6	9	12	21		M			
835	835.2	38.5									
			18	32	55	87		M			
830	830.2	43.5									
			14	19	30	49		M			
825	825.2	48.5								827.7 **WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE	46.0
			28	72/0.4		100/0.9					
820	820.2	53.5									
			100/0.2			100/0.2					
	815.2	58.5	60/0.1			60/0.1				815.2 **CRYSTALLINE ROCK** METAMORPHOSED GRANITE	58.5
	815.1	58.6								Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 815.1 ft IN CRYSTALLINE ROCK: METAMORPHOSED GRANITE	58.6
										Topsoil 0.0 to 0.3 foot	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 330+44	**OFFSET** 64 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 872.8 ft	**TOTAL DEPTH** 63.7 ft	**NORTHING** 874,730	**EASTING** 1,777,467	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/04/16	**COMP. DATE** 10/04/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
	872.8	0.0								872.8 GROUND SURFACE 0.0
			2	3	5	8		M		**RESIDUAL**
870	869.3	3.5								870.3 Brown, Fine Sandy CLAY 2.5
			6	6	9	15		M		Reddish Brown to Dark Reddish Brown to Yellow to Yellow and White, Fine to Coarse Sandy SILT with Trace Mica
865	864.3	8.5								
			4	7	9	16		M		
860	859.3	13.5								
			2	2	3	5		M		
855	854.3	18.5								
			2	2	3	5		M		
850	849.3	23.5								
			2	1	2	3		M		
845	844.3	28.5								
			2	1	2	3		M		
840	839.3	33.5								
			3	3	4	7		M		
835	834.3	38.5								
			4	5	6	11		M		
830	829.3	43.5								
			7	10	12	22		M		
825	824.3	48.5								
			21	36	46	82		M		
820	819.3	53.5								
			38	61	39/0.3	100/0.8				
815	814.3	58.5								
			100/0.3			100/0.3				
810	809.3	63.5								
			100/0.2			100/0.2				
										841.8 Yellow and White, Silty, Fine to Coarse SAND 31.0
										818.8 **WEATHERED ROCK** Yellow and White, METAMORPHOSED GRANITE 54.0
										809.1 Boring Terminated at Elevation 809.1 ft in WEATHERED ROCK: METAMORPHOSED GRANITE 63.7
										Topsoil 0.0 to 0.7 foot
										Other Samples: ST-1 (15.1 - 16.8)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW1-1	**STATION** 329+55	**OFFSET** 117 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 874.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,542	**EASTING** 1,777,538	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
875										
	874.6	0.0	3	4	4	8		M		874.6 GROUND SURFACE 0.0 **RESIDUAL** Yellowish Brown, Fine Sandy CLAY
	871.1	3.5	8	10	14	24		M		872.1 2.5 Yellow and Red, Fine Sandy SILT
870										868.1 6.5
	866.1	8.5	4	6	10	16		M		Yellow to Yellow and Gray, Silty, Fine to Coarse SAND with Some Rock Fragments and Trace Mica
865										
	861.1	13.5	10	13	14	27		M		
860										858.1 16.5 White, Gray and Brown, Silty, Fine to Coarse Sandy Rock Fragments
	856.1	18.5	15	40	28	68		M		
855										853.1 21.5 Olive and Gray, Fine to Coarse Sandy SILT with Little Rock Fragments and Trace Mica
	851.1	23.5	8	17	26	43		M		
850										848.1 26.5 Gray, Silty, Fine to Coarse SAND with Trace Mica
	846.1	28.5	6	12	24	36		M		844.6 30.0 Boring Terminated at Elevation 844.6 ft in RESIDUAL: Silty SAND
845										

Topsoil 0.0 to 0.7 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW1-2	**STATION** 329+56	**OFFSET** 139 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 877.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,796	**EASTING** 1,777,564	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
880										
	877.6	0.0	3	4	6	10		M		877.6 GROUND SURFACE 0.0 **RESIDUAL** Reddish Brown, Fine Sandy CLAY
875										
	874.1	3.5	7	8	9	17		M		
870										871.1 6.5 Red, Silty, Fine to Coarse SAND
	869.1	8.5	5	6	7	13		M		
865										866.1 11.5 Red and Yellow to Red, Brown and Yellow, Fine to Coarse Sandy SILT
	864.1	13.5	3	3	5	8		M		
860										
	859.1	18.5	3	4	5	9		M		
855										
	854.1	23.5	2	3	3	6		M		
850										
	849.1	28.5	1	5	6	11		M		847.6 30.0 Boring Terminated at Elevation 847.6 ft in RESIDUAL: Sandy SILT

Topsoil 0.0 to 0.4 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW2-1	**STATION** 330+49	**OFFSET** 122 ft LT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 873.7 ft	**TOTAL DEPTH** 29.1 ft	**NORTHING** 874,545	**EASTING** 1,777,447	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)
875										
	873.7	0.0	2	5	9	14		M		873.7 GROUND SURFACE 0.0 **RESIDUAL** Brown, Silty, Fine SAND
870	870.2	3.5	8	8	8	16		M		871.2 2.5 Yellowish Brown, Fine Sandy CLAY
865	865.2	8.5	31	28	37	65		M		867.2 6.5 White and Yellow to Olive, Fine Sandy SILT with Trace Mica
860	860.2	13.5	10	10	16	26		M		
855	855.2	18.5	11	20	44	64		M		
850	850.2	23.5	10	15	27	42		M		
845	845.2	28.5	88	12/0.1		100/0.6				846.2 27.5 **WEATHERED ROCK** 844.6 29.1 Gray, METAMORPHOSED GRANITE Boring Terminated at Elevation 844.6 ft in WEATHERED ROCK: METAMORPHOSED GRANITE Topsoil 0.0 to 0.9 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW2-2	**STATION** 330+43	**OFFSET** 143 ft RT	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 873.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,809	**EASTING** 1,777,474	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
	873.0	0.0	1	2	4	6		M		873.0 GROUND SURFACE 0.0 **RESIDUAL** Reddish Brown, Fine Sandy SILT
870	869.5	3.5	4	6	7	13		M		870.5 2.5 Reddish Brown to Yellow and Red, Fine Sandy SILT with Trace Mica
865	864.5	8.5	5	5	8	13		M		
860	859.5	13.5	3	2	4	6		M		
855	854.5	18.5	2	2	3	5		M		
850	849.5	23.5	2	2	3	5		M		
845	844.5	28.5	4	5	9	14		M		843.0 30.0 Boring Terminated at Elevation 843.0 ft in RESIDUAL: Sandy SILT Topsoil 0.0 to 0.4 foot

SUMMARY OF LABORATORY TEST DATA

PROJECT NO. 34821.1.5 (U-2525C)
COUNTY: GUILFORD
SITE #2 (STRUCTURE #2 AND #3) – BRIDGE NO. 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

							Atterberg Limits			Gradation Results							
Sample No.	Boring Number	Station	Offset	Alignment	Sample Depth (ft.)	AASHTO Class	L.L.	P.L.	P.I.	Pass #10	Pass #40	Pass #200	Retained #270	Coarse Sand	Fine Sand	Silt (%)	Clay (%)
ST-1 *	EB2-B	330+44	64' RT	-L-	15.1-16.8	A-5 (3)	45	38	7	99.71	77.34	52.28	53.6	29.89	23.71	37.21	9.19

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample
S = Grab Sample
NP -- Non Plastic NA-- Non Applicable
* CONSOLIDATION TEST RESULTS CAN BE FOUND UNDER SEPARATE COVER

Lab Technician: NCDOT Certification No.: 129-01-0411 – Geotechnics, Raleigh, NC

Michael P. Sm

Site #2 (Structure #2 and #3) – Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Rd. (-Y1-)

SITE PHOTOGRAPHS

Profile View Looking South along -Y1-

Cross-Section View Looking East from End Bent 2

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	76

PROJECT: 34821

REFERENCE: U-2525C

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNDALE DRIVE)*

SITE DESCRIPTION *SITE #2 (STRUCTURE #2 AND #3) BRIDGE NO. 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-) CPT AND DMT TESTING*

CONTENTS

PERSONNEL

C. CHILDREY

B. RAMSEYER

INVESTIGATED BY *T. WELLS*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *OCTOBER 2017*

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Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
7343 WEST FRIENDLY AVE. SUITE B
GREENSBORO, NC 27410
ENGINEERING FIRM LICENSE NO. F-1143

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells
7DA5D2D0518F4B0...
SIGNATURE

10/23/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 1 OF 2)

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 RESISTANCE (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) PL — PLASTIC LIMIT	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [X] CONETEC 15 TON
- [ ] _____

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

HAMMER TYPE:
- [ ] AUTOMATIC [ ] MANUAL

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

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

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS
(PAGE 2 OF 2)

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.

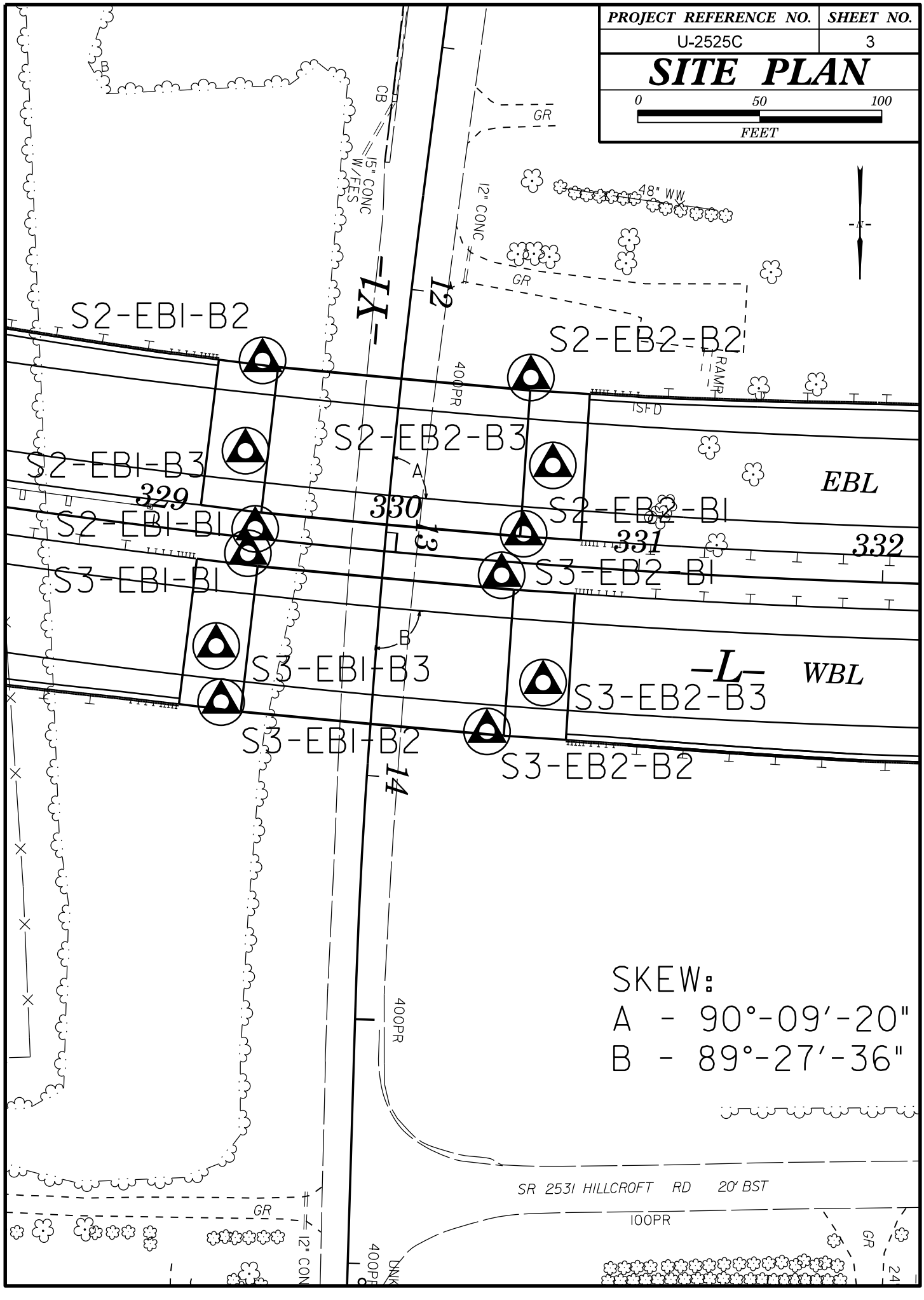
BENCH MARK: N/A

ELEVATION: N/A FEET

NOTES:

TOP OF CPT AND DMT ELEVATIONS OBTAINED FROM PROJECT TIN FILE (U2525C_LS_TIN.TIN) RECEIVED ON SEPTEMBER 14, 2016

DATE: 8-15-14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U-2525C
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100
FEET
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S2-EB1-B3
S2-EB2-B3
S2-EB1-B1
S2-EB2-B1
S3-EB1-B1
S3-EB2-B1
S3-EB1-B3
S3-EB2-B3
S3-EB1-B2
S3-EB2-B2
-Y1-
-L-
EBL
WBL
329
330
331
332
A
B
GR
48" WW
12" CONC
15" CONC W/FES
400PR
RAMP
ISFD
SR 2531 HILLCROFT RD 20' BST
100PR
SKEW:
A - 90°-09'-20"
B - 89°-27'-36"

PRESENTATION OF SITE INVESTIGATION RESULTS

SITE #2 (STRUCTURE #2 AND #3) – BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-) – Greensboro NC – Rev 04

Prepared for:

Kleinfelder

ConeTec Job No: 16-54112

Project Start Date: 19-DEC-2016
Project End Date: 21-DEC-2016
Report Date: 3-JAN-2017
Revision Date: 20-OCT-2017

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Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for Kleinfelder at SITE #2 (STRUCTURE #2 AND #3) – BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-) in Greensboro, NC. The program consisted of 12 cone penetration tests (CPTu) and 12 flat plate dilatometer tests (DMT) at locations selected and labeled under the direction of Kleinfelder personnel. The purpose of the program was to evaluate existing site conditions.

Project Information

Project	
Client	Kleinfelder
Project	SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
ConeTec project number	16-54112

A map from Google Earth including the CPT and DMT test locations is presented below.

Rig Description	Deployment System	Test Type
25 Ton CPT Truck Rig	Integrated CPT Ramset	CPTu, DMT

Coordinates		
Test Type	Collection Method	EPSG Number
CPTu, DMT	Handheld GPS	4326

Cone Penetration Test (CPT)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test
Tip and sleeve data offset	0.1 meter This has been accounted for in the CPT data files

Cone Penetrometers Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm^2)	Sleeve Area (cm^2)	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (psi)
367:T1500F15U500	AD367	15	225	1500	15	500
Cone 367 was used for all CPT soundings						

Interpretation Tables	
Additional information	The Soil Behaviour Type (SBT) classification chart (Robertson et al., 1986 presented by Lunne, Robertson and Powell, 1997) was used to classify the soil for this project. A detailed set of CPT interpretations were generated and are provided in Excel format files in the release folder. The CPT interpretations are based on values of corrected tip (q_t), sleeve friction (f_s) and pore pressure (u_2) averaged over a user specified interval of 20 cm. Soils were classified as either drained or undrained based on the Soil Behaviour Type (SBT) classification chart (Robertson et al., 1986 presented by Lunne, Robertson and Powell, 1997).

Flat Plate Dilatometer Test (DMT)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test
Phreatic surface determination	The phreatic surface is assumed not to be encountered within sounding exploration depth

Limitations

This report has been prepared for the exclusive use of Kleinfelder (Client) for the project titled "SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)". The report's contents may not be relied upon by any other party without the express written permission of ConeTec Inc. (ConeTec). ConeTec has provided site investigation services, prepared the factual data reporting, and provided geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

The information presented in the report document and the accompanying data set pertain to the specific project, site conditions and objectives described to ConeTec by the Client. In order to properly understand the factual data, assumptions and calculations, reference must be made to the documents provided and their accompanying data sets, in their entirety.

The cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd. of Richmond, British Columbia, Canada.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and a geophone sensor for recording seismic signals. All signals are amplified down hole within the cone body and the analog signals are sent to the surface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm^2 and 15 cm^2 tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table presented in the first Appendix. The 15 cm^2 penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm^2 piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 mm diameter over a length of 32 mm with tapered leading and trailing edges) located at a distance of 585 mm above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u_2" position (ASTM Type 2). The filter is 6 mm thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current ASTM D5778 standard. ConeTec's calibration criteria also meet or exceed those of the current ASTM D5778 standard. An illustration of the piezocone penetrometer is presented in Figure CPTu.

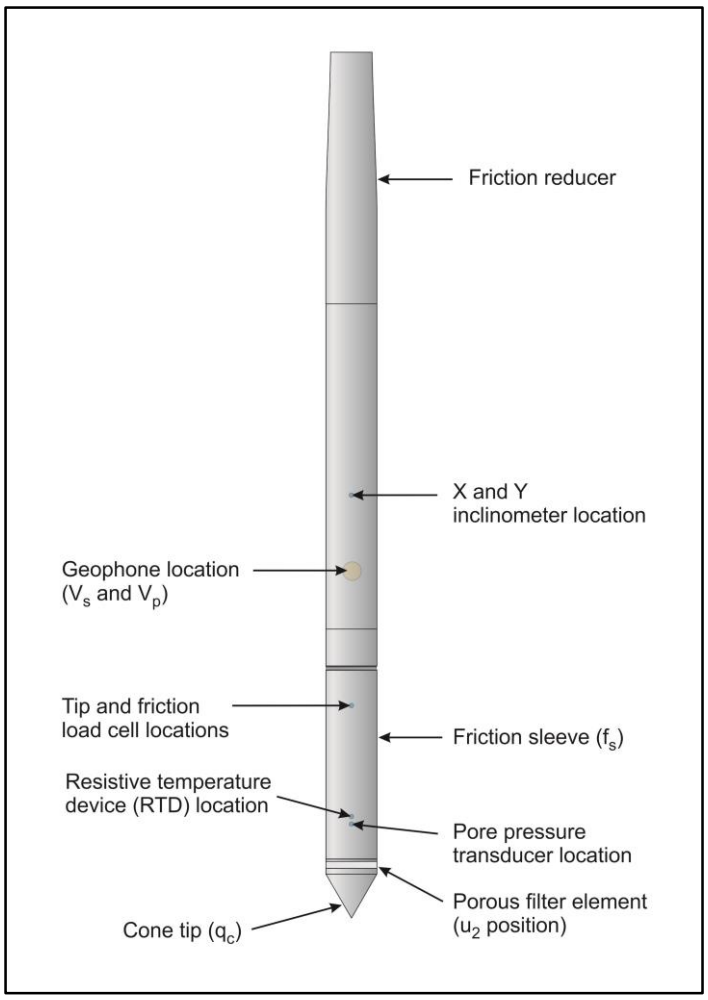

Figure CPTu. Piezocone Penetrometer (15 cm^2)

The ConeTec data acquisition systems consist of a Windows based computer and a signal conditioner and power supply interface box with a 16 bit (or greater) analog to digital (A/D) converter. The data is recorded at fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording intervals are either 2.5 cm or 5.0 cm depending on project requirements; custom recording intervals are possible. The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance (q_c)
- Sleeve friction (f_s)
- Dynamic pore pressure (u)
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPT operating procedures which are in general accordance with the current ASTM D5778 standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with either glycerin or silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of 2 cm/s, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil or glycerin under vacuum pressure prior to use
- Recorded baselines are checked with an independent multi-meter
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with ASTM standards

The interpretation of piezocone data for this report is based on the corrected tip resistance (q_t), sleeve friction (f_s) and pore water pressure (u). The interpretation of soil type is based on the correlations developed by Robertson (1990) and Robertson (2009). It should be noted that it is not always possible to accurately identify a soil type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

The recorded tip resistance (q_c) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance (q_t) according to the following expression presented in Robertson et al, 1986:

$$q_t = q_c + (1\text{-}a) \bullet u_2$$

where: q_t is the corrected tip resistance
q_c is the recorded tip resistance
u_2 is the recorded dynamic pore pressure behind the tip (u_2 position)
a is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction (f_s) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure (u) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio (Rf) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high

friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

A summary of the CPTu soundings along with test details and individual plots are provided in the appendices. A set of interpretation files were generated for each sounding based on published correlations and are provided in Excel format in the data release folder. Information regarding the interpretation methods used is also included in the data release folder.

For additional information on CPTu interpretations, refer to Robertson et al. (1986), Lunne et al. (1997), Robertson (2009), Mayne (2013, 2014) and Mayne and Peuchen (2012).

The cone penetration test is halted at specific depths to carry out pore pressure dissipation (PPD) tests, shown in Figure PPD-1. For each dissipation test the cone and rods are decoupled from the rig and the data acquisition system measures and records the variation of the pore pressure (u) with time (t).

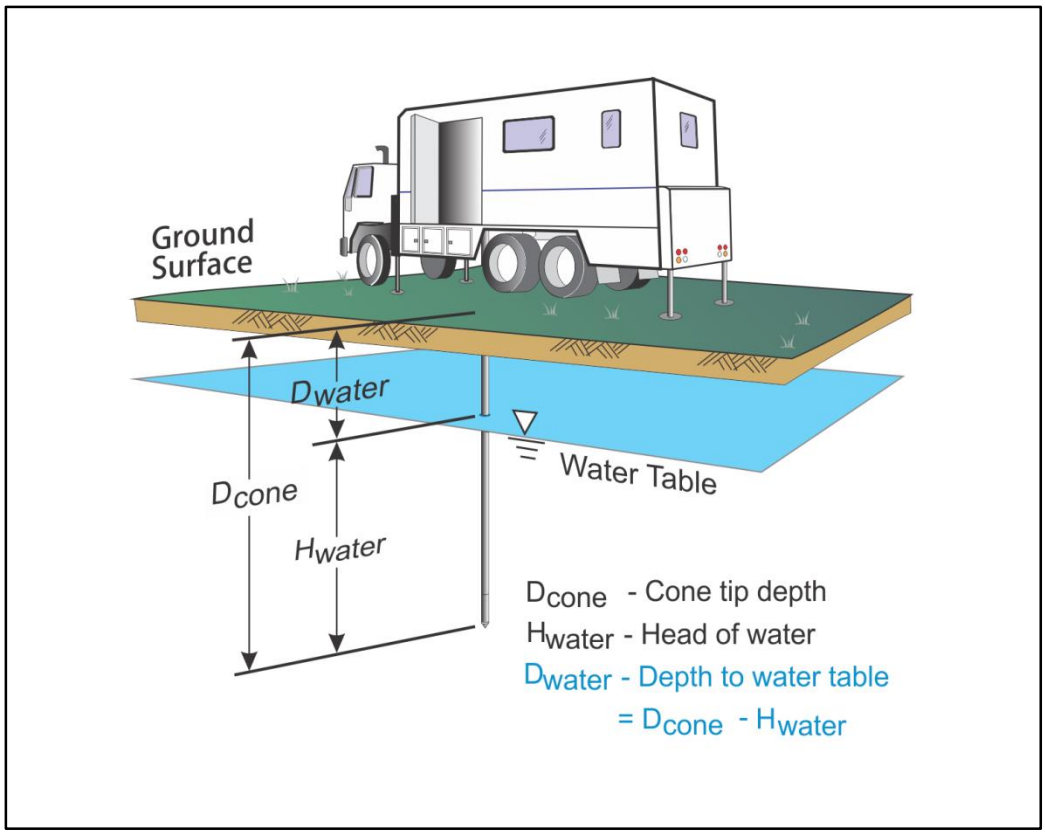

Figure PPD-1. Pore pressure dissipation test setup

Pore pressure dissipation data can be interpreted to provide estimates of ground water conditions, permeability, consolidation characteristics and soil behavior.

The typical shapes of dissipation curves shown in Figure PPD-2 are very useful in assessing soil type, drainage, in situ pore pressure and soil properties. A flat curve that stabilizes quickly is typical of a freely draining sand. Undrained soils such as clays will typically show positive excess pore pressure and have long dissipation times. Dilative soils will often exhibit dynamic pore pressures below equilibrium that then rise over time. Overconsolidated fine-grained soils will often exhibit an initial dilatory response where there is an initial rise in pore pressure before reaching a peak and dissipating.

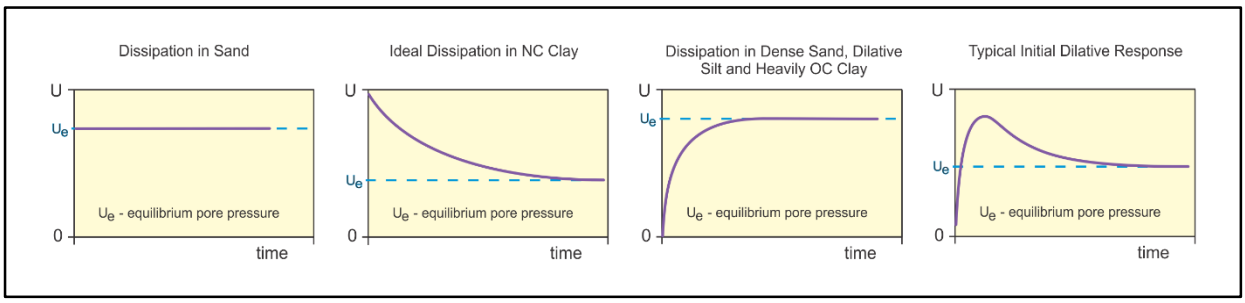

Figure PPD-2. Pore pressure dissipation curve examples

In order to interpret the equilibrium pore pressure (u_{eq}) and the apparent phreatic surface, the pore pressure should be monitored until such time as there is no variation in pore pressure with time as shown for each curve of Figure PPD-2.

In fine grained deposits the point at which 100% of the excess pore pressure has dissipated is known as t_{100}. In some cases this can take an excessive amount of time and it may be impractical to take the dissipation to t_{100}. A theoretical analysis of pore pressure dissipations by Teh and Houlsby (1991) showed that a single curve relating degree of dissipation versus theoretical time factor (T*) may be used to calculate the coefficient of consolidation (c_h) at various degrees of dissipation resulting in the expression for c_h shown below.

$$c_h = \frac{T^* \cdot a^2 \cdot \sqrt{I_r}}{t}$$

Where:

T* is the dimensionless time factor (Table Time Factor)
a is the radius of the cone
I_r is the rigidity index
t is the time at the degree of consolidation

Table Time Factor. T* versus degree of dissipation (Teh and Houlsby, 1991)

Degree of Dissipation (%)	20	30	40	50	60	70	80
T* (u_2)	0.038	0.078	0.142	0.245	0.439	0.804	1.60

The coefficient of consolidation is typically analyzed using the time (t_{50}) corresponding to a degree of dissipation of 50% (u_{50}). In order to determine t_{50}, dissipation tests must be taken to a pressure less than u_{50}. The u_{50} value is half way between the initial maximum pore pressure and the equilibrium pore pressure value, known as u_{100}. To estimate u_{50}, both the initial maximum pore pressure and u_{100} must be known or estimated. Other degrees of dissipations may be considered, particularly for extremely long dissipations.

At any specific degree of dissipation the equilibrium pore pressure (u at t_{100}) must be estimated at the depth of interest. The equilibrium value may be determined from one or more sources such as measuring the value directly (u_{100}), estimating it from other dissipations in the same profile, estimating the phreatic surface and assuming hydrostatic conditions, from nearby soundings, from client provided information, from site observations and/or past experience, or from other site instrumentation.

For calculations of c_h (Teh and Houlsby, 1991), t_{50} values are estimated from the corresponding pore pressure dissipation curve and a rigidity index (I_r) is assumed. For curves having an initial dilatory response in which an initial rise in pore pressure occurs before reaching a peak, the relative time from the peak value is used in determining t_{50}. In cases where the time to peak is excessive, t_{50} values are not calculated.

Due to possible inherent uncertainties in estimating I_r, the equilibrium pore pressure and the effect of an initial dilatory response on calculating t_{50}, other methods should be applied to confirm the results for c_h.

Additional published methods for estimating the coefficient of consolidation from a piezocone test are described in Burns and Mayne (1998, 2002), Jones and Van Zyl (1981), Robertson et al. (1992) and Sully et al. (1999).

A summary of the pore pressure dissipation tests and dissipation plots are presented in the relevant appendix.

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Teh, C.I., and Houlsby, G.T., 1991, "An analytical study of the cone penetration test in clay", Geotechnique, 41(1): 17-34.

Flat plate dilatometer tests (DMT) are conducted using a flat steel blade with a thin, expandable, circular membrane mounted on one surface, a control unit and a compressed gas (typically nitrogen) supply. A photo of the system is presented in Figure DMT-1.

The dilatometer blade is connected to the up-hole control box by a pneumatic tube with an inner conductor wire. The tube is threaded through a set of steel push rods. The control unit has pressure gauges, an audio-visual signal, a gas flow control and vent valve. A syringe is used to quantify the stiffness of the blade membrane.

Figure DMT-1. Flat plate dilatometer system
(Marchetti, http://www.marchetti-dmt.it/pagespictures/blade&case.htm)

Prior to conducting a DMT profile, the blade membrane stiffness is recorded according to the current ASTM D6635 specifications and the system is assembled and tested for any leaks.

The dilatometer blade is pushed into the ground to the desired depth from surface or through a cased hole using a CPT rig or a drill rig. The blade is inflated using compressed gas and up to three pressure readings are recorded, the A reading at zero deflection (lift-off) and the B reading when a deflection of 1.1 mm has been achieved. An optional C reading representing the closing pressure can be recorded by slowly deflating the membrane soon after B is reached. The blade is advanced to subsequent depths

and the test procedures are repeated at each test depth, up to the sounding termination depth. After the blade is retracted membrane stiffness values are recorded.

The dilatometer operating procedures are performed in general accordance with the current ASTM D6635 standard.

The interpretation of the dilatometer data is based on the pressure related parameters p_o and p_1 that are derived from the recorded A and B pressure values corrected for membrane stiffness and the gauge zero offset. Figure DMT-2 shows p_o and p_1.

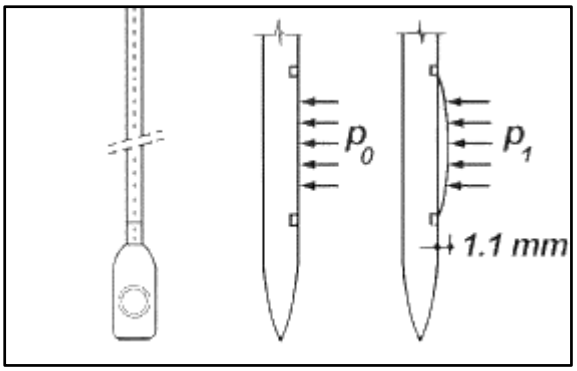

Figure DMT-2. Flat plate dilatometer p_0 and p_1
(Marchetti, http://www.marchetti-dmt.it/)

The A reading is the pressure required to lift-off the membrane while the B reading is the pressure required to move the center of the membrane by 1.1 mm. The C pressure measurement is the pressure at which the membrane returns to the A position and is used to estimate equilibrium pore pressures in sand. The A and B pressure readings are corrected by the membrane stiffness values at the respective membrane deflections that are recorded before and after each test location.

The empirical correlations use the parameters p_0, p_1 and p_2 derived from the A, B and C readings accounting for membrane stiffness and gauge offset. These parameters provide the basic values needed in the empirical correlations developed by Marchetti et al. (2001). The equations for these parameters are presented in the relevant appendix.

The p_o, p_1 and p_2 parameters are used to calculate the DMT indices, material index (I_D), horizontal stress index (K_D), and dilatometer modulus (E_D). Soil type is inferred from the material index. Clays generally have a material index of less than 0.6. The material index for silts is generally between 0.6 and 1.8, while sands generally exhibit a material index greater than 1.8. While K_D and E_D have limited direct use in geotechnical design, they are critical for determining parameters that are required for most design calculations such as earth pressure coefficient (K_o), undrained shear strength (S_u), and over consolidation ratio (OCR).

A summary of the tests including coordinates and estimated phreatic surface, along with plots and tabular results are provided in the relevant appendices. The calculated geotechnical parameters presented are based on published empirical correlations and are provided only as a first approximation. No warranty, expressed or implied, is made to the accuracy of these estimated geotechnical parameters.

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Marchetti, S., n.d, [Photographs of DMT and SDMT system], Retrieved from http://www.marchetti-dmt.it/pagespictures/blade&case.htm.

Marchetti, S., n.d, [Illustration of DMT blade, po and p1], http://www.marchetti-dmt.it/.

The appendices listed below are included in the report:

- Cone Penetration Test Summary and Standard Cone Penetration Test Plots
- Pore Pressure Dissipation Summary and Pore Pressure Dissipation Plots
- Flat Plate Dilatometer Test Summary, Plots and Tabular Results

Cone Penetration Test Summary and Standard Cone Penetration Test Plots

Job No:	16-54112
Client:	Kleinfelder
Project:	SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Start Date:	19-Dec-2016
End Date:	21-Dec-2016

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Northing[2] (feet)	Easting (feet)	Refer to Notation Number
STR2_EB1_B1	16-54112_CP STR2_EB1_B1	19-Dec-2016	367:T1500F15U500		34.0	874653	1777563	1
STR2_EB1_B2	16-54112_CP STR2_EB1_B2	19-Dec-2016	367:T1500F15U500		28.5	874584	1777560	1
STR2_EB1_B3	16-54112_CP STR2_EB1_B3	19-Dec-2016	367:T1500F15U500		30.5	874621	1777567	1
STR2_EB2_B1	16-54112_CP STR2_EB2_B1	19-Dec-2016	367:T1500F15U500		28.1	874655	1777453	1
STR2_EB2_B2	16-54112_CP STR2_EB2_B2	19-Dec-2016	367:T1500F15U500		29.0	874591	1777450	1
STR2_EB2_B3	16-54112_CP STR2_EB2_B3	19-Dec-2016	367:T1500F15U500		29.9	874627	1777441	1
STR3_EB1_B1	16-54112_CP STR3_EB1_B1	19-Dec-2016	367:T1500F15U500		32.8	874663	1777566	1
STR3_EB1_B2	16-54112_CP STR3_EB1_B2	19-Dec-2016	367:T1500F15U500		33.0	874724	1777577	1
STR3_EB1_B3	16-54112_CP STR3_EB1_B3	19-Dec-2016	367:T1500F15U500		32.8	874701	1777579	1
STR3_EB2_B1	16-54112_CP STR3_EB2_B1	19-Dec-2016	367:T1500F15U500		27.6	874672	1777462	1
STR3_EB2_B2	16-54112_CP STR3_EB2_B2	19-Dec-2016	367:T1500F15U500		27.9	874736	1777468	1
STR3_EB2_B3	16-54112_CP STR3_EB2_B3	19-Dec-2016	367:T1500F15U500		27.9	874716	1777445	1
Totals	12 soundings				361.9			

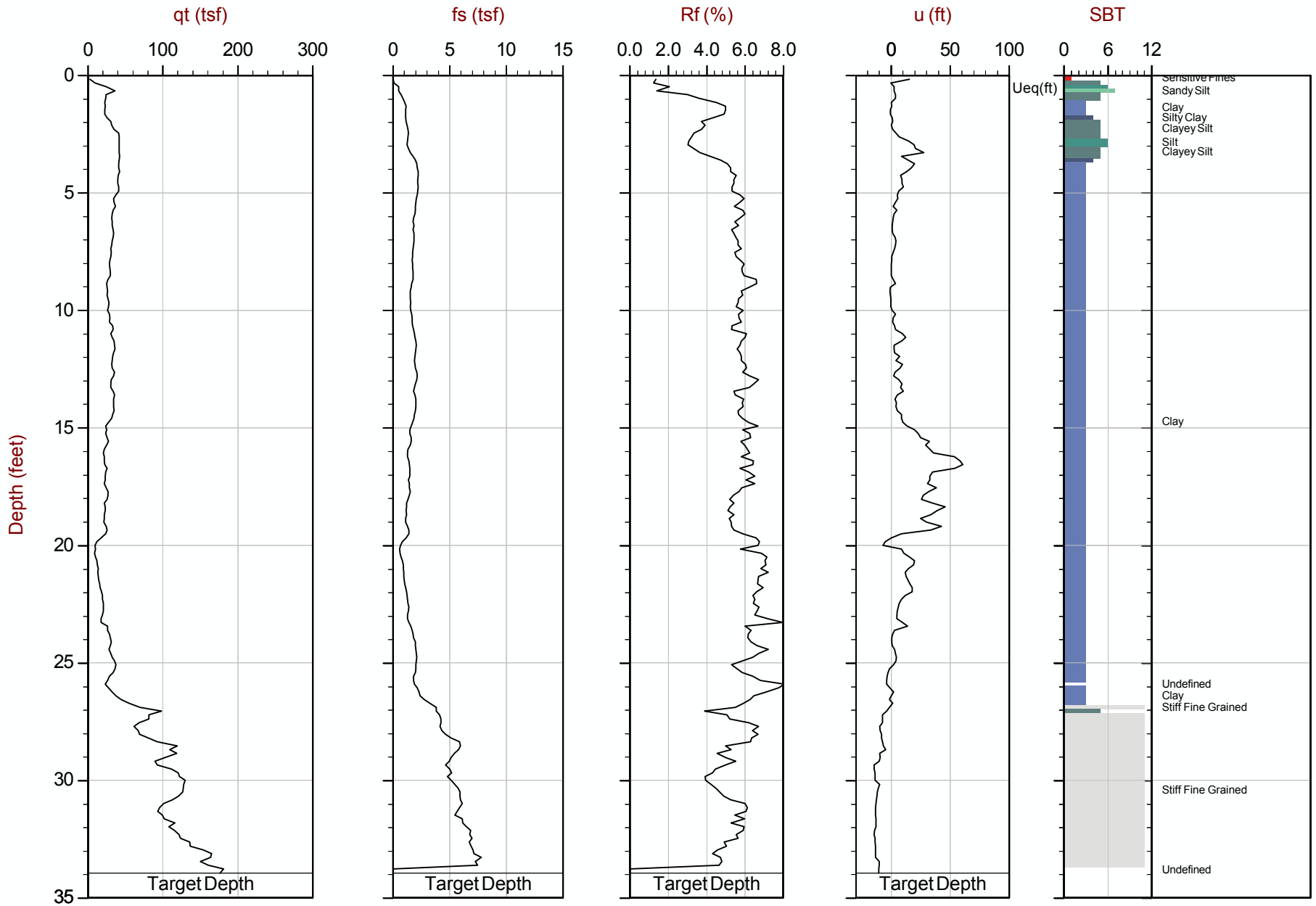
1. Phreatic surface is assumed not to be encountered within exploration depth.
2. State Plane System 3200 - North Carolina. Coordinates were provided by client.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 15:17
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR2_EB1_B1
Cone: 367:T1500F15U500



Max Depth: 10.350 m / 33.96 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB1_B1.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874653 E: 1777563 Elev: 876.9

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

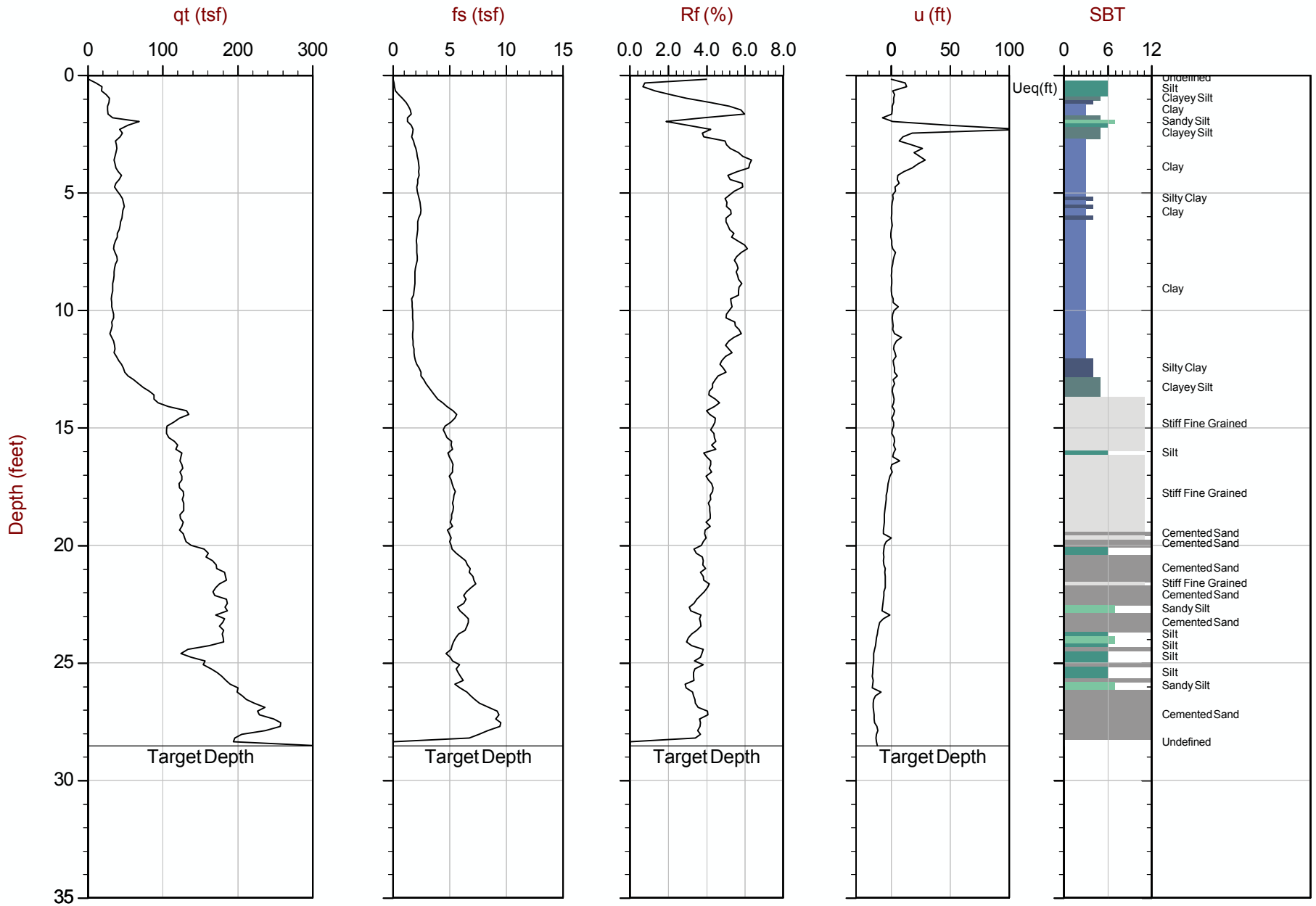
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 16:27
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR2_EB1_B2
Cone: 367:T1500F15U500



Max Depth: 8.700 m / 28.54 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB1_B2.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874584 E: 1777560 Elev: 874.1

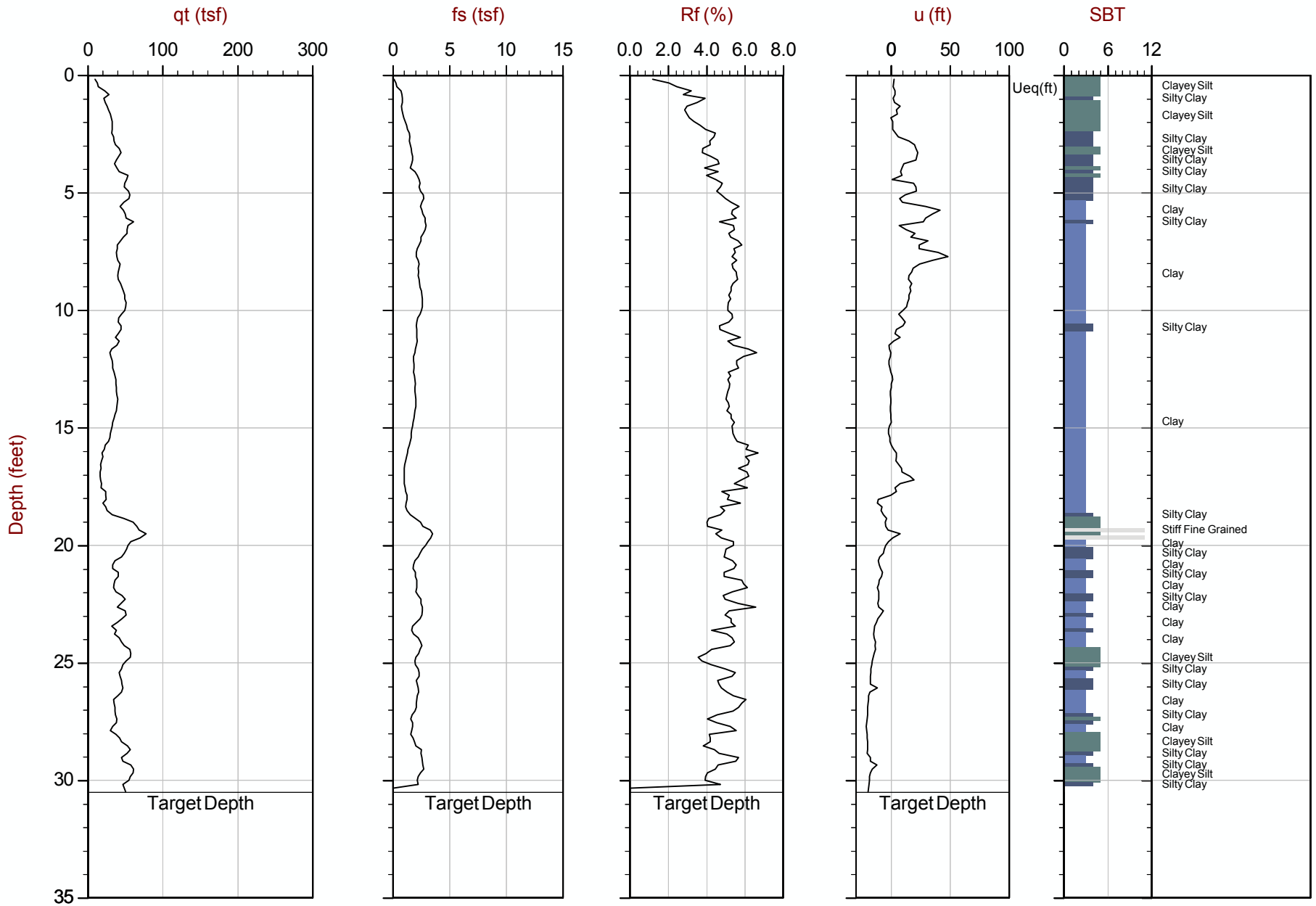
△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112 | Sounding: STR2_EB1_B3
Date: 2016-12-19 15:50 | Cone: 367:T1500F15U500
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)



Max Depth: 9.300 m / 30.51 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB1_B3.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874621 E: 1777567 Elev: 875.8

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

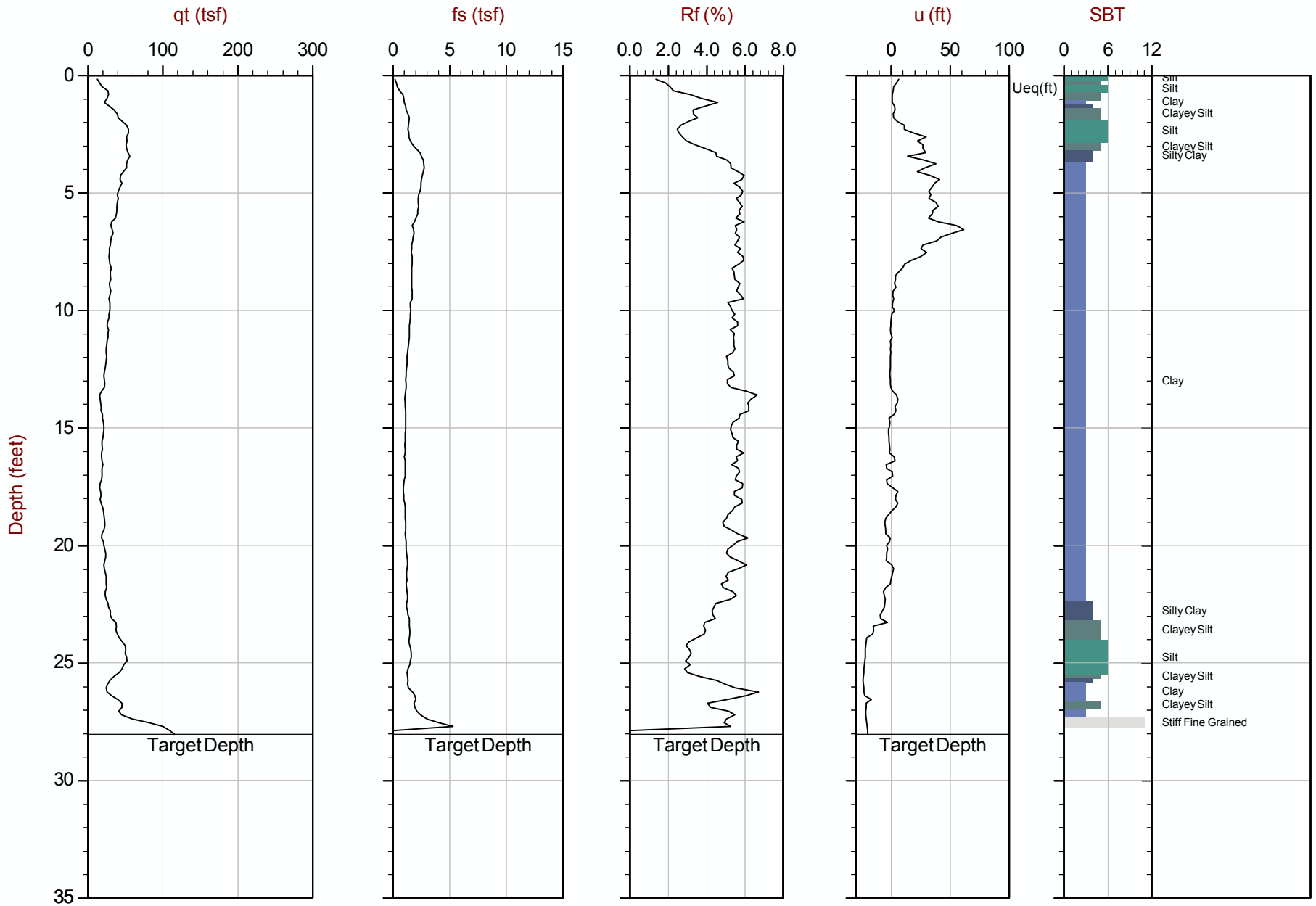
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 10:36
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR2_EB2_B1
Cone: 367:T1500F15U500



Max Depth: 8.550 m / 28.05 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB2_B1.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874655 E: 1777453 Elev: 873.0

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

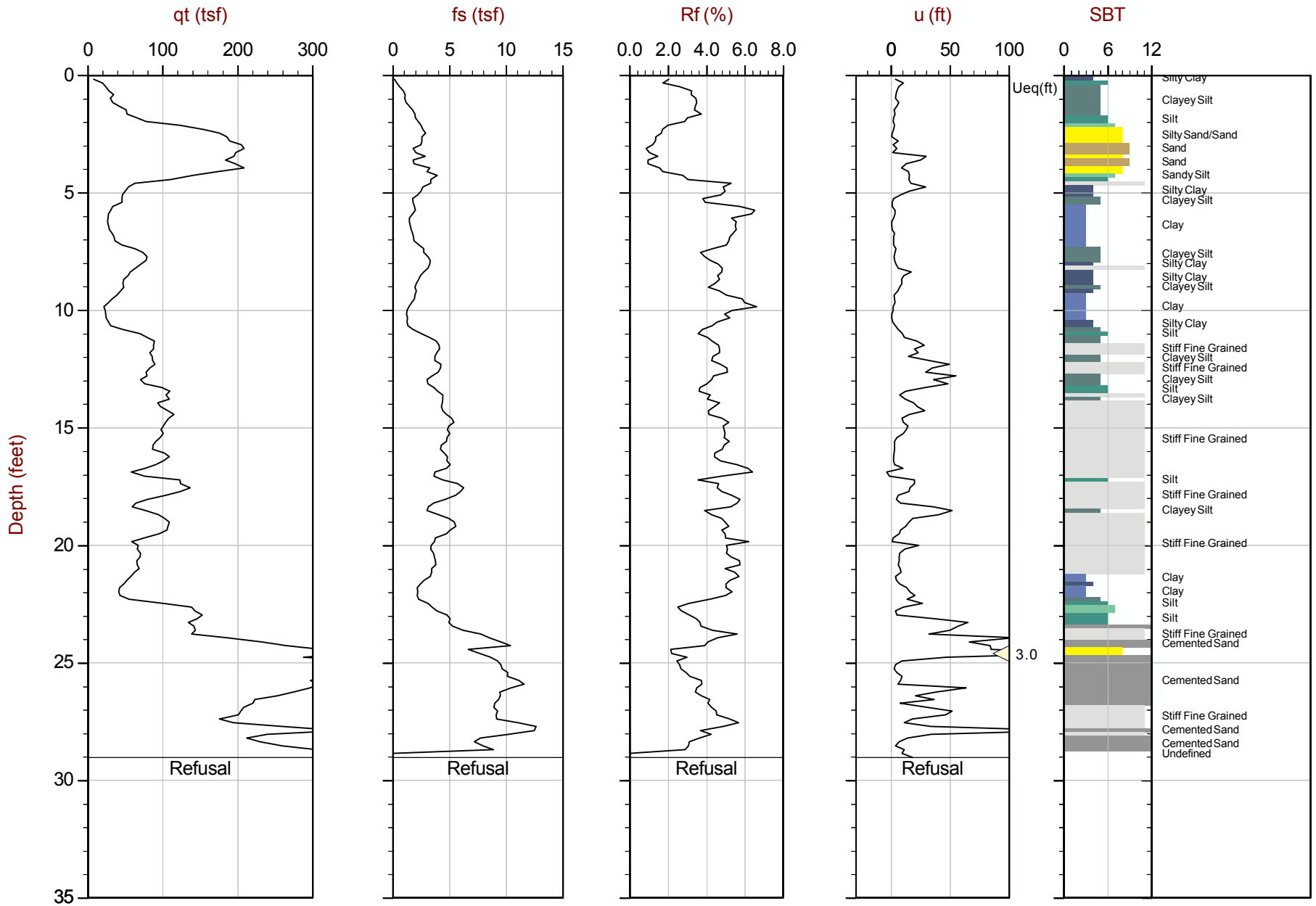
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 08:50
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR2_EB2_B2
Cone: 367:T1500F15U500



Max Depth: 8.850 m / 29.04 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB2_B2.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874591 E: 1777450 Elev: 874.0

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

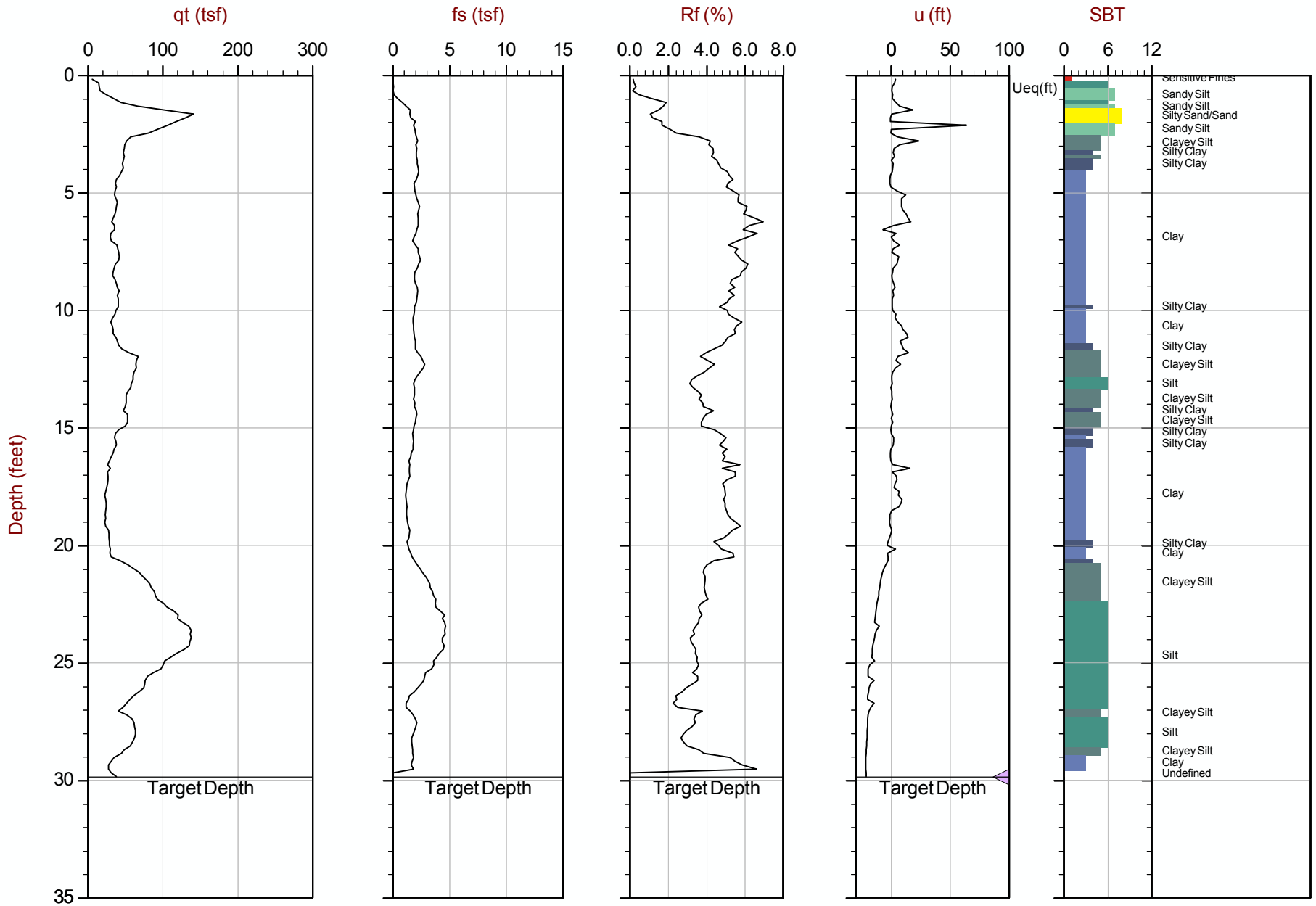
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 09:49
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR2_EB2_B3
Cone: 367:T1500F15U500



Max Depth: 9.100 m / 29.86 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR2_EB2_B3.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874627 E: 1777441 Elev: 873.4

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

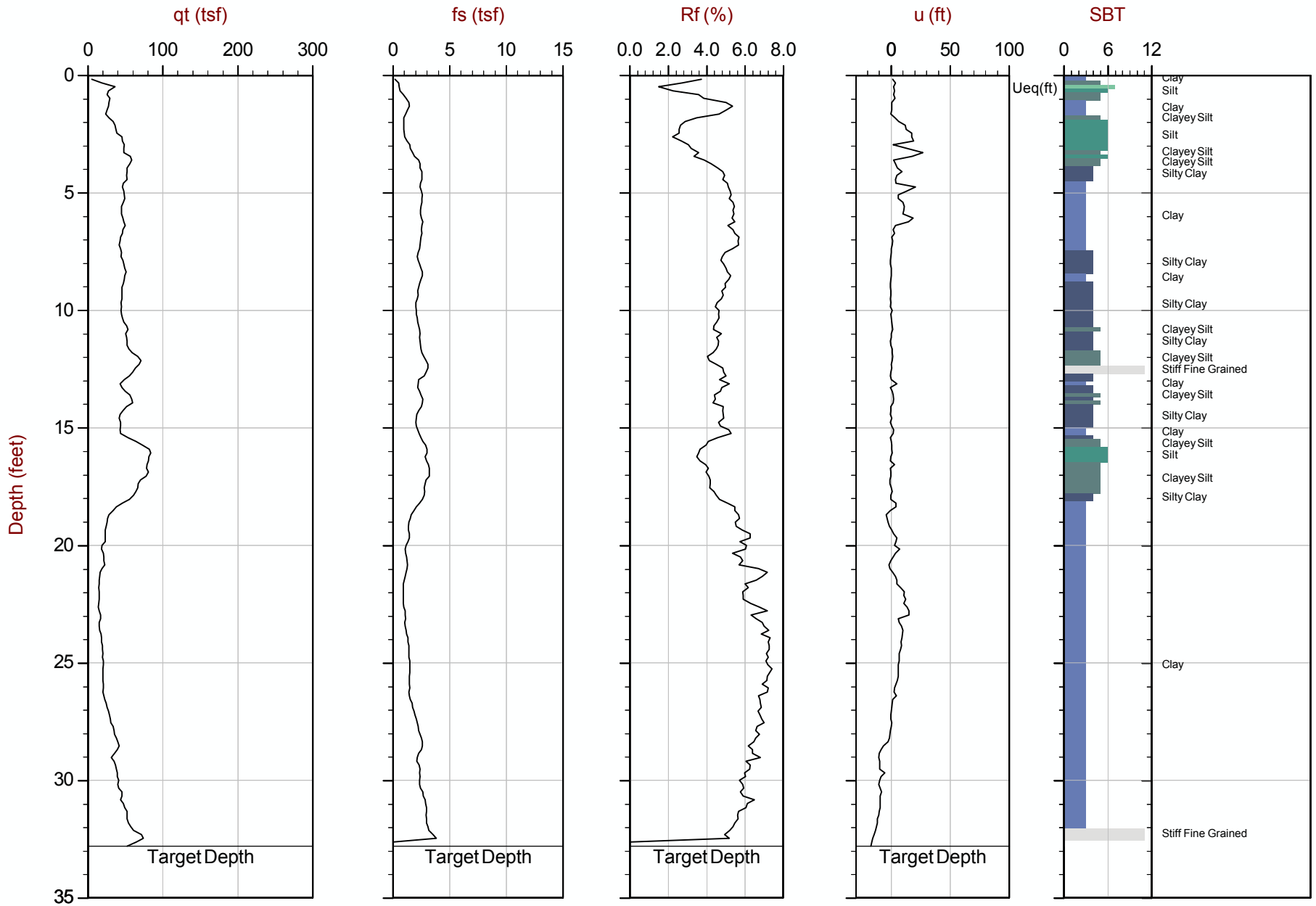
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 14:47
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR3_EB1_B1
Cone: 367:T1500F15U500



Max Depth: 10.000 m / 32.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB1_B1.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874663 E: 1777566 Elev: 877.3

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

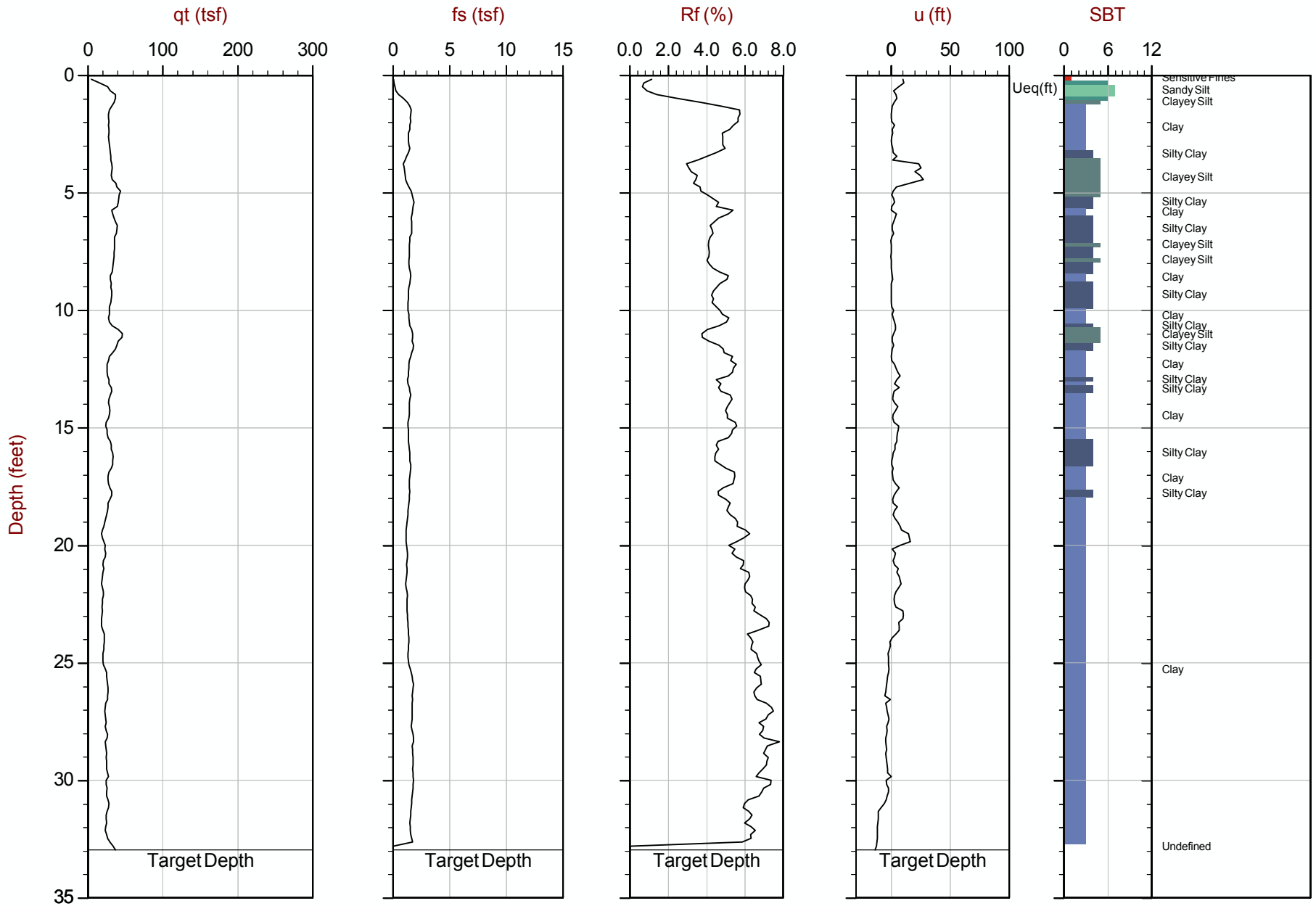
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 13:26
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR3_EB1_B2
Cone: 367:T1500F15U500



Max Depth: 10.050 m / 32.97 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB1_B2.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874724 E: 1777577 Elev: 877.4

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

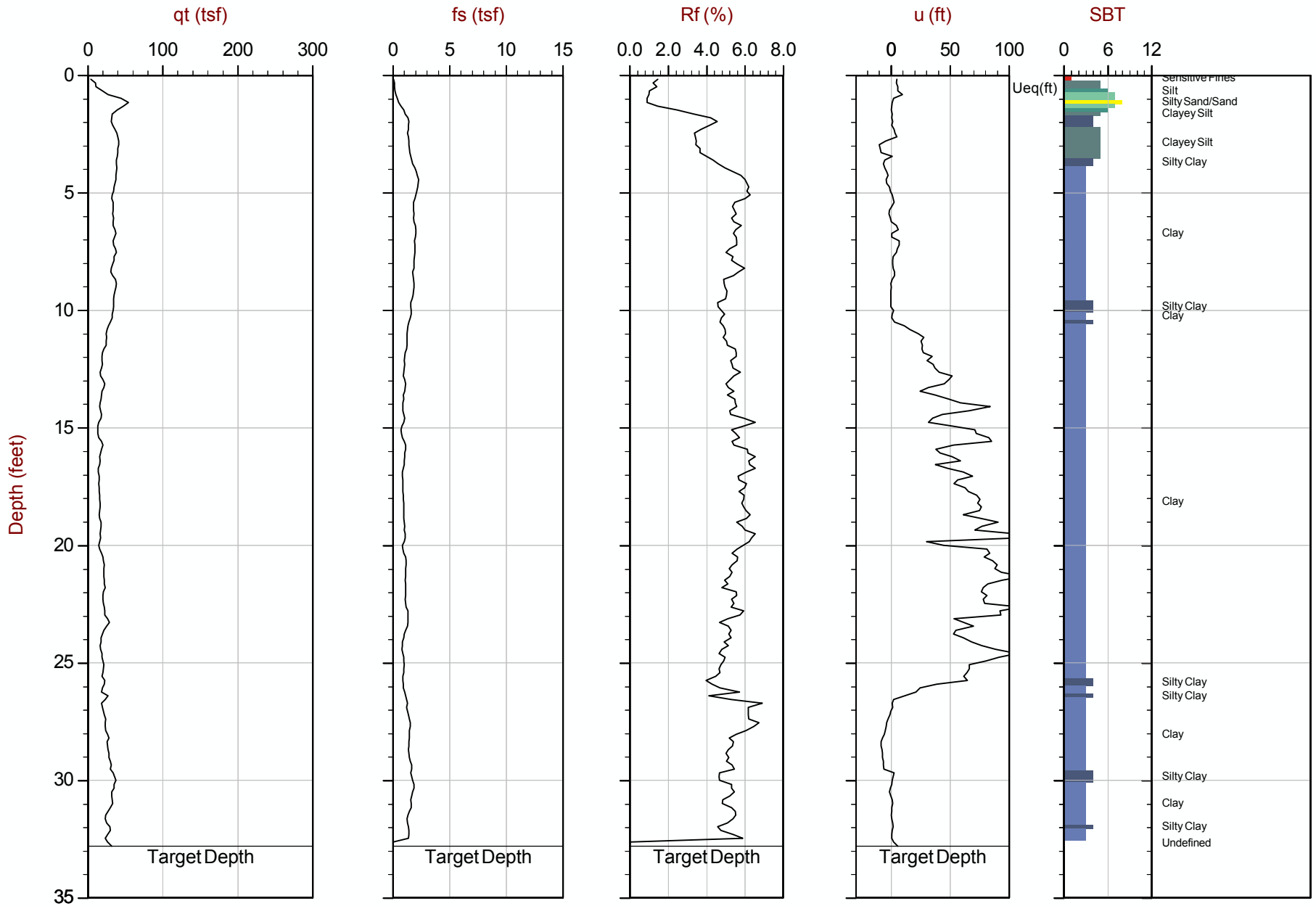
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 14:07
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR3_EB1_B3
Cone: 367:T1500F15U500



Max Depth: 10.000 m / 32.81 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB1_B3.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874701 E: 1777579 Elev: 877.4

△ Dissipation with estimated Ueq value

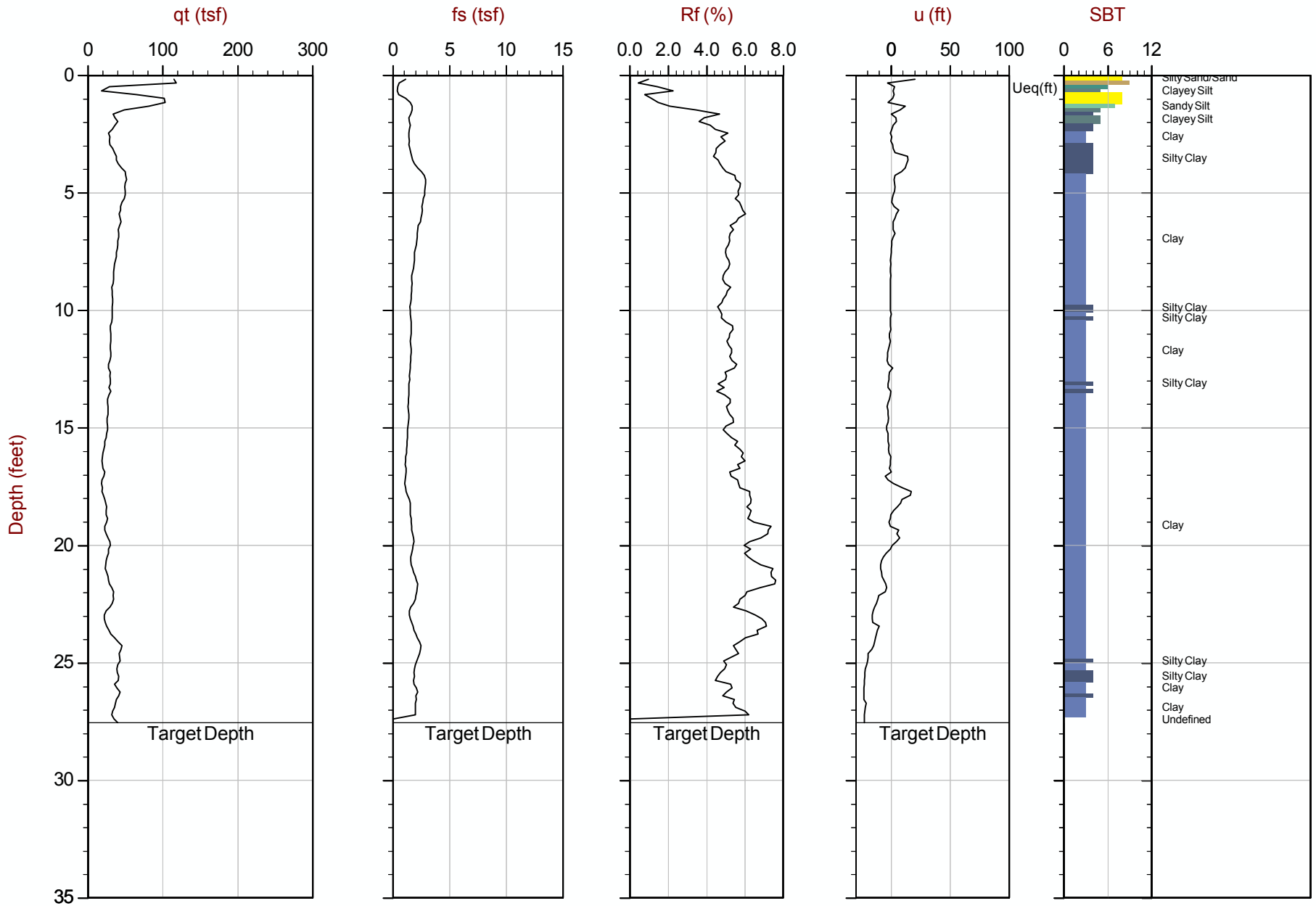
△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112 | Sounding: STR3_EB2_B1
Date: 2016-12-19 11:13 | Cone: 367:T1500F15U500
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)



Max Depth: 8.400 m / 27.56 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB2_B1.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874672 E: 1777462 Elev: 873.3

△ Dissipation with estimated Ueq value
△ Dissipation, equilibrium not achieved

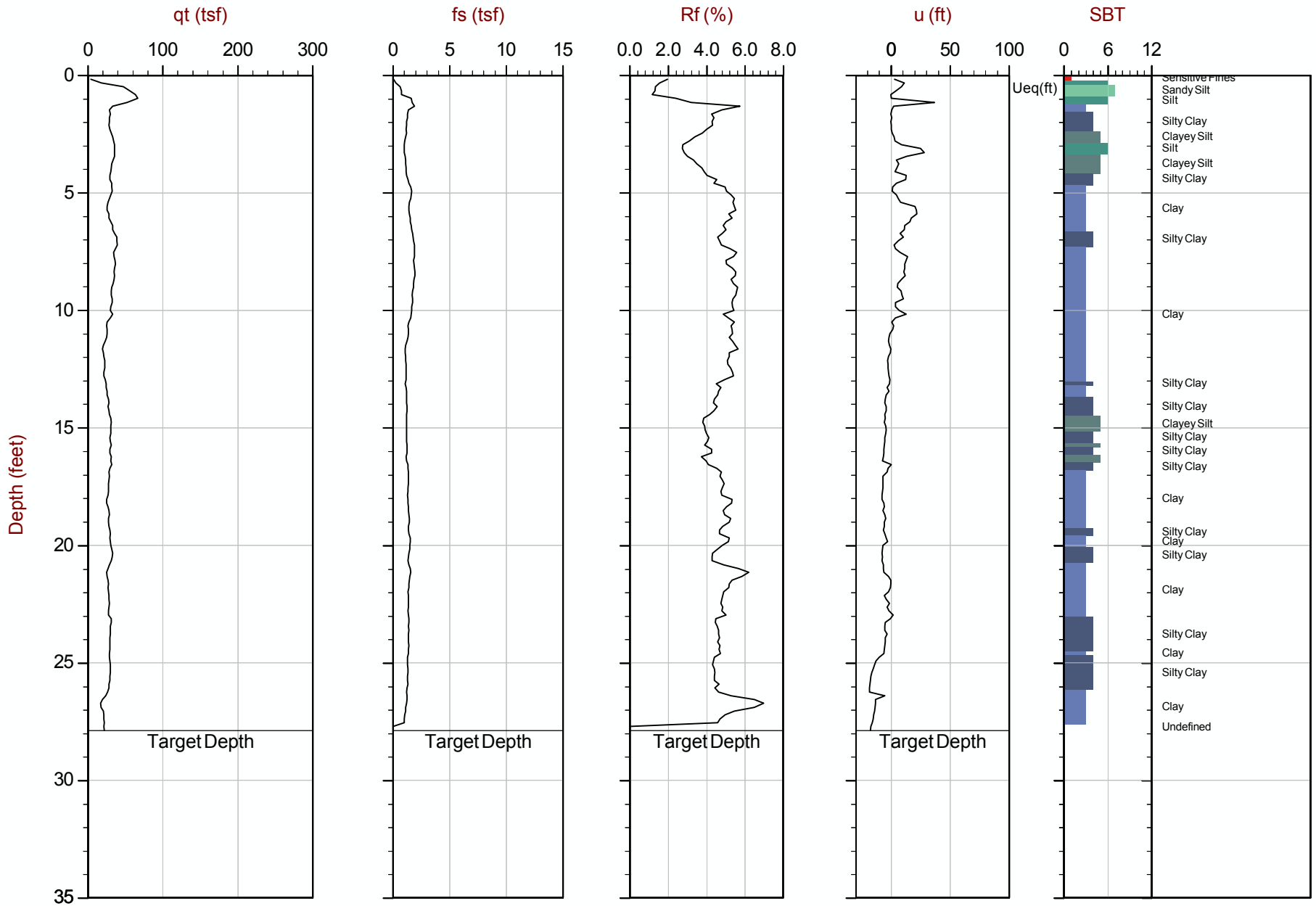
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 12:52
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR3_EB2_B2
Cone: 367:T1500F15U500



Max Depth: 8.500 m / 27.89 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB2_B2.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874736 E: 1777468 Elev: 872.5

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

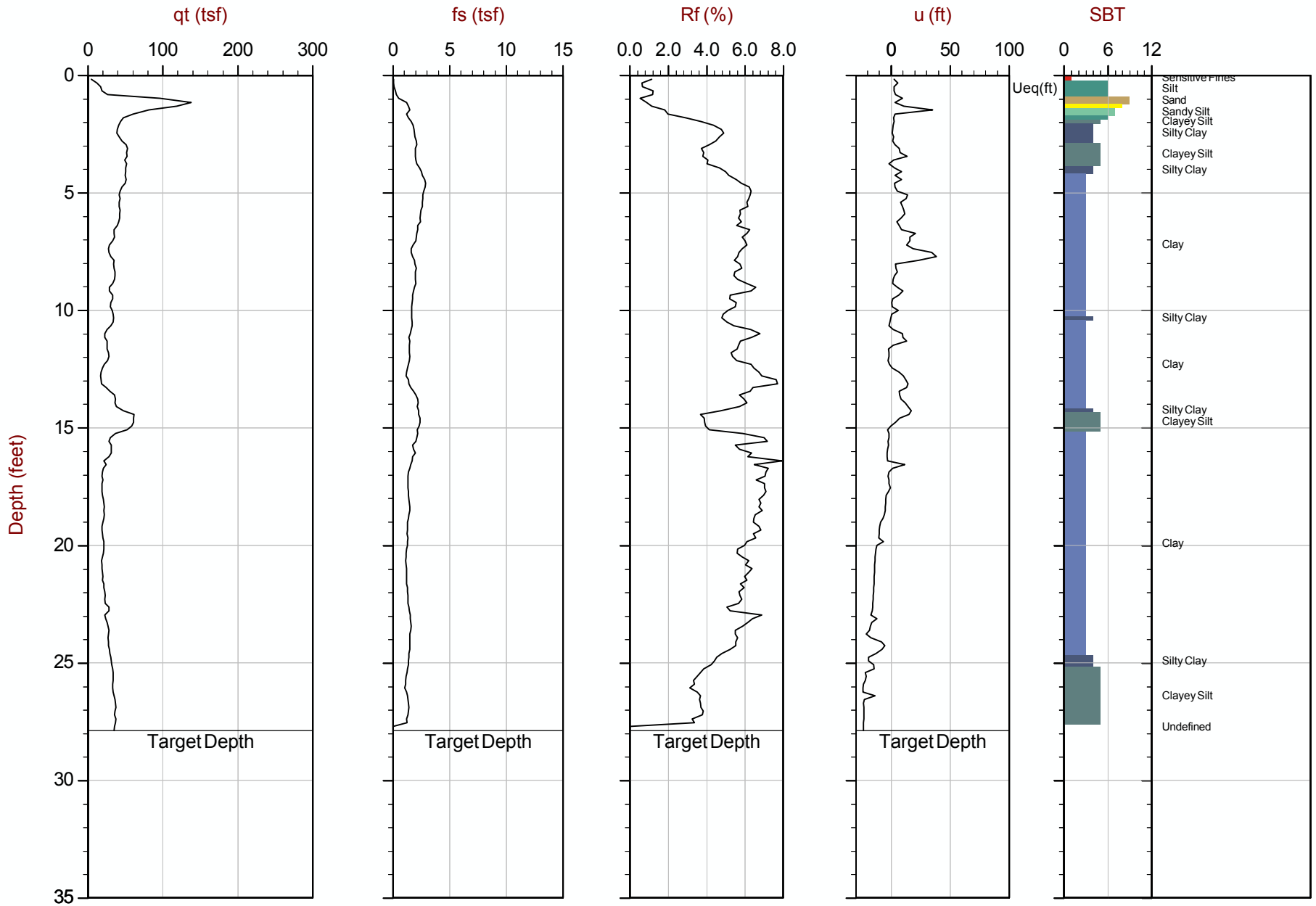
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 2016-12-19 12:09
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

Sounding: STR3_EB2_B3
Cone: 367:T1500F15U500



Max Depth: 8.500 m / 27.89 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 16-54112_CP STR3_EB2_B3.COR
Unit Wt: SBT (R&C1986)

SBT: Robertson and Campanella, 1986
Coords: N: 874716 E: 1777445 Elev: 872.2

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

CONETEC

Job No:	16-54112
Client:	Kleinfelder
Project:	SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Start Date:	19-Dec-2016
End Date:	21-Dec-2016

CPTu PORE PRESSURE DISSIPATION SUMMARY

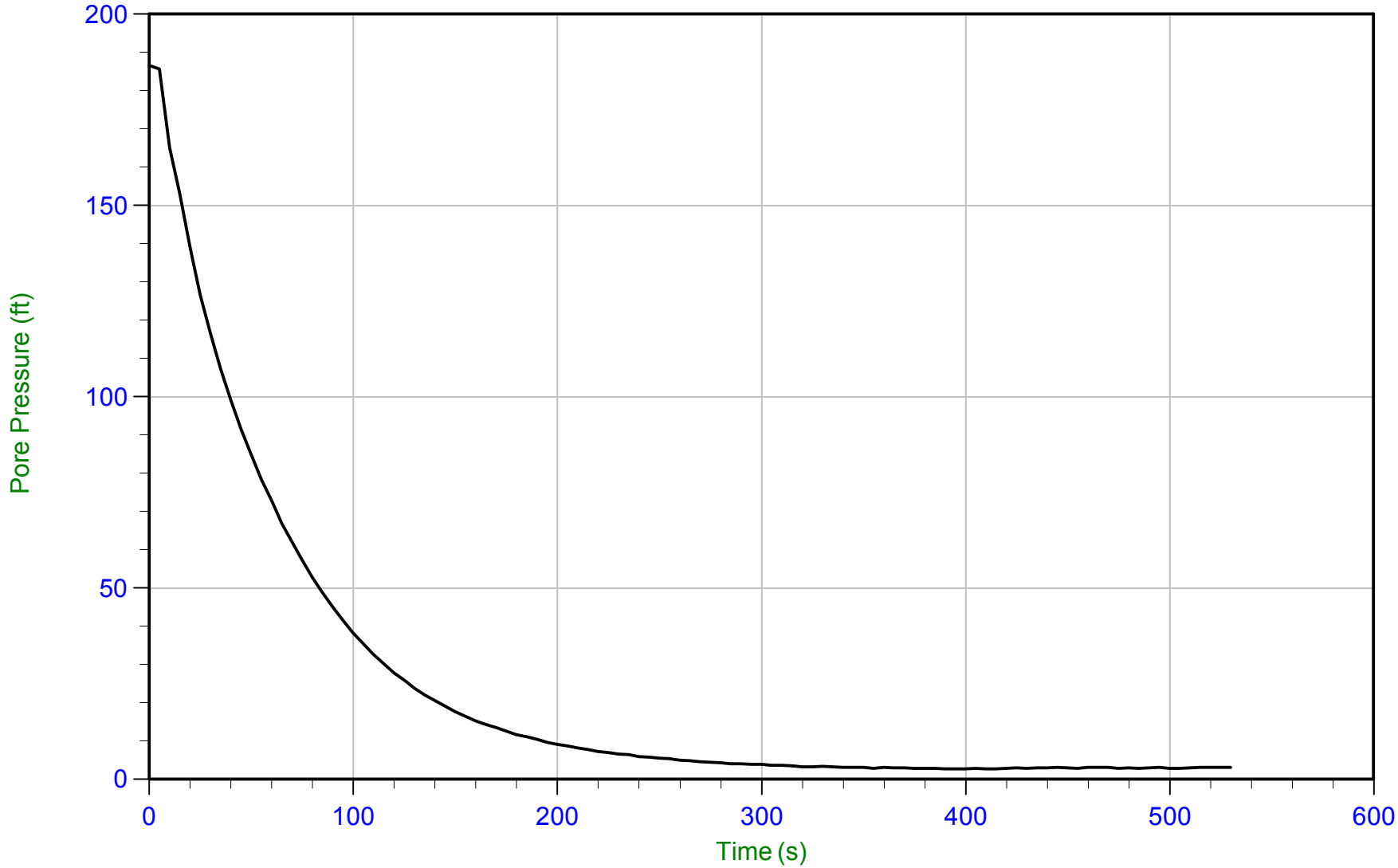
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
STR2_EB2_B2	16-54112_CP STR2_EB2_B2.PPD	15.0	530	24.6	3.0	21.6
STR2_EB2_B3	16-54112_CP STR2_EB2_B3.PPD	15.0	865	29.9		
Totals			14.4 min			

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12/19/2016 08:50
Site: SITE #2 (STRUCTURE #2 AND #3)...

Sounding: STR2_EB2_B2
Cone: 367:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54112_CP STR2_EB2_B2.PUF
Depth: 7.500 m / 24.606 ft
Duration: 530.0 s

U Min: 2.7 ft
U Max: 186.5 ft

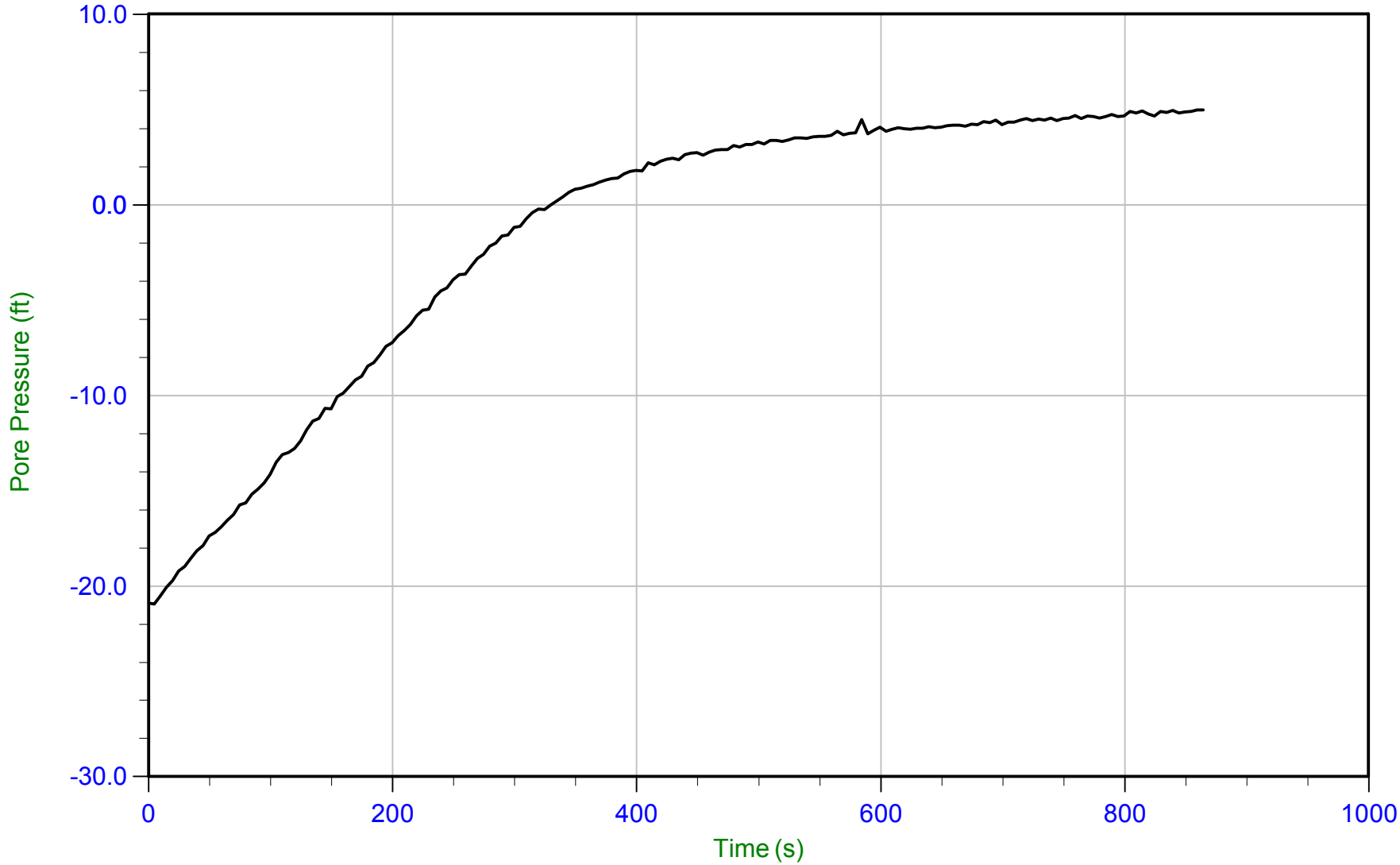
WT: 6.591 m / 21.624 ft
Ueq: 3.0 ft

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12/19/2016 09:49
Site: SITE #2 (STRUCTURE #2 AND #3)...

Sounding: STR2_EB2_B3
Cone: 367:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54112_CP STR2_EB2_B3.PUF
Depth: 9.100 m / 29.855 ft
Duration: 865.0 s

U Min: -20.9 ft
U Max: 5.0 ft

Flat Plate Dilatometer Test Summary, Plots and Tabular Results

CONETEC

Job No:	16-54112
Client:	Kleinfelder
Project:	SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Start Date:	19-Dec-2016
End Date:	21-Dec-2016

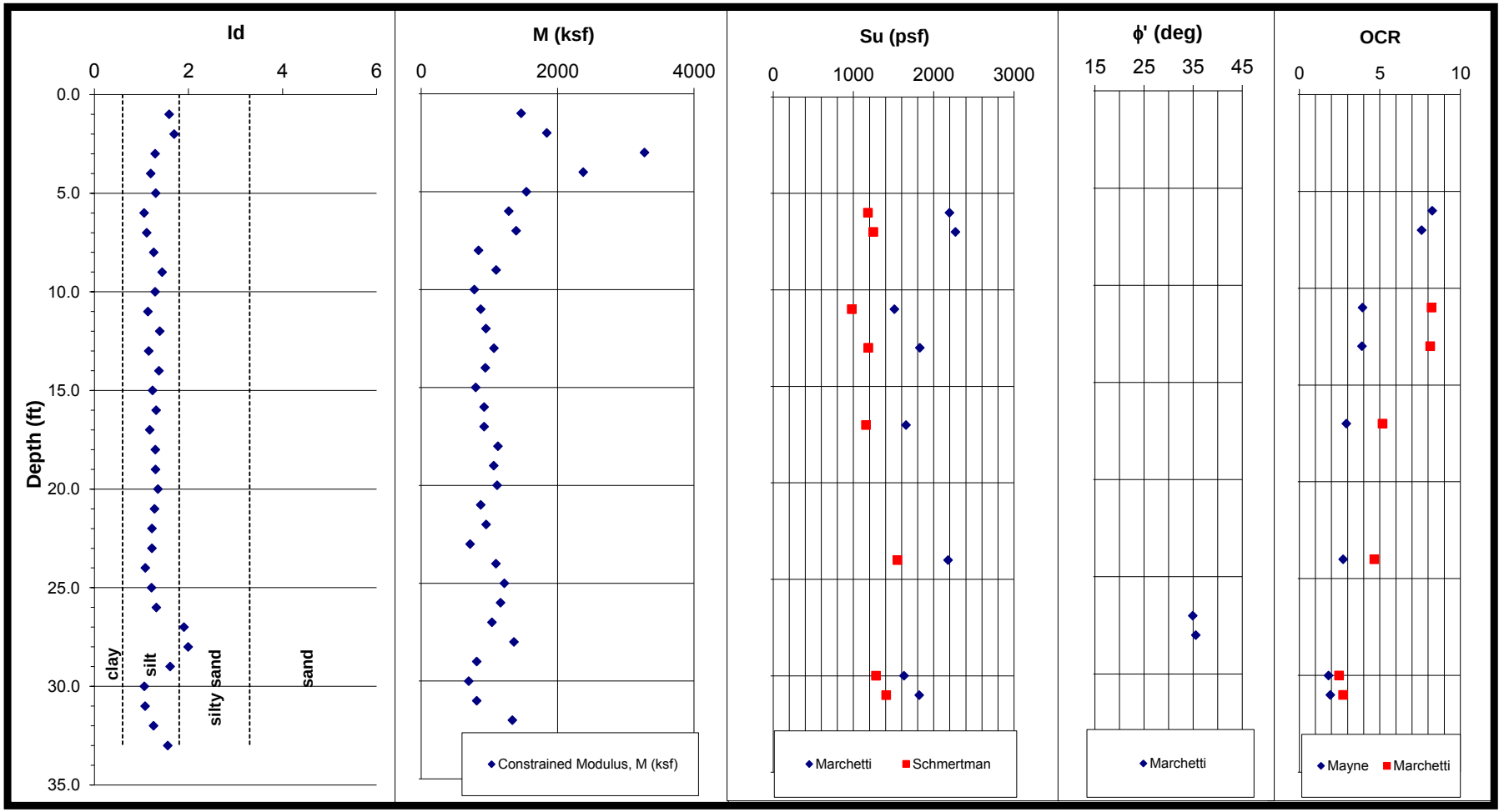
FLAT PLATE DILATOMETER TEST SUMMARY

Sounding ID	File Name	Date	Final Depth (ft)	Assumed Phreatic Surface (ft)	Northing[2] (feet)	Easting (feet)	Refer to Notation Number
STR2_EB1_B1	16-54112_DMT STR2_EB1_B1	20-Dec-2016	33		874653	1777563	1
STR2_EB1_B2	16-54112_DMT STR2_EB1_B2	20-Dec-2016	20		874584	1777560	1
STR2_EB1_B3	16-54112_DMT STR2_EB1_B3	20-Dec-2016	30		874621	1777567	1
STR2_EB2_B1	16-54112_DMT STR2_EB2_B1	21-Dec-2016	25		874655	1777453	1
STR2_EB2_B2	16-54112_DMT STR2_EB2_B2	21-Dec-2016	21		874591	1777450	1
STR2_EB2_B3	16-54112_DMT STR2_EB2_B3	21-Dec-2016	28		874627	1777441	1
STR3_EB1_B1	16-54112_DMT STR3_EB1_B1	20-Dec-2016	32		874663	1777566	1
STR3_EB1_B2	16-54112_DMT STR3_EB1_B2	20-Dec-2016	32		874724	1777577	1
STR3_EB1_B3	16-54112_DMT STR3_EB1_B3	20-Dec-2016	32		874701	1777579	1
STR3_EB2_B1	16-54112_DMT STR3_EB2_B1	21-Dec-2016	28		874672	1777462	1
STR3_EB2_B2	16-54112_DMT STR3_EB2_B2	20-Dec-2016	28		874736	1777468	1
STR3_EB2_B3	16-54112_DMT STR3_EB2_B3	21-Dec-2016	27		874716	1777445	1

1. Phreatic surface is assumed not to be encountered within exploration depth.
2. State Plane System 3200 - North Carolina. Coordinates were provided by client.

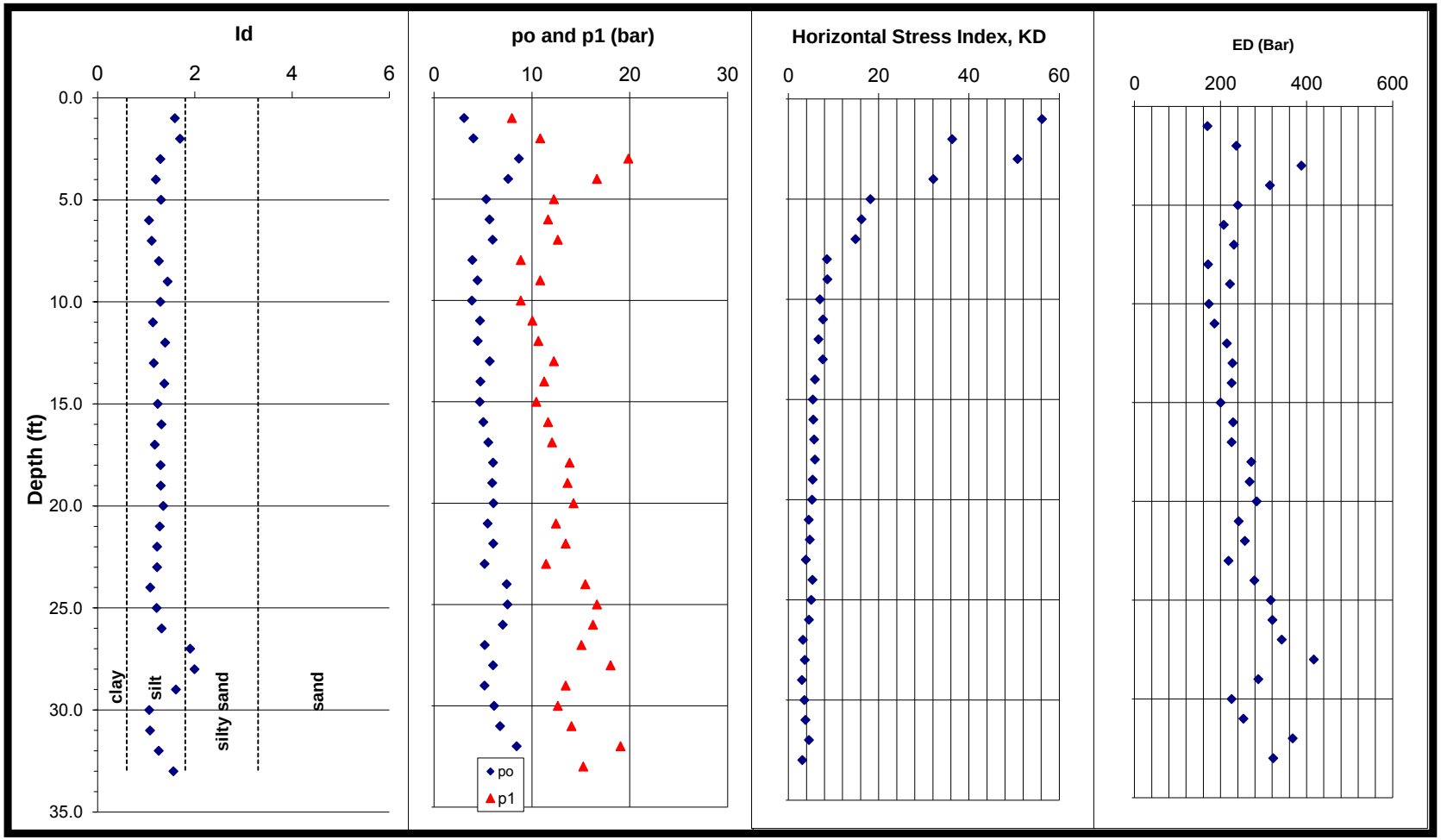
DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 AND
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR2_EB1_B1
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.2	0	0
ΔB =	0.35	0	0
Zm=	0	bar	

Northing 874653
Easting 1777563

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

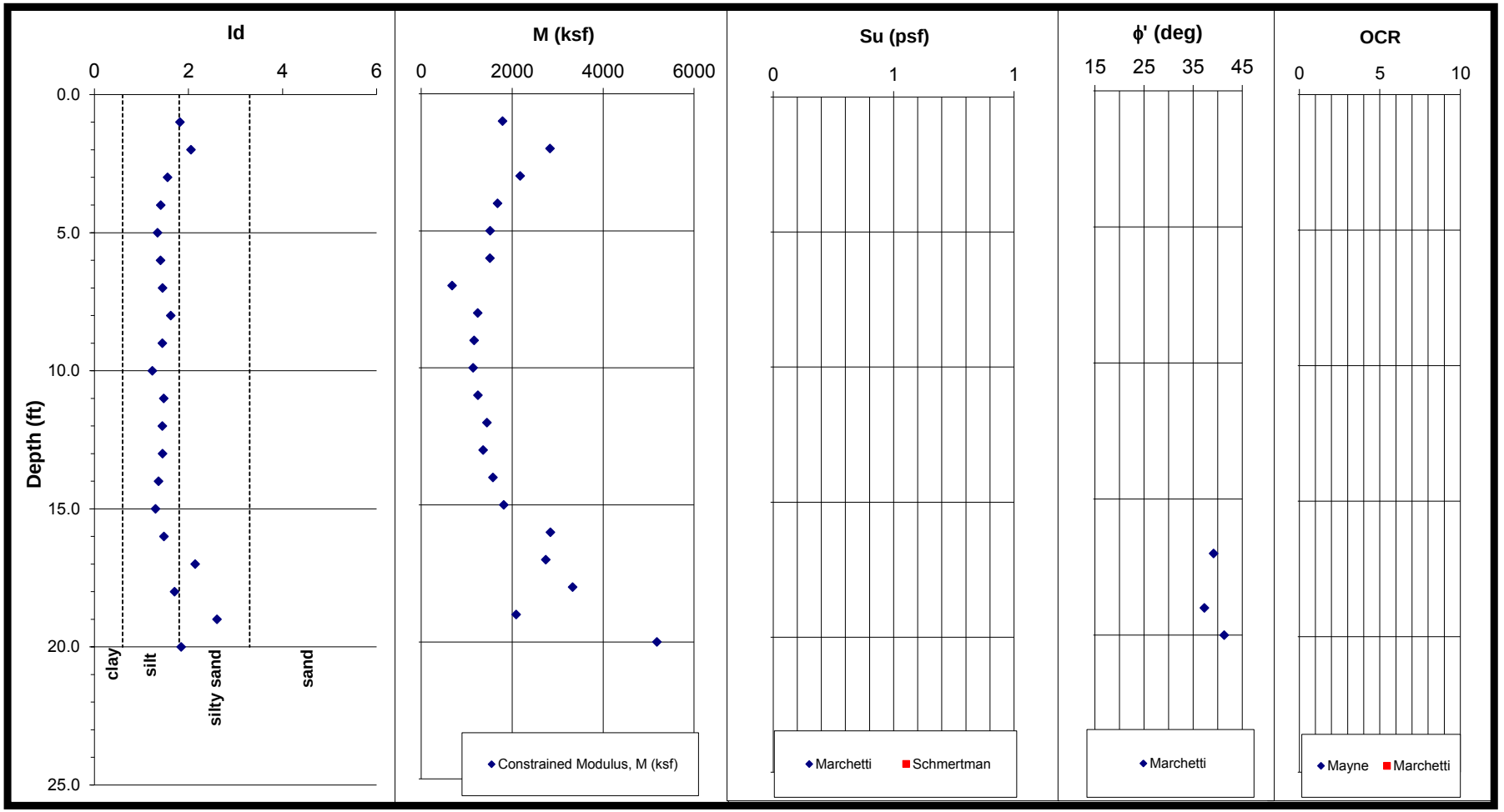
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	3.1	8.3		3.1	7.95		0	114	114	114	1.59	56.2	169					4.13	354			1463
2.0	4.15	11.2		4.0	10.85		0	117	231	231	1.70	36.3	237					3.72	495			1841
3.0	9	20.2	0	8.7	19.85		0	125	356	356	1.29	50.8	388					4.04	810			3273
4.0	7.8	17		7.6	16.65		0	123	492	492	1.20	32.1	315					3.61	658			2373
5.0	5.45	12.6		5.3	12.25		0	119	611	611	1.30	18.2	240					3.07	502			1540
6.0	5.75	12	0	5.7	11.65		0	119	730	730	1.06	16.2	208	2.5	8.3	26.2		2.96	434	2196	1183	1283
7.0	6.1	13		6.0	12.65		0	120	838	838	1.11	14.9	231	2.3	7.6	23.0		2.88	483	2271	1249	1391
8.0	3.95	9.2		3.9	8.85		0	115	953	953	1.26	8.6	171					2.35	358			840
9.0	4.55	11.2	0	4.4	10.85		0	118	1071	1071	1.44	8.7	222					2.36	464			1096
10.0	3.9	9.2		3.9	8.85		0	115	1154	1154	1.29	7.0	173					2.15	361			777
11.0	4.75	10.4		4.7	10.05		0	117	1271	1271	1.14	7.7	186	1.6	3.9	8.2		2.24	388	1512	981	871
12.0	4.55	11	0	4.5	10.65		0	117	1388	1388	1.39	6.7	215					2.11	449			948
13.0	5.8	12.6		5.7	12.25		0	119	1550	1550	1.15	7.7	228	1.6	3.9	8.1		2.24	476	1828	1188	1064
14.0	4.85	11.6		4.7	11.25		0	118	1668	1668	1.37	5.9	226					1.99	472			939
15.0	4.75	10.8	0	4.7	10.45		0	117	1786	1786	1.24	5.5	200					1.91	419			798
16.0	5.15	12		5.0	11.65		0	119	1897	1897	1.31	5.5	230					1.92	479			922
17.0	5.65	12.4		5.5	12.05		0	119	2016	2016	1.18	5.7	226	1.3	2.9	5.2		1.95	472	1656	1157	921
18.0	6.2	14.2	0	6.0	13.85		0	121	2137	2137	1.30	5.9	271					1.98	567			1123
19.0	6.1	14		5.9	13.65		0	120	2289	2289	1.30	5.4	268					1.90	559			1062
20.0	6.25	14.6		6.1	14.25		0	121	2410	2410	1.35	5.3	284					1.87	594			1111
21.0	5.6	12.8	0	5.5	12.45		0	119	2529	2529	1.28	4.5	242					1.72	506			870
22.0	6.2	13.8		6.0	13.45		0	120	2648	2648	1.22	4.8	257					1.77	536			950
23.0	5.25	11.8		5.2	11.45		0	118	2766	2766	1.22	3.9	219					1.57	457			717
24.0	7.6	15.8	0.1	7.4	15.45	0.30	0	122	2888	2888	1.08	5.4	279	1.2	2.7	4.7		1.88	582	2181	1549	1095
25.0	7.75	17		7.5	16.65		0	123	3074	3074	1.22	5.1	317					1.84	662			1217
26.0	7.25	16.6		7.0	16.25		0	123	3196	3196	1.32	4.6	321					1.74	670			1163
27.0	5.45	15.4	0.05	5.2	15.05	0.25	0	121	3317	3317	1.91	3.3	342				34.9	1.45	715			1035
28.0	6.4	18.4		6.0	18.05		0	123	3452	3452	1.99	3.6	417				35.5	1.56	871			1357
29.0	5.35	13.8		5.2	13.45		0	120	3572	3572	1.61	3.0	288					1.35	601			811
30.0	6.25	13	1.25	6.1	12.65	1.45	0	120	3590	3590	1.06	3.6	226	0.9	1.8	2.5		1.48	472	1631	1282	696
31.0	6.9	14.4		6.8	14.05		0	121	3711	3711	1.08	3.8	253	0.9	1.9	2.7		1.54	529	1821	1410	814
32.0	8.75	19.4		8.4	19.05		0	125	3835	3835	1.26	4.6	368					1.74	769			1335
33.0	6.2	15.6	0	6.0	15.25		0	122	4014	4014	1.56	3.1	322					1.37	673			925

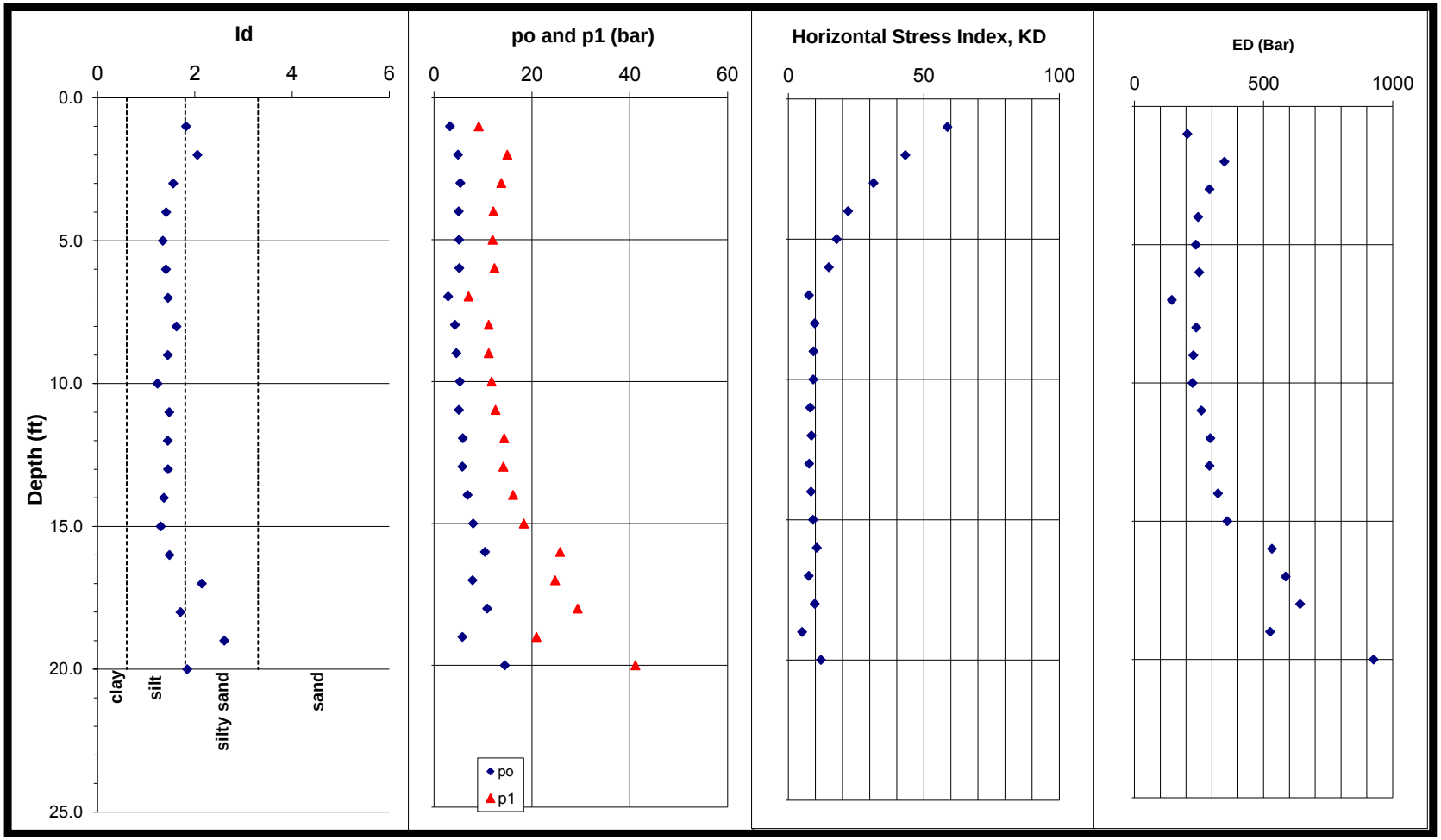
DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



			Membrane 1	Membrane 2	Membrane 3			
Job No:	16-54112							
Job Name:	SITE #2 (STRUCTURE #2 ANI	ΔA =	0.125	0	0			
Job Location:	Greensboro, NC	ΔB =	0.65	0	0			
Date:	12-20-16	Zm=	0	bar		Northing	874584	
Sounding No:	STR2_EB1_B2					Easting	1777560	
Ground Water Depth (ft):	N/A							

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

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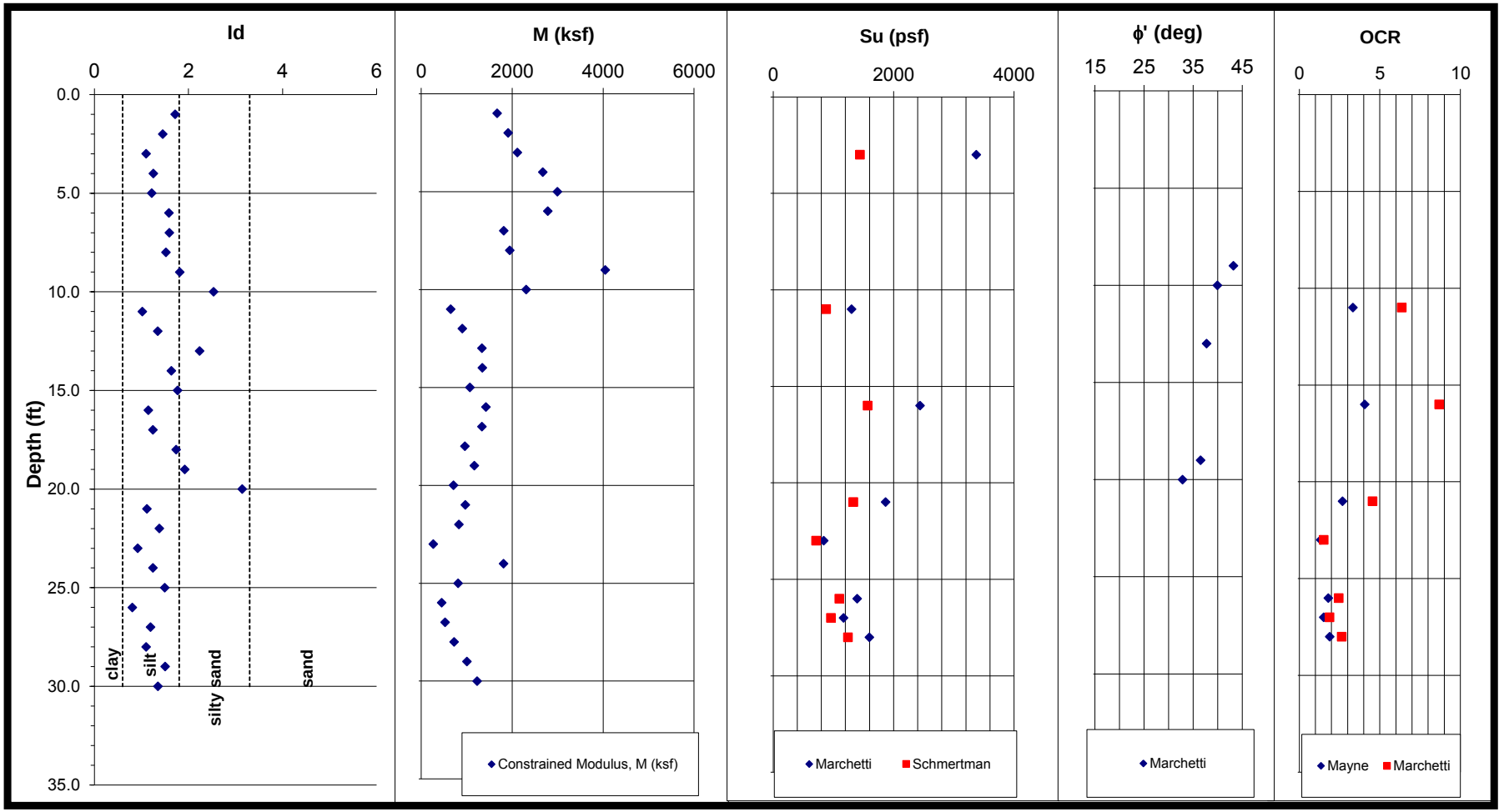
DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	3.4	9.8		3.2	9.15		0	115	115	115	1.82	58.7	205				47.3	4.18	428			1788
2.0	5.25	15.6		4.9	14.95		0	121	236	236	2.05	43.3	349				46.3	3.89	729			2832
3.0	5.65	14.4	0	5.4	13.75		0	120	357	357	1.56	31.5	291					3.59	607			2176
4.0	5.25	12.8		5.0	12.15		0	119	476	476	1.41	22.1	247					3.25	516			1676
5.0	5.3	12.6		5.1	11.95		0	119	595	595	1.34	17.9	238					3.05	497			1515
6.0	5.35	13	0	5.1	12.35		0	119	714	714	1.41	15.0	250					2.88	523			1509
7.0	2.95	7.7		2.9	7.05		0	113	789	789	1.45	7.6	145					2.24	302			676
8.0	4.45	11.8		4.2	11.15		0	118	907	907	1.63	9.8	240					2.48	500			1240
9.0	4.75	11.8	0	4.6	11.15		0	118	1025	1025	1.44	9.3	229					2.43	478			1160
10.0	5.45	12.4		5.3	11.75		0	119	1187	1187	1.23	9.3	225					2.42	470			1139
11.0	5.3	13.2		5.1	12.55		0	119	1307	1307	1.48	8.1	260					2.30	542			1245
12.0	6.15	15	0	5.9	14.35		0	121	1428	1428	1.44	8.6	294					2.35	614			1446
13.0	6.05	14.8		5.8	14.15		0	121	1571	1571	1.45	7.7	291					2.24	607			1362
14.0	7.15	16.8		6.8	16.15		0	122	1693	1693	1.36	8.4	323					2.33	675			1576
15.0	8.35	19	0	8.0	18.35		0	124	1817	1817	1.30	9.2	360					2.42	751			1815
16.0	11	26.4		10.4	25.75		0	128	2052	2052	1.48	10.6	533					2.55	1113			2842
17.0	8.55	25.4		7.9	24.75		0	127	2179	2179	2.14	7.5	586				39.2	2.24	1223			2740
18.0	11.6	30	0	10.8	29.35		0	130	2309	2309	1.71	9.8	642					2.48	1341			3328
19.0	6.4	21.6		5.8	20.95		0	124	2365	2365	2.61	5.1	526				37.3	1.90	1098			2088
20.0	15.6	41.8		14.5	41.15		0	134	2499	2499	1.85	12.1	926				41.3	2.68	1935			5183

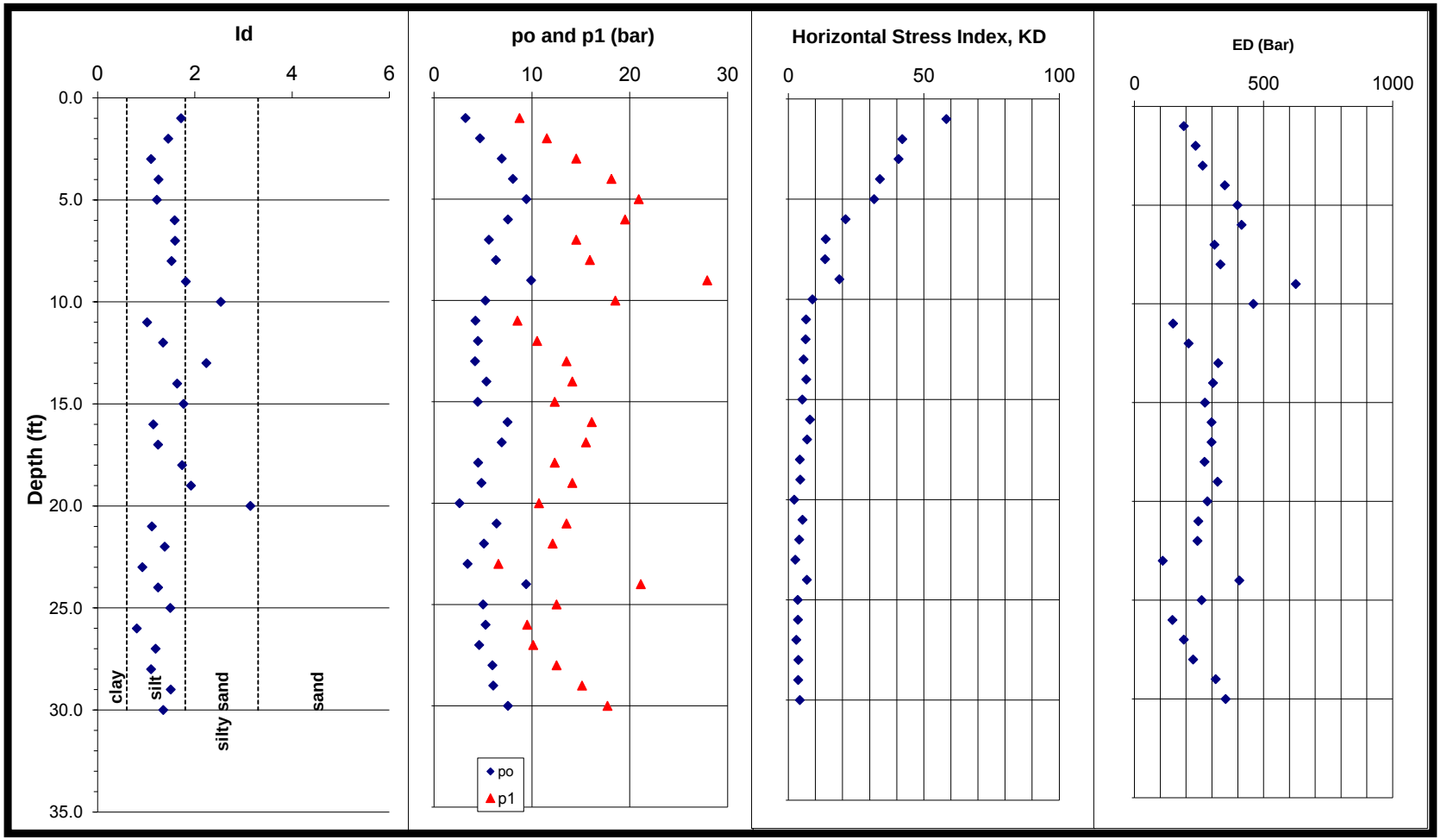
DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB1_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 AND
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR2_EB1_B3
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.175	0	0
ΔB =	0.475	0	0
Zm=	0	bar	

Latitude: 36.15071
Longitude: -79.75336

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

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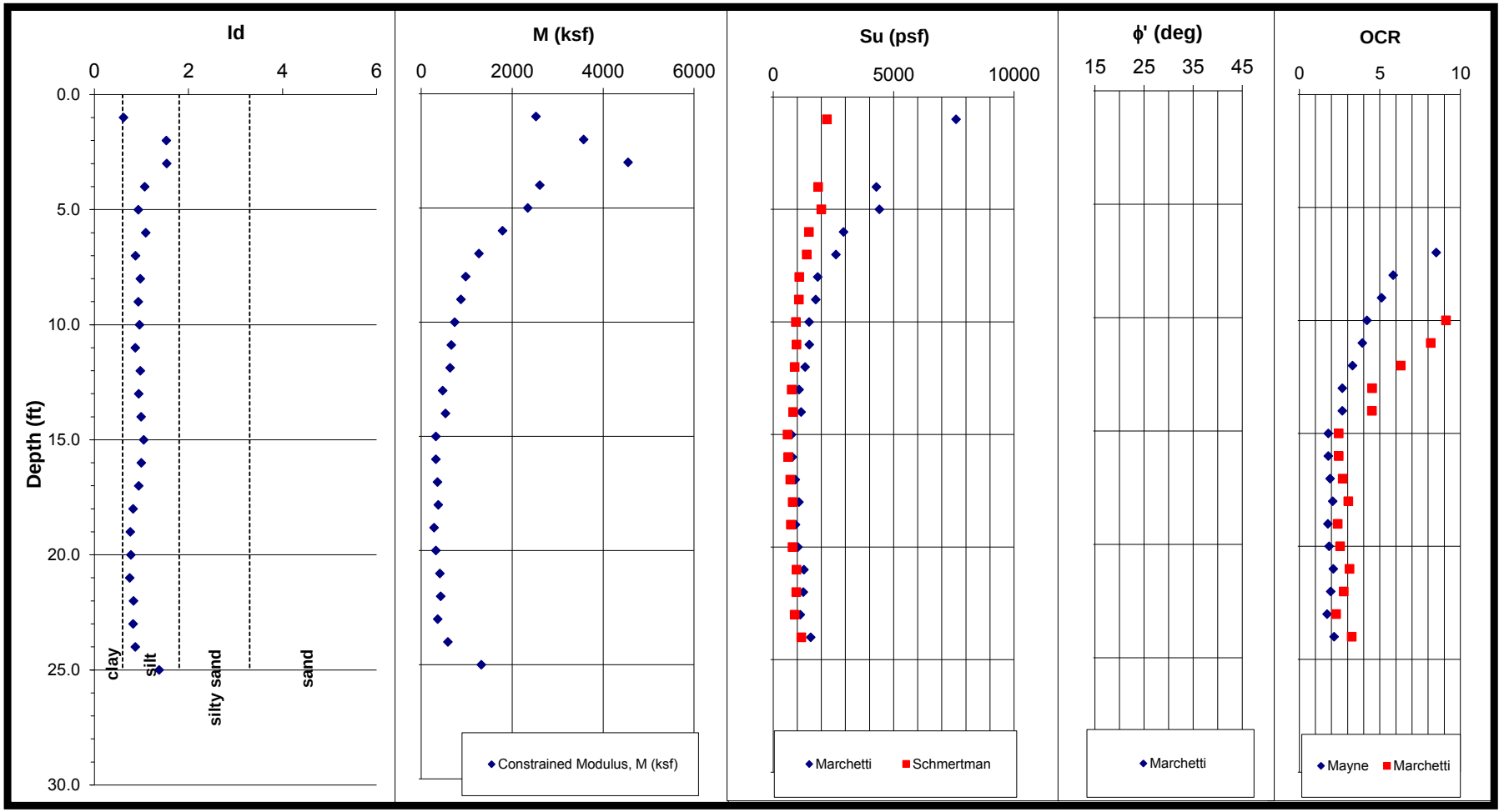
DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	3.3	9.2		3.2	8.725		0	115	115	115	1.72	58.4	191					4.17	400			1666
2.0	4.85	12		4.7	11.525		0	118	233	233	1.45	42.1	237					3.86	495			1910
3.0	7.1	15	0	6.9	14.525		0	121	355	355	1.10	40.7	264	4.1	20.7	110.1		3.83	552	3373	1444	2113
4.0	8.35	18.6		8.0	18.125		0	124	496	496	1.25	33.9	350					3.66	731			2670
5.0	9.8	21.4		9.4	20.925		0	126	622	622	1.22	31.7	399					3.59	833			2993
6.0	7.95	20	0.6	7.6	19.525	0.78	0	125	746	746	1.58	21.1	415					3.21	867			2784
7.0	5.85	15		5.6	14.525		0	121	847	847	1.59	13.8	310					2.81	647			1815
8.0	6.6	16.4		6.3	15.925		0	122	969	969	1.52	13.6	333					2.79	696			1944
9.0	10.6	28.4	1.1	9.9	27.925	1.28	0	129	1098	1098	1.82	18.9	625				43.2	3.10	1305			4047
10.0	5.7	19		5.2	18.525		0	123	1230	1230	2.53	8.9	461				40.0	2.40	963			2306
11.0	4.25	9		4.2	8.525		0	115	1345	1345	1.02	6.6	149	1.4	3.3	6.4		2.08	312	1304	881	648
12.0	4.6	11	0	4.5	10.525		0	117	1463	1463	1.35	6.4	210					2.07	438			904
13.0	4.45	14		4.2	13.525		0	120	1554	1554	2.24	5.6	324				37.8	1.97	677			1335
14.0	5.6	14.6		5.4	14.125		0	121	1674	1674	1.64	6.7	304					2.11	635			1343
15.0	4.65	12.8	0	4.5	12.325		0	119	1793	1793	1.77	5.2	273					1.88	571			1071
16.0	7.75	16.6		7.5	16.125		0	123	1961	1961	1.15	8.0	299	1.6	4.1	8.7		2.28	624	2442	1570	1422
17.0	7.15	16		6.9	15.525		0	122	2083	2083	1.25	6.9	299					2.14	624			1335
18.0	4.7	12.8	0	4.5	12.325		0	119	2202	2202	1.74	4.3	271					1.69	567			959
19.0	5.1	14.6		4.8	14.125		0	120	2287	2287	1.92	4.4	322				36.5	1.73	673			1167
20.0	2.8	11.2		2.6	10.725		0	116	2403	2403	3.14	2.2	282				32.9	1.20	590			710
21.0	6.55	14	0	6.4	13.525		0	120	2523	2523	1.12	5.3	248	1.2	2.7	4.6		1.87	517	1870	1334	967
22.0	5.25	12.6		5.1	12.125		0	119	2618	2618	1.38	4.1	244					1.62	510			827
23.0	3.4	7.05		3.4	6.575		0	112	2730	2730	0.92	2.6	109	0.7	1.3	1.5		1.16	228	842	715	264
24.0	9.8	21.6	0	9.4	21.125		0	126	2856	2856	1.24	6.9	406					2.13	848			1810
25.0	5.2	13		5.0	12.525		0	119	2983	2983	1.50	3.5	261					1.49	544			810
26.0	5.3	10		5.3	9.525		0	116	3099	3099	0.81	3.6	148	0.9	1.8	2.5		1.45	308	1398	1101	448
27.0	4.7	10.6	0	4.6	10.125		0	117	3216	3216	1.20	3.0	191	0.8	1.5	1.9		1.31	400	1172	963	524
28.0	6.1	13		6.0	12.525		0	120	3347	3347	1.10	3.7	228	0.9	1.9	2.6		1.52	476	1600	1245	722
29.0	6.3	15.6		6.0	15.125		0	122	3469	3469	1.50	3.6	315					1.52	658			1003
30.0	7.85	18.2	0	7.5	17.725		0	124	3709	3709	1.35	4.2	353					1.66	738			1228

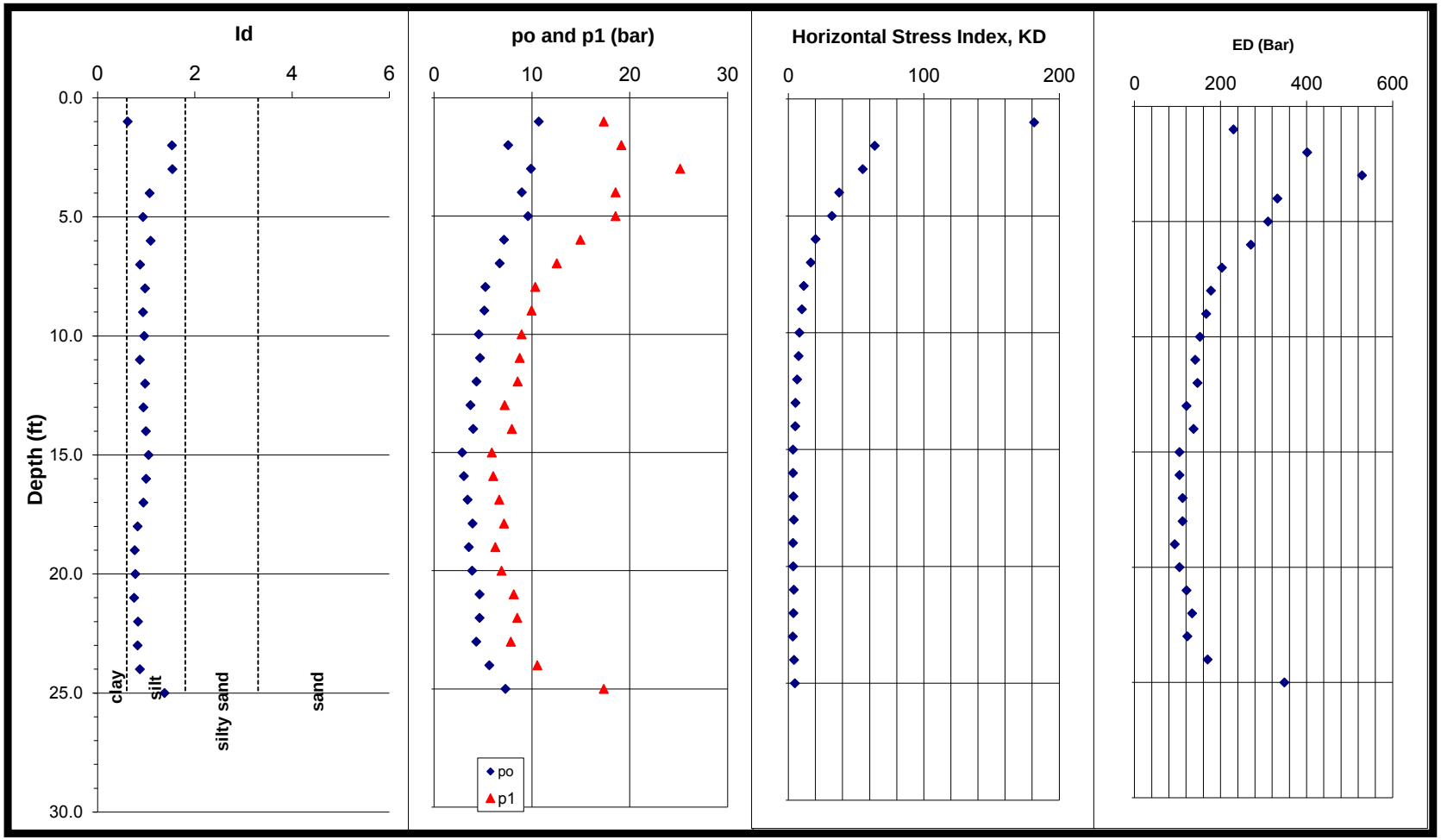
DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



		Membrane 1	Membrane 2	Membrane 3		
Job No:	16-54112					
Job Name:	SITE #2 (STRUCTURE #2 ANI	ΔA =	0.225	0	0	
Job Location:	Greensboro, NC	ΔB =	0.25	0	0	
Date:	12-21-16	Zm=	0	bar	Northing	874655
Sounding No:	STR2_EB2_B1				Easting	1777453
Ground Water Depth (ft):	N/A					

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

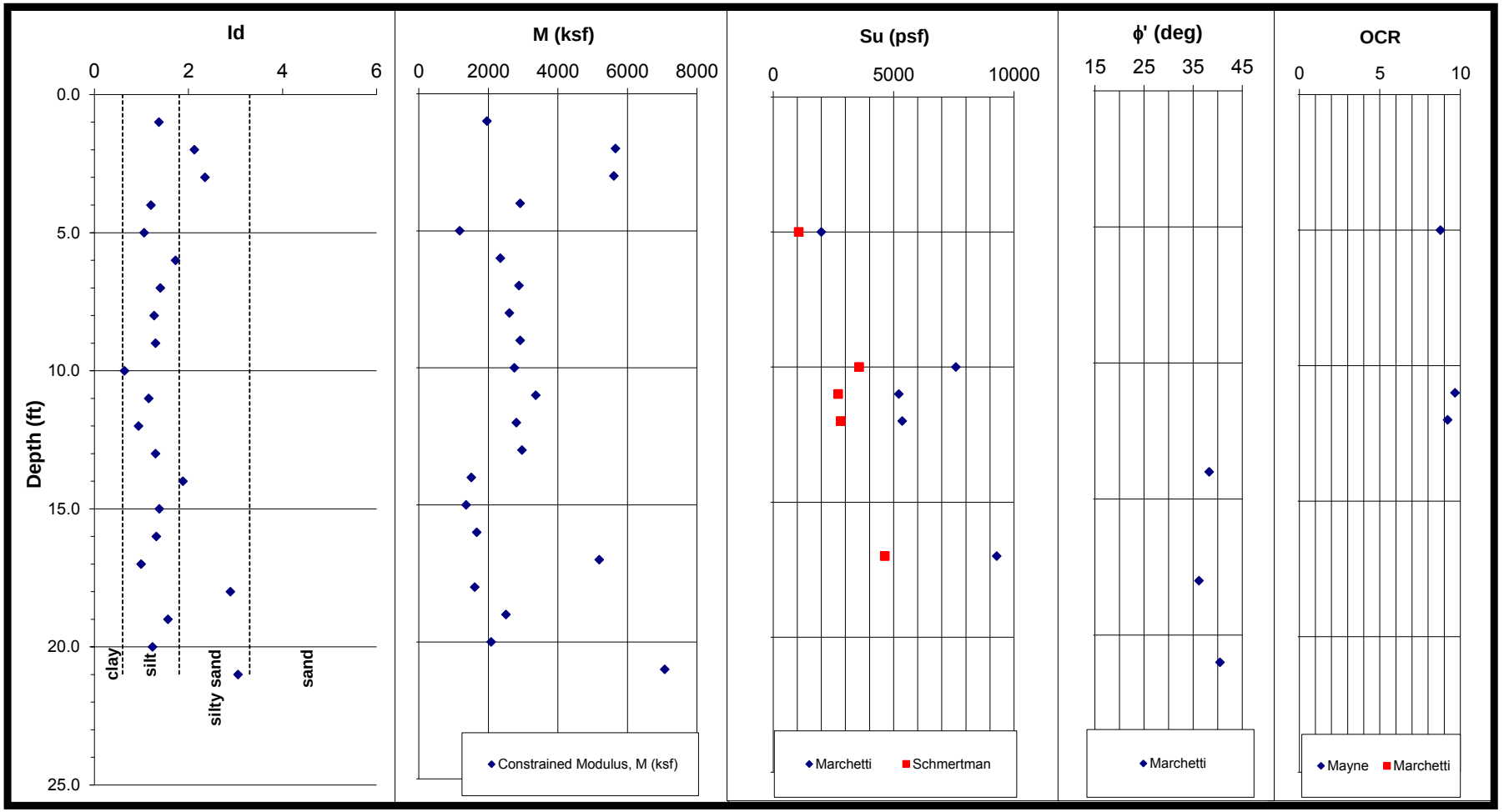
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	10.8	17.6		10.7	17.35		0	123	123	123	0.62	181.6	230	8.9	92.4	1134.0		5.24	481	7594	2237	2524
2.0	7.9	19.4		7.6	19.15		0	124	248	248	1.53	63.9	402					4.26	839			3570
3.0	10.4	25.4	0.15	9.9	25.15	0.38	0	128	376	376	1.54	55.1	529					4.11	1105			4548
4.0	9.2	18.8		9.0	18.55		0	124	497	497	1.07	37.7	332	3.9	19.2	97.5		3.76	694	4292	1873	2608
5.0	9.8	18.8		9.6	18.55		0	124	622	622	0.93	32.2	311	3.6	16.4	76.5		3.61	649	4419	2005	2341
6.0	7.3	15.2	0	7.2	14.95		0	122	743	743	1.09	20.1	271	2.8	10.2	36.6		3.16	565	2926	1494	1786
7.0	6.75	12.8		6.7	12.55		0	120	837	837	0.87	16.7	203	2.5	8.5	27.4		2.99	424	2616	1399	1267
8.0	5.25	10.6		5.2	10.35		0	117	954	954	0.98	11.5	178	2.0	5.8	15.2		2.63	371	1859	1093	975
9.0	5.15	10.2	0	5.1	9.95		0	117	1071	1071	0.93	10.0	167	1.8	5.1	12.4		2.50	348	1770	1075	872
10.0	4.55	9.2		4.6	8.95		0	116	1156	1156	0.96	8.3	152	1.6	4.2	9.1		2.31	318	1495	954	733
11.0	4.65	9		4.7	8.75		0	115	1271	1271	0.87	7.7	141	1.6	3.9	8.2		2.24	295	1506	978	659
12.0	4.3	8.8	0	4.3	8.55		0	115	1386	1386	0.98	6.5	147	1.4	3.3	6.3		2.07	306	1334	903	634
13.0	3.65	7.45		3.7	7.2		0	113	1470	1470	0.94	5.3	121	1.2	2.7	4.5		1.86	253	1085	775	470
14.0	3.95	8.2		4.0	7.95		0	114	1585	1585	0.99	5.3	138	1.2	2.7	4.5		1.86	287	1166	833	533
15.0	2.8	6.15	0	2.9	5.9		0	111	1695	1695	1.05	3.5	105	0.9	1.8	2.4		1.47	219	764	602	321
16.0	2.95	6.3		3.0	6.05		0	111	1779	1779	1.00	3.6	105	0.9	1.8	2.5		1.47	219	804	633	321
17.0	3.35	6.9		3.4	6.65		0	112	1891	1891	0.94	3.8	112	0.9	1.9	2.7		1.52	234	922	715	357
18.0	3.85	7.4	0	3.9	7.15		0	113	2004	2004	0.82	4.1	112	1.0	2.1	3.0		1.60	234	1077	819	373
19.0	3.45	6.5		3.5	6.25		0	111	2117	2117	0.76	3.5	94	0.9	1.8	2.4		1.43	196	937	741	281
20.0	3.8	7.15		3.9	6.9		0	113	2230	2230	0.78	3.6	105	0.9	1.9	2.5		1.47	219	1035	811	323
21.0	4.6	8.4	0	4.7	8.15		0	114	2344	2344	0.75	4.2	121	1.0	2.1	3.1		1.61	253	1285	973	407
22.0	4.6	8.75		4.6	8.5		0	115	2529	2529	0.83	3.8	134	1.0	2.0	2.8		1.53	280	1255	969	428
23.0	4.25	8.1		4.3	7.85		0	114	2643	2643	0.82	3.4	123	0.9	1.7	2.3		1.41	257	1130	899	362
24.0	5.65	10.8	0	5.6	10.55		0	117	2761	2761	0.87	4.3	170	1.0	2.2	3.3		1.64	356	1566	1178	584
25.0	7.55	17.6		7.3	17.35		0	123	3084	3084	1.38	4.9	349					1.81	729			1321

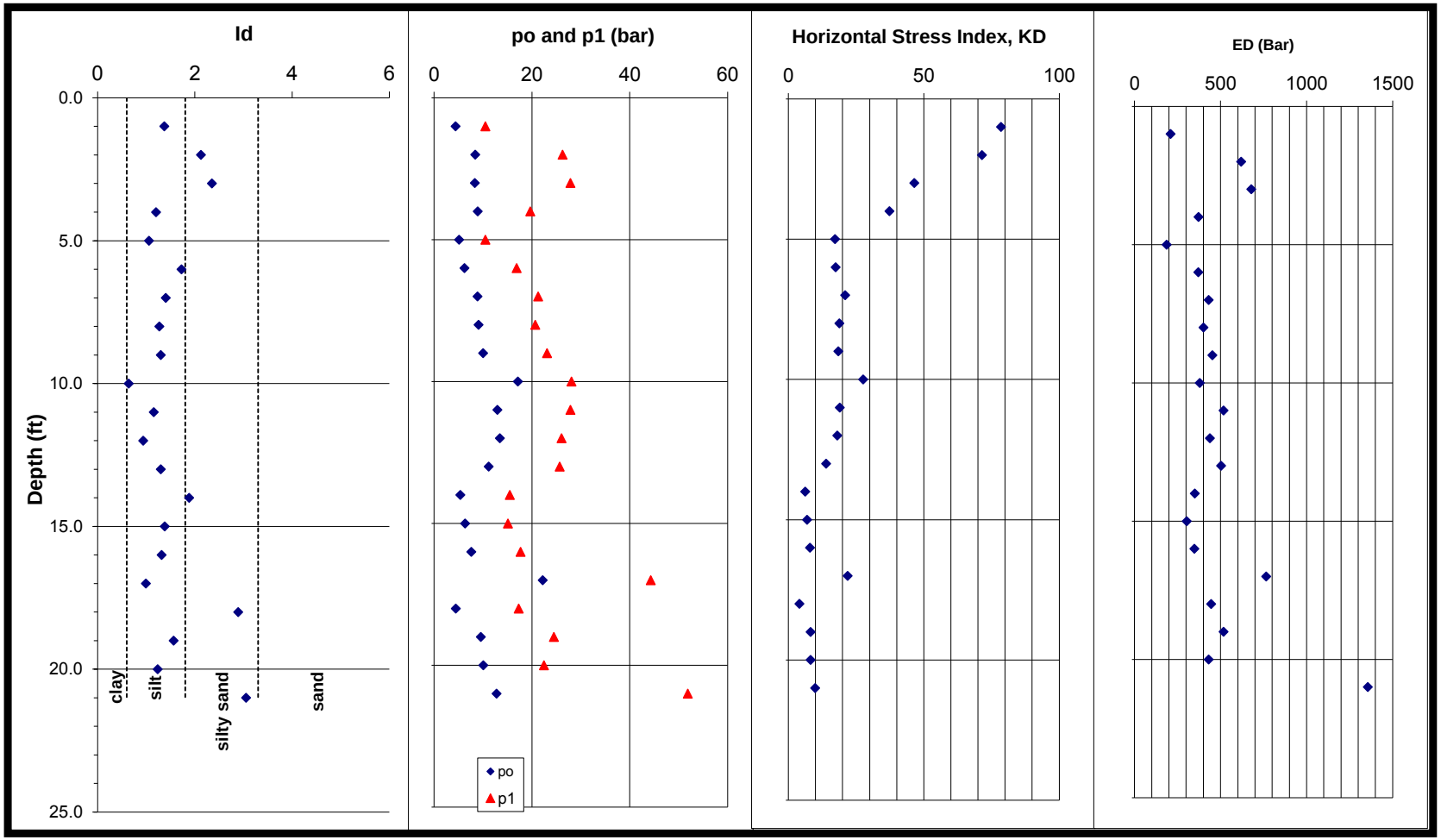
DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 ANI
Job Location: Greensboro, NC
Date: 12-21-16
Sounding No: STR2_EB2_B2
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.25	0	0
ΔB =	0.125	0	0
Zm=	0	bar	

Northing 874591
Easting 1777450

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

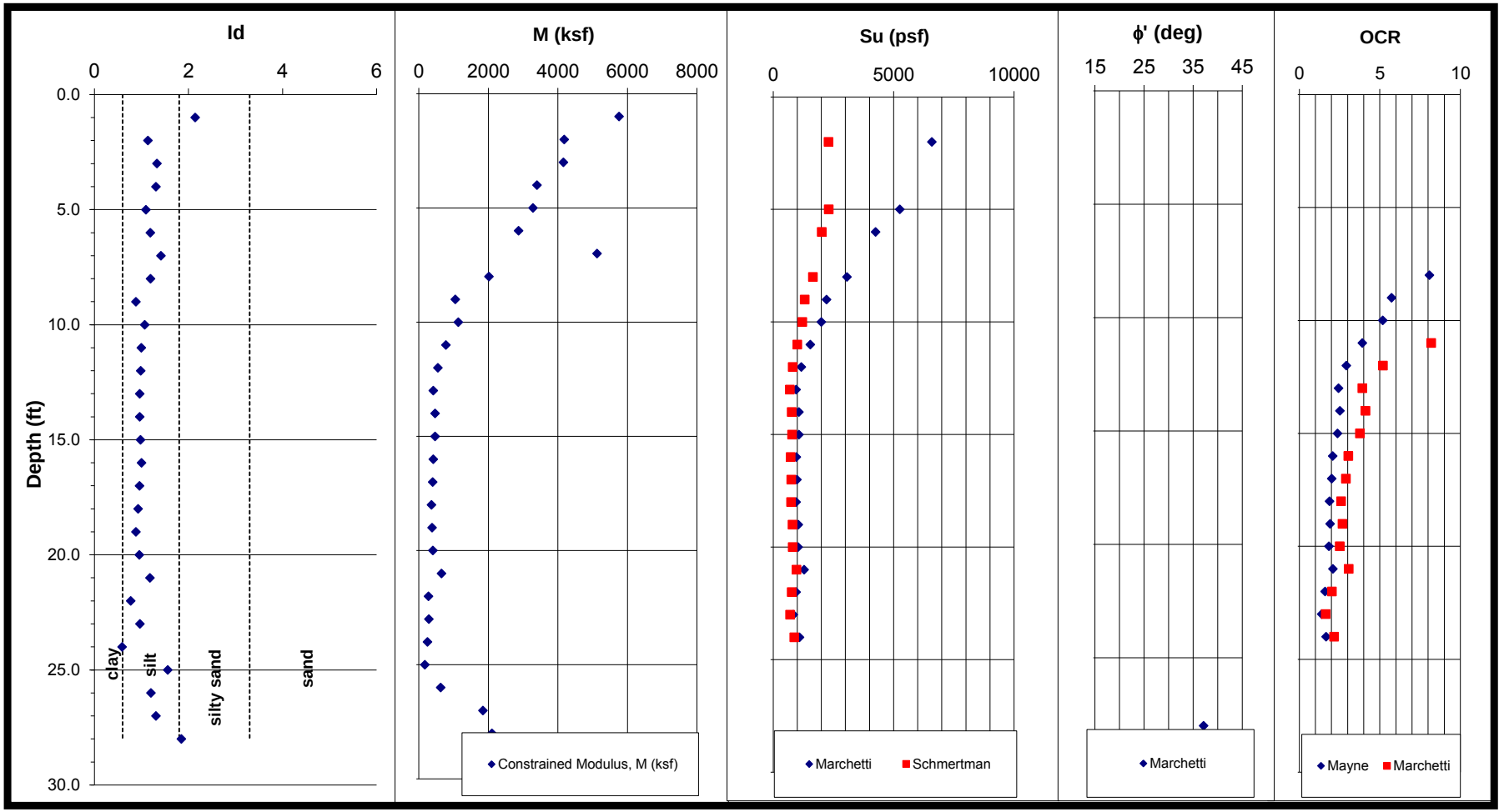
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	4.45	10.6		4.4	10.475		0	117	117	117	1.37	78.6	210					4.45	439			1956
2.0	9	26.4		8.4	26.275		0	128	245	245	2.13	71.6	620				47.9	4.36	1296			5653
3.0	9	28	0	8.3	27.875		0	128	373	373	2.35	46.5	679				46.5	3.96	1417			5606
4.0	9.2	19.8		8.9	19.675		0	125	500	500	1.20	37.3	373					3.75	778			2916
5.0	5.1	10.6		5.1	10.475		0	117	618	618	1.06	17.2	187	2.5	8.8	28.8		3.01	390	2005	1064	1176
6.0	6.45	17	0	6.2	16.875		0	123	740	740	1.73	17.5	371					3.03	774			2345
7.0	9.2	21.4		8.9	21.275		0	126	881	881	1.40	21.0	431					3.20	900			2882
8.0	9.4	20.8		9.1	20.675		0	126	1007	1007	1.27	18.9	402					3.10	839			2602
9.0	10.4	23.2	0.15	10.0	23.075	0.40	0	127	1134	1134	1.30	18.5	453					3.08	945			2913
10.0	17.4	28.2		17.1	28.075		0	129	1293	1293	0.64	27.7	380	3.3	14.1	60.3		3.46	793	7590	3577	2748
11.0	13.4	28		12.9	27.875		0	129	1422	1422	1.15	19.0	518	2.7	9.7	33.5		3.11	1082	5219	2702	3364
12.0	13.8	26.2	0.95	13.4	26.075	1.20	0	129	1551	1551	0.94	18.1	438	2.6	9.2	31.1		3.06	915	5360	2809	2802
13.0	11.6	25.8		11.2	25.675		0	128	1668	1668	1.30	14.0	504					2.82	1052			2963
14.0	5.6	15.6		5.4	15.475		0	122	1790	1790	1.88	6.3	351				38.3	2.06	732			1509
15.0	6.5	15.2	0.25	6.3	15.075	0.50	0	122	1912	1912	1.38	6.9	303					2.14	633			1357
16.0	7.85	17.8		7.6	17.675		0	124	1978	1978	1.32	8.0	349					2.29	729			1667
17.0	23	44.4		22.2	44.275		0	136	2114	2114	0.99	21.9	766	2.9	11.2	41.9		3.24	1600	9281	4636	5190
18.0	4.8	17.4	0	4.4	17.275		0	122	2235	2235	2.89	4.1	445				36.2	1.73	930			1609
19.0	10	24.6		9.5	24.475		0	128	2423	2423	1.57	8.2	518					2.31	1082			2502
20.0	10.4	22.6		10.1	22.475		0	127	2549	2549	1.23	8.2	431					2.31	900			2078
21.0	14.4	52	0	12.8	51.875		0	136	2685	2685	3.06	9.9	1356				40.5	2.50	2833			7069

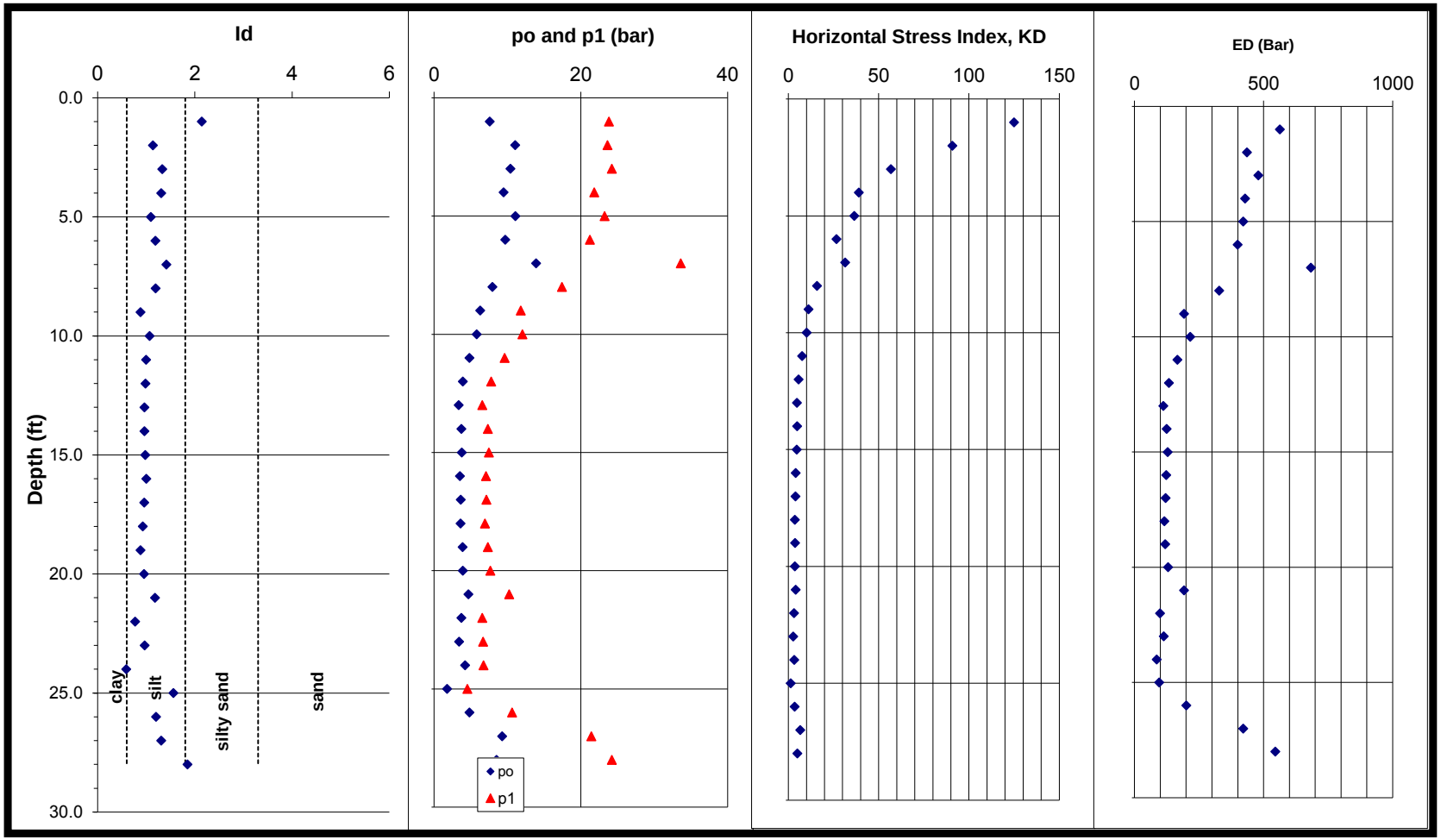
DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR2_EB2_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



		Membrane 1	Membrane 2	Membrane 3		
Job No:	16-54112					
Job Name:	SITE #2 (STRUCTURE #2 ANI	ΔA =	0.25	0	0	
Job Location:	Greensboro, NC	ΔB =	0.175	0	0	
Date:	12-21-16	Zm=	0	bar	Northing	874627
Sounding No:	STR2_EB2_B3				Easting	1777441
Ground Water Depth (ft):	N/A					

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

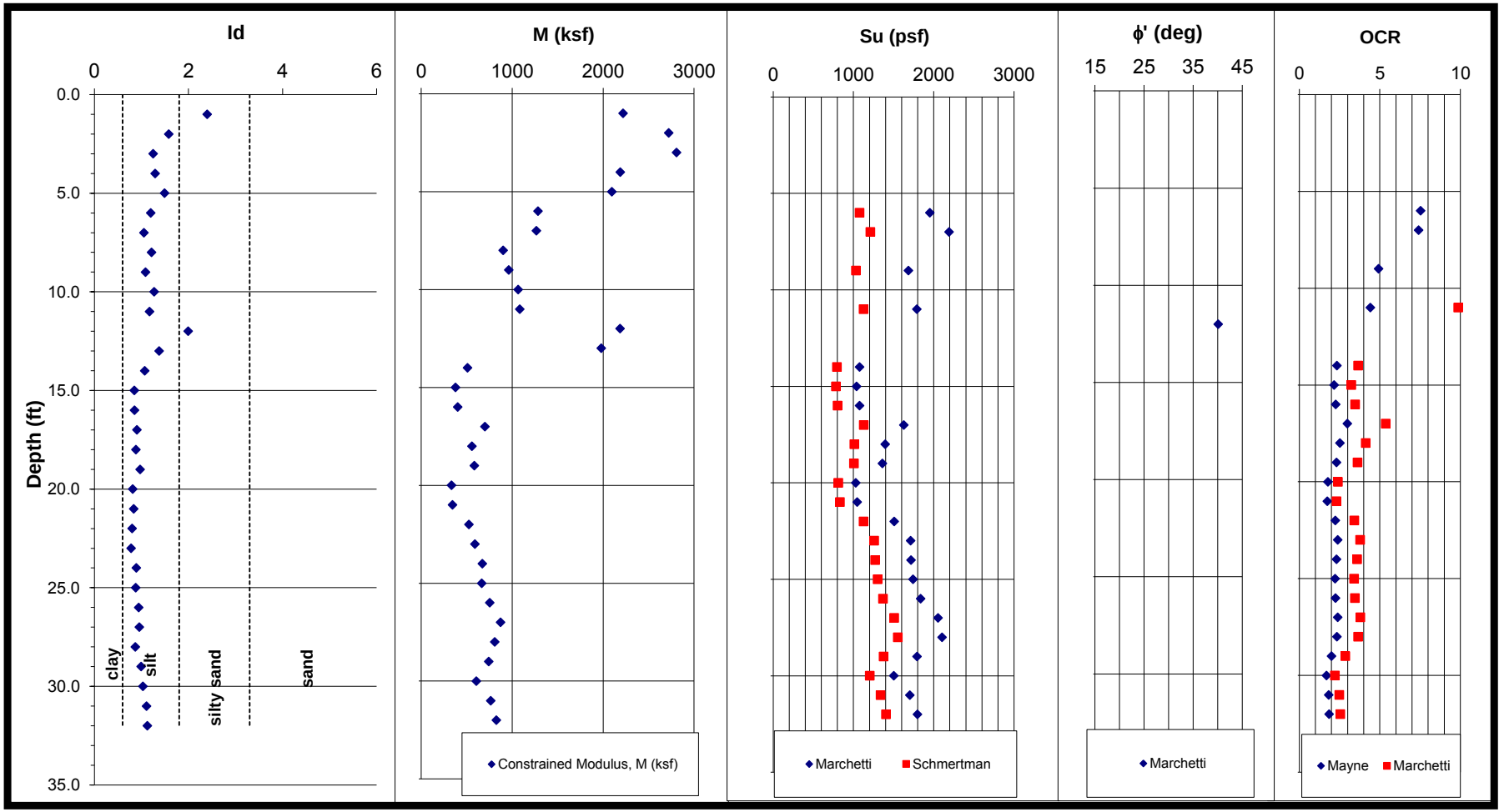
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR^2	OCR^3	ϕ'^3 (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	8.1	24		7.6	23.825		0	127	127	127	2.14	125.0	564				49.4	4.89	1178			5760
2.0	11.4	23.8		11.1	23.625		0	127	254	254	1.14	90.9	436	6.3	46.3	385.2		4.59	911	6592	2308	4182
3.0	10.8	24.4	0	10.4	24.225		0	128	382	382	1.33	56.9	480					4.15	1003			4157
4.0	9.8	22		9.5	21.825		0	126	505	505	1.31	39.1	429					3.79	896			3397
5.0	11.4	23.4		11.1	23.225		0	127	632	632	1.10	36.6	422	3.9	18.6	93.1		3.73	881	5260	2312	3283
6.0	10	21.4	0	9.7	21.225		0	126	758	758	1.19	26.7	400	3.3	13.6	57.1		3.43	835	4261	2026	2865
7.0	14.6	33.8		13.9	33.625		0	132	922	922	1.42	31.5	684					3.59	1429			5124
8.0	8.15	17.6		7.9	17.425		0	124	1046	1046	1.19	15.9	329	2.4	8.1	25.3		2.94	687	3065	1660	2017
9.0	6.3	12	0.5	6.3	11.825	0.75	0	119	1165	1165	0.88	11.3	192	2.0	5.7	14.8		2.61	401	2225	1313	1049
10.0	5.85	12.2		5.8	12.025		0	119	1191	1191	1.07	10.2	216	1.9	5.2	12.7		2.52	451	2003	1212	1135
11.0	4.8	9.8		4.8	9.625		0	116	1307	1307	1.00	7.7	167	1.6	3.9	8.2		2.24	348	1552	1007	780
12.0	3.85	7.95	0	3.9	7.775		0	114	1421	1421	0.99	5.8	134	1.3	2.9	5.2		1.95	280	1172	818	545
13.0	3.25	6.75		3.3	6.575		0	112	1457	1457	0.96	4.8	112	1.1	2.4	3.9		1.76	234	957	699	413
14.0	3.65	7.5		3.7	7.325		0	113	1570	1570	0.96	5.0	125	1.2	2.5	4.1		1.80	261	1075	779	469
15.0	3.7	7.65	0	3.8	7.475		0	114	1684	1684	0.98	4.7	128	1.1	2.4	3.8		1.74	268	1072	788	467
16.0	3.45	7.25		3.5	7.075		0	113	1807	1807	1.00	4.1	123	1.0	2.1	3.0		1.61	257	970	738	412
17.0	3.55	7.3		3.6	7.125		0	113	1920	1920	0.96	4.0	121	1.0	2.0	2.9		1.57	253	990	759	397
18.0	3.5	7.1	0	3.6	6.925		0	113	2032	2032	0.93	3.7	116	0.9	1.9	2.6		1.50	242	962	750	362
19.0	3.8	7.5		3.9	7.325		0	113	2152	2152	0.88	3.8	119	0.9	1.9	2.7		1.52	249	1046	812	378
20.0	3.85	7.85		3.9	7.675		0	114	2266	2266	0.96	3.6	130	0.9	1.8	2.5		1.48	272	1044	819	403
21.0	4.7	10.4	0	4.7	10.225		0	117	2383	2383	1.18	4.1	192	1.0	2.1	3.1		1.62	401	1289	979	651
22.0	3.6	6.75		3.7	6.575		0	112	2464	2464	0.77	3.1	99	0.8	1.6	2.0		1.33	207	956	776	275
23.0	3.3	6.85		3.4	6.675		0	112	2576	2576	0.97	2.8	114	0.7	1.4	1.6		1.21	238	844	709	287
24.0	4.1	6.9	0	4.2	6.725		0	112	2688	2688	0.59	3.3	87	0.8	1.7	2.2		1.36	181	1101	884	246
25.0	1.65	4.7		1.8	4.525		0	108	2693	2693	1.56	1.4	96					0.85	200			170
26.0	4.85	10.8		4.8	10.625		0	118	2810	2810	1.20	3.6	201					1.49	420			626
27.0	9.6	21.6	0	9.3	21.425		0	126	2936	2936	1.31	6.6	422					2.09	881			1843
28.0	9	24.4		8.5	24.225		0	127	3559	3559	1.85	5.0	546				37.2	1.84	1140			2101

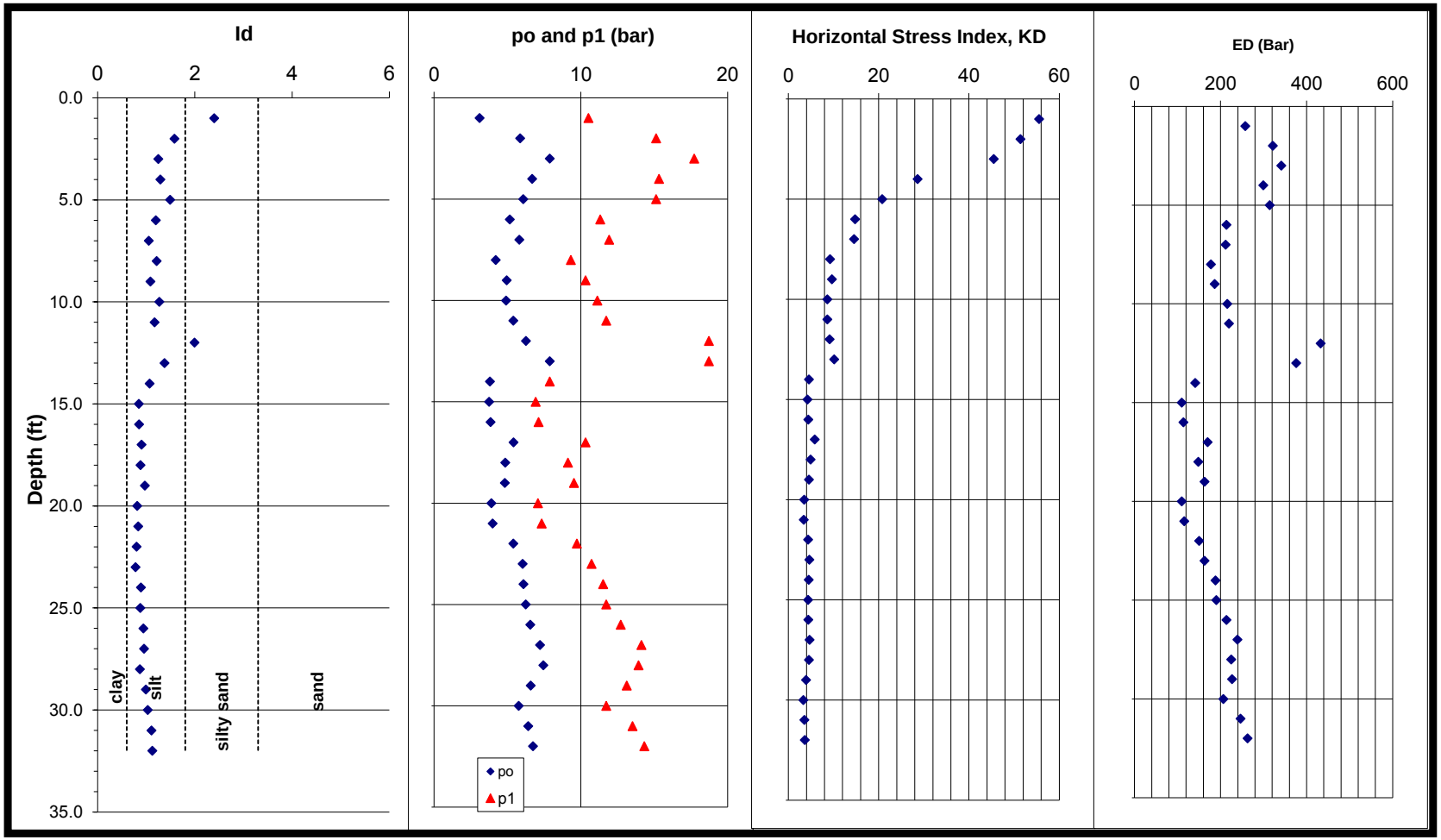
DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 ANI
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR3_EB1_B1
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.2	0	0
ΔB =	0.275	0	0
Zm=	0	bar	

Northing 874663
Easting 1777566

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

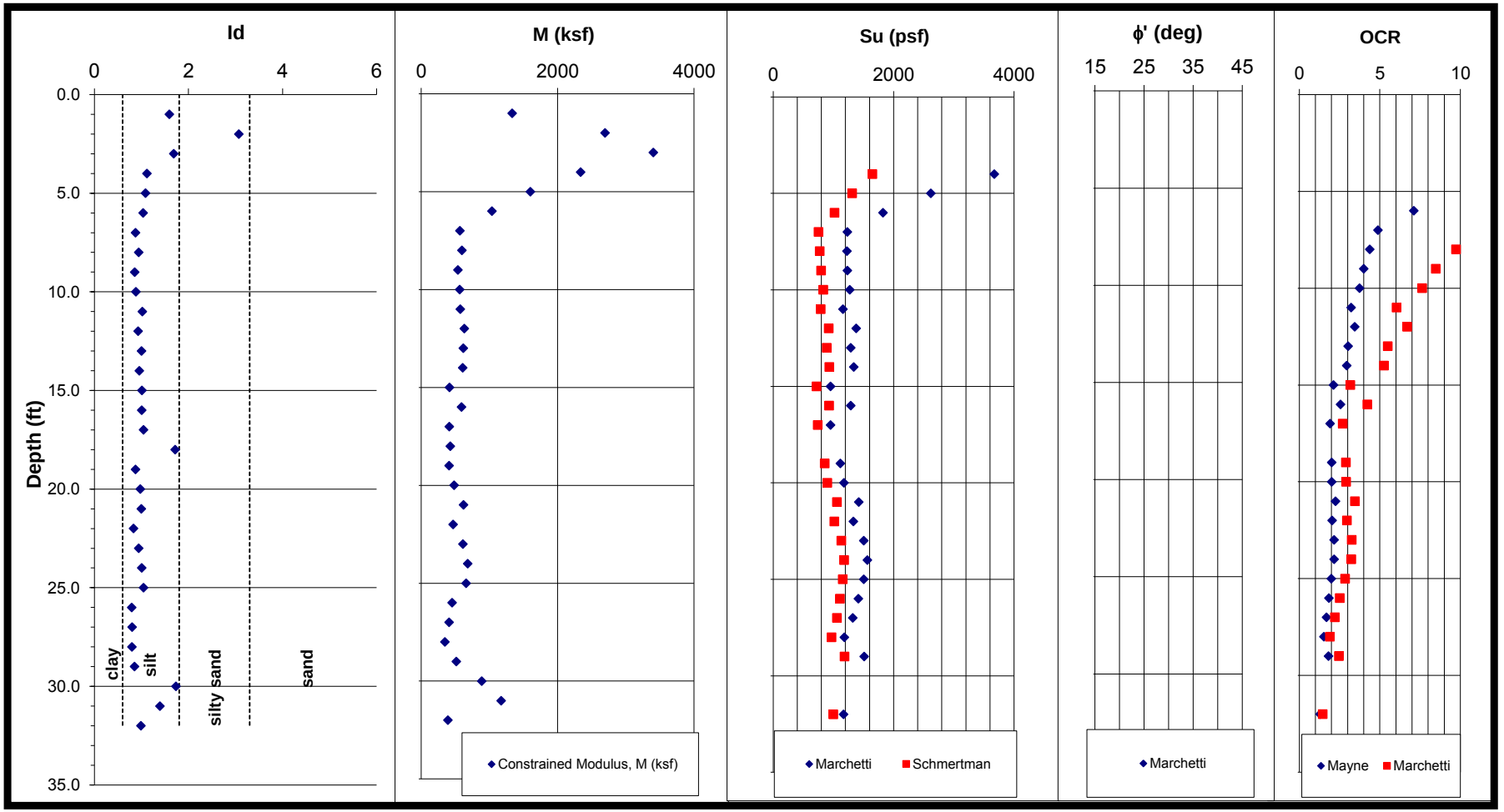
CONETEC

DILATOMETER TEST RESULTS

Depth[1]	A	B	C	po	p1	p2	u_o	γ_T[5]	σ_{vo}	σ_{vo}'			E_D				ϕ[3]		E_D	s_u[3]	s_u[4]	M
(ft)	(bar)	(bar)	(bar)	(bar)	(bar)	(bar)	(psf)	(pcf)	(psf)	(psf)	Id	K_D	(bar)	K_o	OCR[2]	OCR[3]	(deg)	R_M	(ksf)	(psf)	(psf)	(ksf)
1.0	3.25	10.8		3.1	10.525		0	116	116	116	2.40	55.6	258				47.1	4.12	538			2220
2.0	6.1	15.4		5.9	15.125		0	122	238	238	1.58	51.4	322					4.05	672			2720
3.0	8.15	18	0	7.9	17.725		0	124	362	362	1.25	45.5	342					3.93	713			2807
4.0	6.9	15.6		6.7	15.325		0	122	488	488	1.29	28.7	300					3.50	626			2189
5.0	6.3	15.4		6.1	15.125		0	122	609	609	1.49	20.8	314					3.19	656			2096
6.0	5.25	11.6	0	5.2	11.325		0	118	727	727	1.20	14.8	214	2.3	7.5	22.7		2.87	447	1954	1077	1284
7.0	5.9	12.2		5.8	11.925		0	119	833	833	1.05	14.6	212	2.3	7.4	22.1		2.86	443	2192	1213	1266
8.0	4.25	9.6		4.2	9.325		0	116	949	949	1.22	9.3	178					2.42	371			899
9.0	5	10.6	0	4.9	10.325		0	117	1066	1066	1.09	9.7	187	1.8	4.9	11.7		2.47	390	1685	1033	963
10.0	5	11.4		4.9	11.125		0	118	1181	1181	1.27	8.7	216					2.36	451			1064
11.0	5.5	12		5.4	11.725		0	119	1299	1299	1.17	8.7	220	1.7	4.4	9.9		2.36	458	1790	1128	1082
12.0	6.65	19	0	6.3	18.725		0	124	1423	1423	1.99	9.2	433				40.1	2.42	904			2187
13.0	8.2	19		7.9	18.725		0	124	1616	1616	1.38	10.2	376					2.52	786			1978
14.0	3.8	8.15		3.8	7.875		0	114	1730	1730	1.07	4.6	141	1.1	2.3	3.7		1.73	295	1077	795	509
15.0	3.7	7.2	0	3.7	6.925		0	113	1843	1843	0.85	4.2	110	1.0	2.2	3.2		1.64	230	1040	783	377
16.0	3.8	7.4		3.8	7.125		0	113	1807	1807	0.85	4.4	114	1.1	2.3	3.5		1.68	238	1078	803	400
17.0	5.45	10.6		5.4	10.325		0	117	1925	1925	0.91	5.9	170	1.3	3.0	5.4		1.97	356	1629	1131	699
18.0	4.85	9.4	0	4.8	9.125		0	116	2040	2040	0.88	5.0	148	1.2	2.5	4.1		1.79	310	1397	1012	556
19.0	4.85	9.8		4.8	9.525		0	116	2210	2210	0.97	4.6	163	1.1	2.3	3.6		1.71	341	1363	1008	584
20.0	3.85	7.35		3.9	7.075		0	113	2323	2323	0.81	3.5	110	0.9	1.8	2.4		1.44	230	1031	814	332
21.0	3.95	7.6	0	4.0	7.325		0	113	2436	2436	0.84	3.4	116	0.9	1.7	2.3		1.42	242	1049	834	342
22.0	5.4	10		5.4	9.725		0	116	2563	2563	0.80	4.4	150	1.1	2.2	3.4		1.67	314	1509	1127	524
23.0	6.05	11		6.0	10.725		0	118	2680	2680	0.78	4.7	163	1.1	2.4	3.8		1.73	341	1714	1259	590
24.0	6.15	11.8	0	6.1	11.525		0	119	2799	2799	0.89	4.5	189	1.1	2.3	3.6		1.71	394	1718	1272	672
25.0	6.3	12		6.2	11.725		0	119	2968	2968	0.88	4.4	190	1.1	2.2	3.4		1.67	398	1745	1303	664
26.0	6.65	13		6.6	12.725		0	120	3088	3088	0.94	4.4	214	1.1	2.3	3.5		1.68	447	1838	1369	753
27.0	7.35	14.4	0	7.2	14.125		0	121	3209	3209	0.96	4.7	240	1.1	2.4	3.8		1.74	500	2054	1508	872
28.0	7.55	14.2		7.4	13.925		0	121	3382	3382	0.87	4.6	225	1.1	2.3	3.7		1.72	470	2105	1554	807
29.0	6.7	13.4		6.6	13.125		0	120	3502	3502	0.99	3.9	227	1.0	2.0	2.9		1.57	474	1792	1376	742
30.0	5.85	12	0	5.8	11.725		0	119	3621	3621	1.03	3.3	207	0.9	1.7	2.2		1.40	432	1504	1204	606
31.0	6.55	13.8		6.4	13.525		0	120	3734	3734	1.11	3.6	247	0.9	1.8	2.5		1.48	516	1704	1339	765
32.0	6.9	14.6		6.7	14.325		0	121	3855	3855	1.13	3.7	263	0.9	1.9	2.6		1.50	550	1799	1407	826

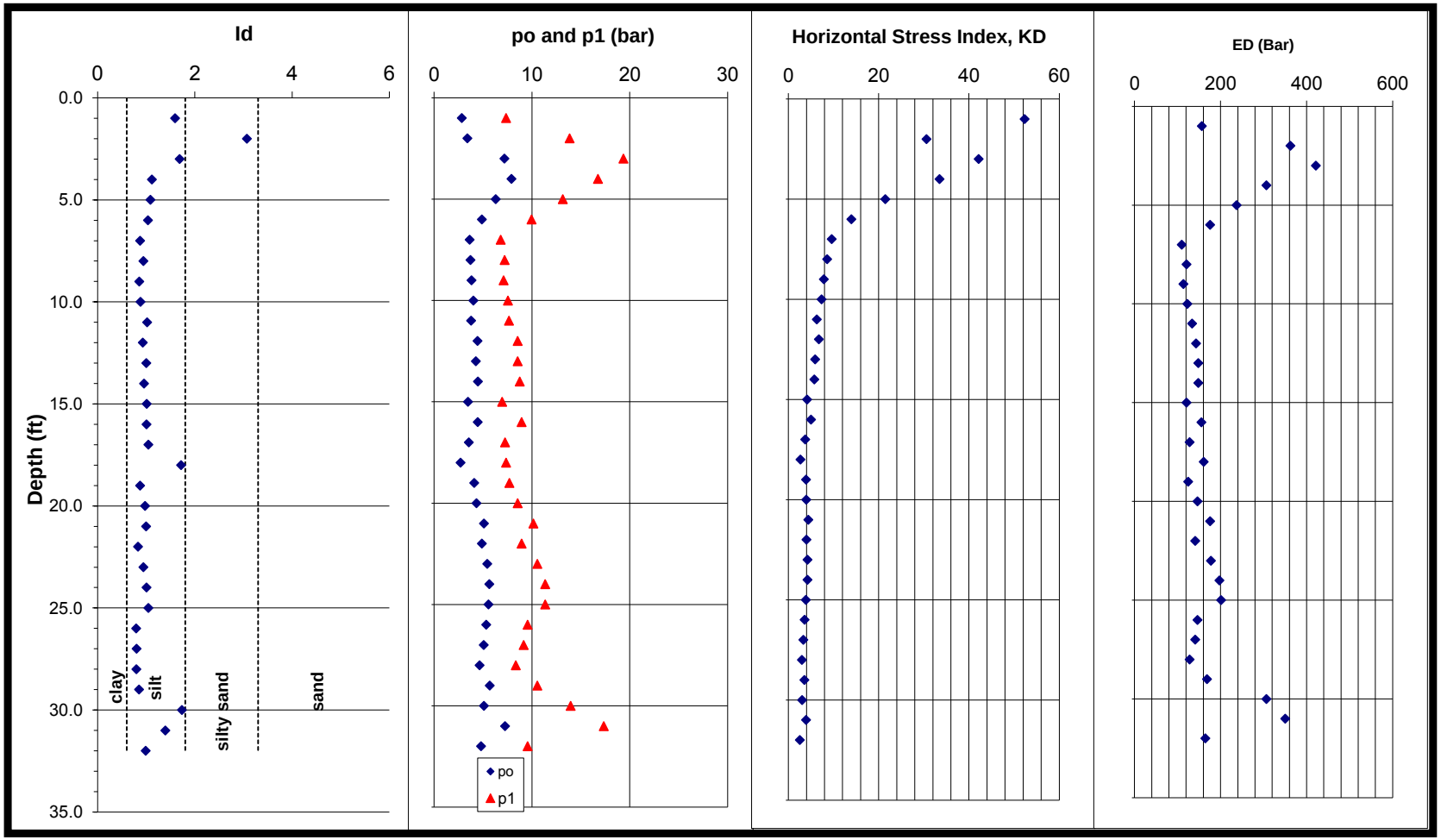
DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 ANI
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR3_EB1_B2
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.25	0.175	0
ΔB =	0.15	0.45	0
Zm=	0	bar	

Latitude: 36.15101
Longitude: -79.75339

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

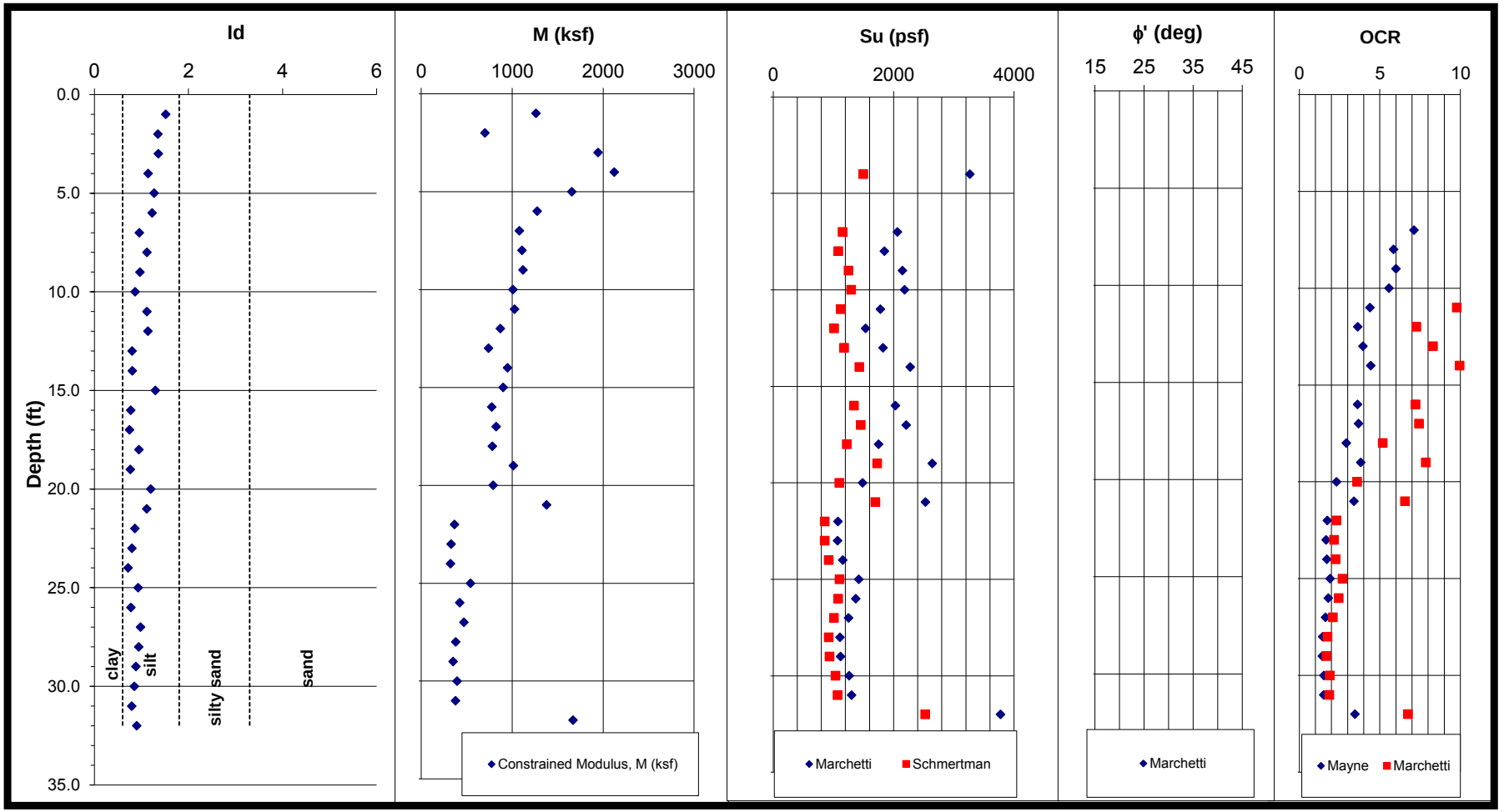
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	2.8	7.5		2.8	7.35		0	113	113	113	1.59	52.4	157					4.07	327			1331
2.0	3.65	14		3.4	13.85		0	119	232	232	3.07	30.6	363				45.1	3.56	757			2695
3.0	7.6	19.8	0	7.2	19.35		0	124	356	356	1.69	42.2	422					3.86	881			3402
4.0	8.15	17.2		7.9	16.75		0	123	492	492	1.12	33.5	307	3.7	17.1	81.3		3.65	641	3674	1651	2337
5.0	6.45	13.6		6.3	13.15		0	120	612	612	1.09	21.5	238	2.9	10.9	40.6		3.22	497	2620	1316	1601
6.0	4.95	10.4	0	4.9	9.95		0	117	729	729	1.04	14.0	176	2.3	7.1	20.8		2.82	367	1825	1020	1035
7.0	3.6	7.25		3.6	6.8		0	112	787	787	0.88	9.6	110	1.8	4.9	11.6		2.46	230	1233	757	566
8.0	3.7	7.65		3.7	7.2		0	113	900	900	0.94	8.6	121	1.7	4.4	9.7		2.35	253	1227	775	594
9.0	3.8	7.55		3.8	7.1		0	113	1013	1013	0.86	7.9	114	1.6	4.0	8.5		2.26	238	1236	798	537
10.0	4	8		4.0	7.55		0	114	1136	1136	0.88	7.4	123	1.5	3.7	7.6		2.19	257	1275	837	563
11.0	3.8	8.1		3.8	7.65		0	114	1250	1250	1.02	6.3	134	1.4	3.2	6.0		2.04	280	1162	792	572
12.0	4.45	9	0	4.4	8.55		0	115	1365	1365	0.93	6.8	143	1.4	3.4	6.7		2.11	299	1380	925	630
13.0	4.3	9		4.3	8.55		0	115	1496	1496	1.00	6.0	148	1.3	3.0	5.5		1.98	310	1289	892	615
14.0	4.5	9.2		4.5	8.75		0	115	1611	1611	0.96	5.8	148	1.3	3.0	5.3		1.95	310	1340	934	606
15.0	3.45	7.4	0	3.5	6.95		0	113	1724	1724	1.01	4.2	121	1.0	2.1	3.2		1.63	253	956	722	413
16.0	4.5	9.4		4.5	8.95		0	116	1850	1850	1.01	5.0	156	1.2	2.6	4.2		1.82	325	1291	932	591
17.0	3.55	7.7		3.5	7.25		0	113	1963	1963	1.04	3.8	128	0.9	1.9	2.7		1.53	268	956	741	410
18.0	2.75	7.8	0	2.7	7.35		0	113	2076	2076	1.72	2.7	161					1.26	337			424
19.0	4.1	8.15		4.1	7.7		0	114	2163	2163	0.88	4.0	125	1.0	2.0	2.9		1.57	261	1119	857	409
20.0	4.35	9		4.3	8.55		0	115	2278	2278	0.98	4.0	147	1.0	2.0	2.9		1.57	306	1179	903	482
21.0	5.15	10.6	0.1	5.1	10.15	0.35	0	117	2395	2395	1.00	4.4	176	1.1	2.3	3.5		1.69	367	1425	1062	619
22.0	4.9	9.4		4.9	8.95		0	116	2542	2542	0.83	4.0	141	1.0	2.0	3.0		1.58	295	1334	1019	465
23.0	5.5	11		5.4	10.55		0	118	2660	2660	0.94	4.3	178	1.0	2.2	3.3		1.65	371	1508	1134	610
24.0	5.75	11.8	0	5.7	11.35		0	118	2778	2778	1.01	4.3	198	1.0	2.2	3.2		1.65	413	1568	1181	679
25.0	5.65	11.8		5.5	11.35		0	118	2959	2959	1.05	3.9	201	1.0	2.0	2.9		1.57	420	1508	1159	659
26.0	5.35	10		5.3	9.55		0	116	3076	3076	0.79	3.6	147	0.9	1.8	2.5		1.47	306	1418	1112	450
27.0	5.1	9.6	0.15	5.1	9.15	0.40	0	116	3191	3191	0.80	3.3	141	0.9	1.7	2.2		1.39	295	1326	1061	409
28.0	4.65	8.8		4.6	8.35		0	115	3212	3212	0.80	3.0	128	0.8	1.5	1.9		1.29	268	1184	971	346
29.0	5.75	11		5.7	10.55		0	117	3330	3330	0.85	3.6	169	0.9	1.8	2.5		1.46	352	1512	1189	514
30.0	5.35	14.4	1.35	5.1	13.95	1.60	0	120	3450	3450	1.73	3.1	307					1.38	641			887
31.0	7.55	17.8		7.2	17.35		0	123	3824	3824	1.40	4.0	351					1.60	732			1170
32.0	4.85	10		4.8	9.55		0	116	3940	3940	0.99	2.5	165	0.7	1.3	1.5		1.13	344	1171	1002	390

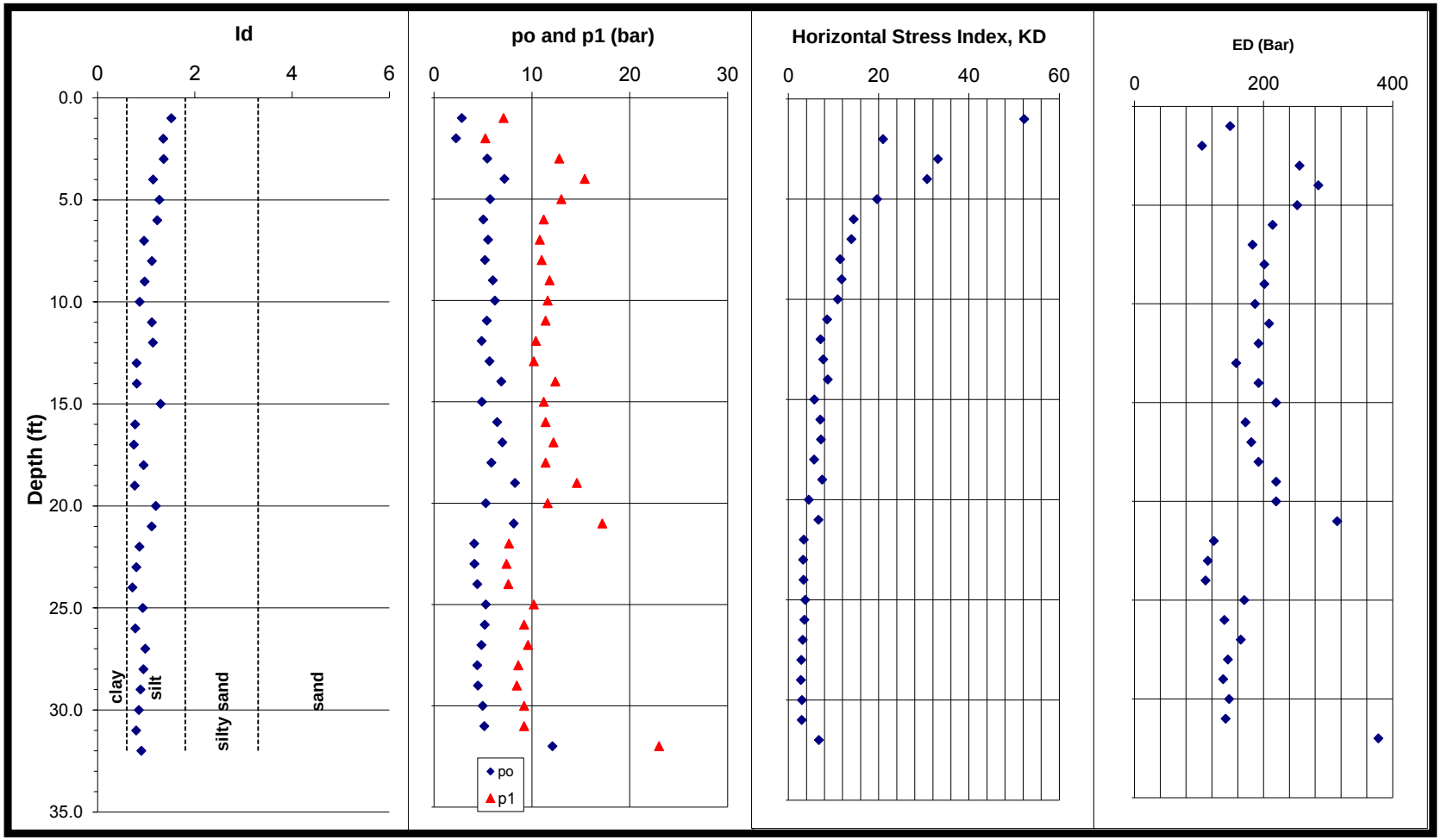
DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB1_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 ANI
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR3_EB1_B3
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.225	0	0
ΔB =	0.2	0	0
Zm=	0	bar	

Northing 874701
Easting 1777579

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

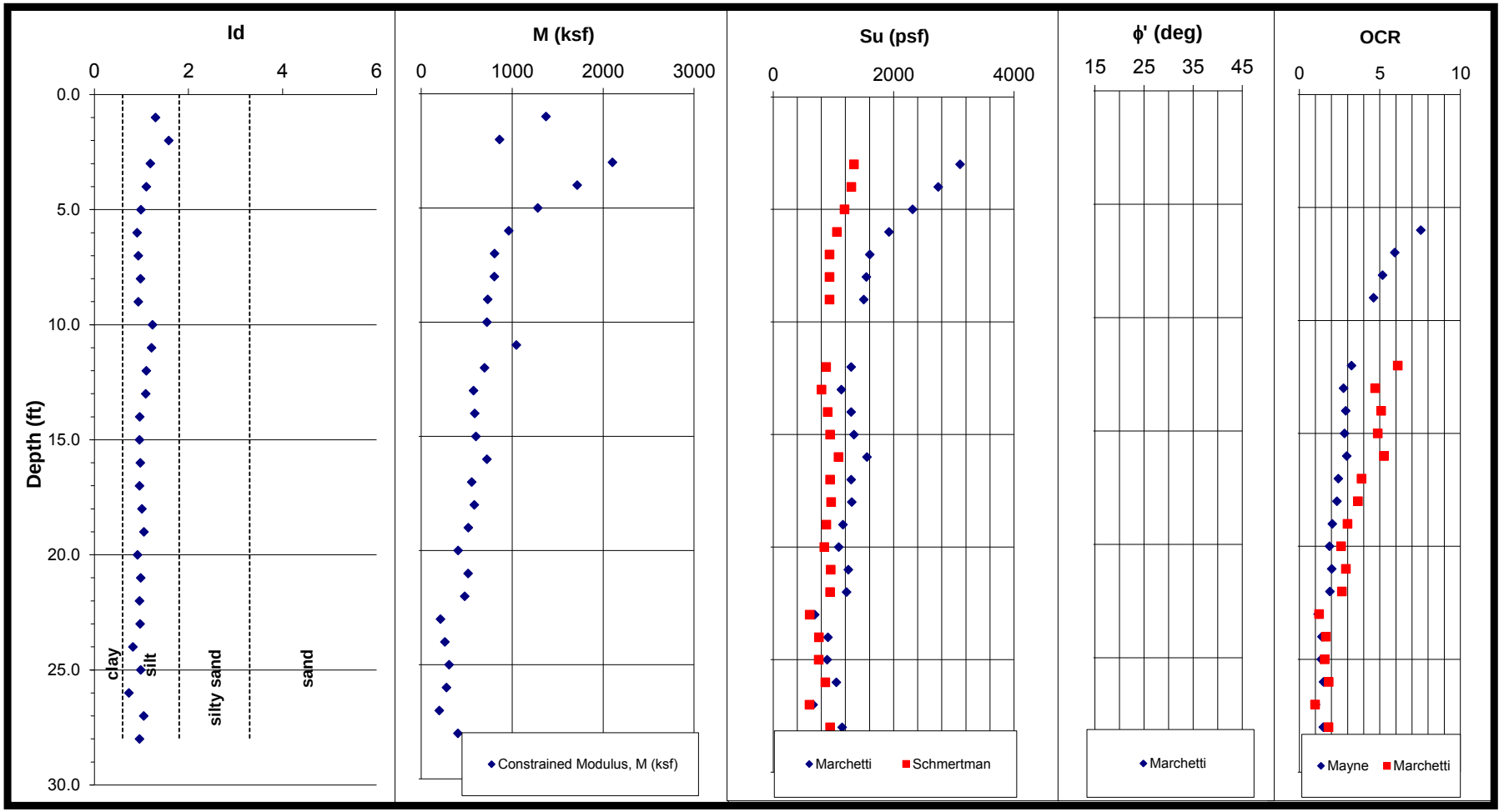
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	2.8	7.3		2.8	7.1		0	113	113	113	1.52	52.3	148					4.07	310			1261
2.0	2.15	5.45		2.2	5.25		0	109	222	222	1.35	21.0	105					3.20	219			700
3.0	5.55	13	0	5.4	12.8		0	120	342	342	1.36	33.1	256					3.63	535			1943
4.0	7.35	15.6		7.2	15.4		0	122	488	488	1.14	30.7	285	3.5	15.6	71.0		3.56	595	3268	1500	2122
5.0	5.85	13.2		5.7	13		0	120	608	608	1.27	19.7	252					3.14	527			1655
6.0	5.1	11.4	0	5.0	11.2		0	118	726	726	1.23	14.5	214					2.85	447			1274
7.0	5.55	11		5.5	10.8		0	118	825	825	0.96	14.0	183	2.3	7.1	20.8		2.82	382	2064	1154	1078
8.0	5.25	11.2		5.2	11		0	118	943	943	1.12	11.5	201	2.0	5.9	15.4		2.63	420	1850	1086	1107
9.0	6.05	12	0	6.0	11.8		0	119	1061	1061	0.97	11.8	201	2.0	6.0	16.0		2.66	420	2148	1253	1117
10.0	6.25	11.8		6.2	11.6		0	119	1186	1186	0.87	11.0	187	1.9	5.6	14.2		2.59	390	2185	1299	1009
11.0	5.45	11.6		5.4	11.4		0	118	1304	1304	1.12	8.6	209	1.7	4.4	9.8		2.35	436	1784	1125	1025
12.0	4.9	10.6	0	4.9	10.4		0	117	1422	1422	1.14	7.1	192	1.5	3.6	7.3		2.17	401	1535	1015	870
13.0	5.65	10.4		5.7	10.2		0	117	1522	1522	0.80	7.8	158	1.6	4.0	8.3		2.24	329	1825	1182	739
14.0	6.9	12.6		6.9	12.4		0	119	1641	1641	0.81	8.7	192	1.7	4.4	10.0		2.36	401	2279	1433	948
15.0	4.95	11.4	0	4.9	11.2		0	118	1759	1759	1.30	5.8	220					1.96	458			901
16.0	6.45	11.6		6.4	11.4		0	118	1893	1893	0.77	7.1	172	1.5	3.6	7.2		2.15	360	2031	1345	774
17.0	7	12.4		7.0	12.2		0	119	2012	2012	0.75	7.2	181	1.5	3.7	7.4		2.17	379	2211	1457	822
18.0	5.9	11.6	0.15	5.9	11.4	0.38	0	118	2131	2131	0.94	5.7	192	1.3	2.9	5.2		1.94	401	1753	1224	780
19.0	8.35	14.8		8.3	14.6		0	121	2304	2304	0.76	7.5	220	1.5	3.8	7.9		2.21	458	2645	1728	1012
20.0	5.35	11.8		5.3	11.6		0	119	2423	2423	1.20	4.5	220	1.1	2.3	3.6		1.72	458	1488	1101	790
21.0	8.35	17.4	0.2	8.1	17.2	0.43	0	123	2546	2546	1.11	6.7	314	1.4	3.4	6.6		2.10	656	2529	1701	1378
22.0	4.05	7.85		4.1	7.65		0	114	2503	2503	0.86	3.4	123	0.9	1.7	2.3		1.42	257	1079	858	365
23.0	4.05	7.6		4.1	7.4		0	113	2616	2616	0.80	3.3	114	0.8	1.7	2.2		1.37	238	1071	860	327
24.0	4.35	7.8	0.05	4.4	7.6	0.28	0	114	2730	2730	0.72	3.4	110	0.9	1.7	2.3		1.40	230	1159	924	322
25.0	5.3	10.4		5.3	10.2		0	117	2928	2928	0.93	3.8	170	0.9	1.9	2.7		1.52	356	1425	1105	542
26.0	5.15	9.4		5.2	9.2		0	116	3044	3044	0.77	3.6	139	0.9	1.8	2.5		1.45	291	1375	1083	423
27.0	4.85	9.8	0	4.8	9.6		0	116	3160	3160	0.98	3.2	165	0.8	1.6	2.1		1.36	344	1253	1013	469
28.0	4.4	8.8		4.4	8.6		0	115	3224	3224	0.94	2.9	145	0.8	1.5	1.8		1.25	302	1113	924	377
29.0	4.45	8.65		4.5	8.45		0	115	3339	3339	0.88	2.8	138	0.7	1.4	1.7		1.22	287	1122	937	351
30.0	4.95	9.4	0.55	5.0	9.2	0.78	0	116	3455	3455	0.85	3.0	147	0.8	1.5	1.9		1.29	306	1265	1039	394
31.0	5.1	9.4		5.1	9.2		0	116	3591	3591	0.79	3.0	141	0.8	1.5	1.9		1.28	295	1303	1072	376
32.0	12.4	23.2		12.1	23		0	127	3718	3718	0.90	6.8	378	1.4	3.5	6.7		2.11	789	3777	2528	1668

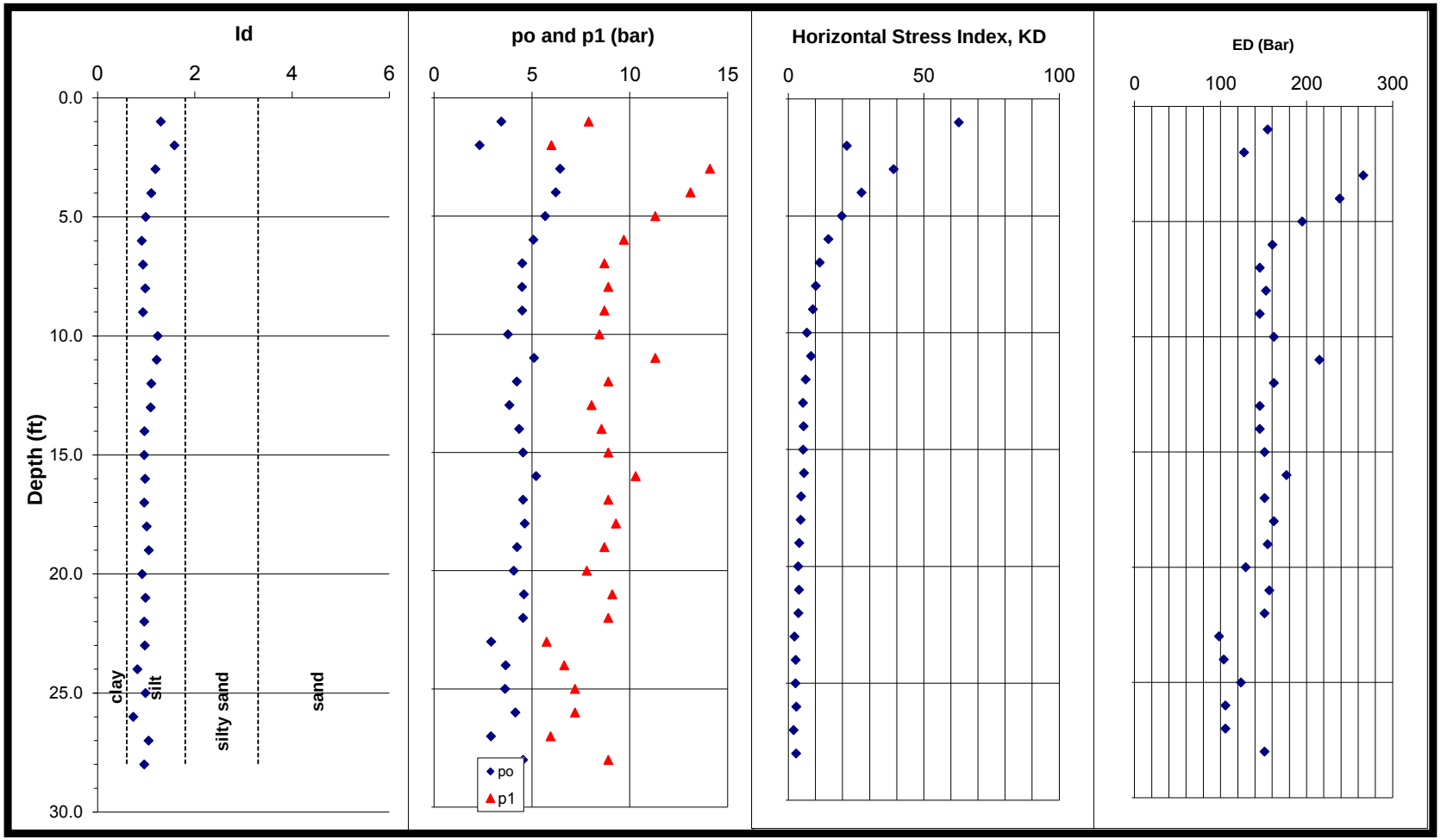
DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B1
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 AND
Job Location: Greensboro, NC
Date: 12-21-16
Sounding No: STR3_EB2_B1
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.2	0	0
ΔB =	0.3	0	0
Zm=	0	bar	

Northing 874672
Easting 1777462

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

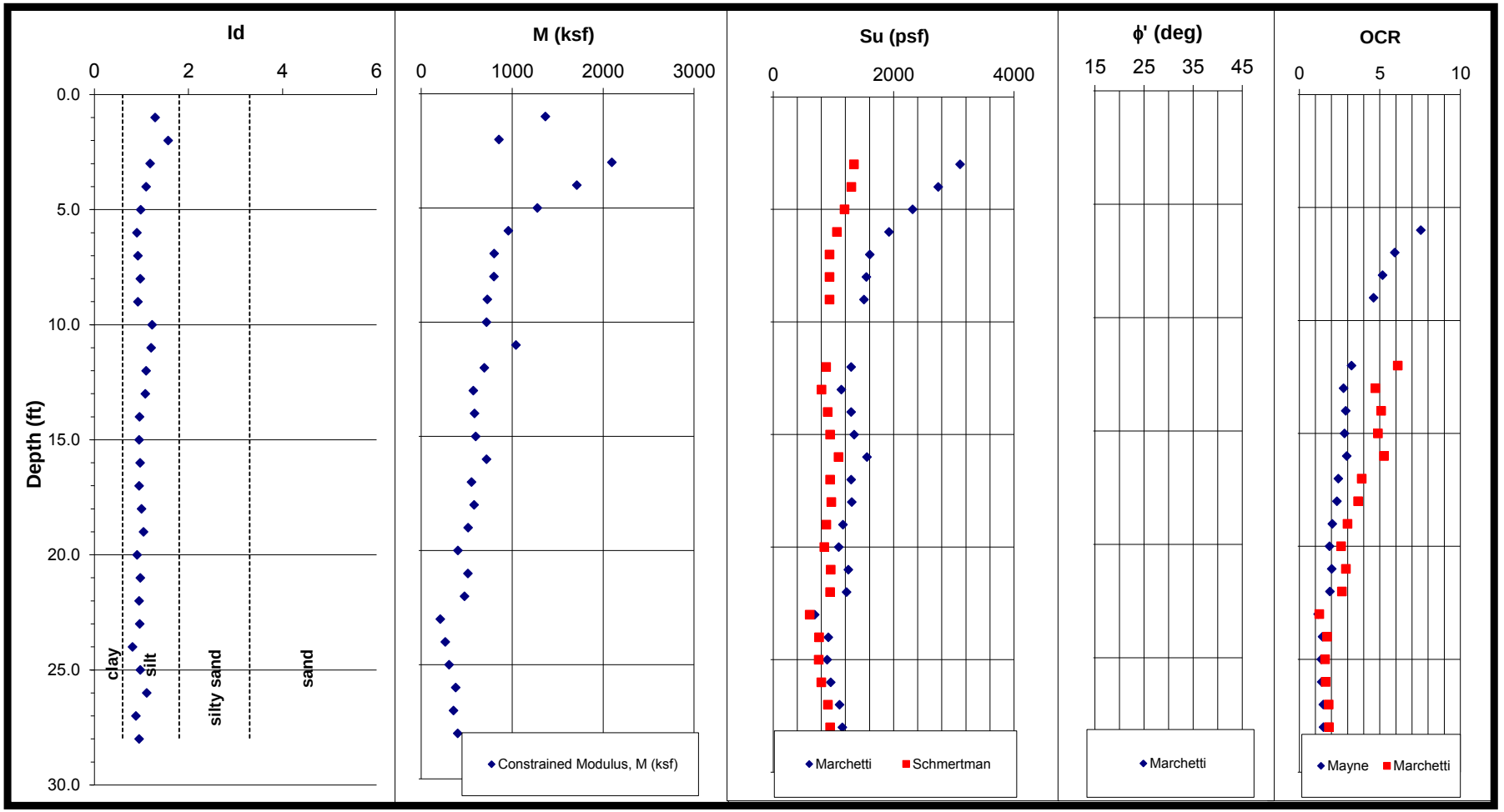
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR^2	OCR^3	ϕ^3 (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	3.45	8.2		3.4	7.9		0	114	114	114	1.30	62.9	155					4.24	323			1372
2.0	2.3	6.3		2.3	6		0	111	225	225	1.58	21.6	128					3.23	266			860
3.0	6.6	14.4		6.4	14.1		0	121	346	346	1.19	38.9	266	4.0	19.8	102.4		3.79	556	3104	1344	2103
4.0	6.35	13.4		6.2	13.1		0	120	480	480	1.11	27.1	239	3.3	13.8	58.2		3.44	498	2742	1300	1716
5.0	5.75	11.6		5.7	11.3		0	118	599	599	0.99	19.8	195	2.8	10.1	35.8		3.15	407	2316	1187	1282
6.0	5.1	10	0	5.1	9.7		0	117	715	715	0.91	14.8	160	2.3	7.6	22.8		2.87	335	1926	1061	962
7.0	4.5	9		4.5	8.7		0	115	807	807	0.93	11.6	146	2.0	5.9	15.6		2.64	304	1606	940	805
8.0	4.5	9.2		4.5	8.9		0	116	922	922	0.98	10.2	153	1.9	5.2	12.6		2.52	320	1549	938	804
9.0	4.5	9	0	4.5	8.7		0	115	1038	1038	0.93	9.1	146	1.7	4.6	10.6		2.40	304	1508	940	731
10.0	3.8	8.75		3.8	8.45		0	115	1149	1149	1.24	6.9	162					2.13	339			721
11.0	5.2	11.6		5.1	11.3		0	118	1267	1267	1.21	8.4	215					2.33	449			1046
12.0	4.25	9.2	0	4.2	8.9		0	116	1383	1383	1.11	6.4	162	1.4	3.3	6.1		2.06	339	1298	883	696
13.0	3.85	8.35		3.9	8.05		0	114	1487	1487	1.09	5.4	146	1.2	2.8	4.7		1.89	304	1134	804	575
14.0	4.35	8.85		4.4	8.55		0	115	1602	1602	0.97	5.7	146	1.3	2.9	5.1		1.93	304	1297	909	588
15.0	4.55	9.2	0	4.5	8.9		0	116	1717	1717	0.96	5.5	151	1.2	2.8	4.9		1.91	316	1345	949	602
16.0	5.25	10.6		5.2	10.3		0	117	1876	1876	0.98	5.8	177	1.3	3.0	5.3		1.95	369	1561	1088	721
17.0	4.55	9.2		4.5	8.9		0	116	1991	1991	0.96	4.8	151	1.1	2.4	3.9		1.76	316	1297	949	555
18.0	4.65	9.6	0	4.6	9.3		0	116	2107	2107	1.01	4.6	162	1.1	2.3	3.6		1.72	339	1308	966	583
19.0	4.25	9		4.2	8.7		0	115	2190	2190	1.05	4.0	155	1.0	2.1	3.0		1.60	323	1161	885	517
20.0	4.05	8.1		4.1	7.8		0	114	2304	2304	0.92	3.7	129	0.9	1.9	2.6		1.50	270	1091	851	405
21.0	4.6	9.4	0	4.6	9.1		0	116	2420	2420	0.98	4.0	157	1.0	2.0	2.9		1.57	327	1249	958	515
22.0	4.55	9.2		4.5	8.9		0	116	2542	2542	0.96	3.7	151	0.9	1.9	2.6		1.51	316	1220	949	478
23.0	2.85	6.05		2.9	5.75		0	111	2652	2652	0.97	2.3	98	0.6	1.2	1.2		1.03	205	693	609	211
24.0	3.6	6.95	0	3.7	6.65		0	112	2764	2764	0.82	2.8	104	0.7	1.4	1.7		1.20	217	911	764	260
25.0	3.6	7.5		3.6	7.2		0	113	2828	2828	0.98	2.7	124	0.7	1.4	1.6		1.18	259	897	758	306
26.0	4.1	7.5		4.2	7.2		0	113	2941	2941	0.73	3.0	106	0.8	1.5	1.8		1.26	221	1052	868	278
27.0	2.85	6.25	0	2.9	5.95		0	111	3052	3052	1.05	2.0	106	0.5	1.0	1.0		0.89	221	666	607	197
28.0	4.55	9.2		4.5	8.9		0	116	3235	3235	0.96	2.9	151	0.8	1.5	1.8		1.27	316	1148	949	402

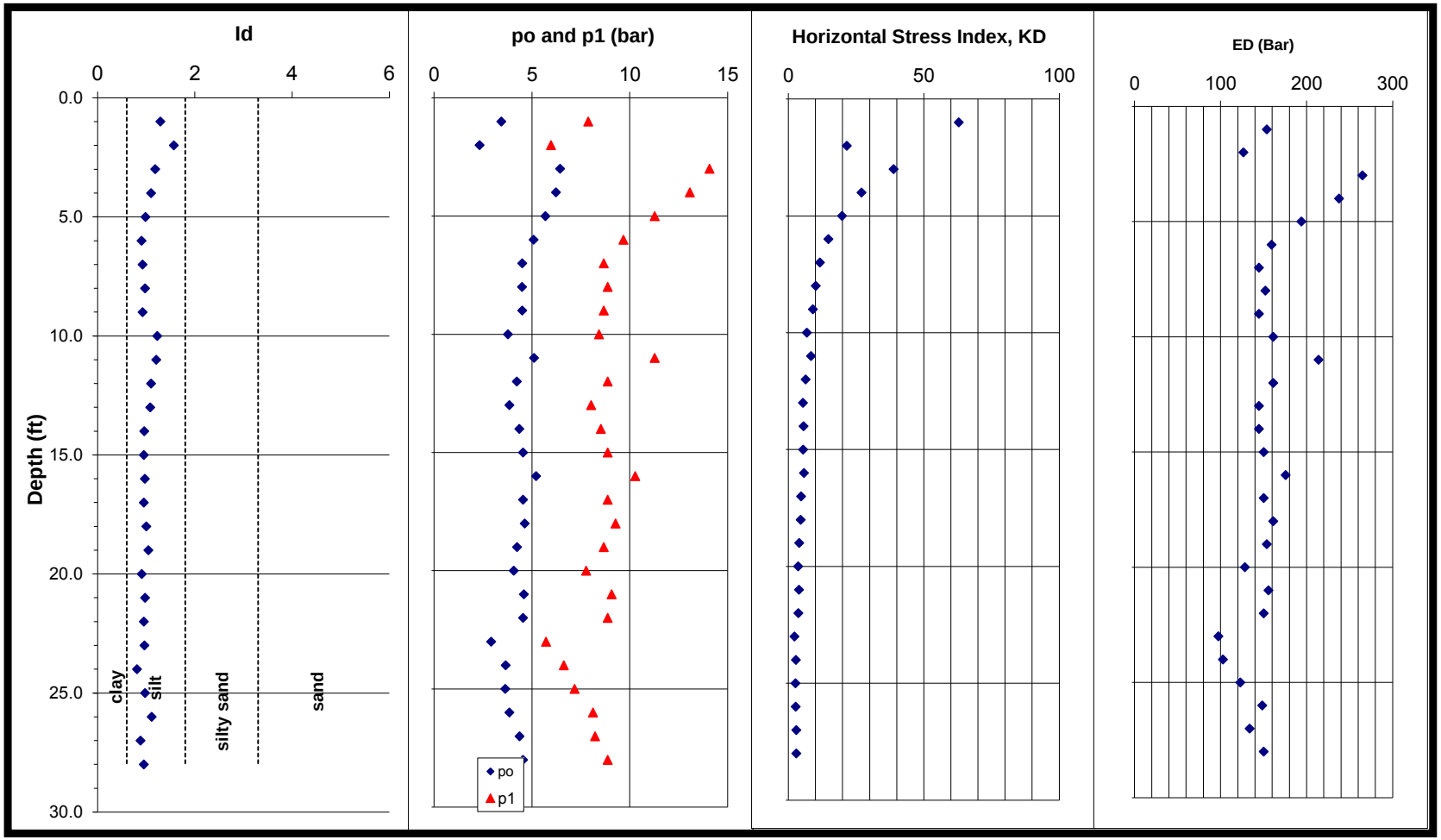
DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B2
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 AND
Job Location: Greensboro, NC
Date: 12-20-16
Sounding No: STR3_EB2_B2
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.2	0	0
ΔB =	0.325	0	0
Zm=	0	bar	

Northing 874736
Easting 1777468

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

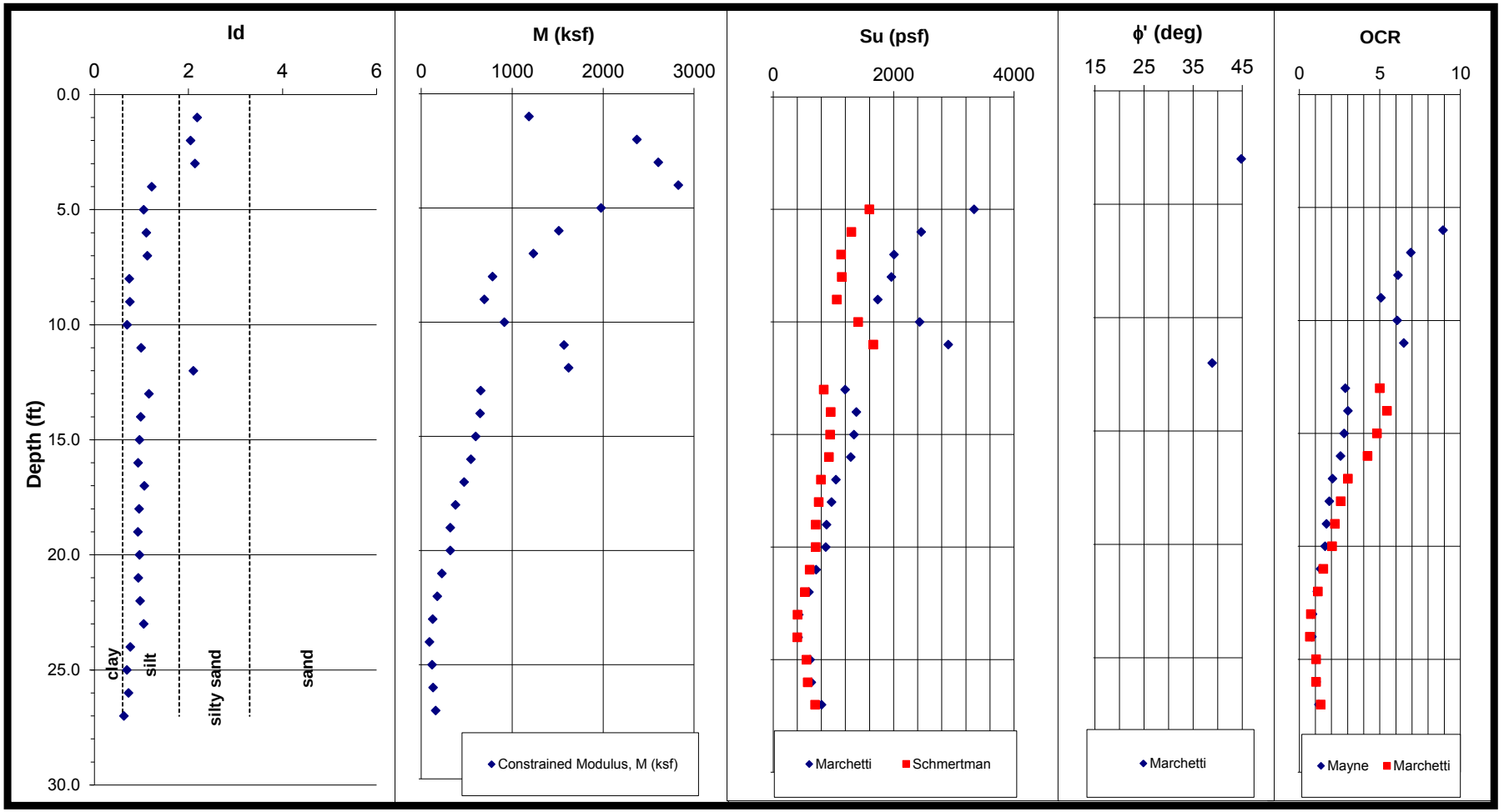
CONETEC

DILATOMETER TEST RESULTS

Depth[1] (ft)	A (bar)	B (bar)	C (bar)	po (bar)	p1 (bar)	p2 (bar)	u_o (psf)	γ_T[5] (pcf)	σ_{vo} (psf)	σ_{vo}' (psf)	Id	K_D	E_D (bar)	K_o	OCR[2]	OCR[3]	ϕ'[3] (deg)	R_M	E_D (ksf)	s_u[3] (psf)	s_u[4] (psf)	M (ksf)
1.0	3.45	8.2		3.4	7.875		0	114	114	114	1.29	63.0	154					4.24	322			1364
2.0	2.3	6.3		2.3	5.975		0	111	225	225	1.57	21.6	127					3.23	264			854
3.0	6.6	14.4		6.4	14.075		0	121	346	346	1.19	38.9	265	4.0	19.8	102.4		3.79	554	3105	1344	2096
4.0	6.35	13.4		6.2	13.075		0	120	480	480	1.10	27.1	238	3.3	13.8	58.2		3.44	497	2743	1300	1709
5.0	5.75	11.6		5.7	11.275		0	118	599	599	0.98	19.8	194	2.8	10.1	35.8		3.15	405	2317	1187	1276
6.0	5.1	10	0	5.1	9.675		0	116	715	715	0.90	14.8	159	2.3	7.6	22.8		2.87	333	1927	1061	957
7.0	4.5	9		4.5	8.675		0	115	807	807	0.93	11.7	145	2.0	5.9	15.6		2.64	302	1607	940	800
8.0	4.5	9.2		4.5	8.875		0	116	922	922	0.98	10.2	152	1.9	5.2	12.6		2.52	318	1550	938	799
9.0	4.5	9	0	4.5	8.675		0	115	1037	1037	0.93	9.1	145	1.7	4.6	10.6		2.40	302	1509	940	726
10.0	3.8	8.75		3.8	8.425		0	115	1148	1148	1.23	6.9	161					2.13	337			718
11.0	5.2	11.6		5.1	11.275		0	118	1267	1267	1.21	8.4	214					2.33	447			1042
12.0	4.25	9.2	0	4.2	8.875		0	115	1382	1382	1.10	6.4	161	1.4	3.3	6.1		2.06	337	1299	883	692
13.0	3.85	8.35		3.9	8.025		0	114	1486	1486	1.08	5.4	145	1.2	2.8	4.7		1.89	302	1135	804	572
14.0	4.35	8.85		4.4	8.525		0	115	1601	1601	0.96	5.7	145	1.3	2.9	5.1		1.93	302	1297	909	585
15.0	4.55	9.2	0	4.5	8.875		0	115	1717	1717	0.95	5.5	150	1.2	2.8	4.9		1.91	314	1346	949	598
16.0	5.25	10.6		5.2	10.275		0	117	1875	1875	0.97	5.8	176	1.3	3.0	5.3		1.96	367	1562	1088	718
17.0	4.55	9.2		4.5	8.875		0	115	1991	1991	0.95	4.8	150	1.1	2.4	3.9		1.76	314	1297	949	552
18.0	4.65	9.6	0	4.6	9.275		0	116	2107	2107	1.00	4.6	161	1.1	2.3	3.7		1.72	337	1309	967	580
19.0	4.25	9		4.2	8.675		0	115	2189	2189	1.05	4.0	154	1.0	2.1	3.0		1.60	322	1161	885	514
20.0	4.05	8.1		4.1	7.775		0	114	2303	2303	0.91	3.7	128	0.9	1.9	2.6		1.50	268	1091	851	402
21.0	4.6	9.4	0	4.6	9.075		0	116	2419	2419	0.98	4.0	156	1.0	2.0	2.9		1.57	325	1250	958	512
22.0	4.55	9.2		4.5	8.875		0	115	2541	2541	0.95	3.7	150	0.9	1.9	2.6		1.51	314	1220	949	475
23.0	2.85	6.05		2.9	5.725		0	111	2652	2652	0.96	2.3	97	0.6	1.2	1.2		1.03	204	694	609	209
24.0	3.6	6.95	0	3.7	6.625		0	112	2691	2691	0.81	2.8	103	0.7	1.4	1.7		1.23	215	918	764	264
25.0	3.6	7.5		3.6	7.175		0	113	2804	2804	0.98	2.7	123	0.7	1.4	1.6		1.19	257	900	758	306
26.0	3.85	8.45		3.8	8.125		0	114	2918	2918	1.11	2.8	148	0.7	1.4	1.6		1.22	310	957	803	379
27.0	4.35	8.55	0.05	4.4	8.225	0.25	0	115	3094	3094	0.88	2.9	134	0.8	1.5	1.8		1.27	280	1105	912	355
28.0	4.55	9.2		4.5	8.875		0	115	3210	3210	0.95	3.0	150	0.8	1.5	1.8		1.28	314	1151	949	401

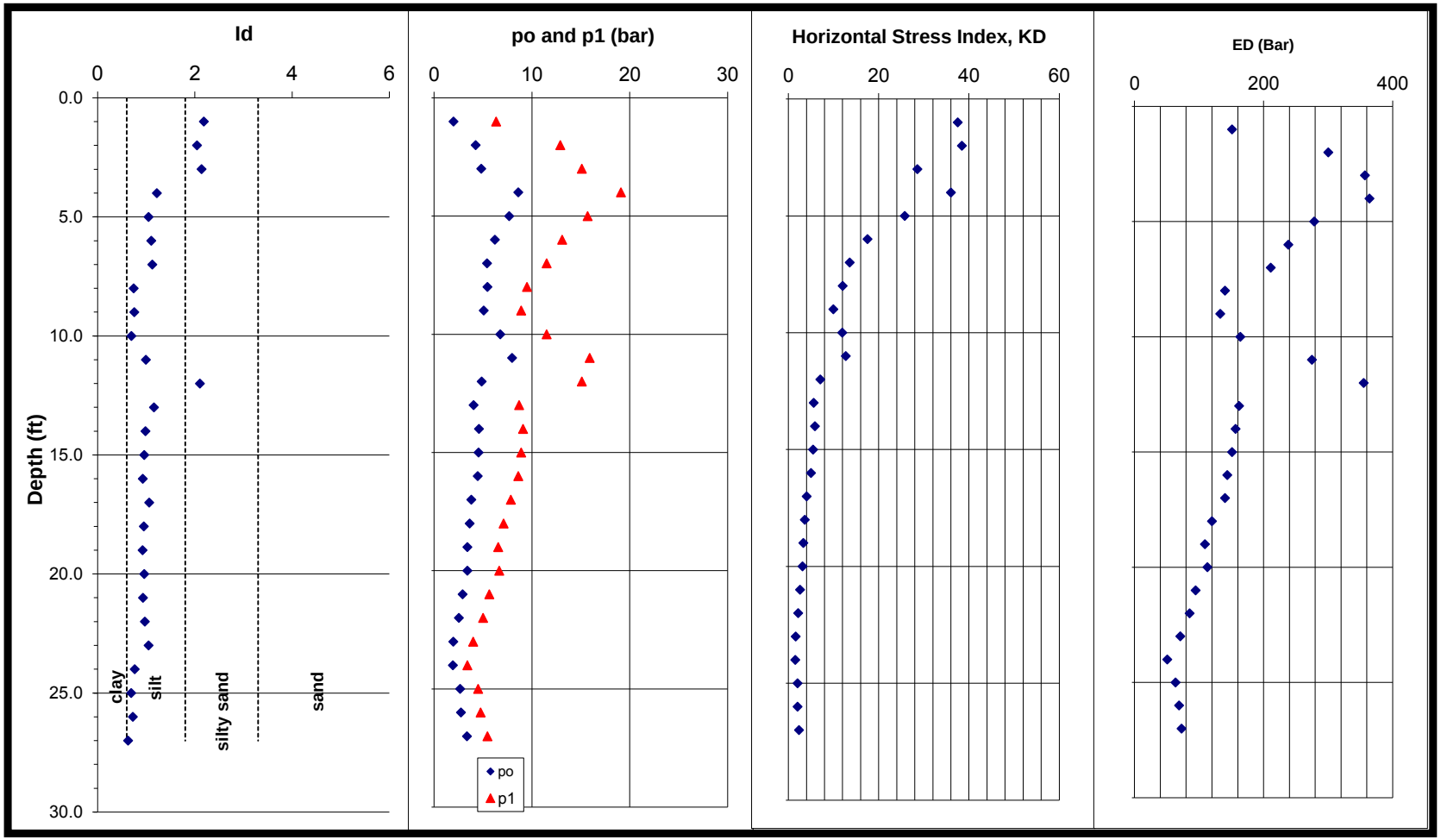
DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR3_EB2_B3
Site: SITE #2 (STRUCTURE #2 AND #3) - BRIDGE NO 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: SITE #2 (STRUCTURE #2 ANI
Job Location: Greensboro, NC
Date: 12-21-16
Sounding No: STR3_EB2_B3
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.2	0	0
ΔB =	0.3	0	0
Zm=	0	bar	

Northing 874716
Easting 1777445

[1] Depth Below Existing Ground Surface
[2] Mayne, 1995
[3] Marchetti,2001
[4] Schmertman, 1991
[5] Mayne, 2002

CONETEC

DILATOMETER TEST RESULTS

Depth[1]	A	B	C	po	p1	p2	u_o	γ_T[5]	σ_{vo}	σ_{vo}'			E_D				ϕ'[3]		E_D	s_u[3]	s_u[4]	M
(ft)	(bar)	(bar)	(bar)	(bar)	(bar)	(bar)	(psf)	(pcf)	(psf)	(psf)	Id	K_D	(bar)	K_o	OCR[2]	OCR[3]	(deg)	R_M	(ksf)	(psf)	(psf)	(ksf)
1.0	2	6.65		2.0	6.35		0	111	111	111	2.19	37.5	151				45.8	3.75	316			1185
2.0	4.45	13.2		4.2	12.9		0	119	230	230	2.04	38.5	301				45.9	3.78	628			2370
3.0	5.1	15.4	0	4.8	15.1		0	121	351	351	2.14	28.6	357				44.8	3.50	746			2607
4.0	8.9	19.4		8.6	19.1		0	125	499	499	1.22	36.0	364					3.71	761			2826
5.0	7.85	16		7.7	15.7		0	122	621	621	1.05	25.8	279	3.2	13.1	54.0		3.40	582	3338	1601	1978
6.0	6.35	13.4	0	6.2	13.1		0	120	741	741	1.11	17.5	239	2.6	8.9	29.6		3.03	498	2460	1300	1511
7.0	5.5	11.8		5.4	11.5		0	119	830	830	1.13	13.6	211	2.2	6.9	19.9		2.79	441	2008	1130	1232
8.0	5.45	9.8		5.5	9.5		0	116	946	946	0.74	12.1	140	2.1	6.1	16.5		2.68	293	1964	1140	784
9.0	5.05	9.2	0	5.1	8.9		0	115	1061	1061	0.76	10.0	133	1.8	5.1	12.3		2.50	278	1740	1058	694
10.0	6.8	11.8		6.8	11.5		0	118	1183	1183	0.70	12.0	164	2.1	6.1	16.3		2.67	342	2434	1415	914
11.0	8.15	16.2		8.0	15.9		0	122	1306	1306	0.99	12.8	275	2.1	6.5	18.0		2.73	575	2910	1665	1568
12.0	5.15	15.4	0	4.9	15.1		0	121	1427	1427	2.11	7.1	355				38.9	2.18	742			1621
13.0	4.05	9		4.0	8.7		0	115	1498	1498	1.16	5.6	162	1.3	2.9	5.0		1.93	339	1198	841	653
14.0	4.6	9.4		4.6	9.1		0	116	1614	1614	0.98	5.9	157	1.3	3.0	5.5		1.98	327	1382	958	647
15.0	4.55	9.2	0	4.5	8.9		0	116	1729	1729	0.96	5.5	151	1.2	2.8	4.8		1.90	316	1343	949	600
16.0	4.45	8.9		4.5	8.6		0	115	1842	1842	0.93	5.0	144	1.2	2.6	4.2		1.81	301	1289	930	545
17.0	3.8	8.15		3.8	7.85		0	114	1956	1956	1.06	4.1	140	1.0	2.1	3.0		1.60	293	1044	795	470
18.0	3.6	7.4	0	3.6	7.1		0	113	2069	2069	0.95	3.7	120	0.9	1.9	2.6		1.50	251	972	759	376
19.0	3.35	6.85		3.4	6.55		0	112	2129	2129	0.93	3.3	109	0.9	1.7	2.2		1.40	228	888	710	319
20.0	3.35	6.95		3.4	6.65		0	112	2241	2241	0.96	3.2	113	0.8	1.6	2.0		1.35	236	875	709	318
21.0	2.85	5.95	0	2.9	5.65		0	110	2351	2351	0.93	2.6	95	0.7	1.3	1.5		1.15	198	716	610	227
22.0	2.45	5.3		2.5	5		0	109	2399	2399	0.97	2.2	86	0.6	1.1	1.2		0.99	179	596	529	177
23.0	1.85	4.3		2.0	4		0	107	2506	2506	1.05	1.6	71	0.4	0.8	0.7		0.85	148	426	408	126
24.0	1.8	3.7	0	1.9	3.4		0	105	2611	2611	0.76	1.5	51	0.4	0.8	0.7		0.85	107	416	403	91
25.0	2.55	4.8		2.7	4.5		0	108	2693	2693	0.69	2.1	64	0.6	1.1	1.1		0.89	133	617	556	119
26.0	2.65	5.05		2.8	4.75		0	108	2802	2802	0.72	2.1	69	0.6	1.0	1.0		0.89	145	637	575	129
27.0	3.25	5.75	0	3.4	5.45		0	110	2911	2911	0.63	2.4	73	0.6	1.2	1.3		1.04	152	806	700	158

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	11

REFERENCE: U-2525C

PROJECT: 34821

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY GUILFORD

PROJECT DESCRIPTION GREENSBORO EASTERN LOOP FROM US 29 NORTH OF GREENSBORO TO SR 2303 (LAWNSDALE DRIVE)

SITE DESCRIPTION MSE WALLS AT END BENT 1 AND END BENT 2 – SITE #2 (STRUCTURE #2 AND #3) ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

CONTENTS

CAUTION NOTICE

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

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

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

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

PERSONNEL

D. KUBINSKI

R. TOOTHMAN

W. ALLEN

B. JOHNSON

INVESTIGATED BY D. KUBINSKI

DRAWN BY T. WELLS

CHECKED BY X. BARRETT

SUBMITTED BY KLEINFELDER, INC.

DATE NOVEMBER 2017

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
7343 WEST FRIENDLY AVENUE, SUITE B
GREENSBORO, NC 27410
ENGINEERING FIRM LICENSE NO. F-1312

NORTH CAROLINA PROFESSIONAL SEAL 015741 ENGINEER XAVIER C. BARRETT

DocuSigned by:
Xavier C. Barrett
2D00374FA68B4CC...
SIGNATURE

11/22/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [X] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [ ] CASING [ ] W/ ADVANCER
- [X] TRICONE 2-15/16" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: BYI-102: -YI- STA. 7+71.38, (874,678 FT. N, 1,777,494 FT. E)

ELEVATION: 874.57 FEET

NOTES:

FIAD: FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	3

SITE PLAN

0 40 80
FEET

N

BEG. MSE WALL
-Y1- 11+84.23
RW1-1

EB1-A

-Y1-

12

CB

15" CONC W/FES

12" CONC

GR

42

BEG. MSE WALL
-Y1- 11+77.48
RW2-1

EB2-A

W/LT

RAMP

ISFD

TO SR 2526
(SUMMIT AVE.)

328

329

EB1-C

330

13

EB2-C

331

332

EBL -L-

TO SR 2523
(YANCEYVILLE RD.)

W

BL-17

BYI-102

EB1-B

EB2-B

WBL

M

14

-BYI-102 PINC 7+71.38

END MSE WALL
-Y1- 14+38.33
RW1-2

-Y1- 14+46.29
END MSE WALL
RW2-2

0	20	40

FEET

VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

END BENT NO. 1 CROSS SECTION

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

910 900 890 880 870 860 850 840 830 820 810 800 790

Ⓐ **RESIDUAL:**
MOIST, MEDIUM DENSE TO VERY DENSE, YELLOW TO WHITE TO GRAY TO BROWN, SILTY, FINE TO COARSE SAND WITH ROCK FRAGMENTS

RW1-2
14+45
44' RT

10 17 13 Ⓐ 8 9 6 11

BT
DRY
10/16

EB1-B
13+71
57' RT

11 22 8 9 5 14 6 5 7 14 20 100/0.8 100/0.2 100/0.3

BT
DRY
10/16

EB1-C
13+06
49' RT

11 20 12 25 10 16 22 16 21 Ⓐ 83 32 89 100/0.4 60/0.0

BT
DRY
10/16

RESIDUAL:
MOIST, MEDIUM STIFF TO HARD, REDDISH BROWN TO YELLOWISH BROWN TO RED TO YELLOW, FINE TO COARSE SANDY CLAY AND FINE TO COARSE SANDY SILT

EB1-A
12+38
52' RT

7 16 10 9 16 22 18 35 100/0.6 100/0.4 100/0.2

BT
FIAD

RW1-1
11+92
40' RT

8 24 16 27 68 Ⓐ 43 36

BT
DRY
10/16

WEATHERED ROCK:
LIGHT BROWNISH GRAY TO YELLOW AND WHITE, METAMORPHOSED GRANITE

CRYSTALLINE ROCK:
GRAY, METAMORPHOSED GRANITE

NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 9/14/2016

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

SKEW: 90°09'20"

-Y1-

6/23/16

27-OCT-2017 13:18
W:\share\GEOTECHNICAL\Projects\Active Projects\20151548.0046A U-2525C Site #2 Retaining Walls\U2525C_GEO_RWAL_Site2\CADD_GEOTECH\Site&Sub\u2525c_geo_xsc_sheet.dgn
twells
AT CA20215

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	5

END BENT NO. 2 CROSS SECTION

0 20 40
FEET
VE = 1:1

Ⓐ **RESIDUAL:**
MOIST, MEDIUM DENSE, BROWN, SILTY, FINE TO COARSE SAND

Ⓑ **RESIDUAL:**
WET, VERY DENSE, TAN, SILTY, FINE TO COARSE SAND

Ⓒ **RESIDUAL:**
WET, HARD, BROWN AND TAN, FINE SANDY SILT WITH TRACE MICA

RW2–1
11+84
50' LT

EB2–A
12+33
55' LT

EB2–C
13+07
46' LT

EB2–B
13+72
49' LT

RW2–2
14+53
46' LT

RESIDUAL:
MOIST, MEDIUM STIFF TO HARD, REDDISH BROWN TO YELLOWISH BROWN TO RED TO YELLOW, FINE TO COARSE SANDY CLAY, FINE TO COARSE SANDY SILT

RESIDUAL:
MOIST, LOOSE TO VERY DENSE, GRAY TO WHITE TO BROWN, SILTY, FINE TO COARSE SAND

WEATHERED ROCK:
LIGHT BROWNISH GRAY TO YELLOW AND WHITE, METAMORPHOSED GRANITE

CRYSTALLINE ROCK:
GRAY, METAMORPHOSED GRANITE

ST-1

BT
DRY
10/16

NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 9/14/2016

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

SKEW: 89°27'36"

–Y1–

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 12+38	**OFFSET** 52 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 874.6 ft	**TOTAL DEPTH** 48.2 ft	**NORTHING** 874,587	**EASTING** 1,777,555	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/10/16	**COMP. DATE** 10/10/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
875	874.6	0.0								874.6 GROUND SURFACE 0.0
			2	2	5	7 16		M		**RESIDUAL** Brown and Yellowish Brown to Red, Fine Sandy CLAY
870	871.6	3.0	7	7	9			M		868.6 6.0
	866.6	8.0								Yellowish Brown and Yellow to Gray to Olive Yellow, Fine to Coarse Sandy SILT
865			4	5	5	10		M		
860	861.6	13.0	3	4	5	9		M		
	856.6	18.0								
855			5	7	9	16		M		
	851.6	23.0								
850			5	10	12	22		M		
	846.6	28.0								
845			5	8	10	18		M		
	841.6	33.0								
840			12	15	20	35		M		
	836.6	38.0								
835			84	16/0.1		100/0.6				
	831.6	43.0	100/0.4			100/0.4				
830										838.1 36.5
	826.6	48.0	100/0.2			100/0.2				**WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE
										826.4 48.2
										Boring Terminated at Elevation 826.4 ft in WEATHERED ROCK: METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.4 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 13+06	**OFFSET** 49 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 876.9 ft	**TOTAL DEPTH** 63.3 ft	**NORTHING** 874,656	**EASTING** 1,777,559	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION (ELEV. (ft) / DEPTH (ft))
880										
	876.9	0.0								876.9 GROUND SURFACE 0.0
875			5	6	5	11		M		**RESIDUAL** Red, Fine Sandy CLAY with Trace Mica
	873.6	3.3								870.4 6.5
870			6	9	11	20		M		Red, Fine Sandy SILT with Trace Mica
	868.6	8.3								865.4 11.5
865			5	5	7	12		M		Red to Olive and Yellow to Light Brownish Gray, Fine Sandy SILT with Trace Mica
	863.6	13.3								
860			8	11	14	25		M		
	858.6	18.3								
855			5	4	6	10		M		
	853.6	23.3								
850			4	6	10	16		M		
	848.6	28.3								
845			7	10	12	22		M		
	843.6	33.3								
840			8	7	9	16		M		
	838.6	38.3								
835			6	9	12	21		M		835.4 41.5
	833.6	43.3								Olive, Silty, Fine to Coarse SAND
830			21	32	51	83		M		830.4 46.5
	828.6	48.3								Olive and Yellow, Fine Sandy SILT with Trace Mica
825			13	14	18	32		M		
	823.6	53.3								
820			17	31	58	89		M		820.4 56.5
	818.6	58.3	100/0.4			100/0.4				**WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE
815										813.6 63.3
	813.6	63.3	60/0.0			60/0.0				Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 813.6 ft on CRYSTALLINE ROCK: METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.4 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 13+71	**OFFSET** 57 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 877.6 ft	**TOTAL DEPTH** 63.3 ft	**NORTHING** 874,721	**EASTING** 1,777,572	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/06/16	**COMP. DATE** 10/06/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
880										
	877.6	0.0								877.6 0.0 GROUND SURFACE
			5	5	6	11		M		**RESIDUAL**
875	874.6	3.0								875.1 2.5 Reddish Brown, Fine Sandy CLAY
			6	10	12	22		M		Reddish Brown to Gray and Yellow to Light Brownish Gray, Fine to Coarse Sandy SILT with Trace Mica
870	869.6	8.0								
			3	4	4	8		M		
865	864.6	13.0								
			3	4	5	9		M		
860	859.6	18.0								
			3	2	4	6		M		
855	854.6	23.0								
			5	6	8	14		M		
850	849.6	28.0								
			2	3	3	6		M		
845	844.6	33.0								
			2	2	3	5		M		
840	839.6	38.0								
			3	3	4	7		M		
835	834.6	43.0								
			3	6	8	14		M		
830	829.6	48.0								
			3	7	13	20		M		
825	824.6	53.0								
			40	60/0.3		100/0.8				
820	819.6	58.0								
			100/0.2			100/0.2				
815	814.6	63.0								826.6 51.0 **WEATHERED ROCK** Yellow and Gray, METAMORPHOSED GRANITE
			100/0.3			100/0.3				814.3 63.3 Boring Terminated at Elevation 814.3 ft in WEATHERED ROCK: METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.5 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 12+33	**OFFSET** 55 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 873.1 ft	**TOTAL DEPTH** 50.0 ft	**NORTHING** 874,594	**EASTING** 1,777,448	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/03/16	**COMP. DATE** 10/03/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
	873.1	0.0								873.1 0.0 GROUND SURFACE
			4	6	9	15		M		**RESIDUAL**
870	869.6	3.5								871.1 2.0 Brown to Tan, Silty, Fine SAND with Trace of Organic Matter
			6	7	6	13		M		Tan, Fine Sandy CLAY
865	864.6	8.5								866.6 6.5 Tan, Micaceous, Fine Sandy SILT
			8	11	10	21		W		
860	859.6	13.5								
			17	19	20	39		W		
855	854.6	18.5								
			6	8	15	23		W		
850	849.6	23.5								
			3	6	8	14		W		
845	844.6	28.5								847.1 26.0 **WEATHERED ROCK** Tan, METAMORPHOSED GRANITE
			53	47/0.3		100/0.8		W		
840	839.6	33.5								841.6 31.5 **RESIDUAL** Brown and Tan, Fine Sandy SILT with Trace Mica
			20	33	62	95		W		
835	834.6	38.5								836.6 36.5 Tan, Silty, Fine to Coarse SAND
			35	27	36	63		W		
830	829.6	43.5								832.1 41.0 Brown, Fine Sandy SILT with Trace Mica
			14	20	31	51		W		
825	824.6	48.5								
			23	32	66	98		W		823.1 50.0 Boring Terminated at Elevation 823.1 ft in RESIDUAL: Sandy SILT
										Topsoil 0.0 to 0.3 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 13+07	**OFFSET** 46 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 873.7 ft	**TOTAL DEPTH** 58.6 ft	**NORTHING** 874,665	**EASTING** 1,777,464	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/04/16	**COMP. DATE** 10/04/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
875										
	873.7	0.0								873.7 0.0 GROUND SURFACE
			3	5	6	11		M		**RESIDUAL**
870	870.2	3.5								871.2 2.5 Reddish Brown, Fine Sandy CLAY
			6	8	9	17		M		Red and Light Brown and Brown to Red to White, Fine to Coarse Sandy SILT with Trace Mica
865	865.2	8.5								
			4	4	5	9		M		
860	860.2	13.5								
			3	3	4	7		M		
855	855.2	18.5								
			3	3	4	7		M		
850	850.2	23.5								
			3	3	4	7		M		
845	845.2	28.5								846.7 27.0 Light Brown to Gray, Silty, Fine to Coarse SAND
			4	4	6	10		M		
840	840.2	33.5								
			6	9	12	21		M		
835	835.2	38.5								
			18	32	55	87		M		
830	830.2	43.5								
			14	19	30	49		M		
825	825.2	48.5								827.7 46.0 **WEATHERED ROCK** Light Brownish Gray, METAMORPHOSED GRANITE
			28	72/0.4		100/0.9				
820	820.2	53.5								
			100/0.2			100/0.2				
	815.2	58.5	60/0.1			60/0.1				815.2 58.5 815.1 58.6 **CRYSTALLINE ROCK** METAMORPHOSED GRANITE

Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 815.1 ft IN CRYSTALLINE ROCK: METAMORPHOSED GRANITE

Topsoil 0.0 to 0.3 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 13+72	**OFFSET** 49 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 872.8 ft	**TOTAL DEPTH** 63.7 ft	**NORTHING** 874,730	**EASTING** 1,777,467	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/04/16	**COMP. DATE** 10/04/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
875										
	872.8	0.0								872.8 0.0 GROUND SURFACE
			2	3	5	8		M		**RESIDUAL**
870	869.3	3.5								870.3 2.5 Brown, Fine Sandy CLAY
			6	6	9	15		M		Reddish Brown to Dark Reddish Brown to Yellow to Yellow and White, Fine to Coarse Sandy SILT with Trace Mica
865	864.3	8.5								
			4	7	9	16		M		
860	859.3	13.5								
			2	2	3	5		M		
855	854.3	18.5								
			2	2	3	5		M		
850	849.3	23.5								
			2	1	2	3		M		
845	844.3	28.5								841.8 31.0 Yellow and White, Silty, Fine to Coarse SAND
			2	1	2	3		M		
840	839.3	33.5								
			3	3	4	7		M		
835	834.3	38.5								
			4	5	6	11		M		
830	829.3	43.5								
			7	10	12	22		M		
825	824.3	48.5								
			21	36	46	82		M		
820	819.3	53.5								818.8 54.0 **WEATHERED ROCK** Yellow and White, METAMORPHOSED GRANITE
			38	61	39/0.3	100/0.8				
815	814.3	58.5								
			100/0.3			100/0.3				
810	809.3	63.5	100/0.2			100/0.2				809.1 63.7 Boring Terminated at Elevation 809.1 ft in WEATHERED ROCK: METAMORPHOSED GRANITE

Topsoil 0.0 to 0.7 foot

Other Samples:
ST-1 (15.1 - 16.8)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW1-1	**STATION** 11+92	**OFFSET** 40 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 874.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,542	**EASTING** 1,777,538	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
875											
	874.6	0.0	3	4	4	8		M		874.6 GROUND SURFACE	0.0
										RESIDUAL Yellowish Brown, Fine Sandy CLAY	
	871.1	3.5								872.1 Yellow and Red, Fine Sandy SILT	2.5
870			8	10	14	24		M			
										868.1 Yellow to Yellow and Gray, Silty, Fine to Coarse SAND with Some Rock Fragments and Trace Mica	6.5
	866.1	8.5									
865			4	6	10	16		M			
	861.1	13.5									
860			10	13	14	27		M			
	856.1	18.5								858.1 White, Gray and Brown, Silty, Fine to Coarse Sandy Rock Fragments	16.5
855			15	40	28	68		M			
	851.1	23.5								853.1 Olive and Gray, Fine to Coarse Sandy SILT with Little Rock Fragments and Trace Mica	21.5
850			8	17	26	43		M			
	846.1	28.5								848.1 Gray, Silty, Fine to Coarse SAND with Trace Mica	26.5
845			6	12	24	36		M		844.6 Boring Terminated at Elevation 844.6 ft in RESIDUAL: Silty SAND	30.0
										Topsoil 0.0 to 0.7 foot	

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW1-2	**STATION** 14+45	**OFFSET** 44 ft RT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 877.6 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,796	**EASTING** 1,777,564	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
880										
	877.6	0.0	3	4	6	10		M		877.6 GROUND SURFACE 0.0
875										**RESIDUAL** Reddish Brown, Fine Sandy CLAY
	874.1	3.5	7	8	9	17		M		
870										871.1 Red, Silty, Fine to Coarse SAND 6.5
	869.1	8.5	5	6	7	13		M		
865										866.1 Red and Yellow to Red, Brown and Yellow, Micaceous, Fine to Coarse Sandy SILT 11.5
	864.1	13.5	3	3	5	8		M		
860										
	859.1	18.5	3	4	5	9		M		
855										
	854.1	23.5	2	3	3	6		M		
850										
	849.1	28.5	1	5	6	11		M		847.6 Boring Terminated at Elevation 847.6 ft in RESIDUAL: Sandy SILT 30.0
										Topsoil 0.0 to 0.4 foot

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW2-1	**STATION** 11+84	**OFFSET** 50 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 873.7 ft	**TOTAL DEPTH** 29.1 ft	**NORTHING** 874,545	**EASTING** 1,777,447	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
875										
	873.7	0.0								873.7 GROUND SURFACE 0.0
			2	5	9	14		M		**RESIDUAL**
870	870.2	3.5								871.2 Brown, Silty, Fine SAND 2.5
			8	8	8	16		M		Yellowish Brown, Fine Sandy CLAY
865	865.2	8.5								867.2 6.5
			31	28	37	65		M		White and Yellow to Olive, Fine Sandy SILT with Trace Mica
860	860.2	13.5								
			10	10	16	26		M		
855	855.2	18.5								
			11	20	44	64		M		
850	850.2	23.5								
			10	15	27	42		M		
845	845.2	28.5								846.2 27.5
			88	12/0.1		100/0.6				844.6 **WEATHERED ROCK** 29.1
										Gray, METAMORPHOSED GRANITE
										Boring Terminated at Elevation 844.6 ft in WEATHERED ROCK: METAMORPHOSED GRANITE
										Topsoil 0.0 to 0.9 foot

WBS 34821.1.5	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #2 (Structure #2 and #3) - Bridge No. 1241 and 1242 on I-85 Bypass (-L-) over Lees Chapel Road (-Y1-)				**GROUND WTR (ft)**
BORING NO. RW2-2	**STATION** 14+53	**OFFSET** 46 ft LT	**ALIGNMENT** -Y1-	**0 HR.** N/A
COLLAR ELEV. 873.0 ft	**TOTAL DEPTH** 30.0 ft	**NORTHING** 874,809	**EASTING** 1,777,474	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 10/05/16	**COMP. DATE** 10/05/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
										ELEV. (ft) DEPTH (ft)
875										
	873.0	0.0								873.0 GROUND SURFACE 0.0
			1	2	4	6		M		**RESIDUAL**
870	869.5	3.5								870.5 Reddish Brown, Fine Sandy CLAY 2.5
			4	6	7	13		M		Reddish Brown to Yellow and Red, Fine Sandy SILT with Trace Mica
865	864.5	8.5								
			5	5	8	13		M		
860	859.5	13.5								
			3	2	4	6		M		
855	854.5	18.5								
			2	2	3	5		M		
850	849.5	23.5								
			2	2	3	5		M		
845	844.5	28.5								
			4	5	9	14		M		843.0 30.0
										Boring Terminated at Elevation 843.0 ft in RESIDUAL: Sandy SILT
										Topsoil 0.0 to 0.4 foot

SUMMARY OF LABORATORY TEST DATA

PROJECT NO. 34821.1.5 (U-2525C)
COUNTY: GUILFORD
SITE #2 (STRUCTURE #2 AND #3) – BRIDGE NO. 1241 AND 1242 ON I-85 BYPASS (-L-) OVER LEES CHAPEL ROAD (-Y1-)

							Atterberg Limits			Gradation Results							
Sample No.	Boring Number	Station	Offset	Alignment	Sample Depth (ft.)	AASHTO Class	L.L.	P.L.	P.I.	Pass #10	Pass #40	Pass #200	Retained #270	Coarse Sand	Fine Sand	Silt (%)	Clay (%)
ST-1 *	EB2-B	330+44	64' RT	-L-	15.1-16.8	A-5 (3)	45	38	7	99.71	77.34	52.28	53.6	29.89	23.71	37.21	9.19

SS = Split-Barrel Sample (ASTM-D-1586) ST = Shelby Tube (Undisturbed) Sample
S = Grab Sample
NP -- Non Plastic NA-- Non Applicable
* CONSOLIDATION TEST RESULTS CAN BE FOUND UNDER SEPARATE COVER

Lab Technician: NCDOT Certification No.: 129-01-0411 – Geotechnics, Raleigh, NC

Michael P. Sm

REFERENCE: U-2525C

PROJECT: 34821

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	30

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *GUILFORD*

PROJECT DESCRIPTION *GREENSBORO EASTERN LOOP I-85 BYPASS (-L-) FROM US 29 NORTH OF GREENSBORO TO EAST OF LAWNDALE DRIVE*

SITE DESCRIPTION *SITE #3 (STRUCTURE #4 AND #5) BRIDGE NO. 1243 AND 1244 ON I-85 BYPASS (-L-) OVER NORFOLK SOUTHERN RAILROAD (-Y2-)*

CONTENTS

CAUTION NOTICE

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

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

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

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

PERSONNEL

D. KUBINSKI

R. TOOTHMAN

W. ALLEN

INVESTIGATED BY *D. KUBINSKI*

DRAWN BY *T. WELLS*

CHECKED BY *X. BARRETT*

SUBMITTED BY *KLEINFELDER, INC.*

DATE *SEPTEMBER 2017*

Prepared in the Office of:

KLEINFELDER
Bright People. Right Solutions.
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ENGINEERING FIRM LICENSE NO. F-1312

NORTH CAROLINA PROFESSIONAL SEAL 037998 ENGINEER THOMAS R. WELLS

DocuSigned by:
Thomas R. Wells 10/10/2017
7DA5D2D0518F4B0...
SIGNATURE DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	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
- [X] CASING [ ] W/ ADVANCER
- [ ] TRICONE _____" STEEL TEETH
- [X] TRICONE 2-15/16" TUNG.-CARB.
- [X] CORE BIT
- [ ] _____

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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: BYIA-105, STA 10+39.32 -BYIA- (874,899 FT. N, 1,776,817 FT. E)

ELEVATION: 851.37 FEET

NOTES:

FIAD: FILLED IMMEDIATELY AFTER DRILLING

BORINGS EB5-C AND EB6-C WERE OBTAINED FROM THE ROADWAY INVESTIGATION PERFORMED BY S&ME FROM 11-15 TO 12-15.

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2A

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SUPPLEMENTAL LEGEND, GEOLOGICAL STRENGTH INDEX (GSI) TABLES FROM AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS

AASHTO LRFD Figure 10.4.6.4-1 — Determination of GSI for Jointed Rock Mass (Marinos and Hoek, 2000)

GEOLOGICAL STRENGTH INDEX (GSI) FOR JOINTED ROCKS (Hoek and Marinos, 2000)

From the lithology, structure and surface conditions of the discontinuities, estimate the average value of GSI. Do not try to be too precise. Quoting a range from 33 to 37 is more realistic than stating that GSI = 35. Note that the table does not apply to structurally controlled failures. Where weak planar structural planes are present in an unfavorable orientation with respect to the excavation face, these will dominate the rock mass behaviour. The shear strength of surfaces in rocks that are prone to deterioration as a result of changes in moisture content will be reduced if water is present. When working with rocks in the fair to very poor categories, a shift to the right may be made for wet conditions. Water pressure is dealt with by effective stress analysis.

STRUCTURE

- INTACT OR MASSIVE - intact rock specimens or massive in situ rock with few widely spaced discontinuities
- BLOCKY - well interlocked undisturbed rock mass consisting of cubical blocks formed by three intersecting discontinuity sets
- VERY BLOCKY - interlocked, partially disturbed mass with multi-faceted angular blocks formed by 4 or more joint sets
- BLOCKY/DISTURBED/SEAMY - folded with angular blocks formed by many intersecting discontinuity sets. Persistence of bedding planes or schistosity
- DISINTEGRATED - poorly interlocked, heavily broken rock mass with mixture of angular and rounded rock pieces
- LAMINATED/SHEARED - Lack of blockiness due to close spacing of weak schistosity or shear planes

DECREASING INTERLOCKING OF ROCK PIECES ⇩

SURFACE CONDITIONS

- **VERY GOOD** Very rough, fresh unweathered surfaces
- **GOOD** Rough, slightly weathered, iron stained surfaces
- **FAIR** Smooth, moderately weathered and altered surfaces
- **POOR** Slickensided, highly weathered surfaces with compact coatings or fillings or angular fragments
- **VERY POOR** Slickensided, highly weathered surfaces with soft clay coatings or fillings

DECREASING SURFACE QUALITY ⇨

	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
90			N/A	N/A	
80					
70					
60					
50					
40					
30					
20					
10					
	N/A	N/A			

AASHTO LRFD Figure 10.4.6.4-2 — Determination of GSI for Tectonically Deformed Heterogeneous Rock Masses (Marinos and Hoek, 2000)

GSI FOR HETEROGENEOUS ROCK MASSES SUCH AS FLYSCH (Marinos. P and Hoek E., 2000)

From a description of the lithology, structure and surface conditions (particularly of the bedding planes), choose a box in the chart. Locate the position in the box that corresponds to the condition of the discontinuities and estimate the average value of GSI from the contours. Do not attempt to be too precise. Quoting a range from 33 to 37 is more realistic than giving GSI = 35. Note that the Hoek-Brown criterion does not apply to structurally controlled failures. Where unfavourably oriented continuous weak planar discontinuities are present, these will dominate the behaviour of the rock mass. The strength of some rock masses is reduced by the presence of groundwater and this can be allowed for by a slight shift to the right in the columns for fair, poor and very poor conditions. Water pressure does not change the value of GSI and it is dealt with by using effective stress analysis.

COMPOSITION AND STRUCTURE

- **A.** *Thick bedded, very blocky sandstone The effect of pelitic coatings on the bedding planes is minimized by the confinement of the rock mass. In shallow tunnels or slopes these bedding planes may cause structurally controlled instability.*
- **B.** *Sandstone with thin interlayers of siltstone*
- **C.** *Sandstone and siltstone in similar amounts*
- **D.** *Siltstone or silty shale with sandstone layers*
- **E.** *Weak siltstone or clayey shale with sandstone layers*
- **C, D, E,** and **G** - may be more or less folded than illustrated but this does not change the strength. Tectonic deformation, faulting and loss of continuity moves these categories to **F** and **H.**
- **F.** *Tectonically deformed, intensively folded/faulted, sheared clayey shale or siltstone with broken and deformed sandstone layers forming an almost chaotic structure*
- **G.** *Undisturbed silty or clayey shale with or without a few very thin sandstone layers* → **H.** ***Tectonically deformed silty or clayey shale forming a chaotic structure with pockets of clay. Thin layers of sandstone are transformed into small rock pieces.***

→ Means deformation after tectonic disturbance

SURFACE CONDITIONS OF DISCONTINUITIES (Predominantly bedding planes)

- **VERY GOOD** - Very Rough, fresh unweathered surfaces
- **GOOD** - Rough, slightly weathered surfaces
- **FAIR** - Smooth, moderately weathered and altered surfaces
- **POOR** - Very smooth, occasionally slickensided surfaces with compact coatings or fillings with angular fragments
- **VERY POOR** - Very smooth, slickensided or highly weathered surfaces with soft clay coatings or fillings

	VERY GOOD	GOOD	FAIR	POOR	VERY POOR
70					
60		A			
50					
40		B	C	D	E
30					
20				F	
10			G		H

DATE: 8-19-16

PROJECT REFERENCE NO.	SHEET NO.
U-2525C (SITE 3)	3

SITE PLAN

0 50 100
FEET

NAD 83/95

-L- ST Sta. 334

-L- POT Sta. 337+20.09=
-Y2- POT Sta. 13+65.07

-Y2-

NORFOLK SOUTHERN RR

LL EB1A
LL B1A
LL B2A
LL EB2A
LL B1B
LL B2B
EB5-C
EB6-C
RL B2A
RL B1A
RL EB1B
RL B1B
RL B2B
RL EB2B

LL
RL

335 -L- 340

SKEW ANGLE: 105°06'40"

SR 2531 HILLCROFT RD 20' BST
SR 2531 HILLCROFT RD 19' BST
100PR
75PR
15" CONC
12" CONC
RR SIGNAL
POSSIBLE BURIED PIPE
BYIA-105
15
JS
TV
WW
MBSG
G
B

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	4

SITE #3 (STRUCTURE #4 AND #5)
CENTERLINE PROFILE ON –L–

0 50 100
FEET
VE = 5:1

EXISTING GROUNDLINE

EB5–C
336+15
CL

LL B1B
336+81
13' LT

RL B2A
337+85
27' RT

EB6–C
338+25
CL

ARTIFICIAL FILL

06/17
11/15
05/17
12/15

(A) **RESIDUAL:**
MOIST TO WET, SOFT TO HARD, YELLOWISH BROWN, ORANGE, RED, YELLOW, BROWN, TAN, GRAY, AND GREEN-BLACK, FINE SANDY, SILTY CLAY TO CLAYEY SILT AND COARSE TO FINE SANDY SILT WITH MANGANESE

(B) **RESIDUAL:**
MOIST, HARD, GREEN-BLACK, MICACEOUS, SILT WITH TRACE ROCK FRAGMENTS

MOIST TO WET, LOOSE TO VERY DENSE, YELLOWISH BROWN, GRAY TO GRAY-WHITE, SILTY, COARSE TO FINE SAND WITH TRACE CLAY AND MANGANESE

WEATHERED ROCK:
TAN, GRAY, AND BROWN METAMORPHOSED GRANITE

CRYSTALLINE ROCK:
MODERATELY SEVERE WEATHERING, MEDIUM HARD, TAN AND GRAY METAMORPHOSED GRANITE WITH CLOSE TO VERY CLOSE FRACTURE SPACING

REC: 71%
RQD: 5%
GSI: 10 TO 30

BT

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN FILE U2525C LS TIN.TIN RECEIVED MARCH 7, 2017

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

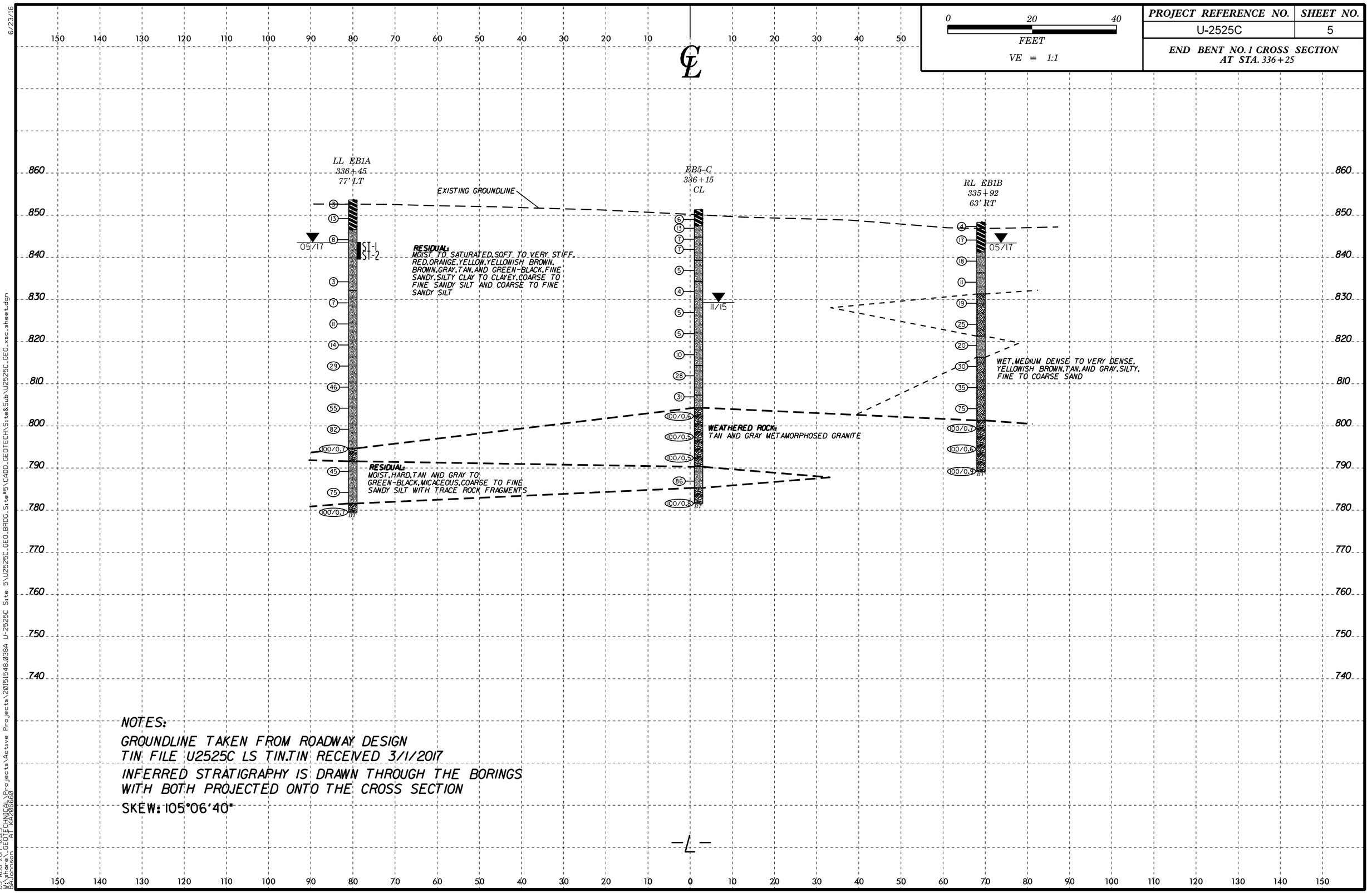
860 850 840 830 820 810 800 790 780 770 760

334+00 334+50 335+00 335+50 336+00 336+50 337+00 337+50 338+00 339+00 339+50 340+00 340+50 341+00

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	5

END BENT NO. 1 CROSS SECTION AT STA. 336+25

0 20 40
FEET
VE = 1:1



NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 3/1/2017

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

SKEW: 105°06'40"

0	20	40

FEET

VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	6

BENT NO. 1 CROSS SECTION AT STA. 336+77

Ⓐ **RESIDUAL:**
WET, HARD, BROWN AND GRAY, COARSE TO FINE SANDY SILT

Ⓑ **WEATHERED ROCK:**
SEVERE TO VERY SEVERE WEATHERING, SOFT TO VERY SOFT, TAN, GRAY, AND BROWN METAMORPHOSED GRANITE
REC: 0%
RQD: 0%

Ⓒ **WEATHERED ROCK:**
SEVERE TO VERY SEVERE WEATHERING, SOFT TO VERY SOFT, TAN, GRAY, AND BROWN METAMORPHOSED GRANITE
REC: 3%
RQD: 0%

LL B1A
336+95
69' LT

LL B1B
336+81
13' LT

RL B1A
336+73
14' RT

RL B1B
336+33
46' RT

EXISTING GROUNDLINE

06/17

RESIDUAL:
MOIST TO WET, SOFT TO HARD, ORANGE, RED, YELLOWISH BROWN, TAN, GRAY, FINE SANDY, SILTY CLAY TO CLAYEY, FINE SANDY CLAY TO COARSE TO FINE SANDY SILT WITH TRACE MANGANESE

WET, VERY DENSE TO DENSE, GRAY AND TAN, SILTY, FINE TO COARSE SAND

WEATHERED ROCK:
BROWN, GRAY, AND TAN METAMORPHOSED GRANITE

REC: 100%
RQD: 42%
GSI: 25 TO 45

REC: 100%
RQD: 64%
GSI: 40 TO 60

REC: 100%
RQD: 32%
GSI: 20 TO 40

CRYSTALLINE ROCK:
MODERATE TO MODERATELY SEVERE WEATHERING, MODERATELY HARD TO MEDIUM HARD, TAN AND GRAY MEATMORPHOSED GRANITE WITH CLOSE TO VERY CLOSE FRACTURE SPACING

BT

FIAD
06/17

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN TIN FILE U2525C LS TIN.TIN RECEIVED 3/1/2017
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION
SKEW: 105°06'40"

—L—

6/23/16

03-AUG-2017 01:37
W:\shore_GEOTECHNICAL\Projects\Active Projects\20151548.038A U-2525C Site 5\U2525C_GEO_BRDG_Site#5\CADD_GEOTECH\Site&Sub\U2525C_GEO_xsc_sheet.dgn
BAJohnson AT KH206660

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	7

BENT NO. 2 CROSS SECTION AT STA. 337+66

0 20 40
FEET
VE = 1:1

Ⓐ **RESIDUAL:** WET, VERY DENSE TO DENSE, YELLOWISH BROWN TO GRAY, SILTY, FINE TO COARSE SAND

Ⓑ **RESIDUAL:** WET, HARD, BROWN, FINE SANDY SILT

Ⓒ **CRYSTALLINE ROCK:** RED QUARTZ

Ⓓ **CRYSTALLINE ROCK:** MODERATLEY SEVERE WEATHERING, MODERATLEY HARD, LIGHT GRAY QUARTZ WITH VERY CLOSE FRACTURE SPACING
REC: 27%
RQD: 0%
GSI: 10 TO 30

LL B2A
338+06
74' LT

LL B2B
337+95
7' LT

RL B2A
337+85
27' RT

RL B2B
337+65
72' RT

EXISTING GROUNDLINE

RESIDUAL: MOIST TO WET, VERY SOFT TO MEDIUM STIFF, YELLOWISH BROWN, GRAY, WHITE, BROWN, COARSE TO FINE SANDY, SILTY CLAY TO CLAYEY, FINE TO COARSE SANDY SILT AND COARSE TO FINE SANDY SILT

WET, LOOSE TO VERY DENSE, YELLOWISH BROWN AND GRAY, SILTY, COARSE TO FINE SAND

WEATHERED ROCK: YELLOWISH BROWN, GRAY, BLACK, TAN METAMORPHOSED GRANITE

CRYSTALLINE ROCK: MODERATELY TO MODERATELY SEVERE WEATHERING, MODERATELY HARD TO MEDIUM HARD, TAN AND GRAY METAMORPHOSED GRANITE WITH CLOSE TO VERY CLOSE FRACTURE SPACING

REC: 71%
RQD: 5%
GSI: 10 TO 30

REC: 83%
RQD: 28%
GSI: 20 TO 40

REC: 71%
RQD: 48%
GSI: 30 TO 50

REC: 80%
RQD: 30%
GSI: 20 TO 40

REC: 100%
RQD: 46%
GSI: 30 TO 50

NOTES:
GROUNDLINE TAKEN FROM ROADWAY DESIGN
TIN FILE U2525C LS TIN.TIN RECEIVED 3/1/2017
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION
SKEW: 105°06'40"

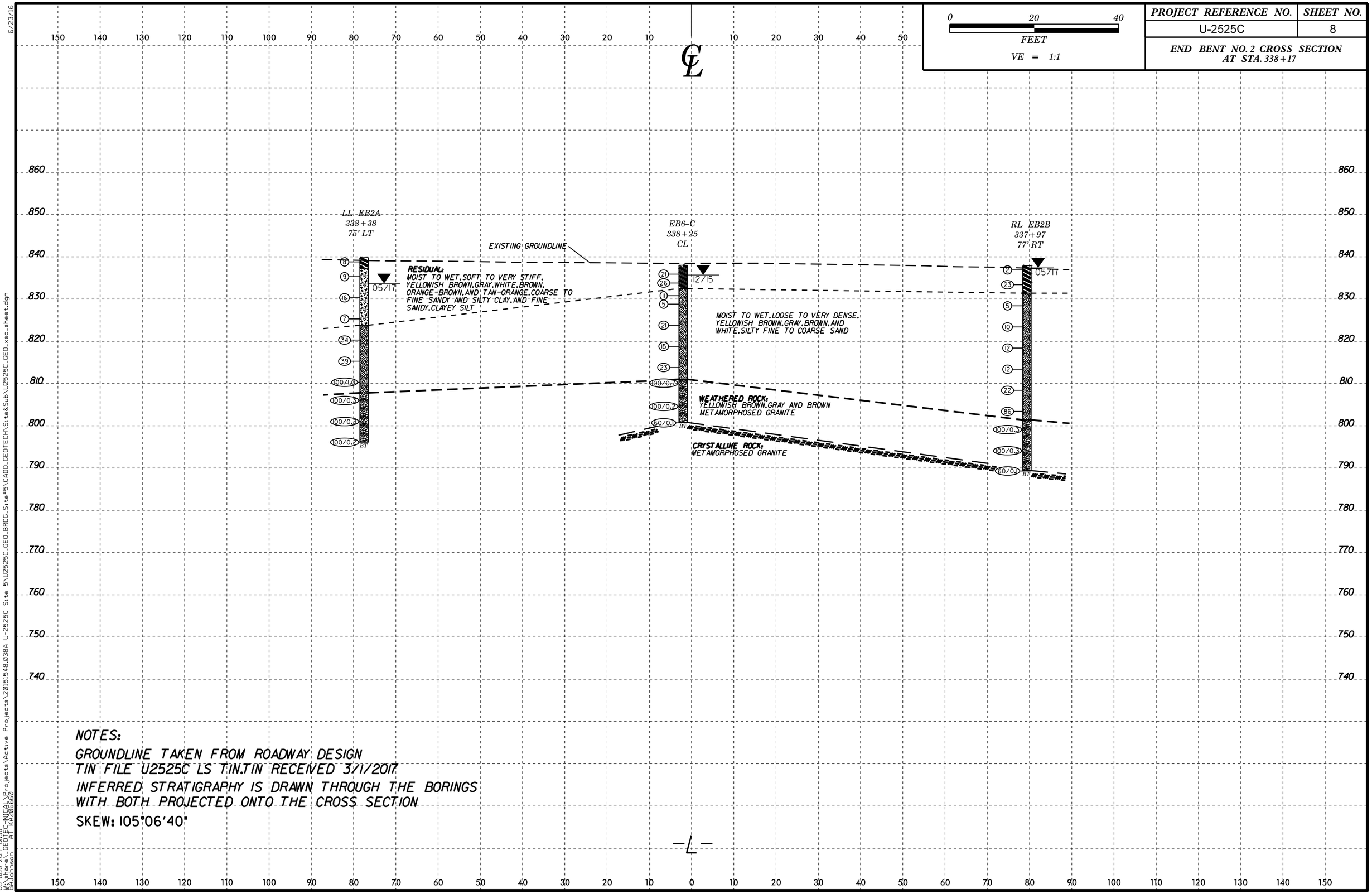
0	20	40

FEET

VE = 1:1

PROJECT REFERENCE NO.	SHEET NO.
U-2525C	8

END BENT NO. 2 CROSS SECTION
AT STA. 338+17



NOTES:

GROUNDLINE TAKEN FROM ROADWAY DESIGN
TIN FILE U2525C LS TIN.TIN RECEIVED 3/1/2017
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

SKEW: 105°06'40"

—L—

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_EB1A	**STATION** 336+45	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.3
COLLAR ELEV. 853.6 ft	**TOTAL DEPTH** 74.1 ft	**NORTHING** 874,602	**EASTING** 1,776,861	**24 HR.** 10.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/25/17	**COMP. DATE** 05/26/17	**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)
860											
855											
	853.6	0.0	WOH	1	2	3		M		853.6 GROUND SURFACE	0.0
850	850.2	3.4	6	6	7	13		M		**RESIDUAL** Red and Orange, Fine Sandy, Silty CLAY	
845	845.2	8.4	2	4	4	8				846.6 Red, Yellow, and Yellowish Brown, Clayey, Fine Sandy SILT	7.0
840											
835	835.2	18.4	1	2	1	3		W			
830	830.2	23.4	2	3	4	7		W		832.1 Red and Yellowish Brown to Brown, Gray, and Tan, Coarse to Fine Sandy SILT with Manganese Seams	21.5
825	825.2	28.4	2	4	7	11		W			
820	820.2	33.4	4	5	9	14		W			
815	815.2	38.4	5	11	18	29		W			
810	810.2	43.4	10	16	30	46		W			
805	805.2	48.4	12	21	34	55		W			
800	800.2	53.4	16	24	58	82		W			
795	795.2	58.4	28	60	40/0.2	100/0.7				794.7 **WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE	58.9
790	790.2	63.4	12	17	28	45		W		791.6 **RESIDUAL** Tan and Gray, Coarse to Fine Sandy SILT	62.0
785	785.2	68.4	31	35	40	75		W			
780	780.2	73.4								781.6	72.0

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_EB1A	**STATION** 336+45	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.3
COLLAR ELEV. 853.6 ft	**TOTAL DEPTH** 74.1 ft	**NORTHING** 874,602	**EASTING** 1,776,861	**24 HR.** 10.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/25/17	**COMP. DATE** 05/26/17	**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
780			47	53/0.2		Match Line 100/0.7				779.5 **WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE *(continued)* 74.1
										Boring Terminated at Elevation 779.5 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)
										Topsoil (0.5 foot)
										Other Samples: ST-1 (10.0 - 12.0) ST-2 (12.1 - 14.1)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Butler, L.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. EB5-C	**STATION** 336+15	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 851.3 ft	**TOTAL DEPTH** 69.7 ft	**NORTHING** 874,679	**EASTING** 1,776,891	**24 HR.** 22.0 Caved
DRILL RIG/HAMMER EFF./DATE SME9403 CME-550X 83% 01/14/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Norwood, R.	**START DATE** 11/19/15	**COMP. DATE** 11/20/15	**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)
855											
										851.3	0.0
850	850.0	1.3	3	2	4	6 13		M		GROUND SURFACE	
	847.9	3.4								**RESIDUAL** Orange-Brown Silty CLAY with Trace of Organics	
			4	5	8			M		847.5 Tan-Orange Clayey SILT	3.8
845	845.3	6.0								844.8	6.5
			3	3	4	7 7		M		Orange-Tan SILT	
	842.9	8.4									
840			2	3	4			W			
	837.9	13.4								839.3 Orange-Gray SILT with Manganese	12.0
			2	2	3	5		Sat.			
835	832.9	18.4								834.3	17.0
			2	2	2	4		Sat.		Tan-Orange Fine Sandy SILT with Manganese	
830	827.9	23.4									
			2	2	3	5		Sat.			
825	822.9	28.4									
			2	2	3	5		Sat.			
820	817.9	33.4									
			4	5	5	10		Sat.			
815	812.9	38.4								814.3 Tan-Gray Fine Sandy SILT	37.0
			7	13	15	28		Sat.			
810	807.9	43.4								807.3	44.0
			6	13	18	31		W		Green-Black Fine Sandy SILT with Trace of Mica, Quartz Seam at 44.8 ft	
805	802.9	48.4								804.3	47.0
			90	10/0.1		100/0.6				**WEATHERED ROCK** (Metamorphosed Granite)	
800	797.9	53.4									
			100/0.5			100/0.5					
795	792.9	58.4									
			100/0.5			100/0.5					
790	787.9	63.4								790.3	61.0
			20	37	49	86		M		**RESIDUAL** Green-Black Micaceous SILT with Trace of Rock Fragments, Quartz Seam at 64.8 ft	
785	782.9	68.4								785.3	66.0
			21	35	65/0.3	100/0.8				**WEATHERED ROCK** (Metamorphosed Granite)	
										781.6	69.7
										Boring Terminated at Elevation 781.6 ft in WEATHERED ROCK: METAMORPHOSED GRANITE	

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. RL_EB1B	**STATION** 335+92	**OFFSET** 63 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.1
COLLAR ELEV. 848.3 ft	**TOTAL DEPTH** 59.1 ft	**NORTHING** 874,742	**EASTING** 1,776,914	**24 HR.** 4.9
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/24/17	**COMP. DATE** 05/25/17	**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	
850											
	848.3	0.0								848.3 GROUND SURFACE	0.0
			1	1	3	4		M		**RESIDUAL** Yellowish Brown, Tan, Red, and Orange, Fine Sandy, Silty CLAY	
845	845.1	3.2									
			4	7	10	17				841.3 Orange and Gray, Clayey, Coarse to Fine Sandy SILT	7.0
840	840.1	8.2						W			
			2	4	14	18				836.3 Orange, Tan, and Gray	12.0
835	835.1	13.2						W			
			4	4	7	11				831.3 Yellowish Brown, Tan, and Gray, Silty, Fine to Coarse SAND	17.0
830	830.1	18.2						W			
			7	9	10	19					
825	825.1	23.2						W			
			9	10	15	25				821.3 Yellowish Brown, Tan, and Gray, Coarse to Fine Sandy SILT	27.0
820	820.1	28.2						W			
			7	8	12	20				816.3 Yellowish Brown, Tan, and Gray, Silty, Fine to Coarse SAND	32.0
815	815.1	33.2						W			
			13	15	15	30					
810	810.1	38.2						W			
			15	19	16	35					
805	805.1	43.2						W			
			15	27	48	75				801.3 **WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE	47.0
800	800.1	48.2									
			42	58/0.2		100/0.7					
795	795.1	53.2									
			55	45/0.1		100/0.6					
790	790.1	58.2								789.2	59.1
			41	59/0.4		100/0.9				Boring Terminated at Elevation 789.2 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.5 foot)	

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_B1A	**STATION** 336+95	**OFFSET** 69 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 851.3 ft	**TOTAL DEPTH** 83.3 ft	**NORTHING** 874,610	**EASTING** 1,776,811	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/30/17	**COMP. DATE** 05/31/17	**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)
855										
	851.3	0.0	1	2	3	5		M		851.3 0.0 GROUND SURFACE
850										**RESIDUAL**
	848.3	3.0	4	5	6	11		M		848.8 2.5 Orange, Fine Sandy, Silty CLAY
845										Red, Orange, and Yellow, Clayey, Fine Sandy, SILT
	843.1	8.2	2	1	2	3				
840										
	838.1	13.2	1	2	1	3		W		839.3 12.0 Red, Yellowish Brown, Tan, and Gray to Brown, Gray, and Yellow, Fine Sandy SILT with Manganese Seams
835										
	833.1	18.2	2	2	2	4		W		
830										
	828.1	23.2	2	2	2	4		W		
825										
	823.1	28.2	2	3	5	8		W		
820										
	818.1	33.2	4	10	13	23		W		
815										
	813.1	38.2	6	12	12	24		W		
810										
	808.1	43.2	3	4	8	12		W		
805										
	803.1	48.2	9	10	12	22		W		
800										
	798.1	53.2	4	7	13	20		W		
795										
	793.1	58.2	19	41	59			W		
790										
	788.1	63.2	11	17	20	37		W		
785										
	783.1	68.2	16	22	29	51		W		
780										
	778.1	73.2	18	20	24	44		W		
775										

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_B1A	**STATION** 336+95	**OFFSET** 69 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 851.3 ft	**TOTAL DEPTH** 83.3 ft	**NORTHING** 874,610	**EASTING** 1,776,811	**24 HR.** 9.8
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/30/17	**COMP. DATE** 05/31/17	**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
775						Match Line				
	773.1	78.2	60/0.1			60/0.1				773.6 77.7 **CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE
770										
	768.1	83.2	60/0.1			60/0.1				768.0 83.3 Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 768.0 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
										Topsoil (0.5 foot)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_B1B	**STATION** 336+81	**OFFSET** 13 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 849.5 ft	**TOTAL DEPTH** 79.6 ft	**NORTHING** 874,666	**EASTING** 1,776,825	**24 HR.** 7.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/30/17	**COMP. DATE** 05/31/17	**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)
850										
	849.5	0.0	1	2	2	4		M		849.5 / 0.0 GROUND SURFACE
	846.4	3.1								**RESIDUAL** Yellowish Brown, Orange, and Red, Fine Sandy, Silty CLAY
845			4	6	10	16		W		
	841.4	8.1								843.0 / 6.5
840			2	1	3	4		W		Yellow, Orange, and Red, Clayey, Fine Sandy, SILT
	836.4	13.1								838.0 / 11.5
835			1	2	2	4		W		Brown, Tan, Orange, and Gray, Coarse to Fine Sandy SILT with Manganese Seams
	831.4	18.1								
830			1	2	2	4		W		
	826.4	23.1								
825			1	1	3	4		W		
	821.4	28.1								
820			3	1	2	3		W		
	816.4	33.1								
815			4	5	9	14		W		
	811.4	38.1								
810			3	4	6	10		W		
	806.4	43.1								
805			7	8	11	19		W		
	801.4	48.1								
800			6	7	11	18		W		
	796.4	53.1								798.0 / 51.5 **WEATHERED ROCK** Tan, Gray, and Brown, METAMORPHOSED GRANITE
795			38	62/0.4		100/0.9				
	791.4	58.1	100/0.3			100/0.3				
790										
	786.4	63.1	100/0.2			100/0.2				
785										
	781.4	68.1	100/0.2			100/0.2				
780										
	776.4	73.1	80	20/0.1		100/0.6				
775										
	771.4	78.1	60/0.1			60/0.1				771.4 / 78.1
770	770.0	79.5								769.9 / 79.6

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_B1B	**STATION** 336+81	**OFFSET** 13 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.7
COLLAR ELEV. 849.5 ft	**TOTAL DEPTH** 79.6 ft	**NORTHING** 874,666	**EASTING** 1,776,825	**24 HR.** 7.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/30/17	**COMP. DATE** 05/31/17	**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
770			60/0.1			Match Line 60/0.1				**CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE *(continued)* Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 769.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B1A	**STATION** 336+73	**OFFSET** 14 ft RT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 849.0 ft	**TOTAL DEPTH** 91.1 ft	**NORTHING** 874,693	**EASTING** 1,776,833	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 06/01/17	**COMP. DATE** 06/02/17	**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)
850										
	849.0	0.0	WOH	WOH	2	2 2		M		849.0 — 0.0 GROUND SURFACE
845	845.8	3.2	4	8	10	18		W		**RESIDUAL** Orange, Yellowish, and Brown, Fine Sandy, Silty CLAY
	840.8	8.2	2	3	4	7		W		842.5 — 6.5 Red, Gray, and Yellow, Clayey, Fine Sandy SILT
840										
	835.8	13.2	2	1	3	4		W		832.5 — 16.5 Tan, Gray, and Brown, Coarse to Fine Sandy SILT with Manganese and Quartz
835										
	830.8	18.2	2	1	3	4		W		
830										
	825.8	23.2	2	4	7	11		W		
825										
	820.8	28.2	3	4	8	12		W		
820										
	815.8	33.2	5	8	13	21		W		
815										
	810.8	38.2	17	28	40	68		W		
810										
	805.8	43.2	100/0.4			100/0.4		W		807.5 — 41.5 **WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE
805										
	800.8	48.2	5	6	13	19		W		802.5 — 46.5 **RESIDUAL** Brown and Gray, Coarse to Fine Sandy SILT
800										
	795.8	53.2	8	17	21	38		W		
795										
	790.8	58.2	8	10	41	51		W		792.5 — 56.5 Gray, Silty, Fine to Coarse SAND
790										
	785.8	63.2	20	50	50/0.3	100/0.8		W		785.3 — 63.7 **WEATHERED ROCK** Brown, Gray, and Tan, METAMORPHOSED GRANITE with Manganese and Quartz
785										
	780.8	68.2	100/0.4			100/0.4		W		
780										
	777.7	71.3	60/0.0			60/0.0		W		777.7 — 71.3 **CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE
775										775.1 — 73.9 **WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE
770							RS-1			772.0 — 77.0

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B1A	**STATION** 336+73	**OFFSET** 14 ft RT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 849.0 ft	**TOTAL DEPTH** 91.1 ft	**NORTHING** 874,693	**EASTING** 1,776,833	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 06/01/17	**COMP. DATE** 06/02/17	**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
770						Match Line				
765										**CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE *(continued)* 765.0 — 84.0
760										**WEATHERED ROCK** Brown, METAMORPHOSED GRANITE 761.7 — 87.3
										CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE 757.9 — 91.1
										Boring Terminated at Elevation 757.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT
CORE LOG

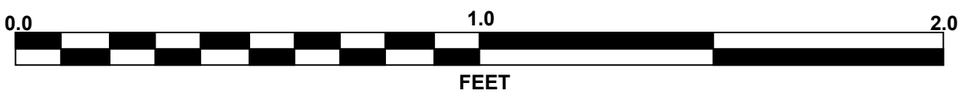
WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B1A	**STATION** 336+73	**OFFSET** 14 ft RT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 849.0 ft	**TOTAL DEPTH** 91.1 ft	**NORTHING** 874,693	**EASTING** 1,776,833	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 06/01/17	**COMP. DATE** 06/02/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 19.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
777.7											Begin Coring @ 71.3 ft
775	777.7	71.3	4.8	*N=60/0.0* 2:29/0.8 2:56 3:42 2:02 2:15	(2.6) 54%	(1.1) 23%		(2.6) 100%	(1.1) 42%		777.7 / 71.3 **CRYSTALLINE ROCK** Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing
	772.9	76.1						(0.0) 0%	N/A		775.1 / 73.9
770			5.0	2:12 2:26 2:46 2:44 2:04	(4.1) 82%	(2.7) 54%	RS-1	(7.0) 100%	(4.5) 64%		772.0 / 77.0 GSI 25 to 45 7 Fractures at 0 to 20 Degrees **WEATHERED ROCK** Severe Weathering, Soft, Tan and Gray METAMORPHOSED GRANITE
	767.9	81.1									**CRYSTALLINE ROCK** Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection
765			5.0	2:35 2:48 2:36 4:55 4:46	(3.0) 60%	(1.8) 36%					765.0 / 84.0
	762.9	86.1						(0.1) 3%	N/A		761.7 / 87.3 GSI 40 to 60 7 Fractures at 0 to 10 Degrees 4 Fractures at 40 to 60 Degrees
760			5.0	2:31 3:24 2:07 3:14 3:25	(3.8) 76%	(1.2) 24%		(3.8) 100%	(1.2) 32%		**WEATHERED ROCK** Severe Weathering, Soft to Very Soft, Brown, METAMORPHOSED GRANITE
	757.9	91.1									757.9 / 91.1 **CRYSTALLINE ROCK** Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection GSI 20 to 40 3 Fractures at 0 to 10 Degrees 3 Fractures at 20 to 40 Degrees 3 Fractures at 50 to 70 Degrees Boring Terminated at Elevation 757.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)

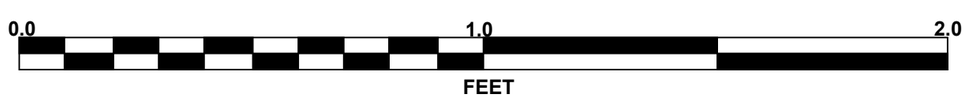
NCDOT CORE DOUBLE_U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

RL_B1A
BOX 1: 71.3 to 86.1 FEET



RL_B1A
BOX 2: 86.1 to 91.1 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B1B	**STATION** 336+33	**OFFSET** 46 ft RT	**ALIGNMENT** -L-	**0 HR.** 10.2
COLLAR ELEV. 847.4 ft	**TOTAL DEPTH** 69.1 ft	**NORTHING** 874,725	**EASTING** 1,776,873	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 06/01/17	**COMP. DATE** 06/02/17	**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)
850											
	847.4	0.0								847.4 GROUND SURFACE	0.0
845			WOH	WOH	3	3		M		**RESIDUAL** Orange and Yellowish Brown, Fine Sandy, Silty CLAY	
	844.2	3.2	8	7	10	17		M			
840										840.4	7.0
	839.2	8.2	2	3	6	9		W		Orange, Clayey, Fine Sandy, SILT	
835											
	834.2	13.2	4	5	7	12		W		833.4	14.0
830										Gray and Tan, Fine Sandy SILT with Manganese	
	829.2	18.2	8	13	14	27		W			
825											
	824.2	23.2	4	5	13	18		W			
820											
	819.2	28.2	28	60	40/0.3	100/0.8				818.7	28.7
815										**WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE	
	814.2	33.2	18	22	22	44		W		815.4	32.0
810										**RESIDUAL** Tan and Gray, Silty, Fine to Coarse SAND	
	809.2	38.2	22	61	39/0.4	100/0.9				808.7	38.7
805										**WEATHERED ROCK** Tan and Gray, METAMORPHOSED GRANITE	
	804.2	43.2	65	35/0.3		100/0.8					
800											
	799.2	48.2	100/0.4			100/0.4					
795											
	794.2	53.2	100/0.4			100/0.4					
790											
	789.2	58.2	100/0.3			100/0.3					
785											
	784.2	63.2	60/0.1			60/0.1				784.2	63.2
780										**CRYSTALLINE ROCK** METAMORPHOSED GRANITE	
	779.2	68.2								780.4	67.0
			32	68/0.4		100/0.9				**WEATHERED ROCK** 778.3 Brown, METAMORPHOSED GRANITE	69.1
										Boring Terminated at Elevation 778.3 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.4 foot)	

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_B2A	**STATION** 338+06	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** 14.9
COLLAR ELEV. 837.8 ft	**TOTAL DEPTH** 60.9 ft	**NORTHING** 874,606	**EASTING** 1,776,700	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/17/17	**COMP. DATE** 05/18/17	**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)
840											
	837.8	0.0								837.8 GROUND SURFACE	0.0
835			1	2	3	5		M		**RESIDUAL** Yellowish Brown, Fine Sandy, Silty CLAY	
	834.7	3.1								835.3	2.5
			6	7	8	15				Yellowish Brown and Gray, Clayey, Fine Sandy SILT	
830	829.7	8.1									
			6	8	12	20		W		829.2	8.6
825	824.7	13.1								Yellowish Brown and Gray, Silty, Fine to Coarse SAND	
			3	5	7	12		W			
820	819.7	18.1									
			9	14	16	30		W			
815	814.7	23.1									
			11	10	15	25		W			
810	809.7	28.1								809.2	28.6
			30	60	40/0.2	100/0.7				**WEATHERED ROCK** Yellowish Brown, Tan, Gray, and Brown, METAMORPHOSED GRANITE	
805	804.7	33.1									
			78	22/0.1		100/0.6					
800	799.7	38.1									
			40	60/0.3		100/0.8					
795	794.7	43.1									
			65	35/0.2		100/0.7					
790	789.7	48.1									
			100/0.3			100/0.3					
785	784.7	53.1								784.7	53.1
			60/0.0			60/0.0				**CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE	
780										776.9	60.9
										Boring Terminated at Elevation 776.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.7 foot)	

GEOTECHNICAL BORING REPORT
CORE LOG

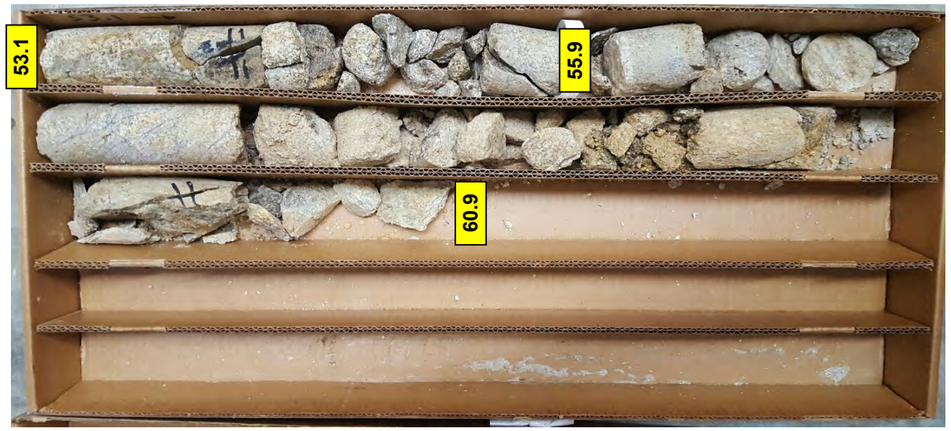
WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. LL_B2A	**STATION** 338+06	**OFFSET** 74 ft LT	**ALIGNMENT** -L-	**0 HR.** 14.9
COLLAR ELEV. 837.8 ft	**TOTAL DEPTH** 60.9 ft	**NORTHING** 874,606	**EASTING** 1,776,700	**24 HR.** 6.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/17/17	**COMP. DATE** 05/18/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 7.8 ft			

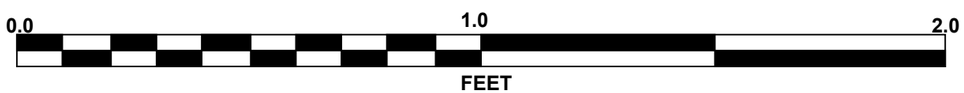
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
784.7											Begin Coring @ 53.1 ft
	784.7	53.1	2.8	*N=60/0.0* 1:35/0.8 1:33 1:34	(1.2) 43%	(0.0) 0%		(5.5) 71%	(0.4) 5%	784.7	**CRYSTALLINE ROCK** 53.1 Moderately Severe Weathering, Medium Hard, Tan and Gray, METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing
	781.9	55.9									GSI 10 to 30
780			5.0	3:21 2:46 3:20 2:51 1:30	(3.3) 66%	(0.4) 8%					6 Fractures at 0 to 10 Degrees
	776.9	60.9								776.9	60.9
											Boring Terminated at Elevation 776.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
											Topsoil (0.7 foot)

CORE PHOTOGRAPHS

LL_B2A

BOX 1: 53.1 to 60.9 FEET





GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_B2B	**STATION** 337+95	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 840.8 ft	**TOTAL DEPTH** 71.1 ft	**NORTHING** 874,673	**EASTING** 1,776,711	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/18/17	**COMP. DATE** 05/19/17	**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)
850										
845										
840	840.8	0.0	2	3	2	5		M		840.8 GROUND SURFACE 0.0 **RESIDUAL** 838.3 Yellowish Brown and Gray, Fine Sandy, Silty CLAY 2.5
	837.3	3.5	4	4	4	8				Gray and White, Clayey, Fine to Coarse Sandy SILT
835										834.3 6.5
	832.3	8.5	1	2	2	4		W		Yellowish Brown and Gray, Fine Sandy, Silty CLAY
830										828.8 12.0
	827.3	13.5	6	7	10	17		W		Brown and Gray, Coarse to Fine Sandy SILT
825										823.8 17.0
	822.3	18.5	13	15	27	42		W		Yellowish Brown and Gray, Silty, Fine to Coarse SAND
820										
	817.3	23.5	21	30	32	62		W		
815										
	812.3	28.5	17	17	13	30		W		
810										
	807.3	33.5	27	41	59/0.3	100/0.8				806.8 34.0 **WEATHERED ROCK** Yellowish Brown and Gray, METAMORPHOSED GRANITE
805										
	802.3	38.5	75	25/0.1		100/0.6				
800										
	797.3	43.5	27	73/0.3		100/0.8				
795										794.3 46.5 **RESIDUAL** Yellowish Brown and Gray, Silty, Fine to Coarse SAND
	792.3	48.5	42	40	28	68		W		
790										
	787.3	53.5	11	23	17	40		W		786.0 54.8 Brown, Fine Sandy SILT
785										
	782.3	58.5	26	74/0.3		100/0.8				781.8 59.0 **WEATHERED ROCK** Brown and Black, METAMORPHOSED GRANITE
780										
	777.3	63.5	60/0.1			60/0.1				777.3 63.5 **CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE
775										
770										

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_B2B	**STATION** 337+95	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 840.8 ft	**TOTAL DEPTH** 71.1 ft	**NORTHING** 874,673	**EASTING** 1,776,711	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/18/17	**COMP. DATE** 05/19/17	**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
770						Match Line				769.7 71.1 Boring Terminated at Elevation 769.7 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)

GEOTECHNICAL BORING REPORT
CORE LOG

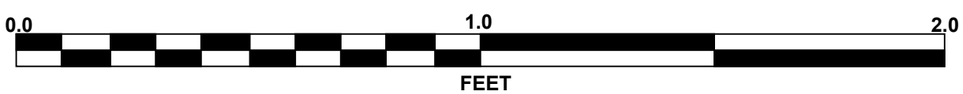
WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_B2B	**STATION** 337+95	**OFFSET** 7 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 840.8 ft	**TOTAL DEPTH** 71.1 ft	**NORTHING** 874,673	**EASTING** 1,776,711	**24 HR.** 4.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/18/17	**COMP. DATE** 05/19/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 7.5 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
											ELEV. (ft) DEPTH (ft)
777.2											Continued from previous page
775	777.2	63.6	3.0	2:16 2:34 6:58	(2.4) 80%	(1.1) 37%		(6.2) 83%	(2.1) 30%		**CRYSTALLINE ROCK** Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Close to Very Close Fracture Spacing, Quartz Injection GSI 20 to 40 3 Fractures at 10 to 20 Degrees 8 Fractures at 60 to 70 Degrees
	774.2	66.6	4.5	3:21 2:46 3:34	(3.8) 84%	(1.0) 22%					
770	769.7	71.1		2:32 5:22/0.5							769.7 71.1 Weathered Rock Seams Present From 66.0 to 66.6 feet and 70.4 and 71.1 feet *(continued)* Boring Terminated at Elevation 769.7 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE) Topsoil (0.4 foot)

CORE PHOTOGRAPHS

LL_B2B

BOX 1: 63.6 to 71.1 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. RL_B2A	**STATION** 337+85	**OFFSET** 27 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.5
COLLAR ELEV. 840.9 ft	**TOTAL DEPTH** 66.0 ft	**NORTHING** 874,707	**EASTING** 1,776,721	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/18/17	**COMP. DATE** 05/22/17	**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)
845											
	840.9	0.0								840.9 GROUND SURFACE	0.0
840			2	2	3	5				**RESIDUAL** Yellowish Brown and Gray, Fine to Coarse Sandy, Silty CLAY	
	837.8	3.1									
835			6	11	14	25		W			
	832.8	8.1									
830			2	2	2	4		W			
	827.8	13.1								829.9	11.0
825			3	5	4	9		W		Brown to Gray, Clayey, Fine Sandy SILT with Manganese	
	822.8	18.1								823.9	17.0
820			2	5	6	11		W		Yellowish Brown and Gray, Silty, Fine to Coarse SAND	
	817.8	23.1									
815			4	6	9	15		W			
	812.8	28.1									
810			9	12	21	33		W			
	807.8	33.1									
805			17	25	69	94		W			
	802.8	38.1								803.9	37.0
800			100/0.2			100/0.2				**WEATHERED ROCK** Gray, Tan, and Brown, METAMORPHOSED GRANITE	
	797.8	43.1									
795			75	25/0.2		100/0.7					
	792.8	48.1									
790			100/0.5			100/0.5					
	787.8	53.1								787.8	53.1
785			60/0.1			60/0.1				**CRYSTALLINE ROCK** Tan and Gray, METAMORPHOSED GRANITE	
780											
775										774.9	66.0
										Boring Terminated at Elevation 774.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.7 foot)	

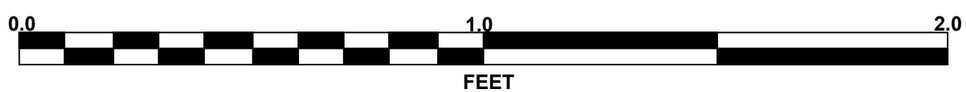
WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-				**GROUND WTR (ft)**
BORING NO. RL_B2A	**STATION** 337+85	**OFFSET** 27 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.5
COLLAR ELEV. 840.9 ft	**TOTAL DEPTH** 66.0 ft	**NORTHING** 874,707	**EASTING** 1,776,721	**24 HR.** 2.0
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/18/17	**COMP. DATE** 05/22/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 12.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS
787.7											Continued from previous page
	787.7	53.2	2.8	1:08/0.8 1:31 1:52	(2.4) 86%	(1.9) 68%		(9.1) 71%	(6.2) 48%		**CRYSTALLINE ROCK** Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Cloes Fracture Spacing
785	784.9	56.0									
			5.0	2:16 2:19 3:09 2:49 2:56	(3.0) 60%	(1.2) 24%					GSI 30 to 50 7 Fractures at 0 to 20 Degrees 6 Fractures at 60 to 80 Degrees *(continued)*
780	779.9	61.0									
			5.0	2:27 2:15 2:16 1:27 1:03	(3.7) 74%	(3.1) 62%					
775	774.9	66.0									774.9 66.0
											Boring Terminated at Elevation 774.9 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)
											Topsoil (0.7 foot)

CORE PHOTOGRAPHS

RL_B2A

BOX 1: 53.2 to 66.0 FEET



GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B2B	**STATION** 337+65	**OFFSET** 72 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.1
COLLAR ELEV. 839.4 ft	**TOTAL DEPTH** 65.9 ft	**NORTHING** 874,752	**EASTING** 1,776,741	**24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/24/17	**COMP. DATE** 05/25/17	**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)
840	839.4	0.0	WOH	WOH	1	1		W		GROUND SURFACE	0.0
										RESIDUAL Gray, White, and Yellowish Brown, Coarse to Fine Sandy, Silty CLAY	
835	836.3	3.1	3	6	8	14		W			
830	831.3	8.1	2	2	3	5		W		827.9	11.5
										Yellowish Brown and Gray, Silty, Fine to Coarse Sand	
825	826.3	13.1	3	3	5	8		W			
820	821.3	18.1	4	6	6	12		W			
815	816.3	23.1	7	8	9	17		W			
810	811.3	28.1	10	7	5	12		W			
805	806.3	33.1	9	9	14	23		W			
800	801.3	38.1	60/0.1			60/0.1				801.3	38.1
										CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE	
795	796.3	43.1	60/0.1			60/0.1				796.9	42.5
										795.9 Red, QUARTZ	43.5
										Tan and Gray, METAMORPHOSED GRANITE	
790	791.3	48.1	60/0.0			60/0.0				791.3	48.1
										CRYSTALLINE ROCK Tan and Gray, METAMORPHOSED GRANITE	
785											
780										782.0	57.4
										Light Gray, QUARTZ	
775										778.3	61.1
										Tan and Gray, METAMORPHOSED GRANITE	
							RS-2			773.5	65.9
										Boring Terminated at Elevation 773.5 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.8 foot)	

NCDOT BORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

GEOTECHNICAL BORING REPORT
CORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_B2B	**STATION** 337+65	**OFFSET** 72 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.1
COLLAR ELEV. 839.4 ft	**TOTAL DEPTH** 65.9 ft	**NORTHING** 874,752	**EASTING** 1,776,741	**24 HR.** 0.3
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/24/17	**COMP. DATE** 05/25/17	**SURFACE WATER DEPTH** N/A	
CORE SIZE NQ	**TOTAL RUN** 17.8 ft			

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN REC. (ft) %	RUN RQD (ft) %	SAMP. NO.	STRATA REC. (ft) %	STRATA RQD (ft) %	LOG	DESCRIPTION AND REMARKS ELEV. (ft)	DEPTH (ft)
791.3											Continued from previous page	
790	791.3	48.1	2.8	*N=60/0.0* 1:01/0.8	(1.6) 57%	(0.8) 29%		(7.4) 80%	(2.8) 30%		791.3 **CRYSTALLINE ROCK**	48.1
	788.5	50.9	5.0	2:48 3:22 2:12	(4.0) 80%	(0.7) 14%					Moderate to Moderately Severe Weathering, Moderately Hard to Medium Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Close Fracture Spacing	
785				2:14 8:38 6:44							GSI 20 to 40 11 Fractures at 50 to 70 Degrees 3 Fractures at 30 to 50 Degrees 2 Fractures at 0 to 10 Degrees	
	783.5	55.9	5.0	4:28 1:43	(2.3) 46%	(1.3) 26%					782.0	57.4
780				2:16 3:04 1:10				(1.0) 27%	N/A		Moderately Severe Weathering, Moderately Hard, Light Gray QUARTZ with Very Close Fracture Spacing	
	778.5	60.9	5.0	1:45 2:13	(5.0) 100%	(2.2) 44%		(4.8) 100%	(2.2) 46%		778.3	61.1
775				2:27 3:13 7:10							GSI 10 to 30 2 Fractures at 80 to 90 Degrees 2 Fractures at 0 to 5 Degrees	
	773.5	65.9		3:07			RS-2				Slight to Moderate Weathering, Hard to Moderately Hard, Tan and Gray METAMORPHOSED GRANITE with Moderately Close to Very Close Fracture Spacing	773.5 65.9
											GSI 30 to 50 8 Fractures at 50 to 70 Degrees 6 Fractures at 10 to 30 Degrees	
											Boring Terminated at Elevation 773.5 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)	
											Topsoil (0.8 foot)	

NCDOT CORE DOUBLE U2525C_GEO_BRDG_SITE5.GPJ NC_DOT.GDT 9/29/17

CORE PHOTOGRAPHS

RL_B2B
BOX 1: 48.1 to 62.5 FEET

0.0 1.0 2.0
FEET

RL_B2B
BOX 2: 62.5 to 65.9 FEET

0.0 1.0 2.0
FEET

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. LL_EB2A	**STATION** 338+38	**OFFSET** 75 ft LT	**ALIGNMENT** -L-	**0 HR.** 3.3
COLLAR ELEV. 839.8 ft	**TOTAL DEPTH** 43.7 ft	**NORTHING** 874,605	**EASTING** 1,776,668	**24 HR.** 6.1
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/16/17	**COMP. DATE** 05/16/17	**SURFACE WATER DEPTH** N/A	

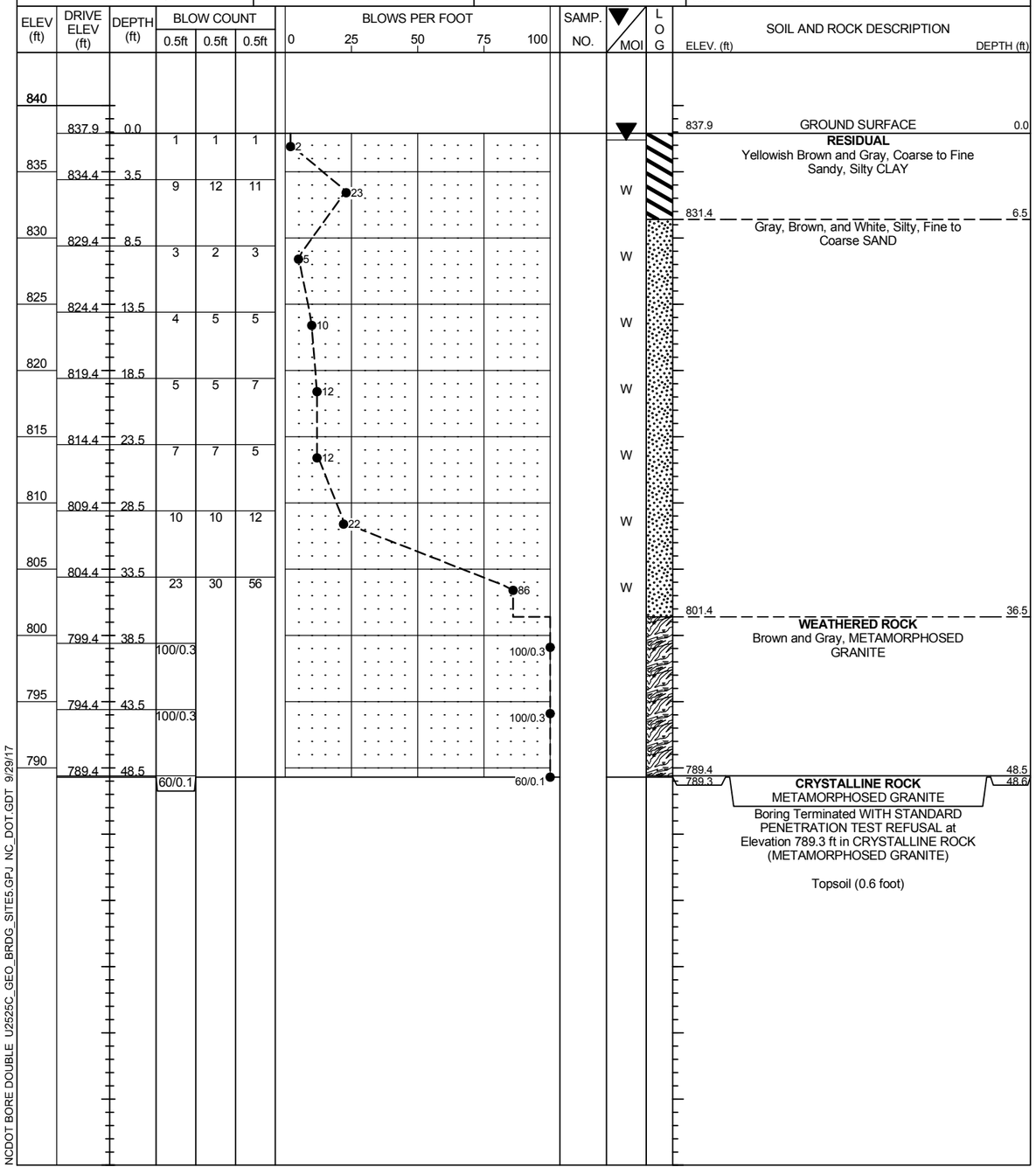
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION — ELEV. (ft)	DEPTH (ft)
840											
	839.8	0.0	2	4	4	8		M		839.8 GROUND SURFACE	0.0
										RESIDUAL	
										Yellowish Brown and Gray, Coarse to Fine Sandy, Silty CLAY with Trace Gravel	
	836.3	3.5	3	4	5	9				837.3	2.5
835										Gray, White, and Brown to Yellowish Brown and Gray, Clayey, Fine Sandy SILT	
	831.3	8.5	5	8	8	16		W			
830											
	826.3	13.5	3	3	4	7		W			
825										823.8	16.0
	821.3	18.5	3	12	22	34		W		Yellowish Brown and Gray, Silty, Fine to Coarse SAND	
820											
	816.3	23.5	7	18	21	39		W			
815											
	811.3	28.5	16	40	60	100/1.0		W			
810											
	806.3	33.5	100/0.3			100/0.3				807.8	32.0
805										**WEATHERED ROCK** Yellowish Brown and Gray, METAMORPHOSED GRANITE	
	801.3	38.5	100/0.3			100/0.3					
800											
	796.3	43.5	100/0.2			100/0.2				796.1	43.7
										Boring Terminated at Elevation 796.1 ft in WEATHERED ROCK (METAMORPHOSED GRANITE)	
										Topsoil (0.7 foot)	

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Wright, F.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. EB6-C	**STATION** 338+25	**OFFSET** CL	**ALIGNMENT** -L-	**0 HR.** N/A
COLLAR ELEV. 838.0 ft	**TOTAL DEPTH** 37.3 ft	**NORTHING** 874,680	**EASTING** 1,776,681	**24 HR.** 2.3
DRILL RIG/HAMMER EFF./DATE SME275 CME-55 89% 01/15/2016		**DRILL METHOD** Wash Boring	**HAMMER TYPE** Automatic	
DRILLER Williams, T.	**START DATE** 12/08/15	**COMP. DATE** 12/08/15	**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
840										
	836.9	1.1	4	9	12	21				838.0 GROUND SURFACE 0.0
835	834.8	3.2	7	8	18	26		M		**RESIDUAL** Gray-Tan Fine to Coarse Sandy CLAY
	831.8	6.2	4	5	6	11				832.5 5.5
830	829.8	8.2	3	2	3	5		M		Gray-White Silty Fine SAND with Little Clay, Manganese Seams at 18 feet
	824.8	13.2	6	10	11	21		W		
825										
820	819.8	18.2	11	8	7	15		W		
	814.8	23.2	11	10	13	23		M		
815										
810	810.8	27.2	55	45/0.2		100/0.7		M		811.0 27.0
										WEATHERED ROCK (Metamorphosed Granite)
805	804.8	33.2	100/0.2			100/0.2				
	800.8	37.2	60/0.1			60/0.1				800.8 37.2
										800.7 37.3
										CRYSTALLINE ROCK (Metamorphosed Granite)
										Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 800.7 ft in CRYSTALLINE ROCK (METAMORPHOSED GRANITE)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Kubinski, D.	
SITE DESCRIPTION Site #3 (Structure #4 & #5) - Bridge No. 1243 and 1244 on I-85 Bypass (-L-) over Norfolk Southern Railroad (-Y2-)				**GROUND WTR (ft)**
BORING NO. RL_EB2B	**STATION** 337+97	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 2.2
COLLAR ELEV. 837.9 ft	**TOTAL DEPTH** 48.6 ft	**NORTHING** 874,757	**EASTING** 1,776,709	**24 HR.** 0.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 81% 02/20/2017		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 05/15/17	**COMP. DATE** 05/15/17	**SURFACE WATER DEPTH** N/A	

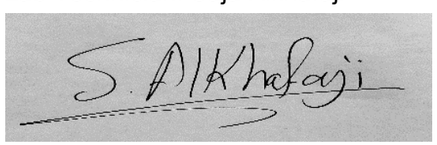


LABORATORY SUMMARY SHEET FOR ROCK CORE SAMPLES

PROJECT NO.: 34821.1.1 (U-2525C)
COUNTY: GUILFORD
SITE #3 (STRUCTURE #4 & #5) - BRIDGE NO. 1243 AND 1244 ON I-85 BYPASS (-L-) OVER NORFOLK SOUTHERN RAILROAD (-Y2-)

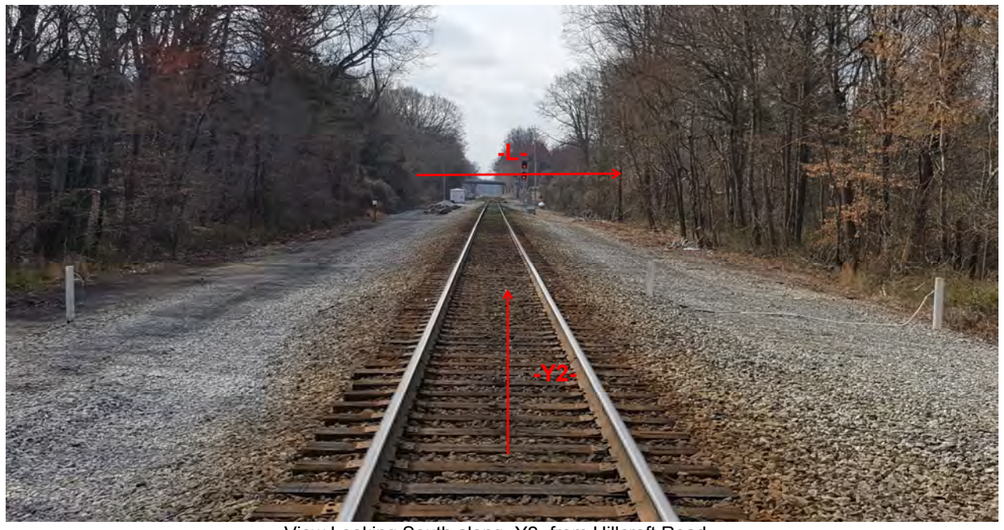
Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Splitting Tensile Strength (PSI)	Remarks
RS-1	RL_B1A	76.5-76.8	GRANITE	PzZG	54	3.96	1.98	165.3	5,739	N/A	N/A	GSI from 40 to 60
RS-2	RL_B2B	65.0-65.3	GRANITE	PzZG	44	4.04	2.00	159.7	2,335	N/A	N/A	GSI from 30 to 50

Lab Technician: Saja Alkhafaji



SITE #3 (STRUCTURE #4 & #5) - BRIDGE NO. 1243 AND 1244 ON I-85 BYPASS (-L-) OVER NORFOLK SOUTHERN RAILROAD (-Y2-)

SITE PHOTOGRAPHS



View Looking South along -Y2- from Hillcroft Road

View Looking West on East Side of Bridge along -L-