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STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	13

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

SITE DESCRIPTION SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245 ON SR 2523 (YANCEYVILLE ROAD) (-Y4-) OVER I-85 BYPASS (-L-)

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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SIGNATURE DATE

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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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [X] ACKER (TER0912-0)
- [X] D-50 (TER373)
- [X] D-50 (TER346)

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2⅝" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3¼" HOLLOW STEM AUGER

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-31: N: 873,138; E: 1,770,787 - 36" REBAR WITH ALUMINUM CAP
ELEVATION: 837.00 FEET

NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

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

SITE PLAN

0 50 100

FEET

TYPICAL SKEW ANGLE 59° 18' 22"

TO NORTH CHURCH STREET

TO LEES CHAPEL ROAD

TO PEACH ORCHARD DRIVE

SR 2523 YANCEYVILLE RD 22' BST

TO WATLINGTON ROAD

-L- 402+00

-Y4DET-

-Y4- 25+00

-Y4- 30+00

-DR5- 13+00

-DR5- 15+00

GRAU 350 TL-3

GRAU 350 TL-3

-BL-31 PING 14+07.30

-BY4- PING 22+78.51

EB1-A

EB1-B

EB1-C

B1-A

B1-B

B1-C

EB2-A

EB2-B

EB2-C

20' UTILITY EASEMENT

20' UTILITY EASEMENT

RUINS

RUINS

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2401 BRENTWOOD ROAD, SUITE 107
RALEIGH, NORTH CAROLINA 27604
PHONE: (919) 873-2211 FAX: (919) 873-9555
NC REGISTERED FIRM: F-0869

CROSS SECTION THROUGH END BENT 1 AT STA. 27+98 –Y4–

0 20 40
FEET
VE = 2:1

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

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NC REGISTERED FIRM: F-0869

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

NORTH CHURCH STREET
(SR 1001)

–Y4–
℄

LEES CHAPEL ROAD
(SR 2359)

850 840 830 820 810 800 790 780 770

SS-1
SS-2

EB1-A
27+75
42' LT -Y4-

SS-3

EB1-C
27+94
8' LT -Y4-

SS-4

EB1-B
28+04
54' RT -Y4-

PAVEMENT (ASPHALT)

EXISTING GROUND SURFACE

RESIDUAL, RED-TAN, RED-BROWN, STIFF TO HARD, MOIST TO CLAY, WITH TRACE TO LITTLE MANGANESE SEAMS

TAN-GRAY AND WET, SILTY MICA AND

BLACK, MEDIUM TO HARD, MOIST TO WET, WITH TRACE TO SOME MANGANESE SEAMS

RESIDUAL, RED-ORANGE, BROWN, TAN, BLACK, GREEN-BROWN AND GRAY, WHITE, ORANGE-BROWN, GREEN TO GRAY, MEDIUM STIFF MICACEOUS, CLAYEY SILT, (METAMORPHOSED GRANITE)

WEATHERED ROCK

RESIDUAL, BROWN, GRAY AND TAN, VERY DENSE, MOIST, SAPROLITIC, SILTY FINE SAND, WITH LITTLE TO SOME MICA

	EB1-A	EB1-C	EB1-B
	11	7	6
	12	13	9
	11	7	10
	10	9	6
	10	9	8
	7	7	11
	5	21	15
	12	20	17
	16	48	90
	27	84	100
	41	100/0.4	100/0.9
	50	100/0.9	100/0.5
	52	97	
	100/0.8		
	100/0.7		
	100/0.3		
	BT	BT	BT
	CAVED DRY AT 18.5' 11/16	FIAD 11/16	CAVED DRY AT 27' 11/16

SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245

TYPICAL SKEW ANGLE 59°18'22"

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ON TO THE CROSS SECTION GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/2016)

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

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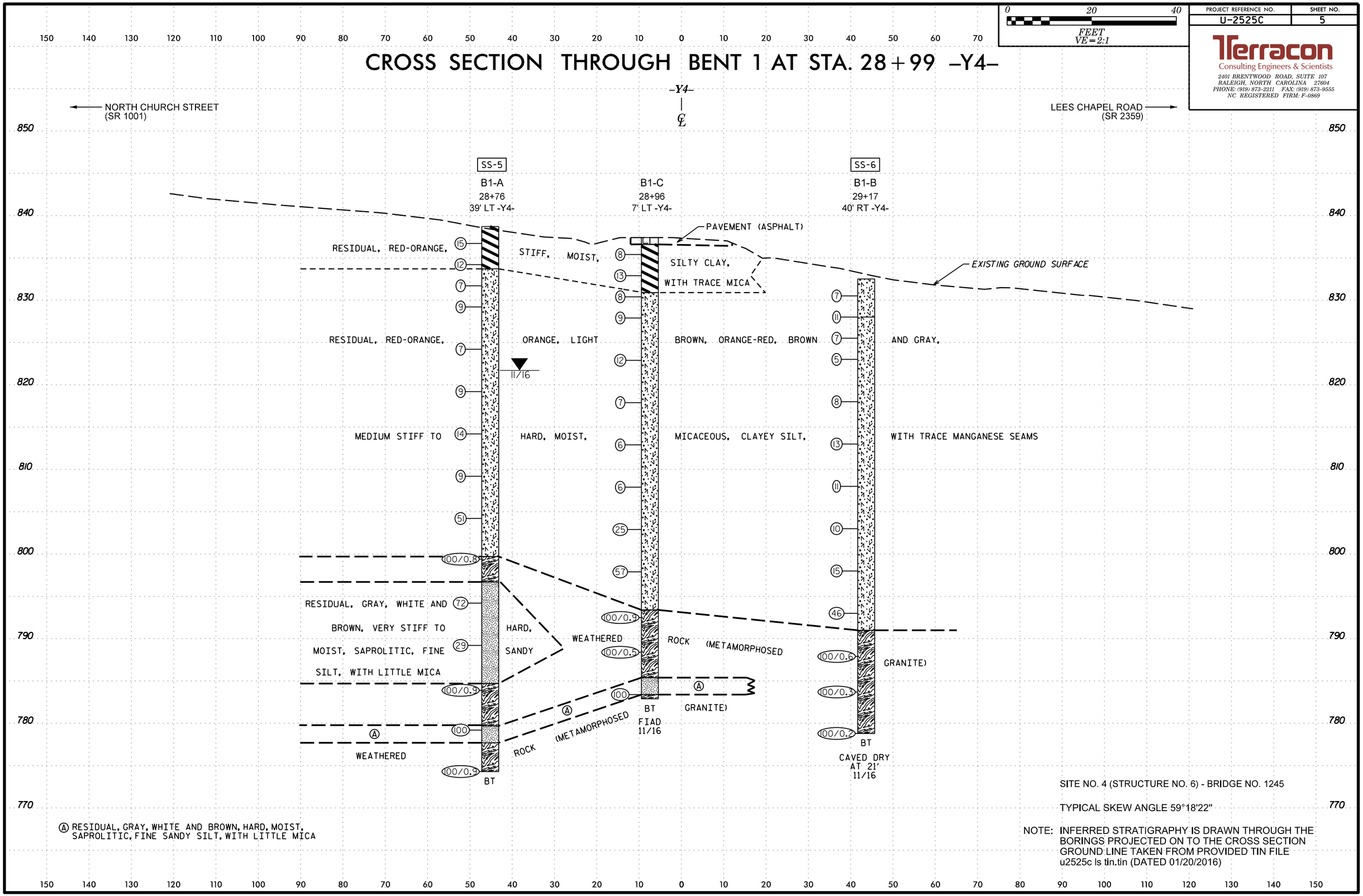
PHONE: (919) 873-2211 FAX: (919) 873-9555
NC REGISTERED FIRM: F-0869

0 20 40
FEET
VE=2:1

CROSS SECTION THROUGH BENT 1 AT STA. 28+99 –Y4–



Ⓐ RESIDUAL, GRAY, WHITE AND BROWN, HARD, MOIST, SAPROLITIC, FINE SANDY SILT, WITH LITTLE MICA

SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245

TYPICAL SKEW ANGLE 59°18'22"

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ON TO THE CROSS SECTION GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/2016)

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

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RALEIGH, NORTH CAROLINA 27604
PHONE: (919) 873-2211 FAX: (919) 873-9555
NC REGISTERED FIRM: F-0869

0 20 40
FEET
VE = 2:1

CROSS SECTION THROUGH END BENT 2 AT STA. 30 + 00 –Y4–

–Y4–

NORTH CHURCH STREET (SR 1001)

LEES CHAPEL ROAD (SR 2359)

SS-7	SS-8 SS-9	ST-1 SS-10
EB2-A	EB2-C	EB2-B
29+73	29+96	30+16
45' LT -Y4-	7' LT -Y4-	40' RT -Y4-

PAVEMENT (ASPHALT)

EXISTING GROUND SURFACE

RESIDUAL, RED-BROWN, RED-ORANGE, TAN, BLACK, TO VERY STIFF, WET

GRAY AND ORANGE, MEDIUM TO MOIST, SILTY CLAY, WITH AND BLACK, BROWN, GRAY AND WHITE, MICACEOUS, MANGANESE SEAMS

STIFF

ST-1

TRACE MICA

RED-ORANGE, GRAY-TAN, ORANGE, LIGHT BROWN, TAN CLAYEY SILT AND FINE SANDY SILT, WITH TRACE MICA AND TRACE TO LITTLE

GRANITE)

WEATHERED ROCK (METAMORPHOSED

SS-7	SS-8 SS-9	ST-1 SS-10
11	8	11
12	11	24
11	8	12
13	8	8
10	8	ST-1
9	6	8
7	5	6
11/16	Ⓑ	8
19	8	Ⓒ
67	17	31
49	46	64
87	61	100/0.9
100/0.4	100/0.9	100/0.7
100/0.5	100/0.5	69
100/0.9	100/0.8	100/0.9
BT	BT	BT
	FIAD 11/16	CAVED DRY AT 7.5' 11/16

Ⓑ TAN, ORANGE AND BLACK, STIFF, MOIST, SILTY CLAY, WITH TRACE TO LITTLE MICA

Ⓒ RESIDUAL, GRAY, WHITE AND ORANGE, HARD, MOIST, SAPROLITIC, FINE SANDY SILT, WITH TRACE MICA

SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245

TYPICAL SKEW ANGLE 59°18'22"

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ON TO THE CROSS SECTION GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/2016)

850 840 830 820 810 800 790 780 770

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

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** RIGGS, A. F.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 27+75	**OFFSET** 42 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 840.1 ft	**TOTAL DEPTH** 68.1 ft	**NORTHING** 873,077	**EASTING** 1,770,762	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER346 DIEDRICH D-50 94% 11/22/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER EKLUND, M.A.	**START DATE** 11/22/16	**COMP. DATE** 11/22/16	**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)
845											
840	839.2	0.9	6	5	6	11 11		M		840.1 GROUND SURFACE	0.0
	836.7	3.4	4	5	7	12 12		M		**RESIDUAL** RED-TAN, TAN-BROWN AND TAN-GRAY, SILTY CLAY, WITH TRACE MICA AND MANGANESE SEAMS	
835	834.1	6.0	3	5	6	11 11		M			
	832.1	8.0	5	5	5	10 10		M			
830	827.3	12.8	3	4	6	10 10		M			
825	822.3	17.8	3	3	4	7 7	SS-1	41%			
820	817.3	22.8	2	2	3	5 5		W			
815	812.3	27.8	3	5	7	12 12		W			
810	807.3	32.8	4	6	10	16 16		W			
805	802.3	37.8	5	10	17	27 27		W			
800	797.3	42.8	11	19	22	41 41	SS-2	23%			
795	792.3	47.8	8	14	36	50 50		W			
790	787.3	52.8	12	28	24	52 52		W			
785	782.3	57.8	46	54/0.3		100/0.8 100/0.8				781.8 **WEATHERED ROCK** (GRAY AND TAN, METAMORPHOSED GRANITE)	58.3
780	777.3	62.8	50	50/0.2		100/0.7 100/0.7					
775	772.3	67.8	100/0.3			100/0.3 100/0.3				772.0 Boring Terminated at Elevation 772.0 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)	68.1
										24 Hr. Ground Water Caved Dry at 18.5 FT	

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** ALEXANDER, M.J.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-C	**STATION** 27+94	**OFFSET** 8 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 838.0 ft	**TOTAL DEPTH** 59.1 ft	**NORTHING** 873,096	**EASTING** 1,770,796	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER01912-0 ACKER RENEGADE 86% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER DUGGINS, W. T.	**START DATE** 11/22/16	**COMP. DATE** 11/22/16	**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	
840	837.0	1.0	7	3	4	7		W		838.0 PAVEMENT	0.0
835	835.4	2.6	8	7	6	13	SS-3	45%		837.4 0.6' ASPHALT	0.6
830	830.4	7.6	3	3	4	7		M		**RESIDUAL** RED-BROWN AND BLACK, SILTY CLAY, WITH TRACE TO LITTLE MICA	
825	825.4	12.6	3	4	5	9		M		831.0	7.0
820	820.4	17.6	3	4	5	9		M		ORANGE-BROWN, BROWN, TAN, BLACK, GREEN-BROWN AND GREEN GRAY, MICACEOUS, CLAYEY SILT	
815	815.4	22.6	2	2	5	7		W			
810	810.4	27.6	5	8	13	21		M			
805	805.4	32.6	6	9	11	20		M			
800	800.4	37.6	10	21	27	48		M			
795	795.4	42.6	16	33	51	84		M			
790	790.4	47.6	8	100/0.4		100/0.4				792.0	46.0
785	785.4	52.6	22	56	44/0.4	100/0.9				**WEATHERED ROCK** (BLUE-GRAY, GREEN-GRAY, BROWN, BLACK AND WHITE, METAMORPHOSED GRANITE)	
780	780.4	57.6	19	21	76	97		M		782.0	56.0
										RESIDUAL BROWN, GRAY AND TAN, SAPROLITIC, SILTY FINE SAND, WITH LITTLE TO SOME MICA	
										778.9 Boring Terminated at Elevation 778.9 ft IN RESIDUAL (SILTY SAND)	59.1

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)			**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 28+04	**OFFSET** 54 ft RT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 835.3 ft	**TOTAL DEPTH** 49.0 ft	**NORTHING** 873,106	**EASTING** 1,770,858	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/22/16	**COMP. DATE** 11/22/16	**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))
840										
835	834.3	1.0	4	3	3	6 9		M		835.3 / 0.0 GROUND SURFACE **RESIDUAL** RED-ORANGE, BROWN, GRAY AND WHITE, MICACEOUS, CLAYEY SILT, WITH TRACE TO SOME MANGANESE SEAMS
	831.8	3.5	5	4	5	10		M		
830	829.3	6.0	5	5	5	10		M		
	826.8	8.5	3	3	3	6		M		
825	821.8	13.5	3	3	5	8	SS-4	35%		
820	816.8	18.5	4	4	7	11		M		
815	811.8	23.5	5	5	10	15		M		
810	806.8	28.5	5	8	9	17		M		
805	802.8	32.5	36	44	46	90		M		
800	796.8	38.5	28	53	47	100		M		795.3 / 40.0 **WEATHERED ROCK** (GRAY, BROWN AND WHITE, METAMORPHOSED GRANITE)
795	791.8	43.5	33	67/0.4		100/0.9				
790	786.8	48.5	100/0.5			100/0.5				786.3 / 49.0 Boring Terminated at Elevation 786.3 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE) 24 Hr. Ground Water Caved Dry at 27.0 FT

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)			**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 28+76	**OFFSET** 39 ft LT	**ALIGNMENT** -Y4-	**0 HR.** 10.0
COLLAR ELEV. 838.7 ft	**TOTAL DEPTH** 64.4 ft	**NORTHING** 873,178	**EASTING** 1,770,765	**24 HR.** 17.0
DRILL RIG/HAMMER EFF./DATE TER01912-0 ACKER RENEGADE 86% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER DUGGINS, W. T.	**START DATE** 11/23/16	**COMP. DATE** 11/23/16	**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
840										
	837.7	1.0								838.7 / 0.0 GROUND SURFACE **RESIDUAL** RED-ORANGE, SILTY CLAY, WITH TRACE MICA
835	835.2	3.5	5	6	9	15	SS-5	26%		833.7 / 5.0
	832.7	6.0	4	5	7	12		M		RED-ORANGE, ORANGE, LIGHT BROWN, BROWN AND GRAY, MICACEOUS, CLAYEY SILT, WITH TRACE MANGANESE SEAMS
830	830.2	8.5	3	3	4	7		M		
	827.7	11.0	2	4	5	9		M		
825	825.2	13.5	2	3	4	7		M		
820	820.2	18.5	3	4	5	9		M		
815	815.2	23.5	4	6	8	14		M		
810	810.2	28.5	2	4	5	9		M		
805	805.2	33.5	9	15	36	51		M		
800	800.2	38.5	31	69/0.3		100/0.8		M		799.7 / 39.0 **WEATHERED ROCK** (GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)
795	795.2	43.5	28	42	30	72		M		796.7 / 42.0 **RESIDUAL** GRAY, WHITE AND BROWN, SAPROLITIC, FINE SANDY SILT, WITH LITTLE MICA
790	790.2	48.5	8	12	17	29		M		
785	785.2	53.5	12	58	42/0.4	100/0.9		M		784.7 / 54.0 **WEATHERED ROCK** (GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)
780	780.2	58.5	52	48/0.5		100		M		779.7 / 59.0 **RESIDUAL** 777.7 / 61.0 GRAY, WHITE AND BROWN, SAPROLITIC, FINE SANDY SILT, WITH LITTLE MICA
775	775.2	63.5	28	72/0.4		100/0.9				774.3 / 64.4 **WEATHERED ROCK** (GRAY, WHITE AND BROWN METAMORPHOSED GRANITE) Boring Terminated at Elevation 774.3 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)

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GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. B1-C	**STATION** 28+96	**OFFSET** 7 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 837.4 ft	**TOTAL DEPTH** 54.5 ft	**NORTHING** 873,198	**EASTING** 1,770,797	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/30/16	**COMP. DATE** 11/30/16	**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)
840											
										837.4	0.0
	836.4	1.0								PAVEMENT	
										836.6	0.8
835			3	3	5	8		M		0.8' ASPHALT	
										RESIDUAL	
	833.9	3.5	6	6	7	13		M		RED-ORANGE, SILTY CLAY	
	831.4	6.0	3	3	5	8		M			
830											
	828.9	8.5	3	4	5	9		M			
825											
	823.9	13.5	4	5	7	12		M			
820											
	818.9	18.5	2	3	4	7		M			
815											
	813.9	23.5	2	2	4	6		M			
810											
	808.9	28.5	2	3	3	6		M			
805											
	803.9	33.5	8	11	14	25		M			
800											
	798.9	38.5	9	19	38	57		M			
795											
	793.9	43.5	40	52	48/0.4	100/0.9				793.4	44.0
										WEATHERED ROCK	
790										(GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)	
	788.9	48.5	100/0.5			100/0.5					
785										785.4	52.0
	783.9	53.5	19	81/0.5		100/0.1		M		783.4	54.0
										RESIDUAL	
										GRAY, WHITE AND BROWN, SAPROLITIC, FINE SANDY SILT, WITH LITTLE MICA	
										782.9	54.5
										WEATHERED ROCK	
										(GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)	
										Boring Terminated at Elevation 782.9 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)	

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 29+17	**OFFSET** 40 ft RT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 832.5 ft	**TOTAL DEPTH** 53.7 ft	**NORTHING** 873,219	**EASTING** 1,770,844	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/28/16	**COMP. DATE** 11/28/16	**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
835										
										832.5 GROUND SURFACE 0.0
	831.5	1.0								**RESIDUAL**
830			4	4	3	7		M		ORANGE-RED, LIGHT BROWN, GRAY AND ORANGE, MICACEOUS, CLAYEY SILT, WITH TRACE MANGANESE SEAMS
	829.0	3.5	4	5	6	11		M		
	826.5	6.0	3	4	3	7		M		
825										
	824.0	8.5	2	3	2	5		M		
820										
	819.0	13.5	3	3	5	8		M		
815										
	814.0	18.5	4	5	8	13		M		
810										
	809.0	23.5	3	5	6	11		M		
805										
	804.0	28.5	2	3	7	10	SS-6	43%		
800										
	799.0	33.5	5	7	8	15		M		
795										
	794.0	38.5	14	20	26	46		M		
790										791.0 41.5
	789.0	43.5	18	80	20/0.1	100/0.6				**WEATHERED ROCK**
785										(LIGHT BROWN, BROWN AND GRAY, METAMORPHOSED GRANITE)
	784.0	48.5	100/0.3			100/0.3				
780										778.8 53.7
	779.0	53.5	100/0.2			100/0.2				Boring Terminated at Elevation 778.8 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)
										24 Hr. Ground Water Caved Dry at 21.0 FT

Terracon
Consulting Engineers & Scientists

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 29+73	**OFFSET** 45 ft LT	**ALIGNMENT** -Y4-	**0 HR.** 21.0
COLLAR ELEV. 837.8 ft	**TOTAL DEPTH** 59.4 ft	**NORTHING** 873,275	**EASTING** 1,770,759	**24 HR.** 24.0
DRILL RIG/HAMMER EFF./DATE TER01912-0 ACKER RENEGADE 86% 03/21/2016		DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
DRILLER DUGGINS, W. T.	**START DATE** 11/23/16	**COMP. DATE** 11/23/16	**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)
840											
	836.8	1.0								837.8 GROUND SURFACE	0.0
835	834.3	3.5	5	5	6	11		M		**RESIDUAL** RED-ORANGE, SILTY CLAY, WITH TRACE MICA	
	831.8	6.0	4	5	7	12	SS-7	33%		831.3	6.5
830	829.3	8.5	4	5	6	11		M		RED-ORANGE, ORANGE, GRAY, LIGHT BROWN, BROWN, BLACK AND WHITE, MICACEOUS, CLAYEY SILT, WITH LITTLE MANGANESE SEAMS	
	824.3	13.5	4	6	7	13		M			
825	819.3	18.5	4	5	5	10		M			
	814.3	23.5	3	4	5	9		M			
820	809.3	28.5	3	2	5	7		M			
	804.3	33.5	3	6	13	19		M			
815	799.3	38.5	9	16	51	67		M			
	794.3	43.5	17	25	24	49		M			
810	789.3	48.5	24	32	55	87		M		793.0 **WEATHERED ROCK** (WHITE, GRAY AND BROWN, METAMORPHOSED GRANITE)	44.8
			100/0.4			100/0.4					
805	784.3	53.5	100/0.5			100/0.5					
	779.3	58.5	33	100/0.4		100/0.9				778.4 Boring Terminated at Elevation 778.4 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)	59.4
800											
795											
790											
785											
780											

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** ALEXANDER, M.J.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-C	**STATION** 29+96	**OFFSET** 7 ft LT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 837.2 ft	**TOTAL DEPTH** 58.9 ft	**NORTHING** 873,298	**EASTING** 1,770,797	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE TER01912-0 ACKER RENEGADE 86% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER DUGGINS, W. T.	**START DATE** 11/22/16	**COMP. DATE** 11/22/16	**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	
840											
	836.2	1.0								837.2 PAVEMENT	0.0
835	834.6	2.6	3	4	4	8		W		836.7 0.5' ASPHALT **RESIDUAL** RED-BROWN, RED-ORANGE, TAN AND BLACK, SILTY CLAY, WITH TRACE MICA	0.5
	829.6	7.6	4	5	6	11	SS-8	49%			
830	824.6	12.6	2	3	5	8		M		827.2 ORANGE, TAN AND BLACK, FINE SANDY SILT, WITH TRACE MICA	10.0
	819.6	17.6	2	3	5	8		M			
825	814.6	22.6	2	3	3	6		M			
	809.6	27.6	WOH	3	2	5		M			
820	804.6	32.6	4	3	5	8	SS-9	55%		811.2 TAN, ORANGE AND BLACK, SILTY CLAY, WITH TRACE TO LITTLE MICA	26.0
	799.6	37.6	3	7	10	17		M		807.2 GRAY-TAN, TAN, BROWN AND GRAY, MICACEOUS, CLAYEY SILT	30.0
815	794.6	42.6	10	16	30	46		M			
	789.6	47.6	15	26	35	61		M		789.1 **WEATHERED ROCK** (BROWN, WHITE AND GRAY, METAMORPHOSED GRANITE)	48.1
810	784.6	52.6	28	44	56/0.4	100/0.9					
	779.6	57.6	100/0.5			100/0.5					
805			16	55	45/0.3	100/0.8				778.3 Boring Terminated at Elevation 778.3 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)	58.9
800											
795											
790											
785											
780											

Terracon
Consulting Engineers & Scientists

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** SCHLEMM, T.S.	
SITE DESCRIPTION SITE NO. 4 (STRUC. NO. 6) - BRDG. NO. 1245 ON SR 2523 (YANCEYVILLE RD.) (-Y4-) OVER I-85 BYPASS (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 30+16	**OFFSET** 40 ft RT	**ALIGNMENT** -Y4-	**0 HR.** N/A
COLLAR ELEV. 834.8 ft	**TOTAL DEPTH** 54.9 ft	**NORTHING** 873,318	**EASTING** 1,770,844	**24 HR.** Caved
DRILL RIG/HAMMER EFF./DATE TER373 DIEDRICH D-50 92% 03/21/2016		DRILL METHOD Wash Boring	HAMMER TYPE Automatic	
DRILLER TURNAGE, J.R.	**START DATE** 11/28/16	**COMP. DATE** 11/29/16	**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
835										834.8 GROUND SURFACE 0.0
	833.8	1.0	8	6	5	11		M		**RESIDUAL** RED, RED-BROWN, GRAY AND ORANGE, SILTY CLAY
830	831.3	3.5	7	10	14	24		M		
	828.8	6.0	5	5	7	12		M		
825	826.3	8.5	4	4	4	8		M		
	821.3	13.5	3	4	4	8		28%		
820								M		
815	816.3	18.5	2	2	4	6	SS-10	42%		813.8 21.0 GRAY, BROWN AND ORANGE, MICACEOUS, CLAYEY SILT, WITH TRACE MANGANESE SEAMS
	811.3	23.5	3	4	4	8		M		
810										
805	806.3	28.5	11	12	19	31		M		
	801.3	33.5	27	25	39	64		M		798.8 36.0 **WEATHERED ROCK** (GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)
800										
795	796.3	38.5	41	54	46/0.4	100/0.9				
	791.3	43.5	38	60	40/0.2	100/0.7				787.3 47.5 **RESIDUAL** GRAY, WHITE AND ORANGE, SAPROLITIC, FINE SANDY SILT, WITH TRACE MICA
790										
785	786.3	48.5	23	31	38	69		M		780.8 54.0
	781.3	53.5	28	47	53/0.4	100/0.9				779.9 54.9 **WEATHERED ROCK** (GRAY, WHITE AND BROWN METAMORPHOSED GRANITE)
780										

Boring Terminated at Elevation 779.9 ft IN WEATHERED ROCK (METAMORPHOSED GRANITE)

24 Hr. Ground Water Caved Dry at 7.5 FT

Other Samples:
ST-1 (10.0 - 12.0)

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 34821.1.1 **TIP:** U-2525C **COUNTY:** GUILFORD

DESCRIPTION: SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245 ON SR 2523 (YANCEYVILLE ROAD) (-Y4-) OVER I-85 BYPASS (-L-)

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (ϕ)	Effective Cohesion (psf)	Effective Friction (ϕ')
SS-1	-Y4-	27+75	42 LT	17.8-19.3	A-7-5 (10)	52	14	5.0	45.5	36.3	13.2	0	100	99	67	40.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-2	-Y4-	27+75	42 LT	42.8-44.3	A-7-6 (5)	41	12	23.2	32.6	35.2	9.0	0	100	85	54	23.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-3	-Y4-	27+94	8 LT	2.6-4.1	A-7-5 (53)	91	49	1.7	17	29	52.3	0	100	99	88	44.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-4	-Y4-	28+04	54 RT	13.5-15.0	A-5 (7)	51	9	5.5	44.8	40.5	9.2	0	100	97	65	34.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-5	-Y4-	28+76	39 LT	1.0-2.5	A-7-6 (32)	66	36	6.1	17.8	27.9	48.2	0	100	97	81	26.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-6	-Y4-	29+17	40 RT	28.5-30.0	A-5 (6)	44	9	10.2	36.2	41.7	11.9	0	100	95	65	43.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-7	-Y4-	29+73	45 LT	3.5-5.0	A-7-5 (38)	78	37	3.0	18.8	31.2	47.0	1	99	98	84	33.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-8	-Y4-	29+96	7 LT	2.6-4.1	A-7-5 (71)	106	61	1.6	8.4	17.7	72.3	0	100	99	93	49.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-9	-Y4-	29+96	7 LT	27.6-29.1	A-7-6 (29)	65	36	6.3	28.2	49.2	16.3	0	100	97	76	54.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-10	-Y4-	30+16	40 RT	18.5-20.0	A-7-5 (10)	47	12	7.1	34.2	48.2	10.5	0	100	96	73	42.3	N/D	N/D	N/D	N/D	N/D	N/D
ST-1	-Y4-	30+16	40 RT	10.0-12.0	A-7-5 (21)	81	29	1.7	48.6	32.4	17.3	0	100	99	64	28.4	N/D	92.5	534	10º	219	29º

N/D - NOT DETERMINED

LABORATORY TESTING OF SHELBY TUBE SAMPLE ST-1 PERFORMED BY GEOTECHNICS

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

Photograph No. 1: South Approach to End Bent No.1 on Yanceyville Road (-Y4-), looking North.

Photograph No. 3: Left of Yanceyville Road (-Y4-) looking Northeast along the proposed I-85 Bypass (-L-) alignment.

Photograph No. 2: North Approach to End Bent No. 2 on Yanceyville Road (-Y4-), looking South.

Photograph No. 4: Right of Yanceyville Road (-Y4-) looking Southwest along the Proposed I-85 Bypass (-L-) alignment.

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 #4 – DUAL BRIDGES (STR. #5 & #6) ON I-85 BYPASS (-L-) OVER LEES CHAPEL RD. (-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 *JANUARY 2017*

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

2/7/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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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.

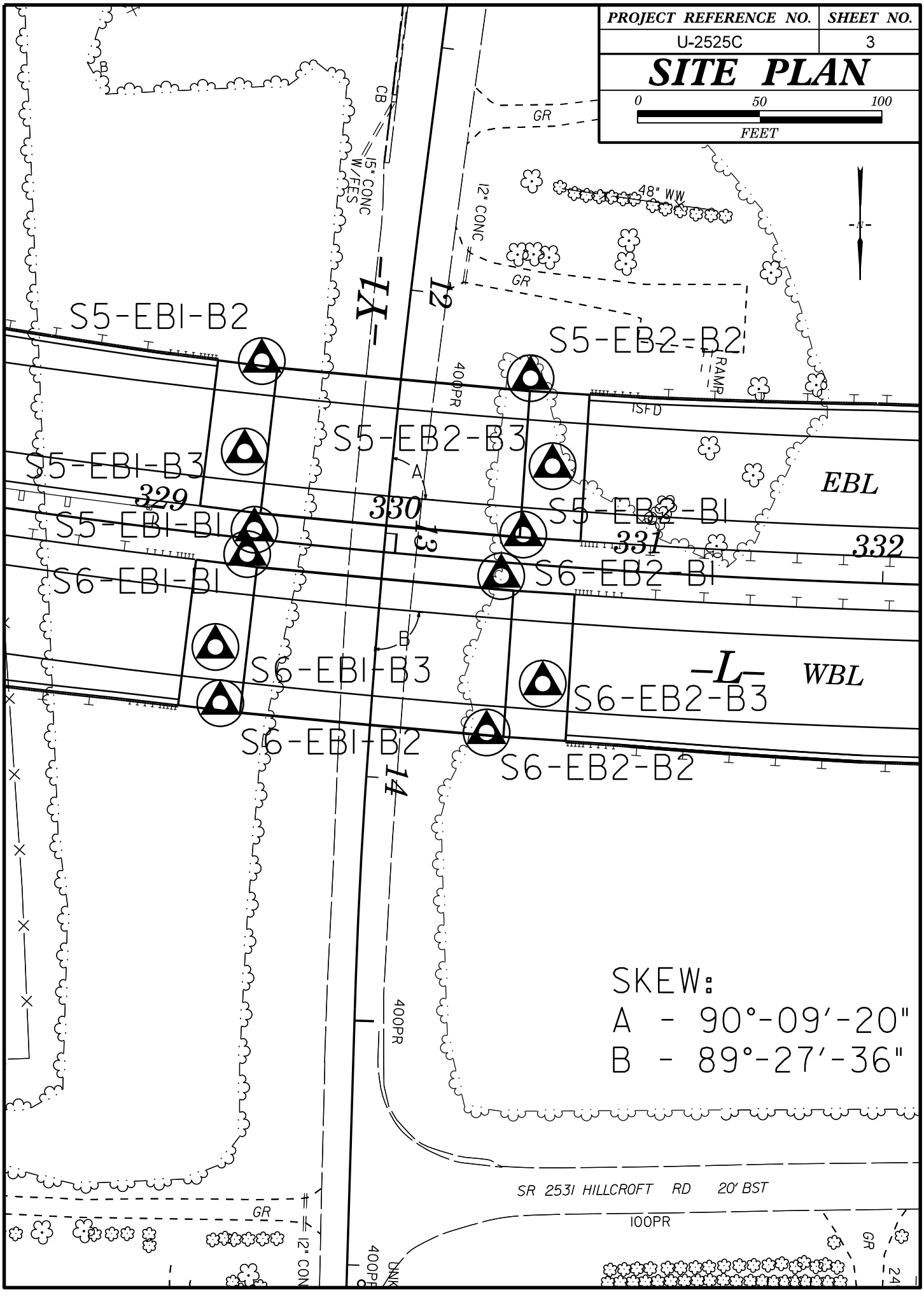
BENCH MARK: N/A

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


PROJECT REFERENCE NO.
U-2525C
SHEET NO.
3
SITE PLAN
0
50
100
FEET
S5-EB1-B2
S5-EB2-B2
S5-EB1-B3
S5-EB2-B3
S5-EB1-B1
S5-EB2-B1
S6-EB1-B1
S6-EB2-B1
S6-EB1-B3
S6-EB2-B3
S6-EB1-B2
S6-EB2-B2
329
330
331
332
EBL
WBL
-L-
-Y1-
12
14
A
B
C
15" CONC W/FES
12" CONC
48" WW
GR
400PR
ISFD
RAMP
SR 2531 HILLCROFT RD 20' BST
100PR
SKEW:
A - 90°-09'-20"
B - 89°-27'-36"

PRESENTATION OF SITE INVESTIGATION RESULTS

U-2525 C Site #4 – Greensboro, NC

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

Prepared by:

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CONETEC

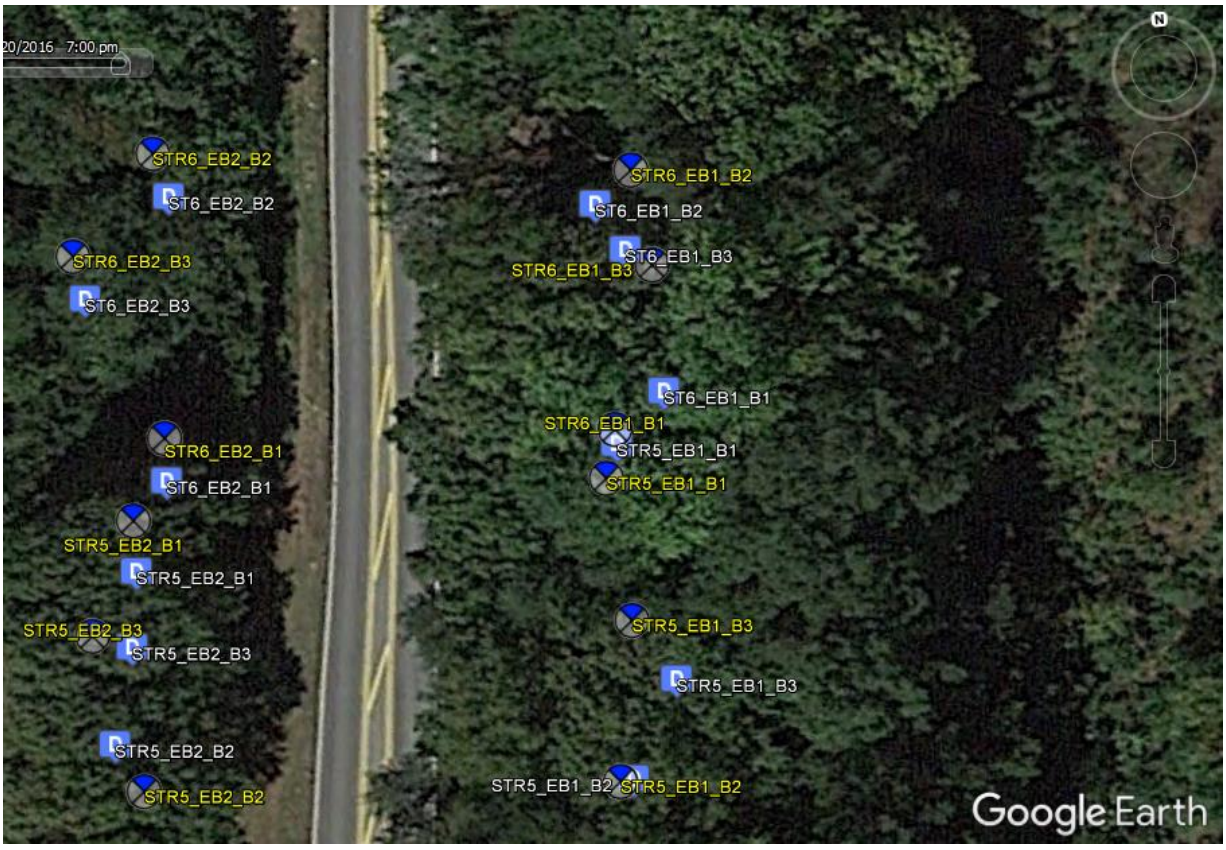
Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for Kleinfelder at the U-2525 C Site #4 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	U-2525 C Site #4 Energy Center
ConeTec project number	16-54112

A map from Google Earth including the CPTu 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 AD367 was used for all CPTu 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 every point. 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 "U-2525 C Site #4". 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.

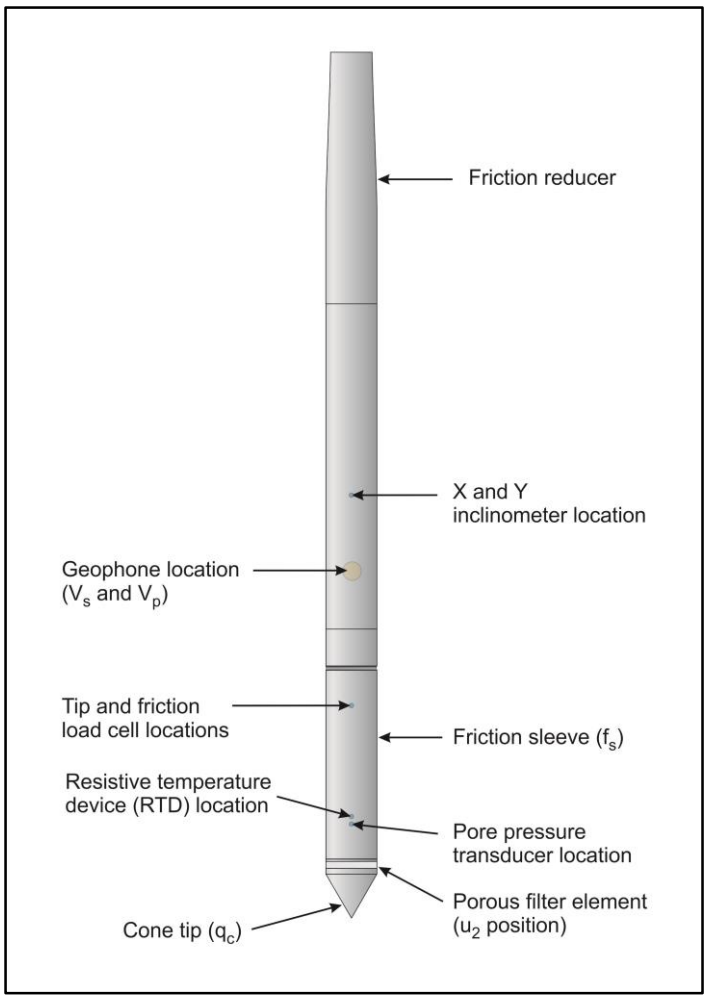


Figure CPTu. Piezocone Penetrometer (15 cm^2)

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).

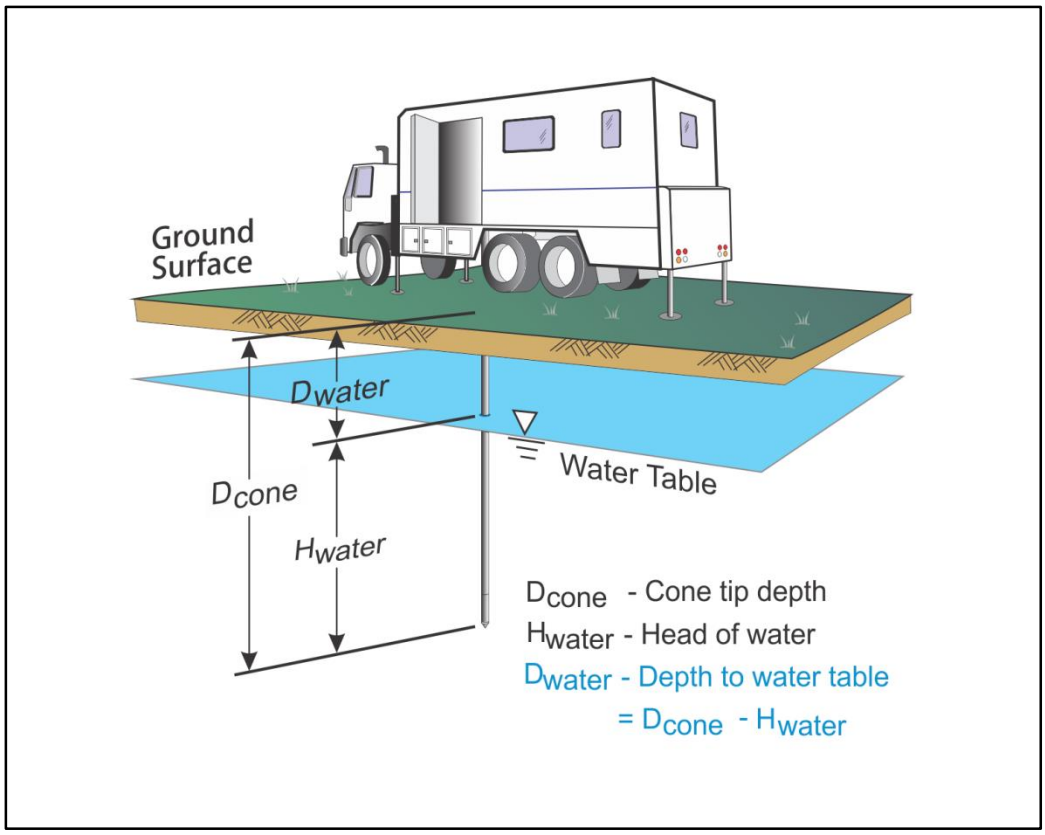


Figure PPD-1. Pore pressure dissipation test setup

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.

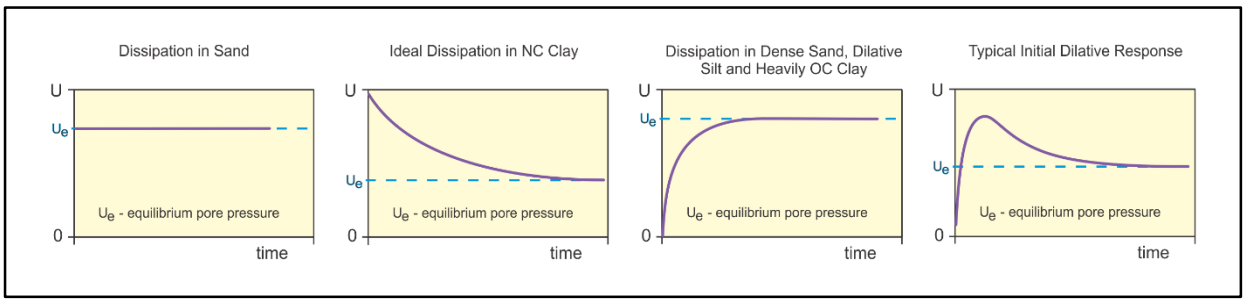


Figure PPD-2. Pore pressure dissipation curve examples

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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Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

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Sully, J.P., Robertson, P.K., Campanella, R.G. and Woeller, D.J., 1999, "An approach to evaluation of field CPTU dissipation data in overconsolidated fine-grained soils", Canadian Geotechnical Journal, 36(2): 369-381.

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.

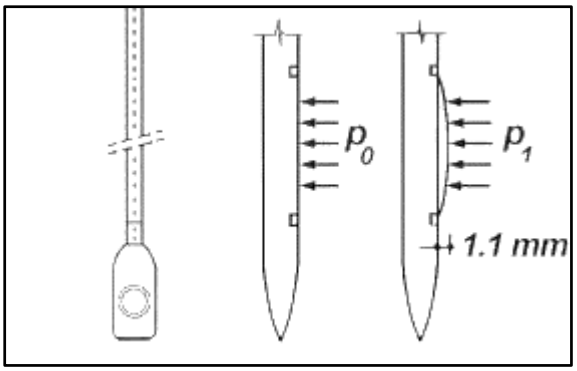

Figure DMT-2. Flat plate dilatometer p_0 and p_1
(Marchetti, http://www.marchetti-dmt.it/)

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.

References

ASTM D6635-01, Reapproved 2007, "Standard Test Method for Performing the Flat Plate Dilatometer ", ASTM, West Conshohocken, US.

Foti, D., Lancellotta, R., Marchetti, D., Monaco, P., and Totani, P., 2006, “Interpretation of SDMT tests in a transversely isotropic medium”, Proceedings from the Second International Conference on the Flat Dilatometer, Washington, DC., April 2-5.

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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:	U-2525 C Site #4
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
STR5_EB1_B1	16-54112_CP STR5_EB1_B1	19-Dec-2016	367:T1500F15U500		34.0	874653	1777563	1
STR5_EB1_B2	16-54112_CP STR5_EB1_B2	19-Dec-2016	367:T1500F15U500		28.5	874584	1777560	1
STR5_EB1_B3	16-54112_CP STR5_EB1_B3	19-Dec-2016	367:T1500F15U500		30.5	874621	1777567	1
STR5_EB2_B1	16-54112_CP STR5_EB2_B1	19-Dec-2016	367:T1500F15U500		28.1	874655	1777453	1
STR5_EB2_B2	16-54112_CP STR5_EB2_B2	19-Dec-2016	367:T1500F15U500		29.0	874591	1777450	1
STR5_EB2_B3	16-54112_CP STR5_EB2_B3	19-Dec-2016	367:T1500F15U500		29.9	874627	1777441	1
STR6-EB1_B1	16-54112_CP STR6_EB1_B1	19-Dec-2016	367:T1500F15U500		32.8	874663	1777566	1
STR6_EB1_B2	16-54112_CP STR6_EB1_B2	19-Dec-2016	367:T1500F15U500		33.0	874724	1777577	1
STR6_EB1_B3	16-54112_CP STR6_EB1_B3	19-Dec-2016	367:T1500F15U500		32.8	874701	1777579	1
STR6_EB2_B1	16-54112_CP STR6_EB2_B1	19-Dec-2016	367:T1500F15U500		27.6	874672	1777462	1
STR6_EB2_B2	16-54112_CP STR6_EB2_B2	19-Dec-2016	367:T1500F15U500		27.9	874736	1777468	1
STR6_EB2_B3	16-54112_CP STR6_EB2_B3	19-Dec-2016	367:T1500F15U500		27.9	874716	1777445	1
Totals	12 soundings				361.9			

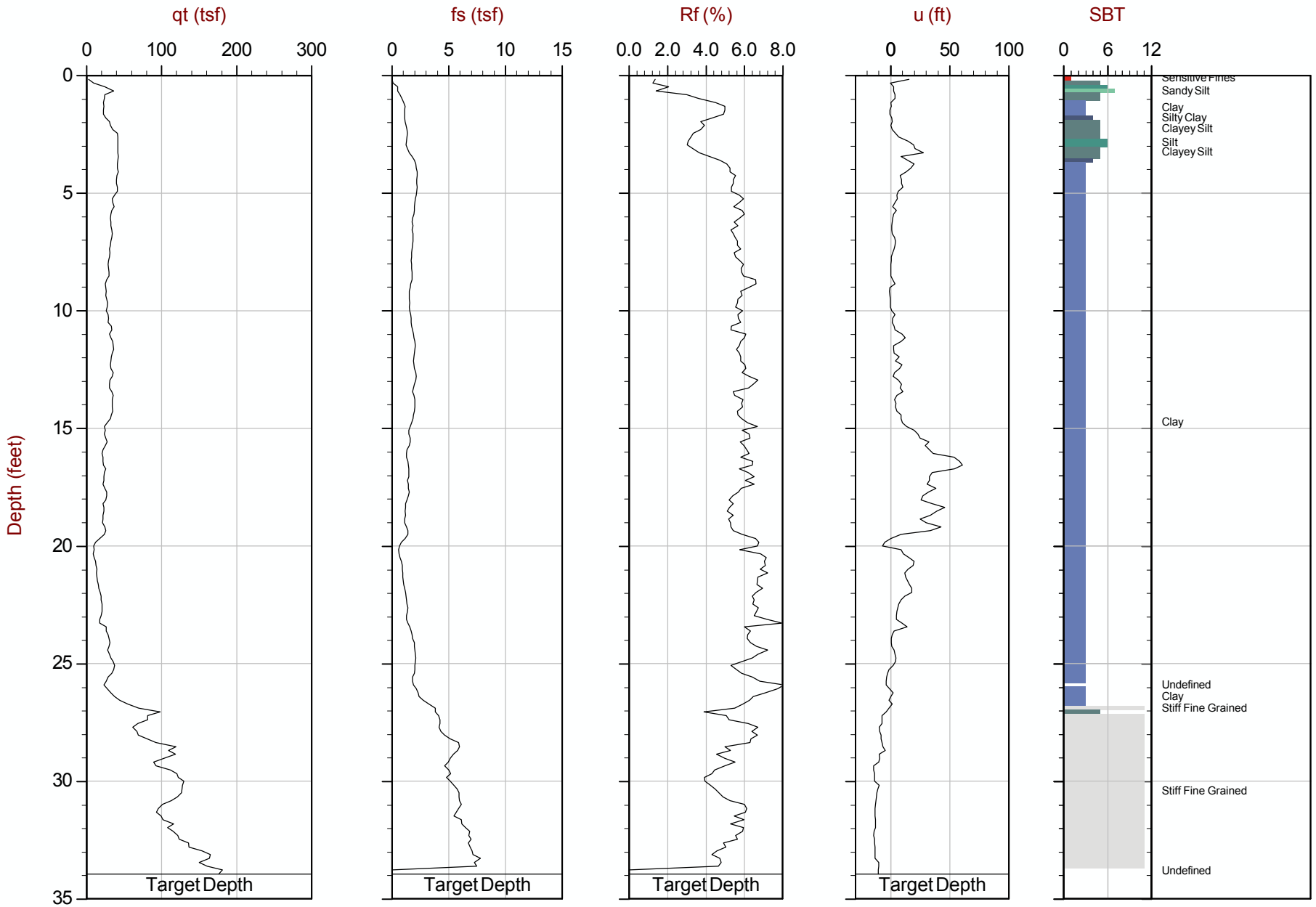
1. Phreatic surface is assumed not to be encountered within exploration depth.
2. State Plane System 3200 - North Carolina. Coordinates were provided by client.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 15:17
Site: U-2525 C Site #4

Sounding: STR5_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 STR5_EB1_B1.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

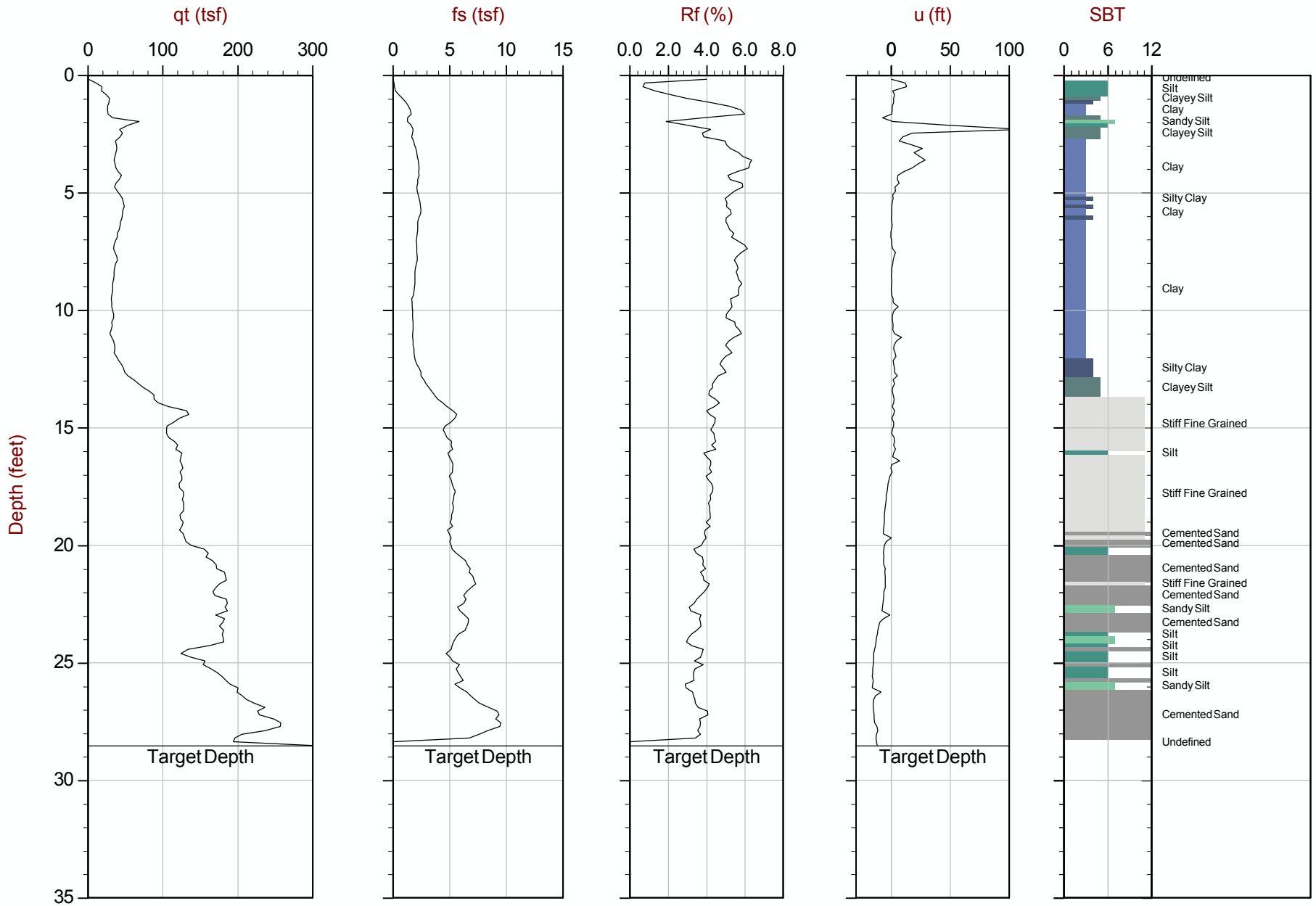
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 16:27
Site: U-2525 C Site #4

Sounding: STR5_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 STR5_EB1_B2.COR
Unit Wt: SBT Zones

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

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

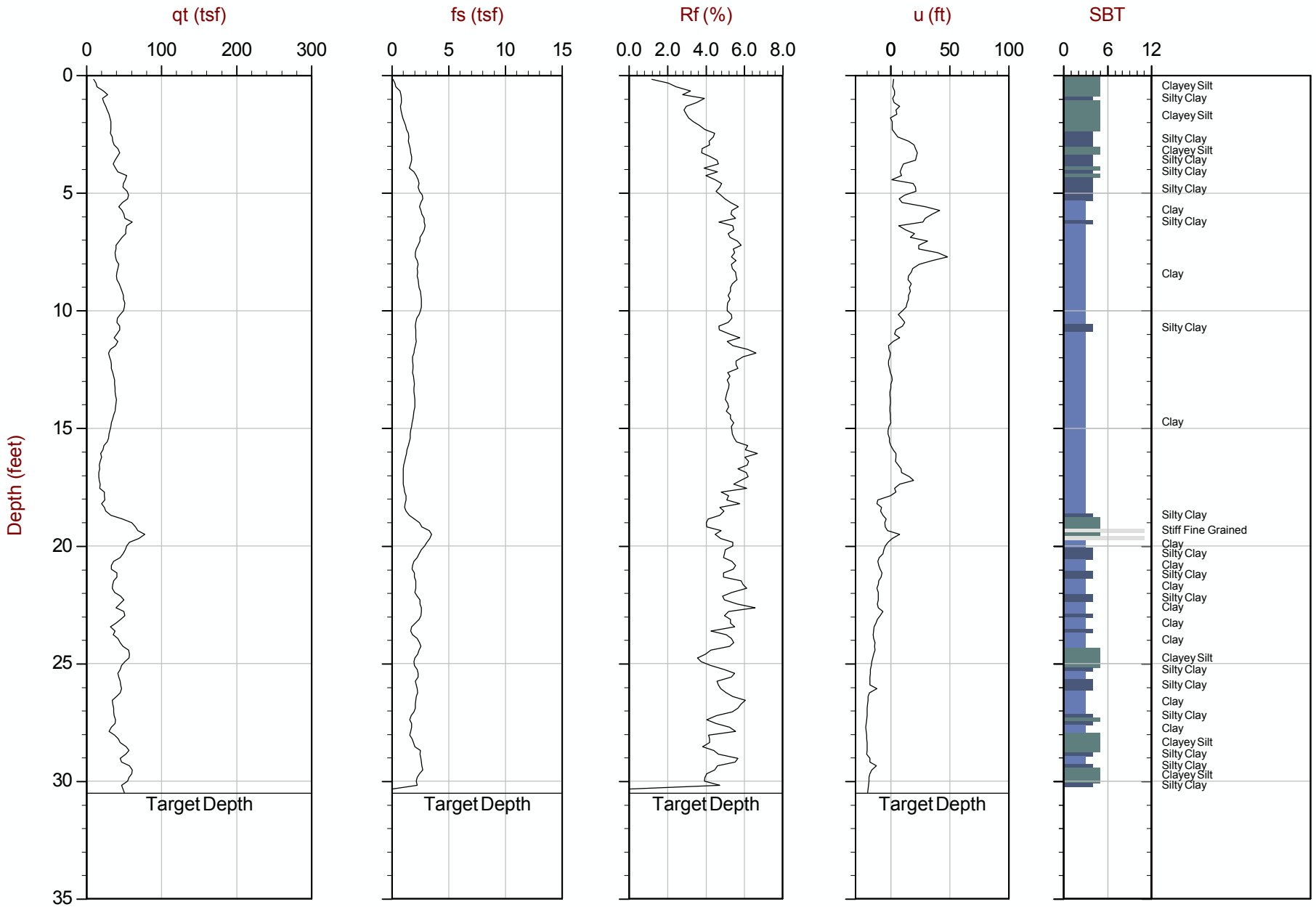
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 15:50
Site: U-2525 C Site #4

Sounding: STR5_EB1_B3
Cone: 367:T1500F15U500



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

File: 16-54112_CP STR5_EB1_B3.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

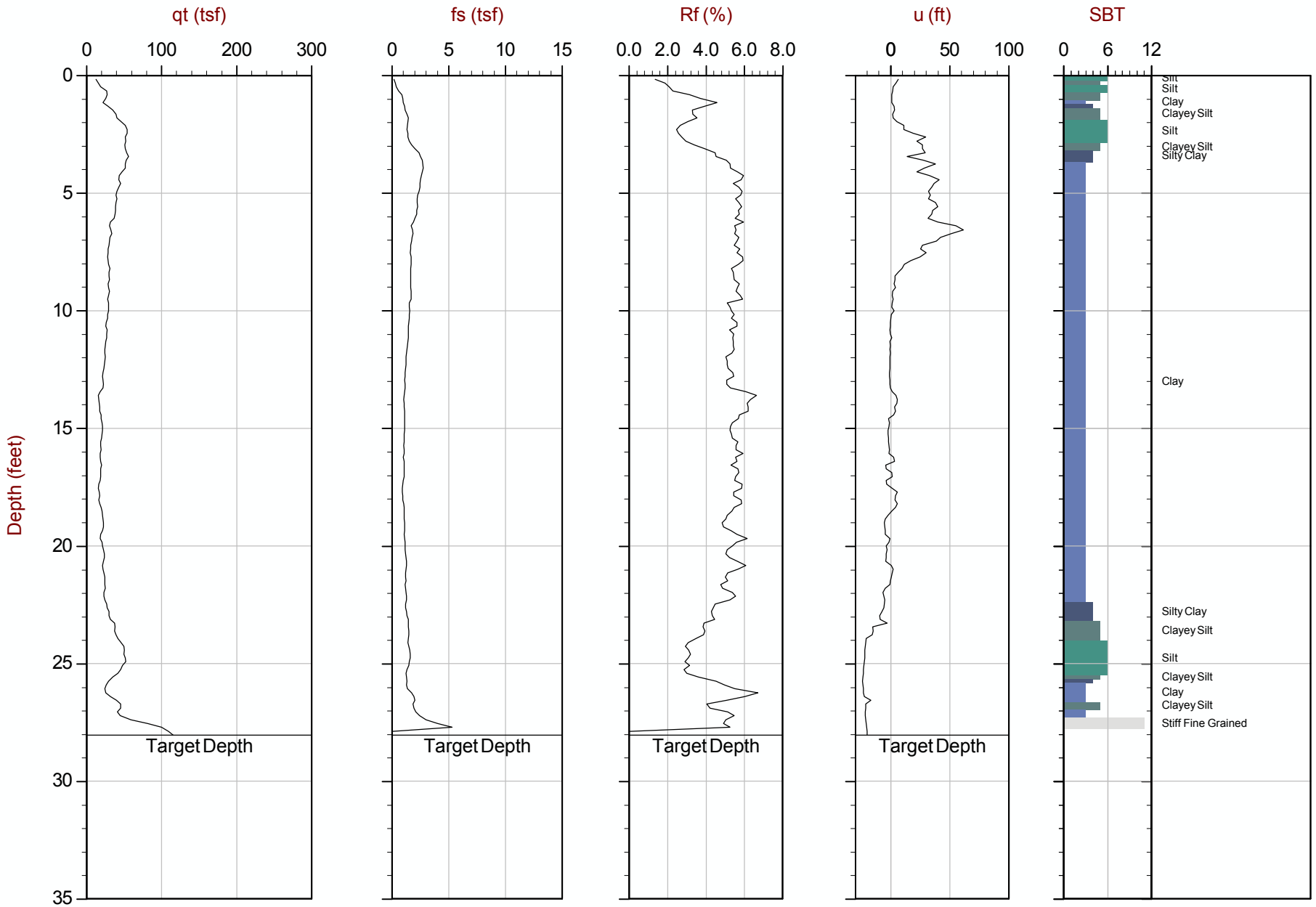
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 10:36
Site: U-2525 C Site #4

Sounding: STR5_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 STR5_EB2_B1.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

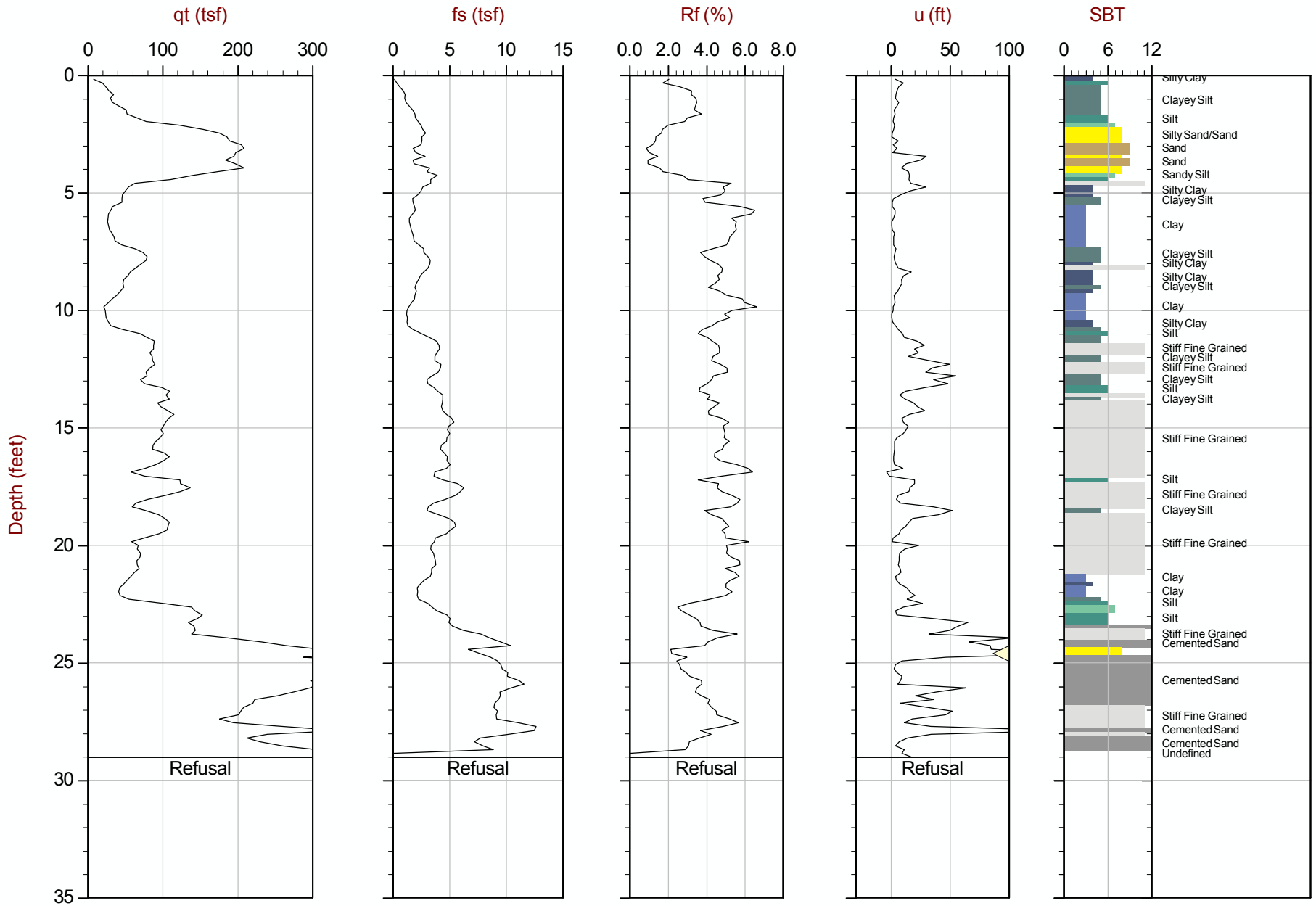
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 08:50
Site: U-2525 C Site #4

Sounding: STR5_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 STR5_EB2_B2.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

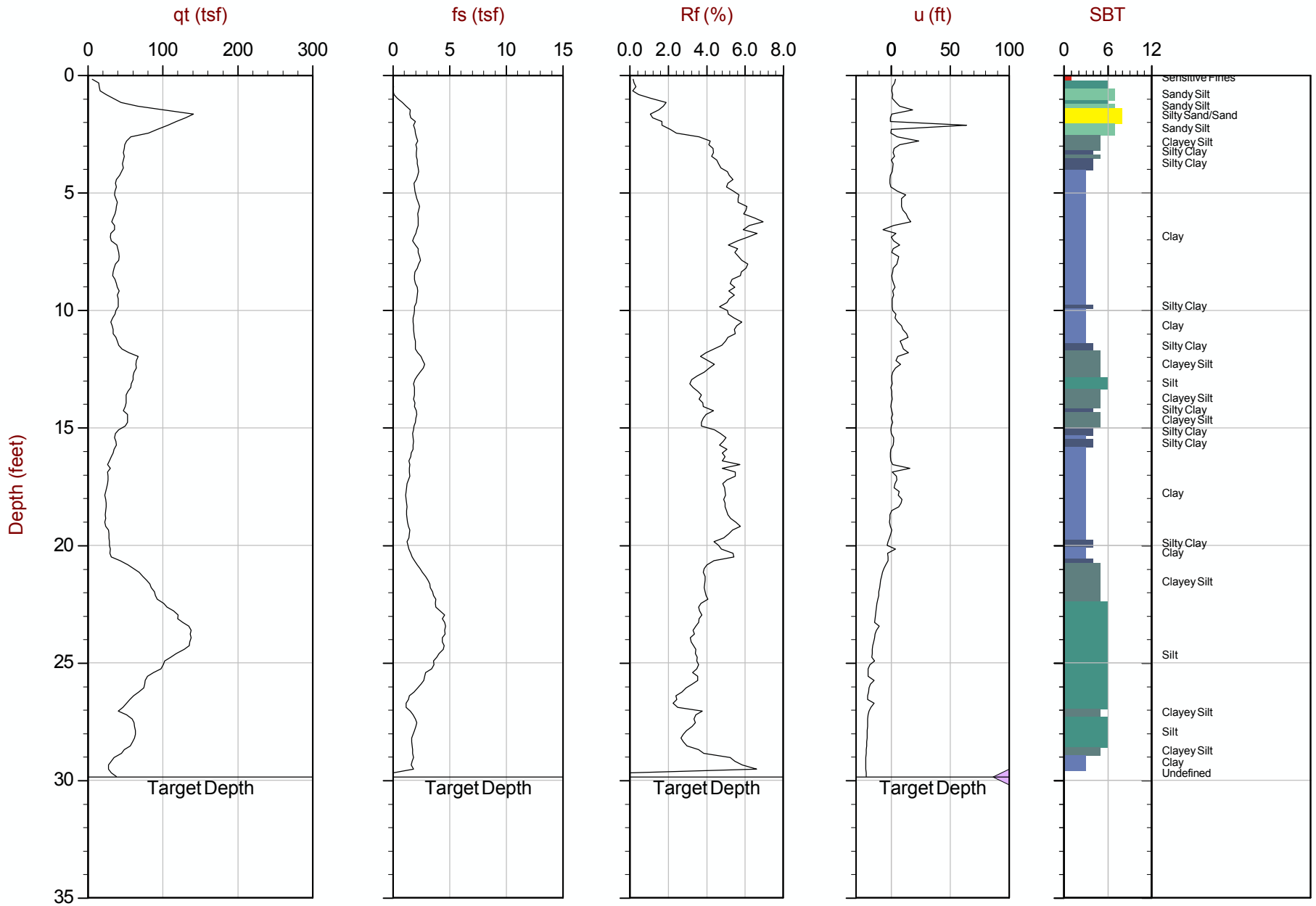
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 09:49
Site: U-2525 C Site #4

Sounding: STR5_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 STR5_EB2_B3.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

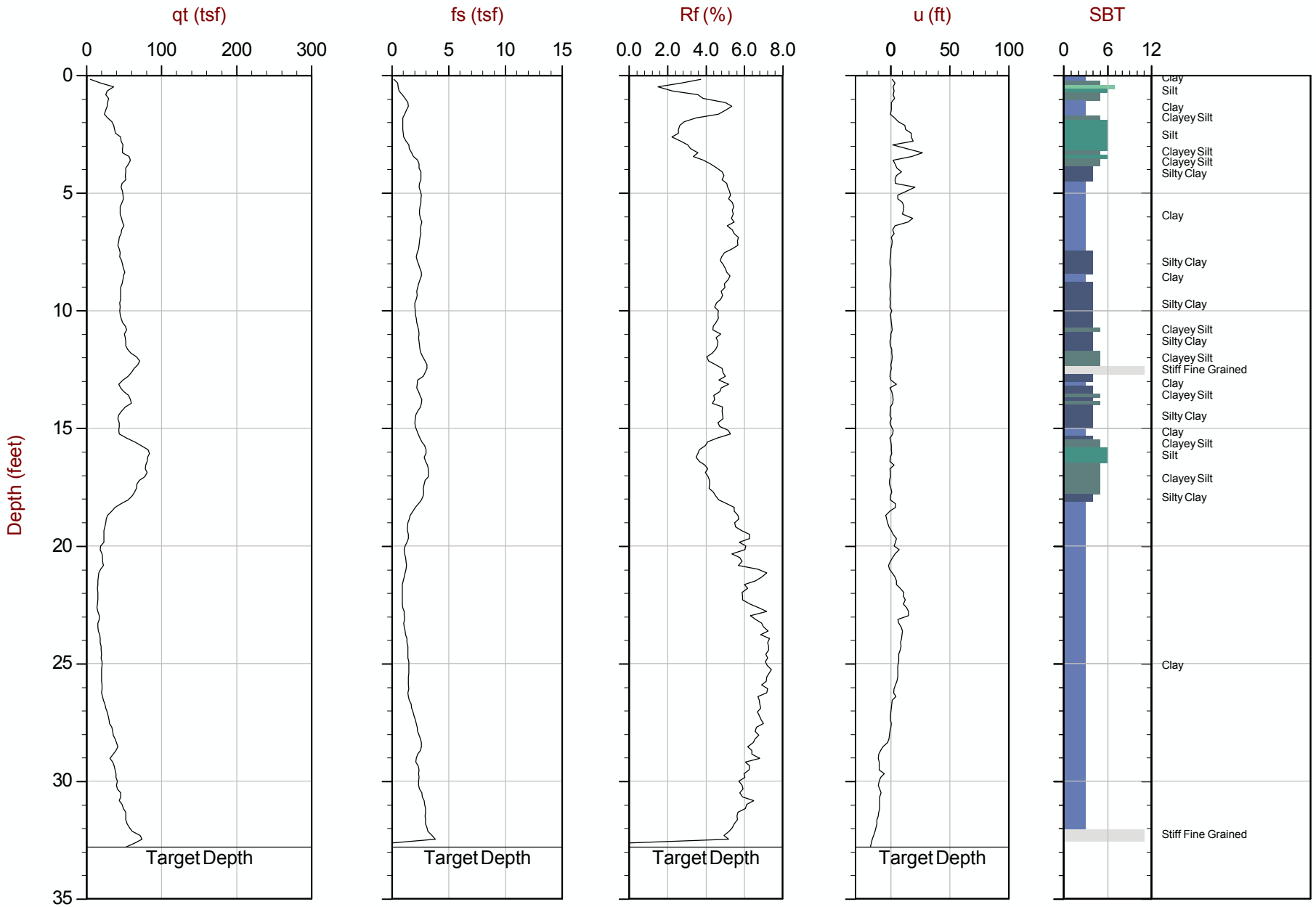
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 14:47
Site: U-2525 C Site #4

Sounding: STR6_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 STR6_EB1_B1.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

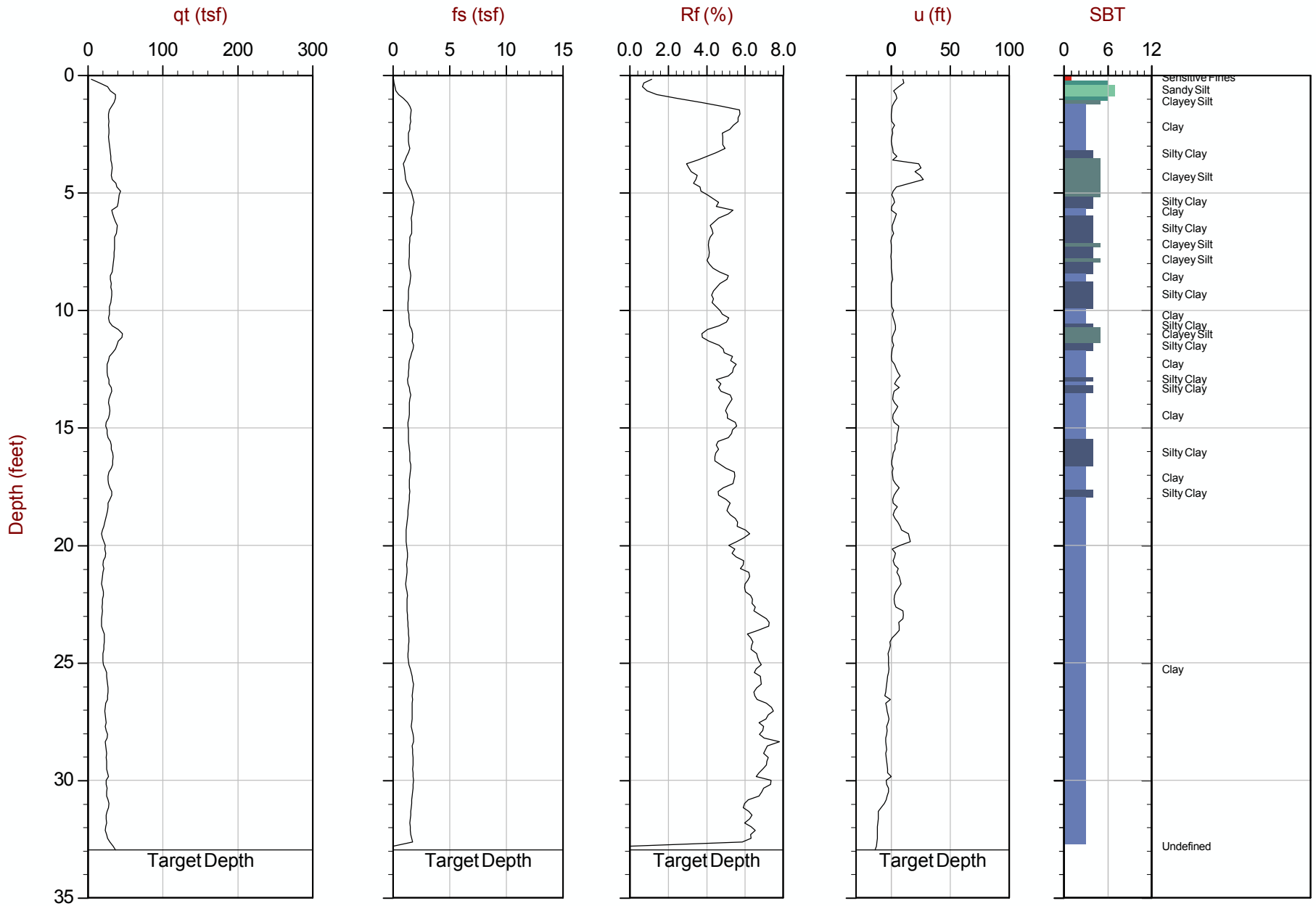
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 13:26
Site: U-2525 C Site #4

Sounding: STR6_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 STR6_EB1_B2.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

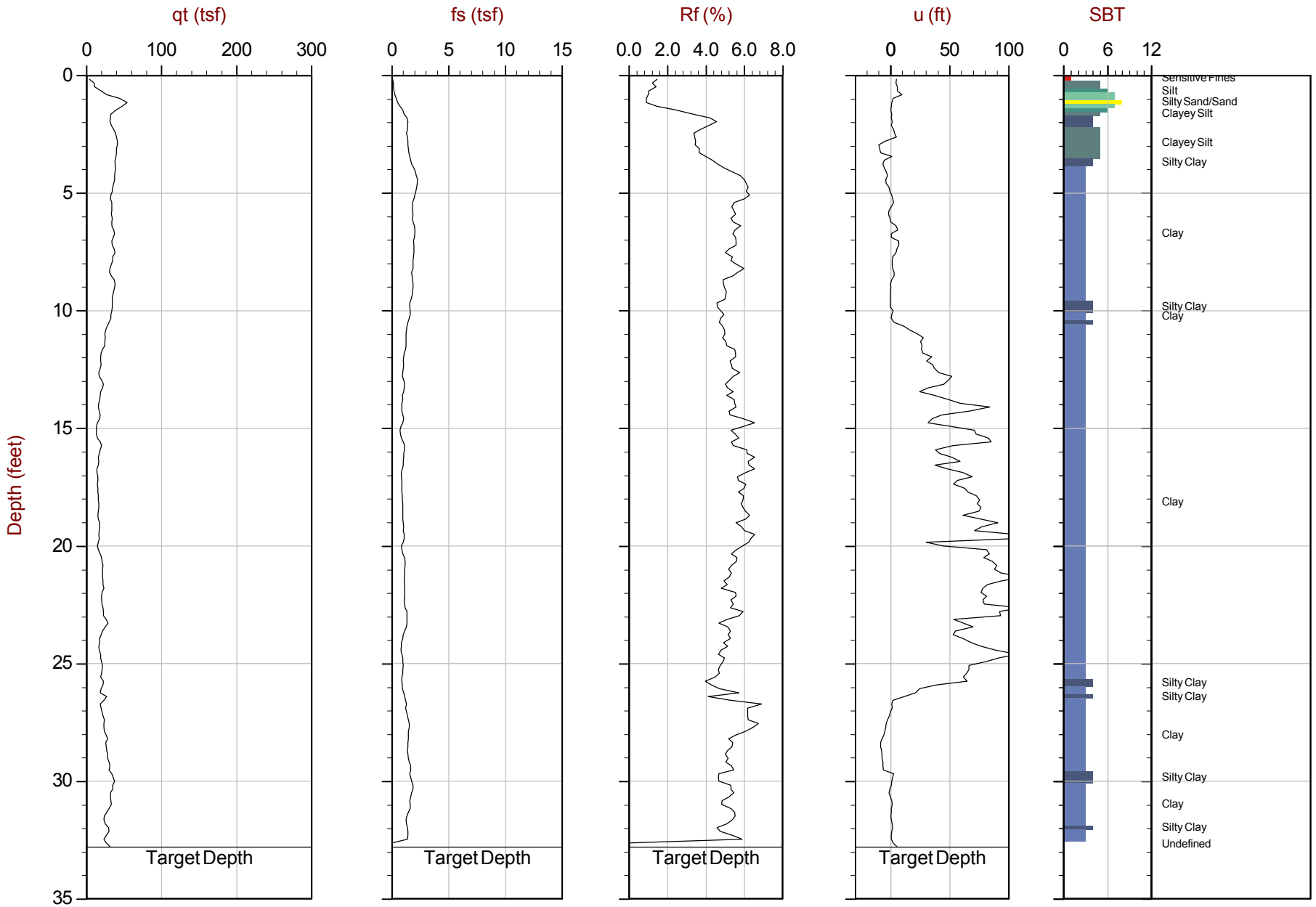
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 14:07
Site: U-2525 C Site #4

Sounding: STR6_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 STR6_EB1_B3.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

△ Dissipation, equilibrium not achieved

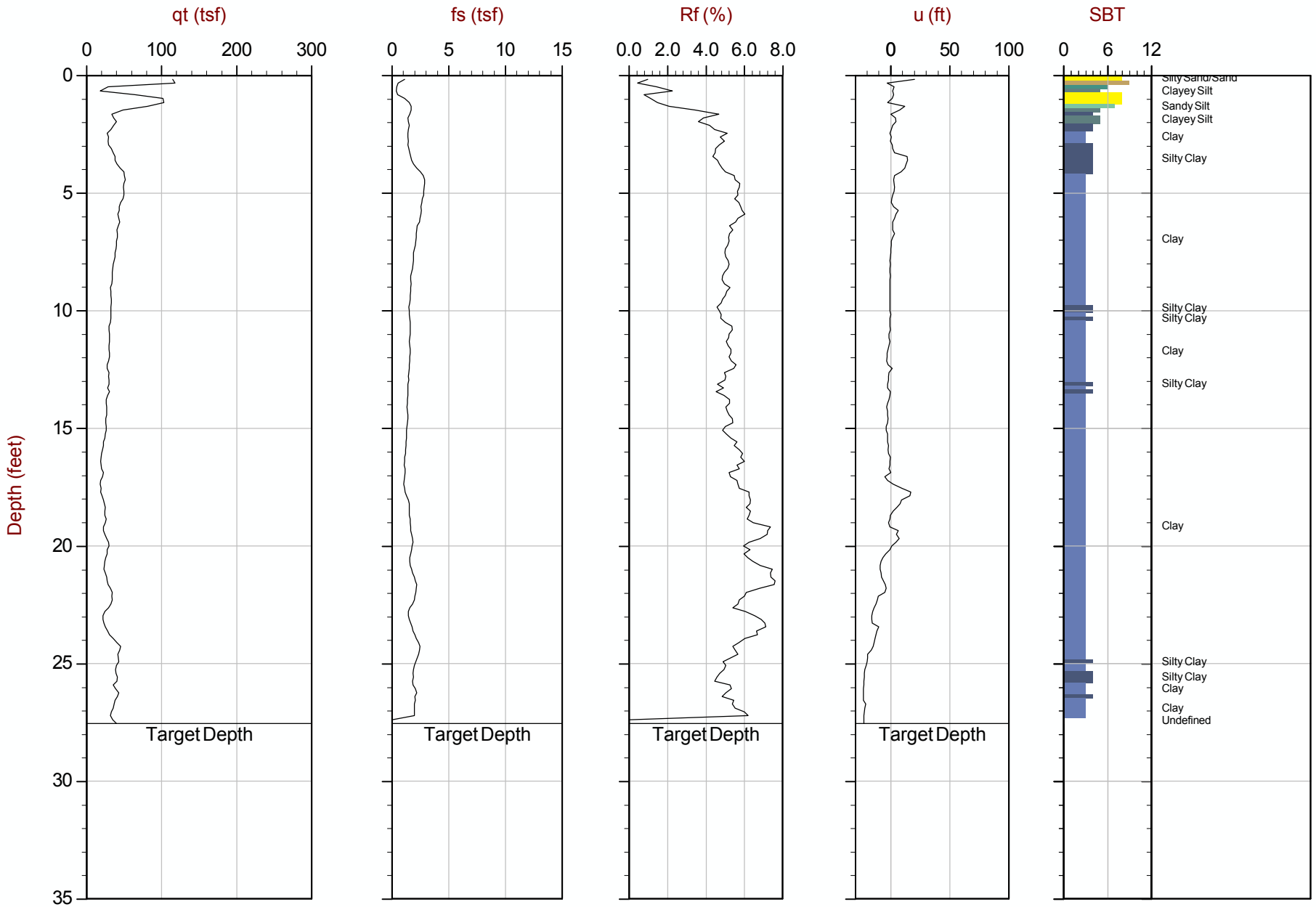
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 11:13
Site: U-2525 C Site #4

Sounding: STR6_EB2_B1
Cone: 367:T1500F15U500



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

File: 16-54112_CP STR6_EB2_B1.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

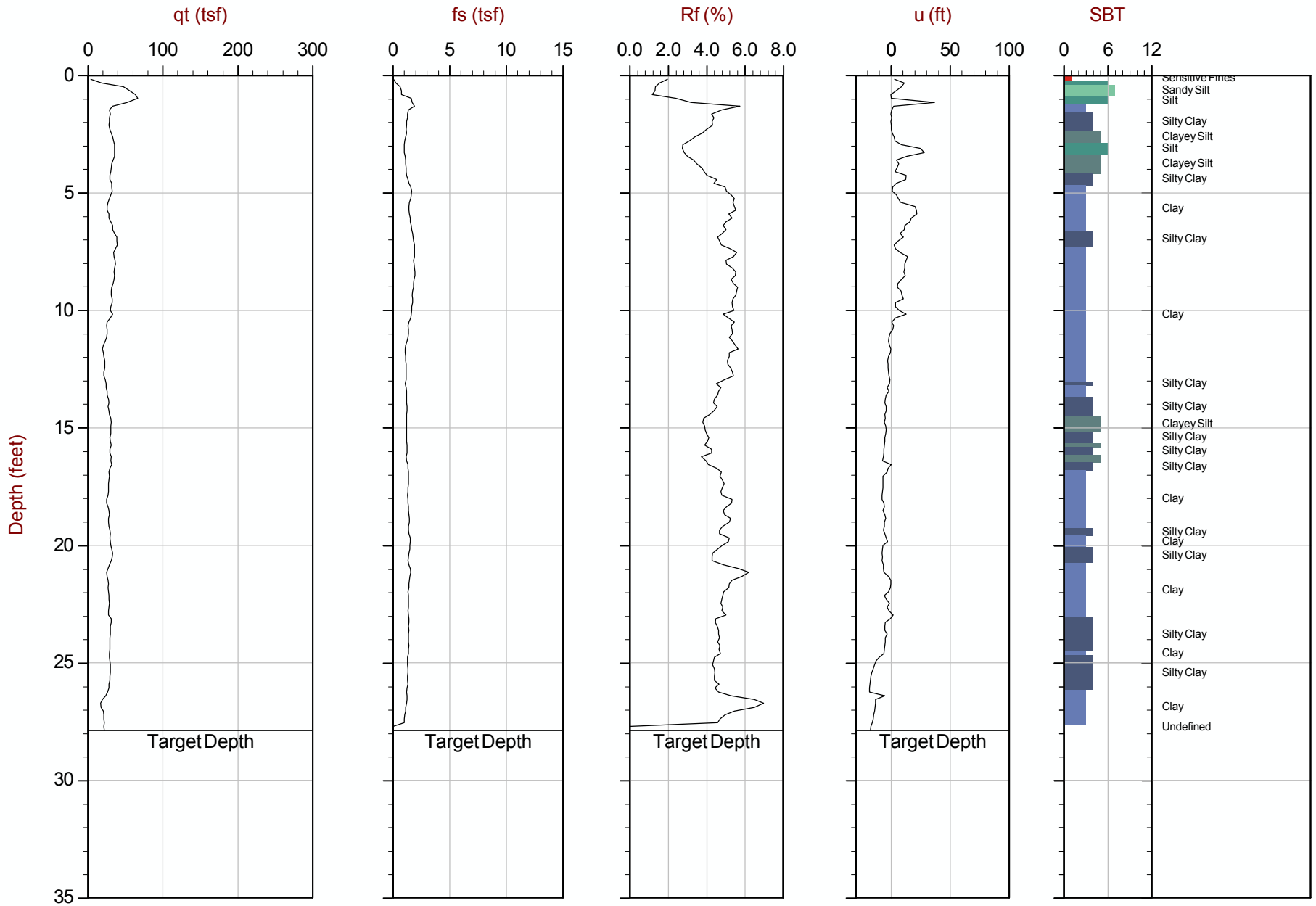
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 12:52
Site: U-2525 C Site #4

Sounding: STR6_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 STR6_EB2_B2.COR
Unit Wt: SBT Zones

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

△ Dissipation with estimated Ueq value

▲ Dissipation, equilibrium not achieved

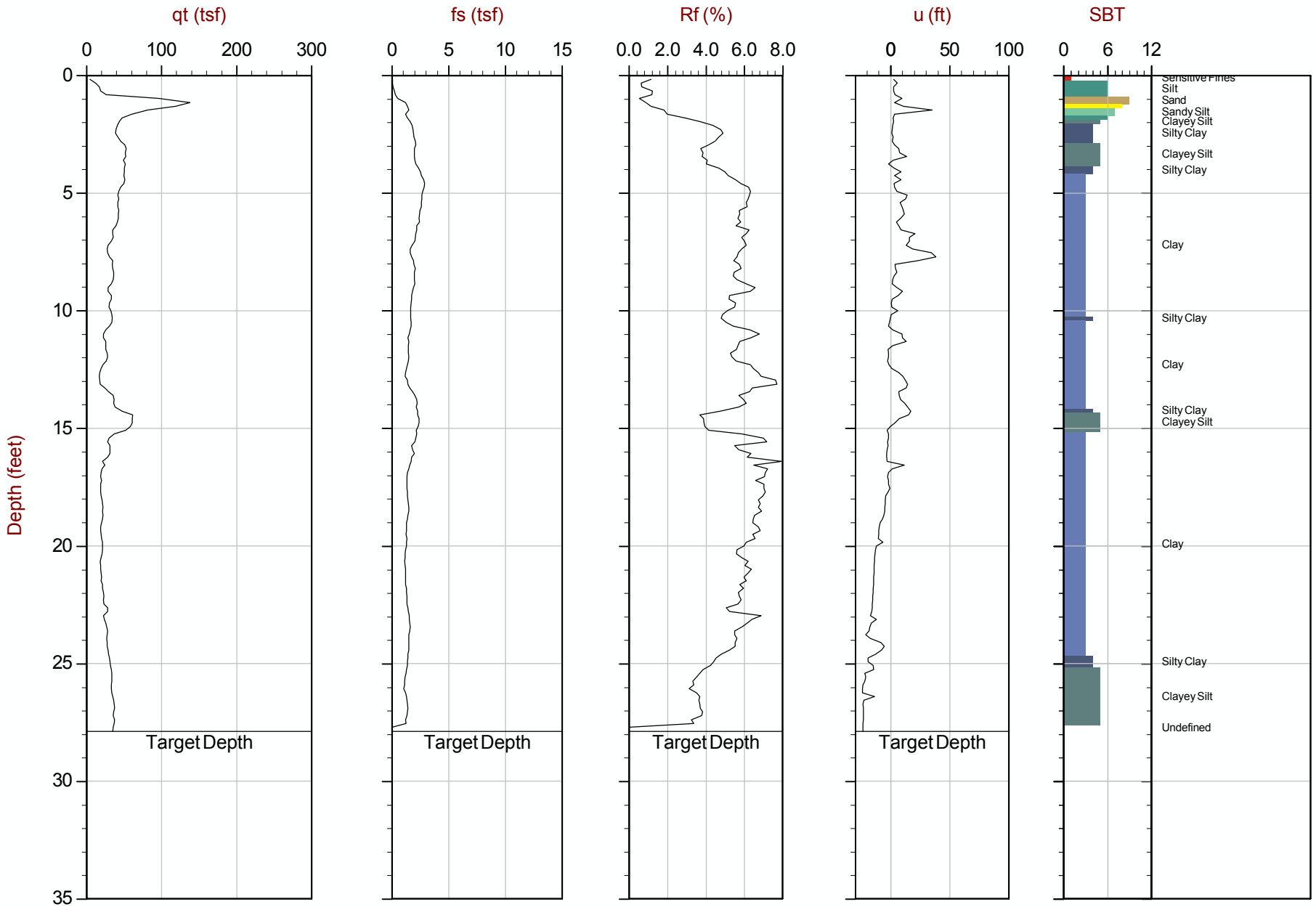
The reported coordinates were acquired from hand-held GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12:19:16 12:09
Site: U-2525 C Site #4

Sounding: STR6_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 STR6_EB2_B3.COR
Unit Wt: SBT Zones

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:	U-2525 C Site #4
Start Date:	19-Dec-2016
End Date:	21-Dec-2016

CPTu PORE PRESSURE DISSIPATION SUMMARY

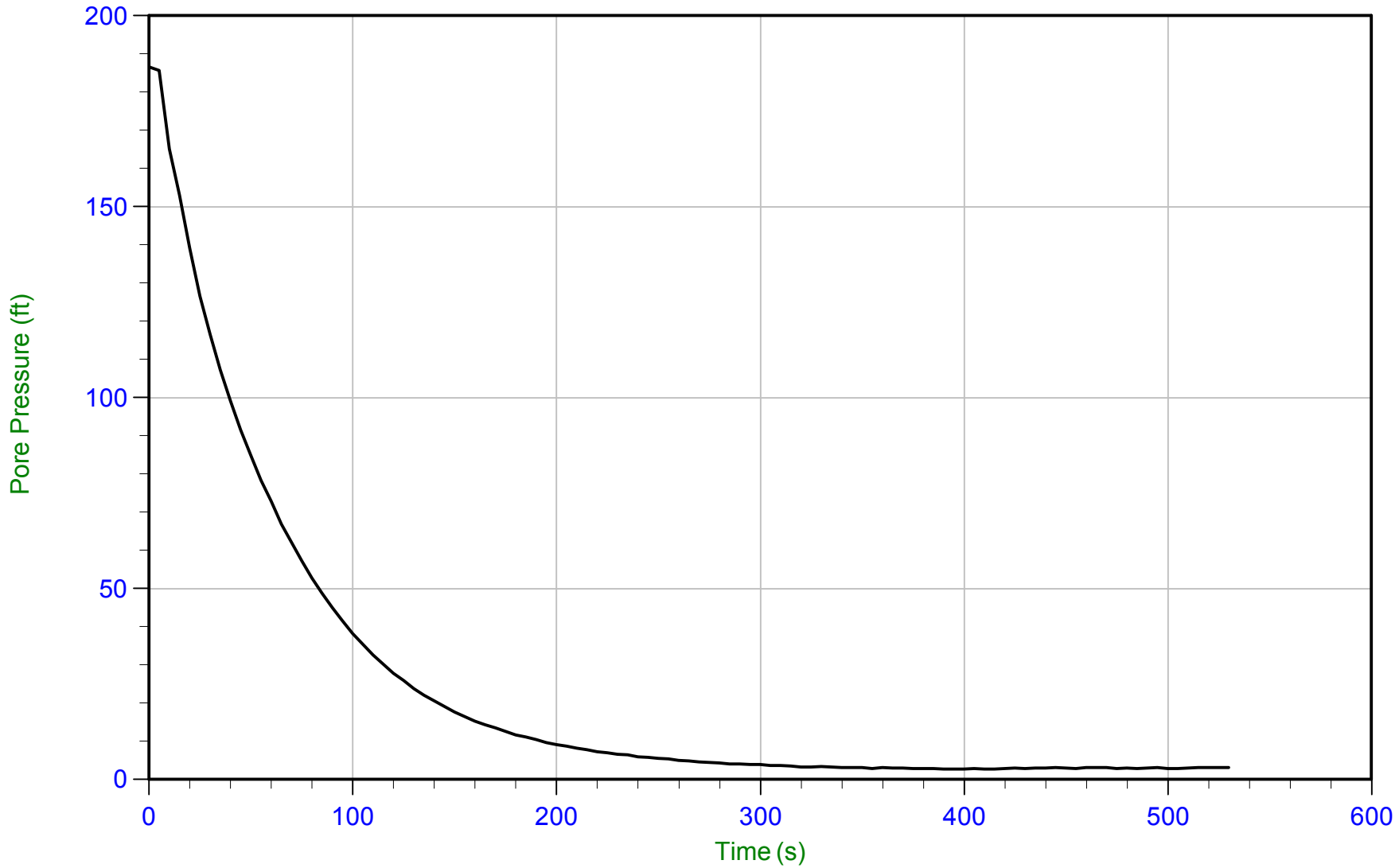
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
STR5_EB2_B2	16-54112_CP STR5_EB2_B2.PPD	15.0	530	24.6	3.0	21.6
STR5_EB2_B3	16-54112_CP STR5_EB2_B3.PPD	15.0	865	29.9		
Totals			14.4 min			

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12/19/2016 08:50
Site: U-2525 C Site #4

Sounding: STR5_EB2_B2
Cone: 367:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54112_CP STR5_EB2_B2.PPD
Depth: 7.500 m / 24.606 ft
Duration: 530.0 s

U Min: 2.7 ft
U Max: 186.5 ft

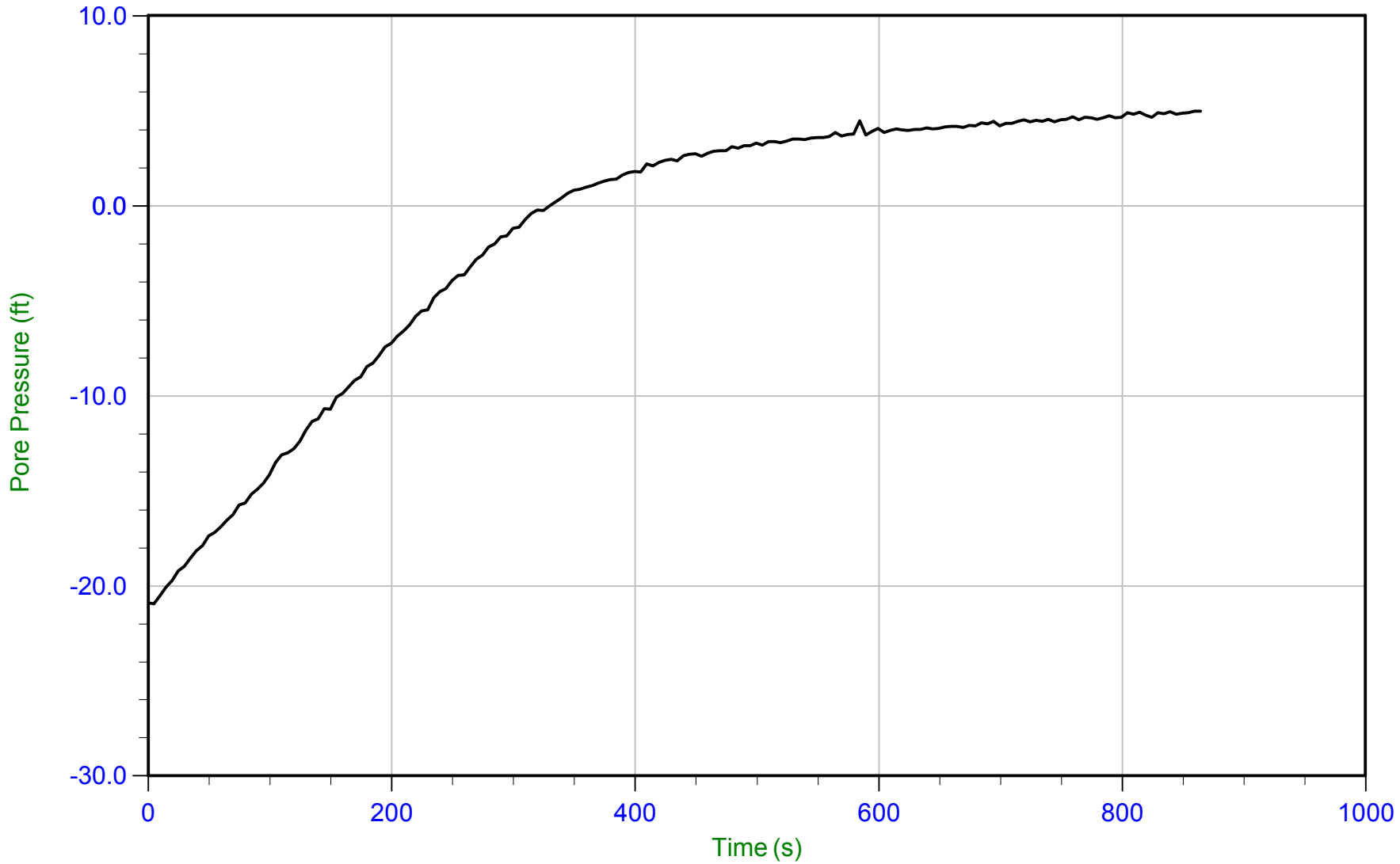
WT: 6.579 m / 21.584 ft
Ueq: 3.0 ft

CONETEC

Kleinfelder

Job No: 16-54112
Date: 12/19/2016 09:49
Site: U-2525 C Site #4

Sounding: STR5_EB2_B3
Cone: 367:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 16-54112_CP STR5_EB2_B3.PPD
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:	U-2525 C Site #4
Start Date:	19-Dec-2016
End Date:	21-Dec-2016

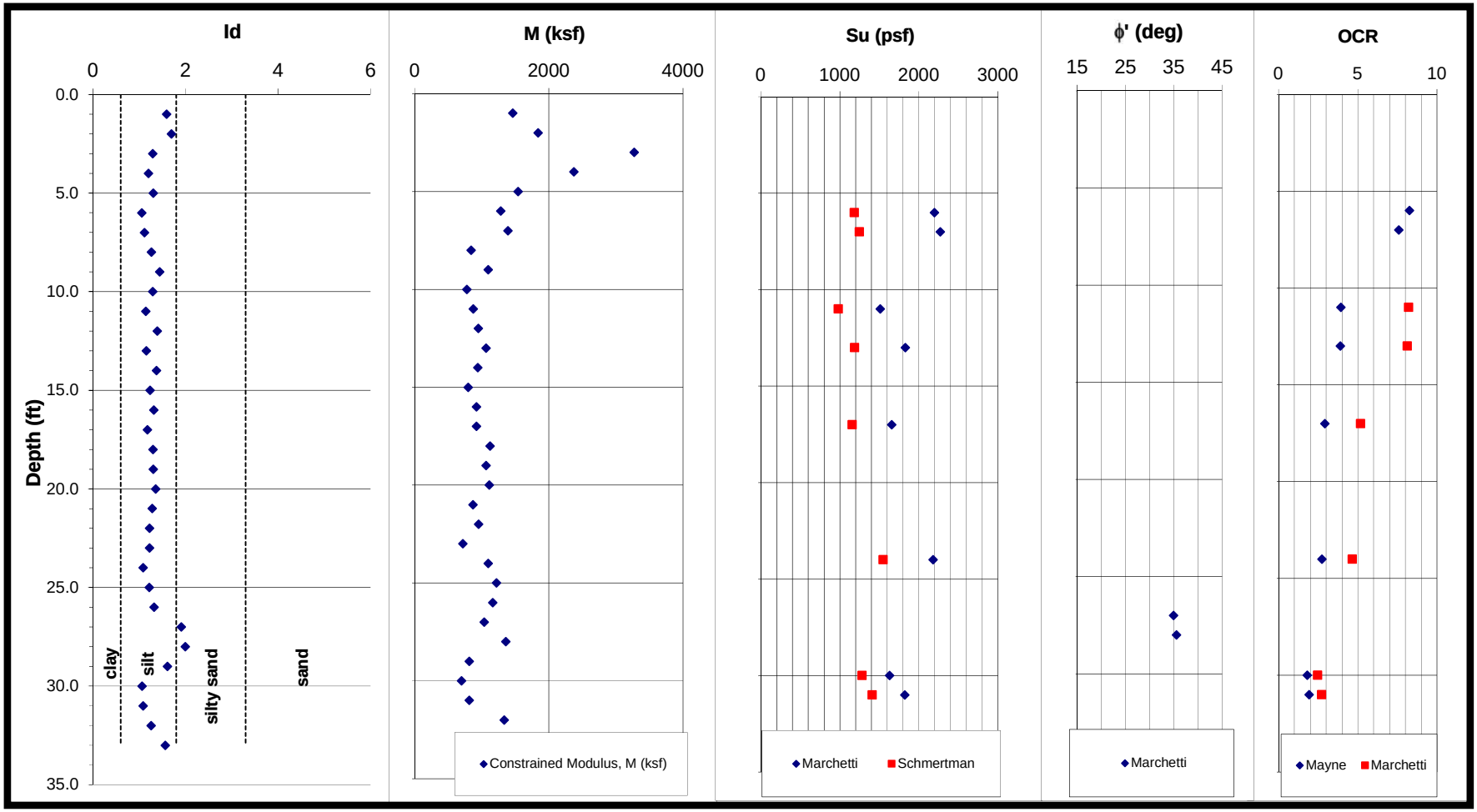
FLAT PLATE DILATOMETER TEST SUMMARY

Sounding ID	File Name	Date	Final Depth (ft)	Assumed Phreatic Surface (ft)	Northing[2] (feet)	Easting (feet)	Refer to Notation Number
STR5_EB1_B1	16-54112_DMT STR5_EB1_B1	20-Dec-2016	33		874653	1777563	1
STR5_EB1_B2	16-54112_DMT STR5_EB1_B2	20-Dec-2016	20		874584	1777560	1
STR5_EB1_B3	16-54112_DMT STR5_EB1_B3	20-Dec-2016	30		874621	1777567	1
STR5_EB2_B1	16-54112_DMT STR5_EB2_B1	21-Dec-2016	25		874655	1777453	1
STR5_EB2_B2	16-54112_DMT STR5_EB2_B2	21-Dec-2016	21		874591	1777450	1
STR5_EB2_B3	16-54112_DMT STR5_EB2_B3	21-Dec-2016	28		874627	1777441	1
STR6_EB1_B1	16-54112_DMT STR6_EB1_B1	20-Dec-2016	32		874663	1777566	1
STR6_EB1_B2	16-54112_DMT STR6_EB1_B2	20-Dec-2016	32		874724	1777577	1
STR6_EB1_B3	16-54112_DMT STR6_EB1_B3	20-Dec-2016	32		874701	1777579	1
STR6_EB2_B1	16-54112_DMT STR6_EB2_B1	21-Dec-2016	28		874672	1777462	1
STR6_EB2_B2	16-54112_DMT STR6_EB2_B2	20-Dec-2016	28		874736	1777468	1
STR6_EB2_B3	16-54112_DMT STR6_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.

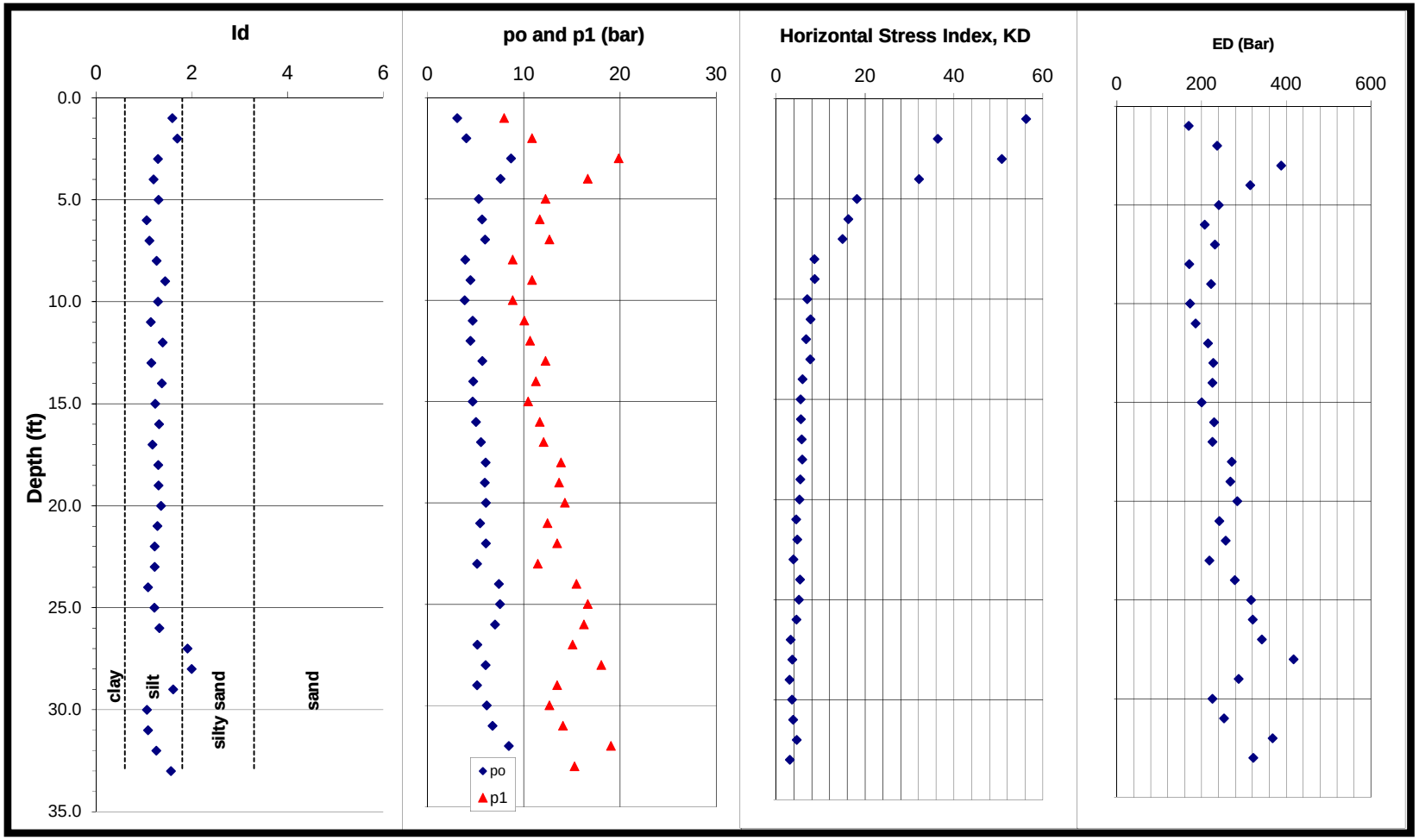
DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR5_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
Elevation 876.9

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

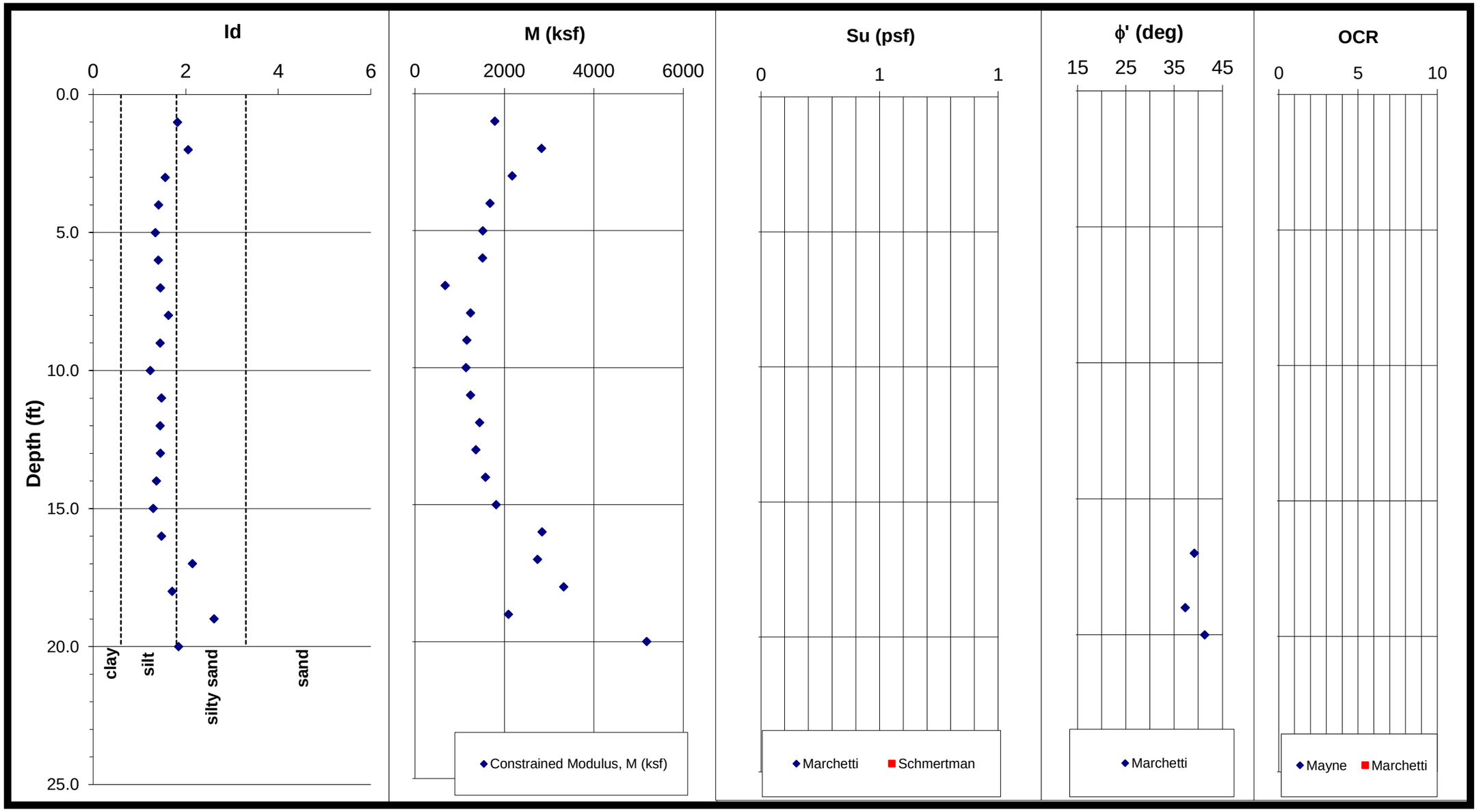
CONETEC

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

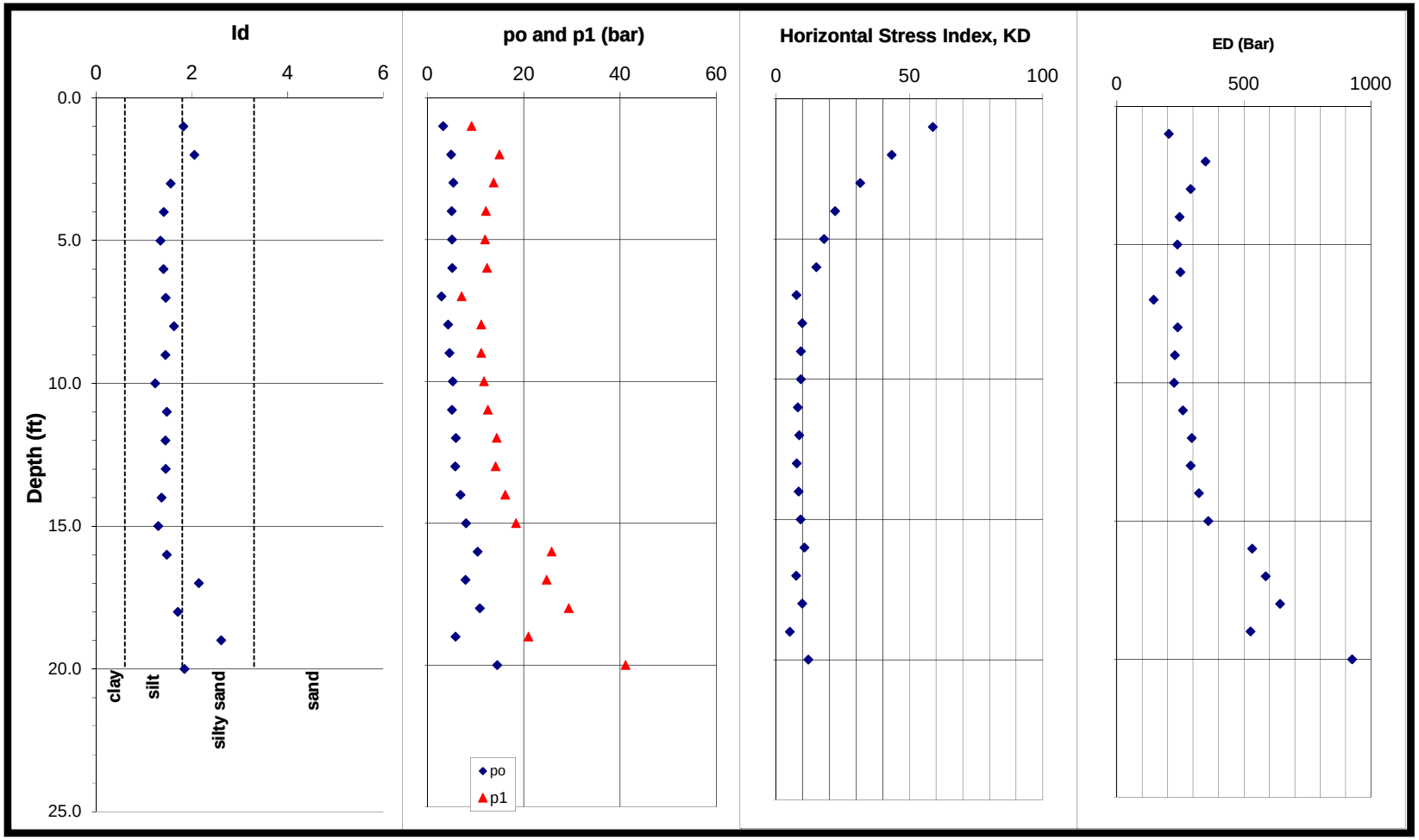
DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR5_EB1_B2
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.125	0	0
ΔB =	0.65	0	0
Zm=	0	bar	

Northing 874584
Easting 1777560
Elevation 874.1

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

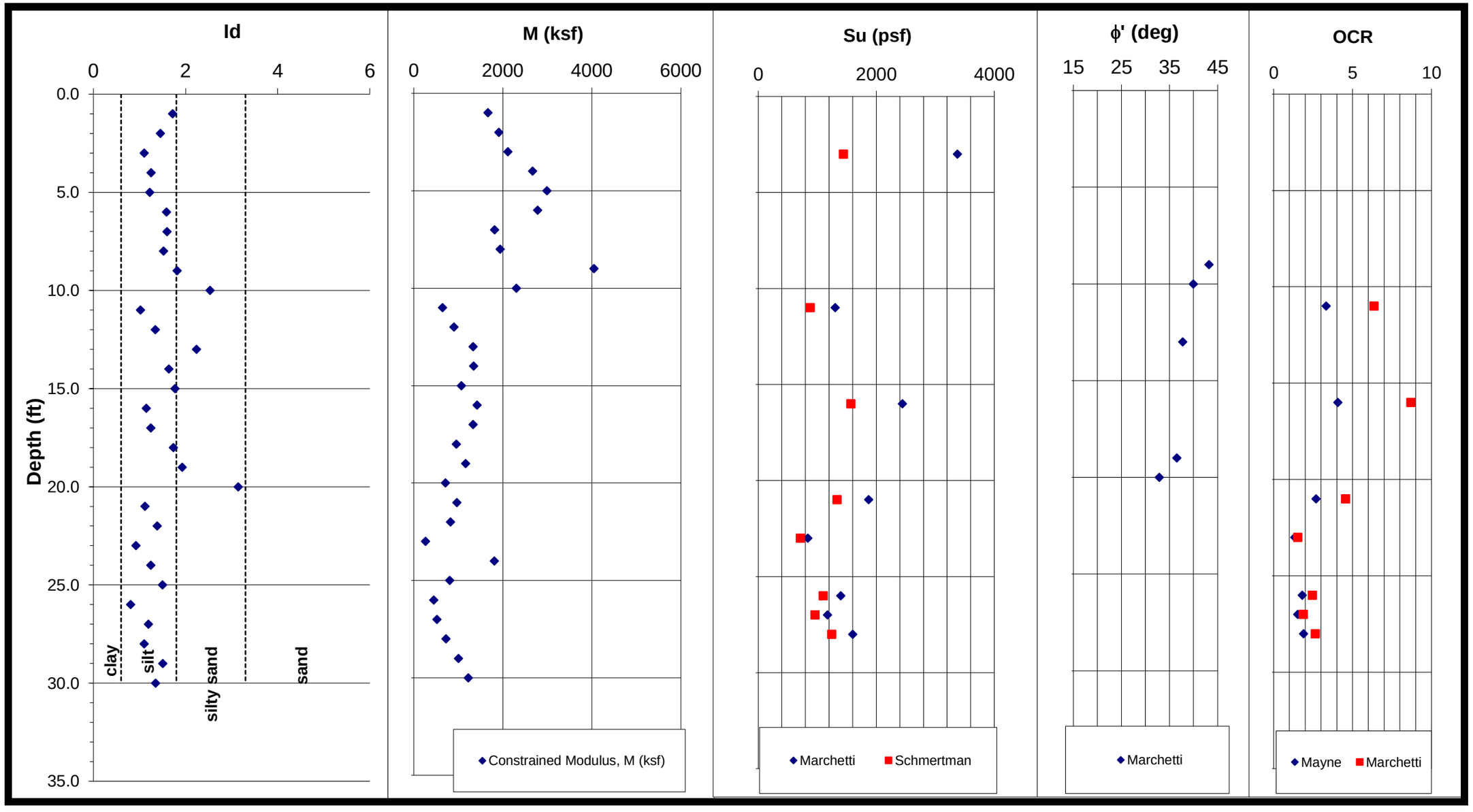
CONETEC

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	3.4	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

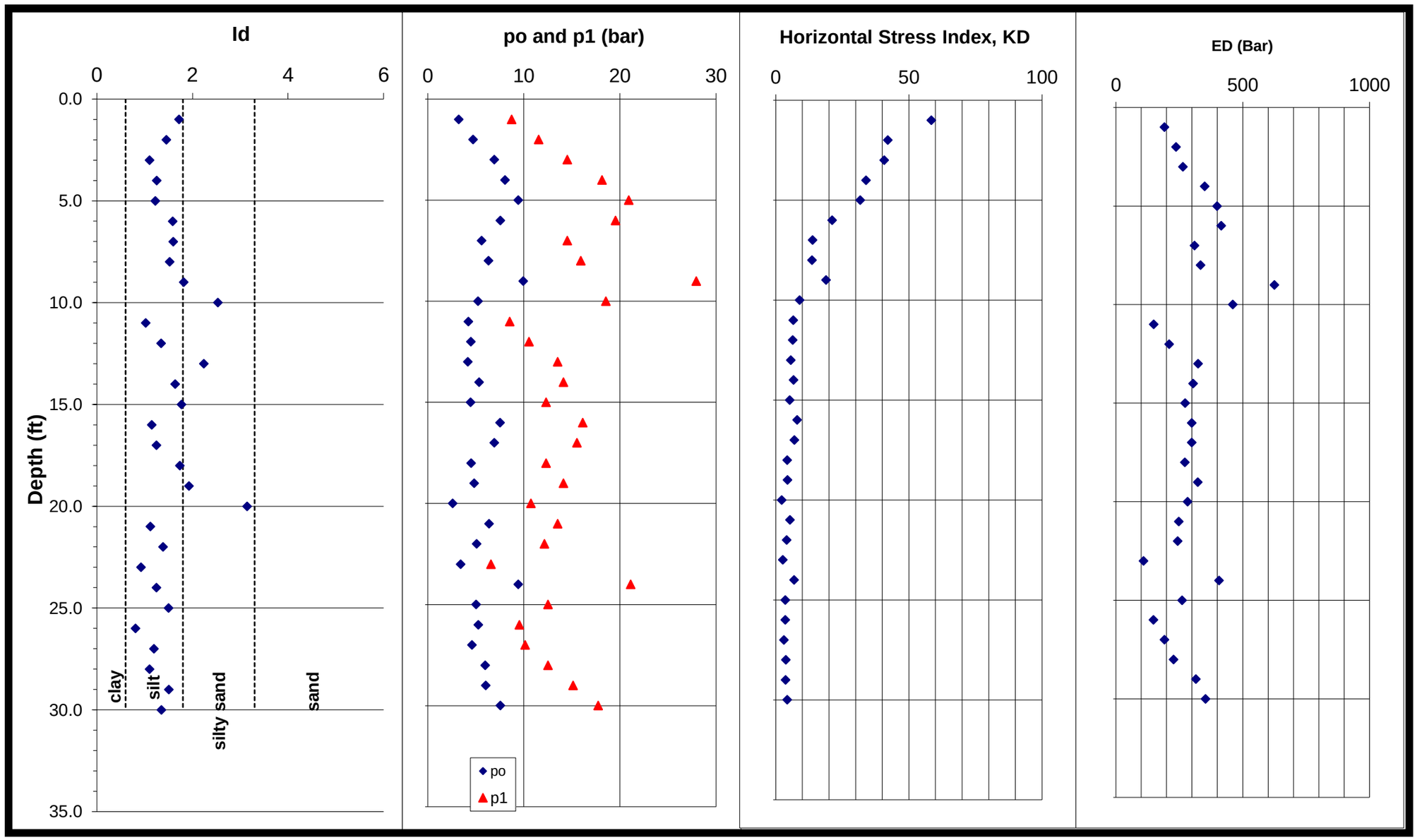
DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB1_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR5_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	

Northing 874621
Longitude: 1777567
Elevation 875.8

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

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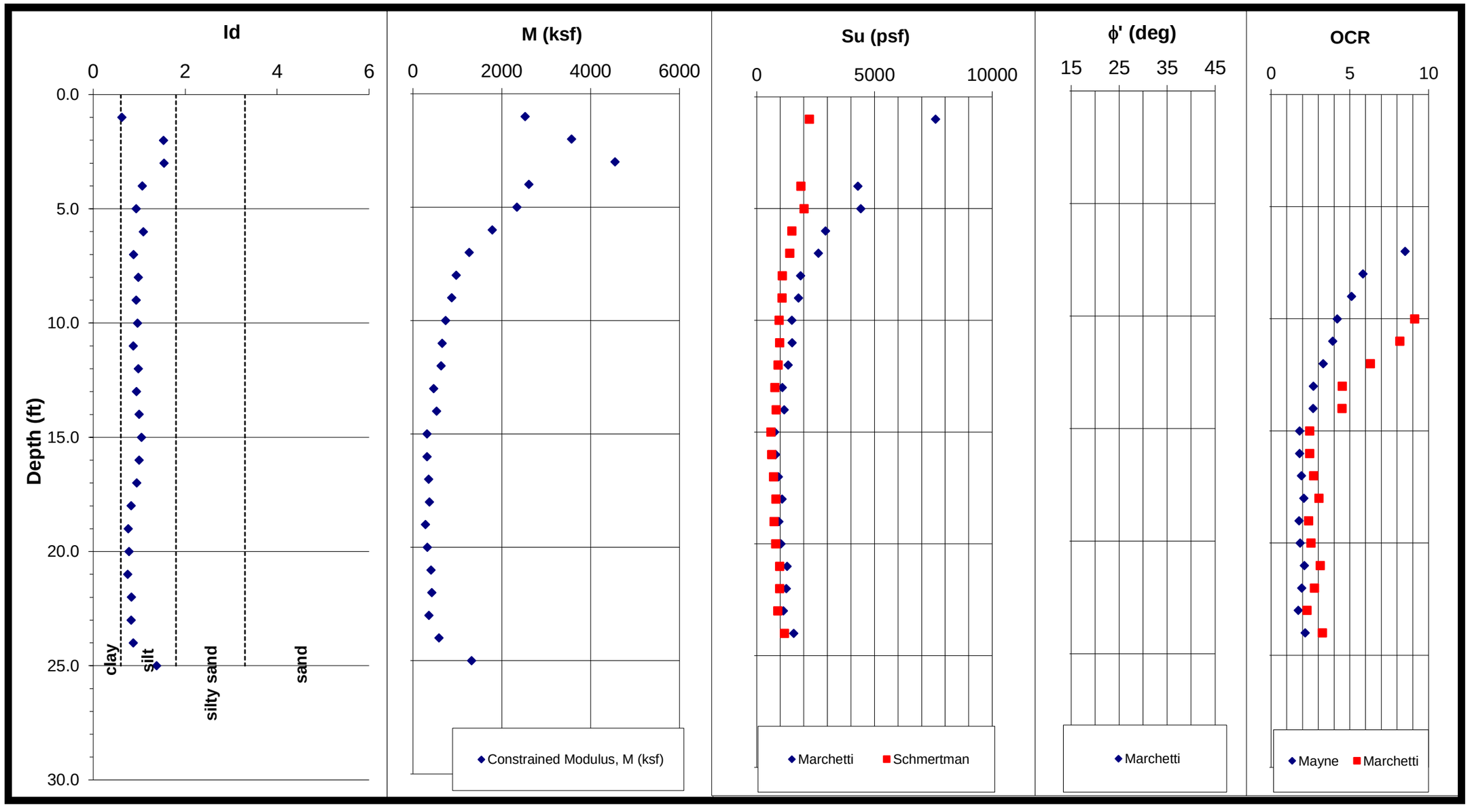
DILATOMETER TEST RESULTS

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

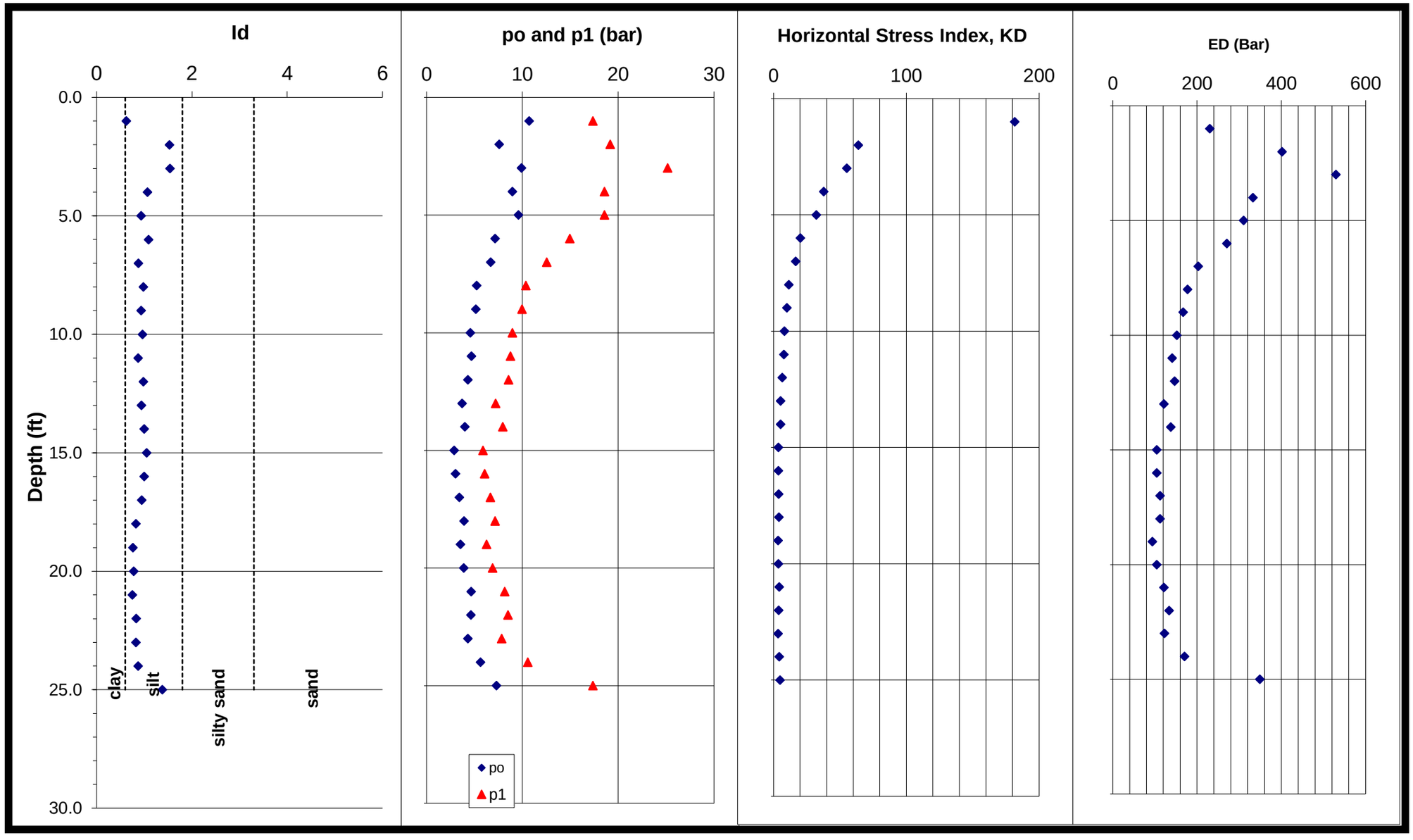
DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/21/16
Sounding No: STR5_EB2_B1
Ground Water Depth (ft): N/A

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.225	0	0
ΔB =	0.25	0	0
Zm=	0	bar	

Northing 874655
Easting 1777453
Elevation 873.0

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

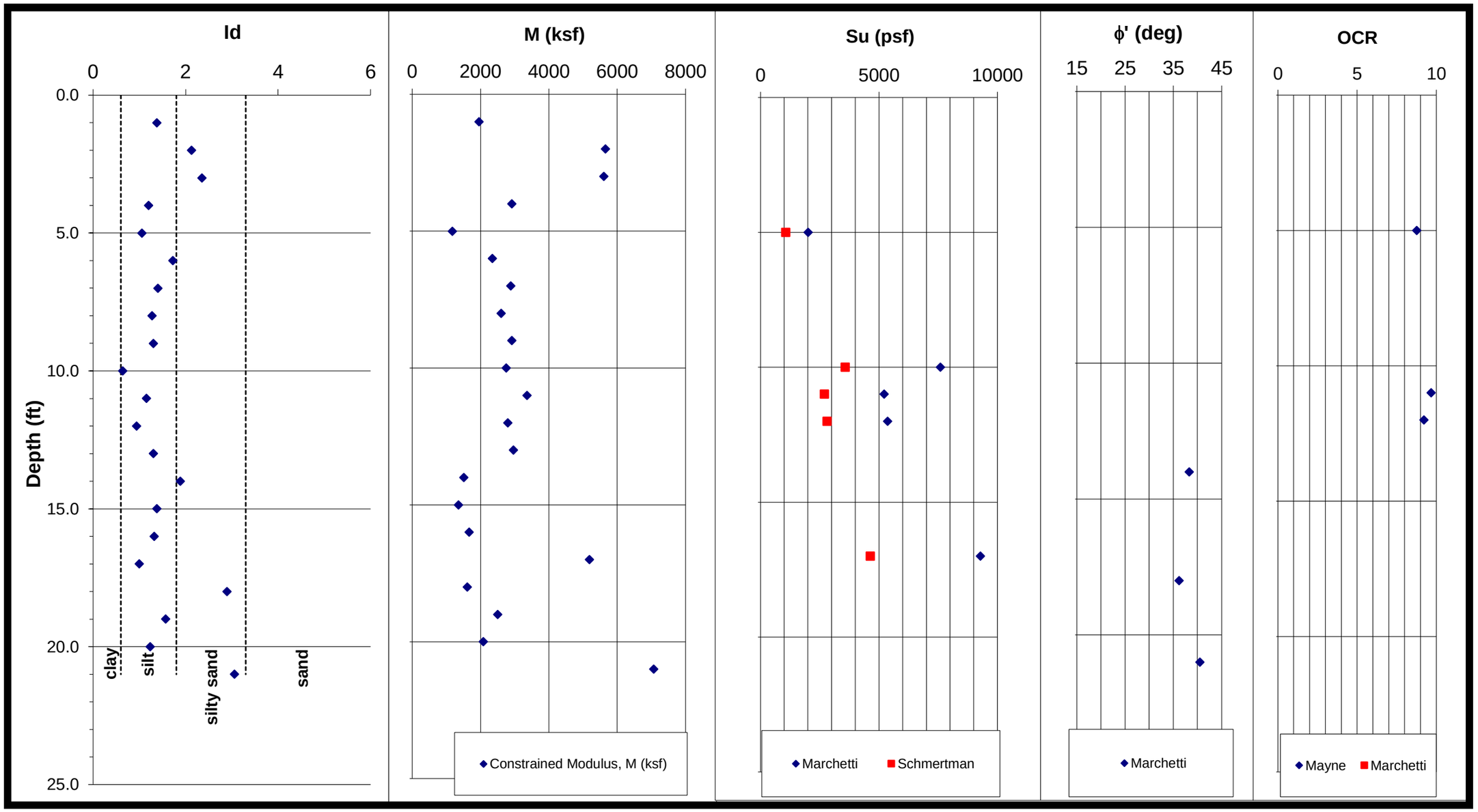
CONETEC

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

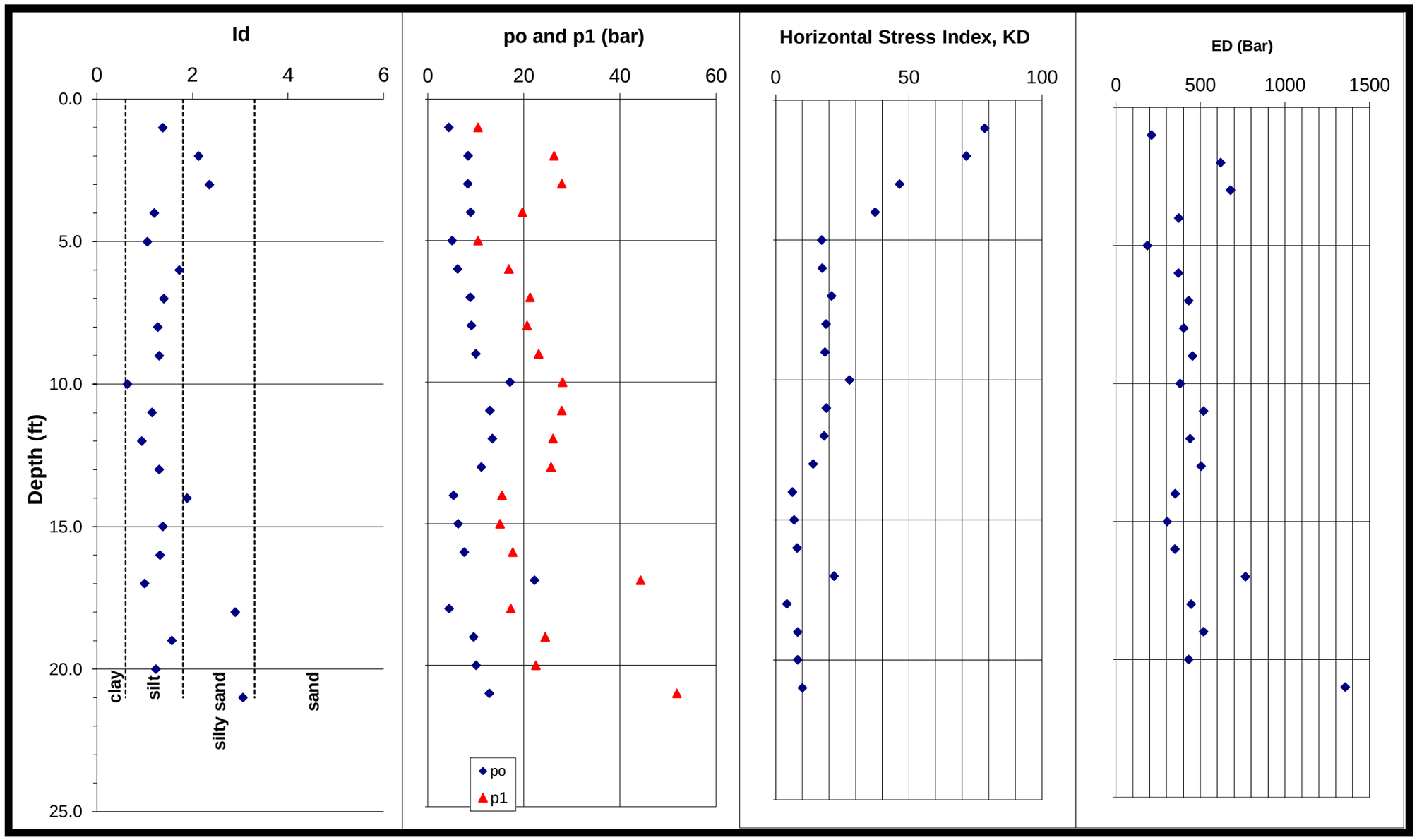
DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/21/16
Sounding No: STR5_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
Elevation 874.0

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

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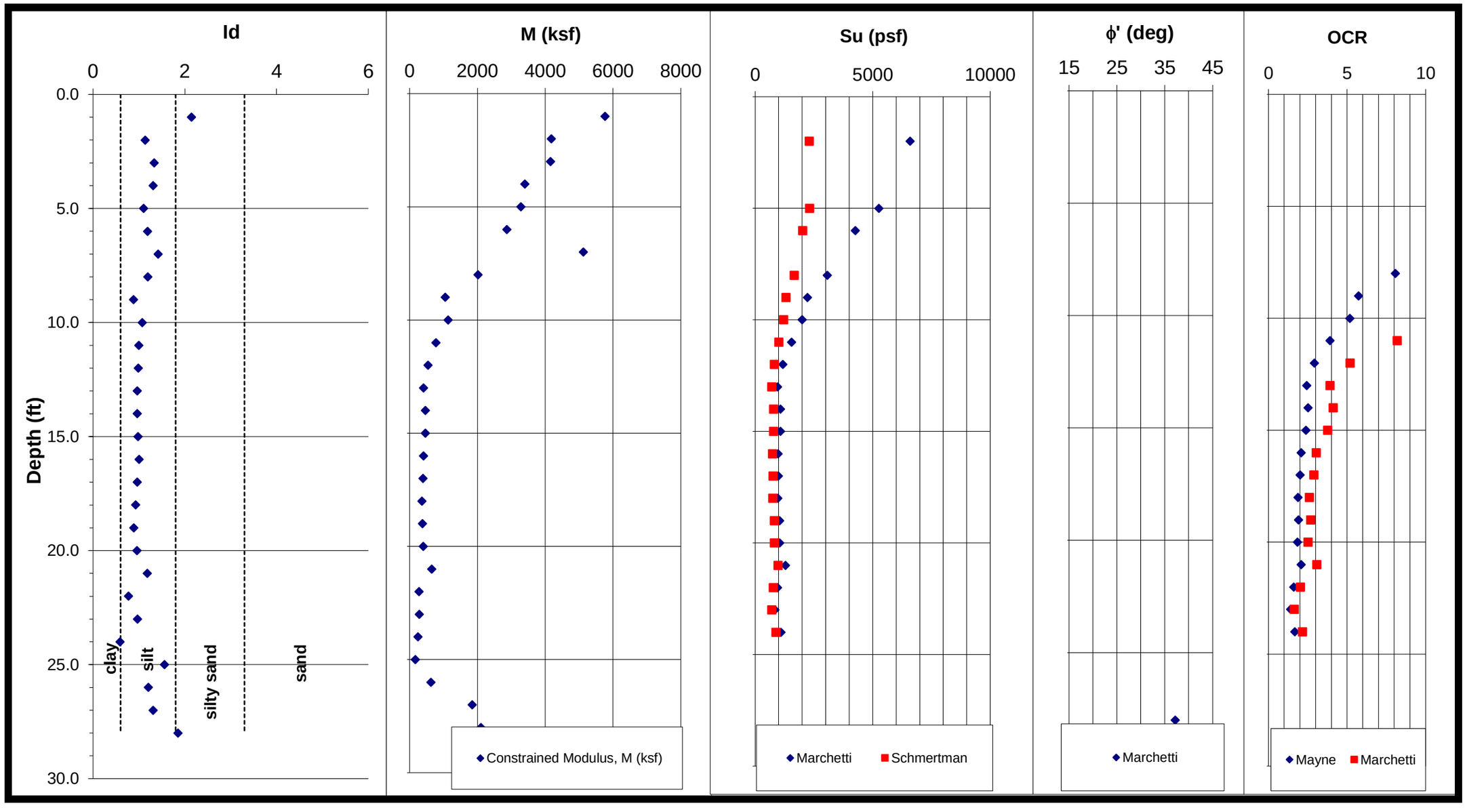
DILATOMETER TEST RESULTS

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	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

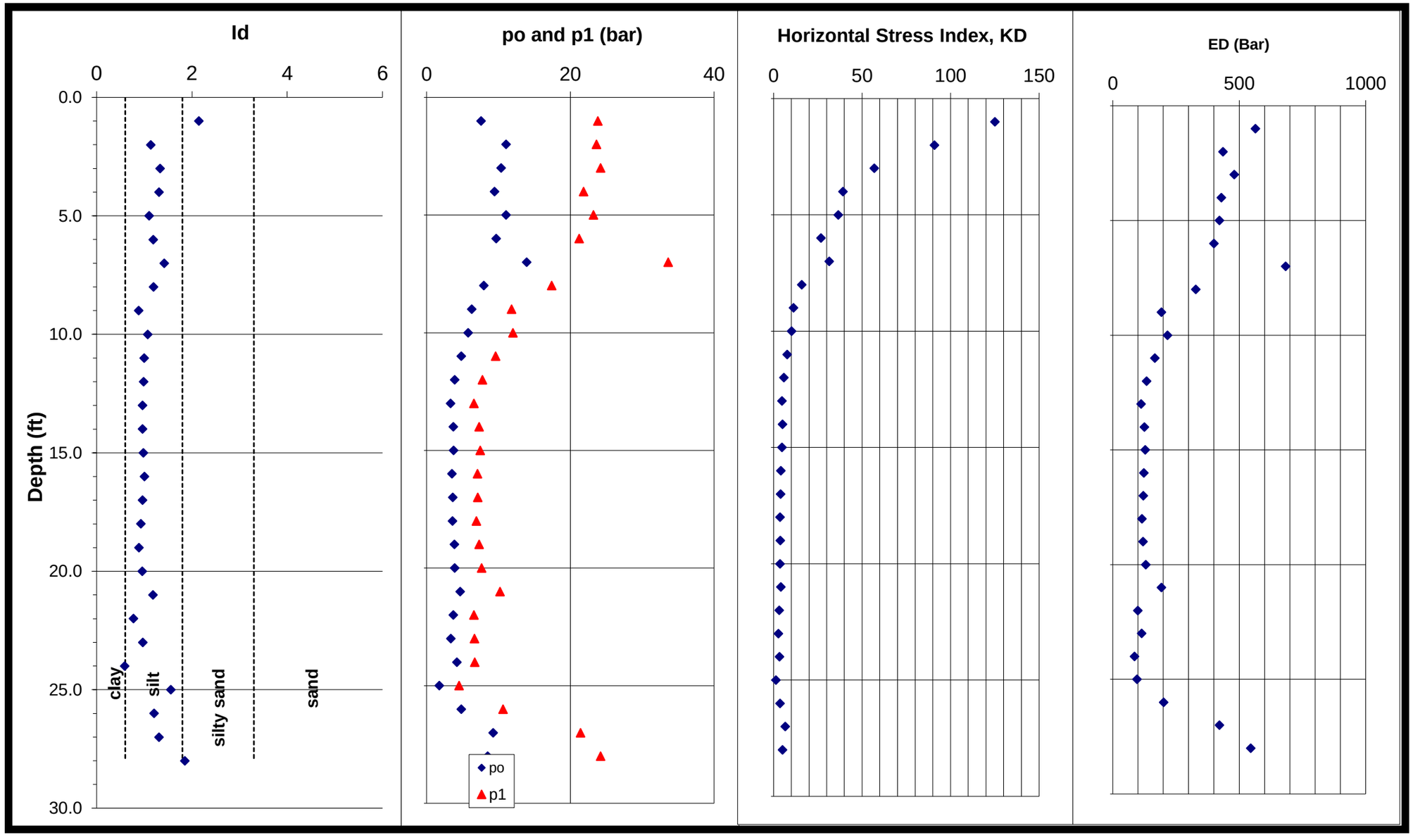
DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR5_EB2_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/21/16
Sounding No: STR5_EB2_B3
Ground Water Depth (ft): N/A

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

Northing 874627
Easting 1777441
Elevation 873.4

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

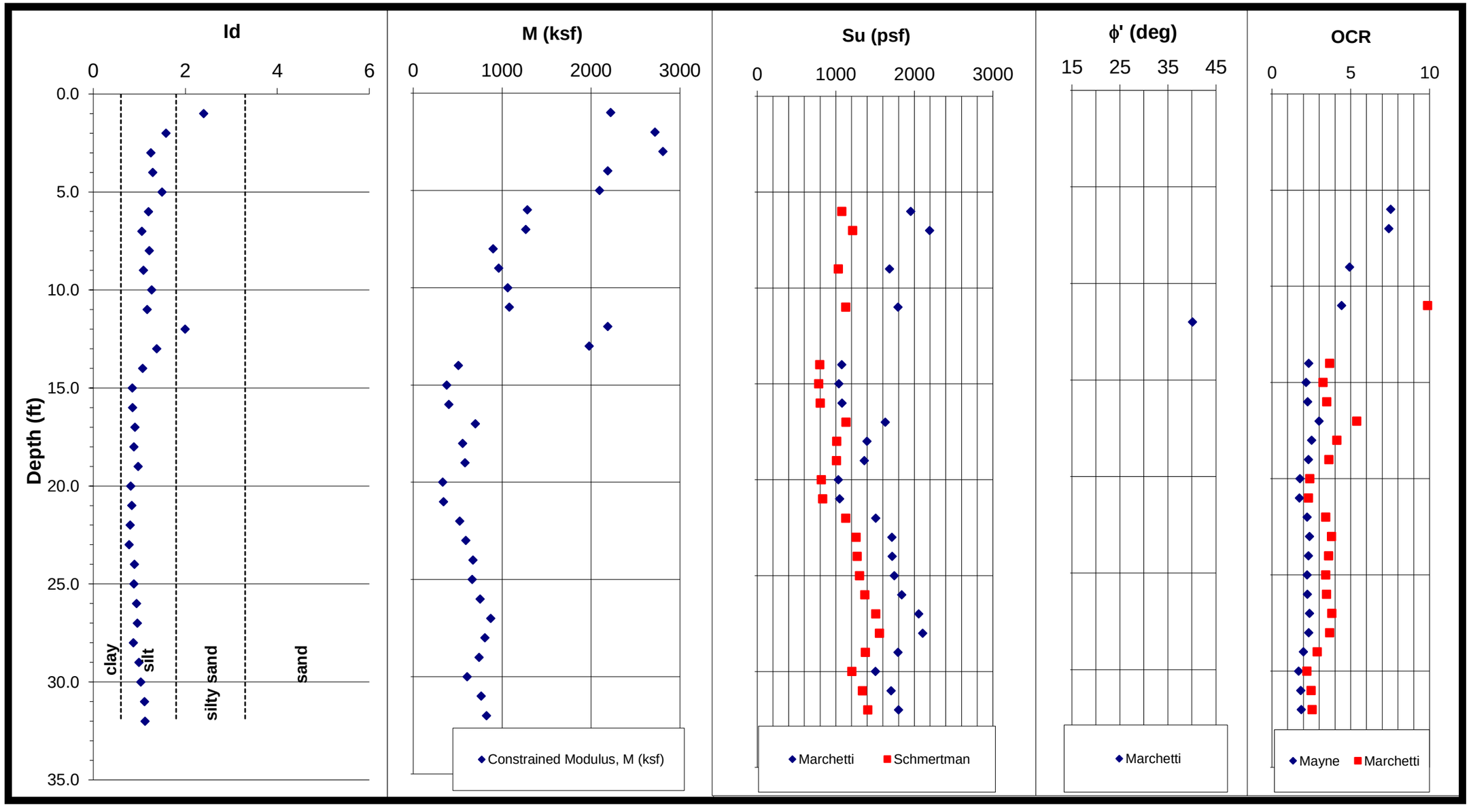
CONETEC

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

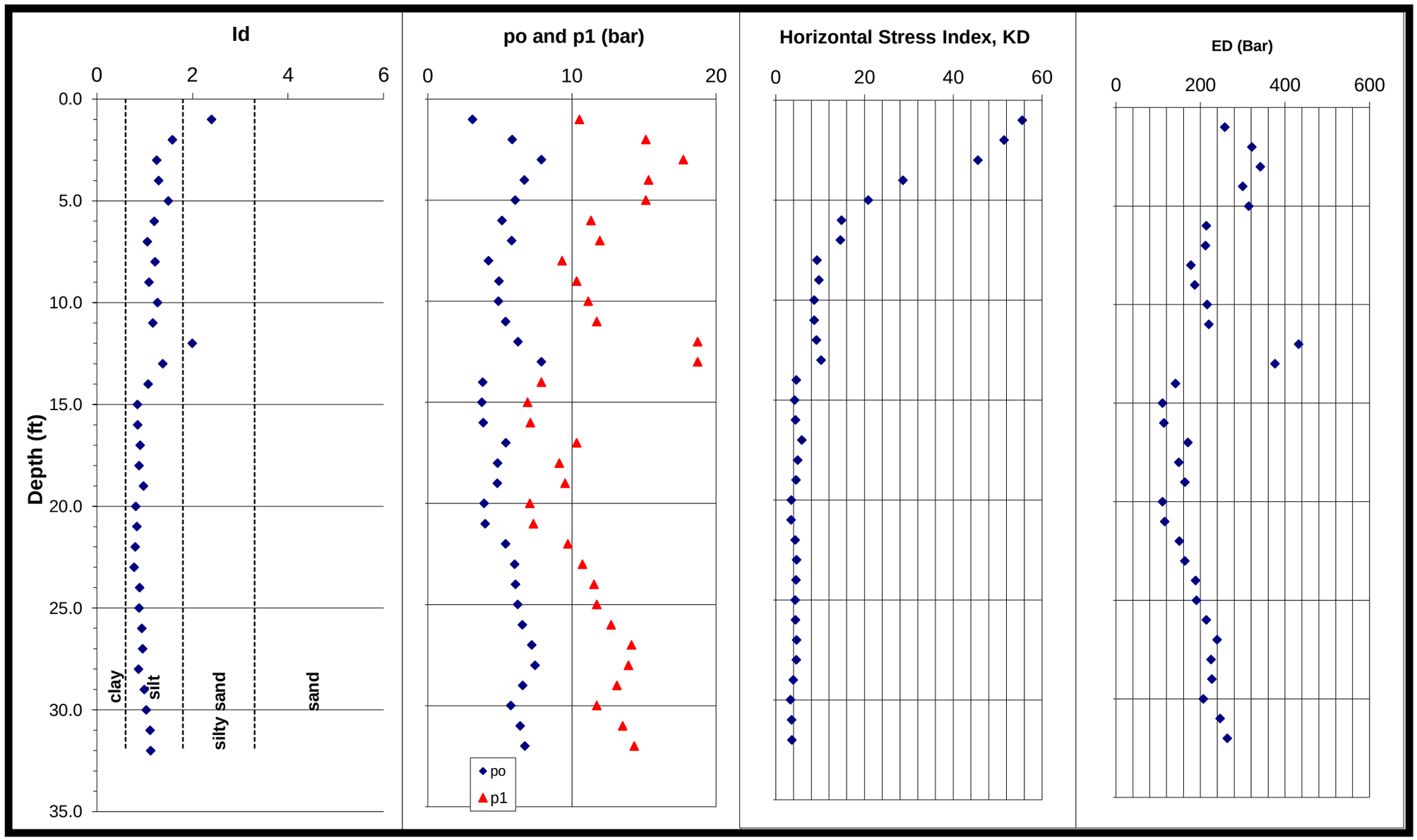
DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR6_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
Elevation 877.3

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

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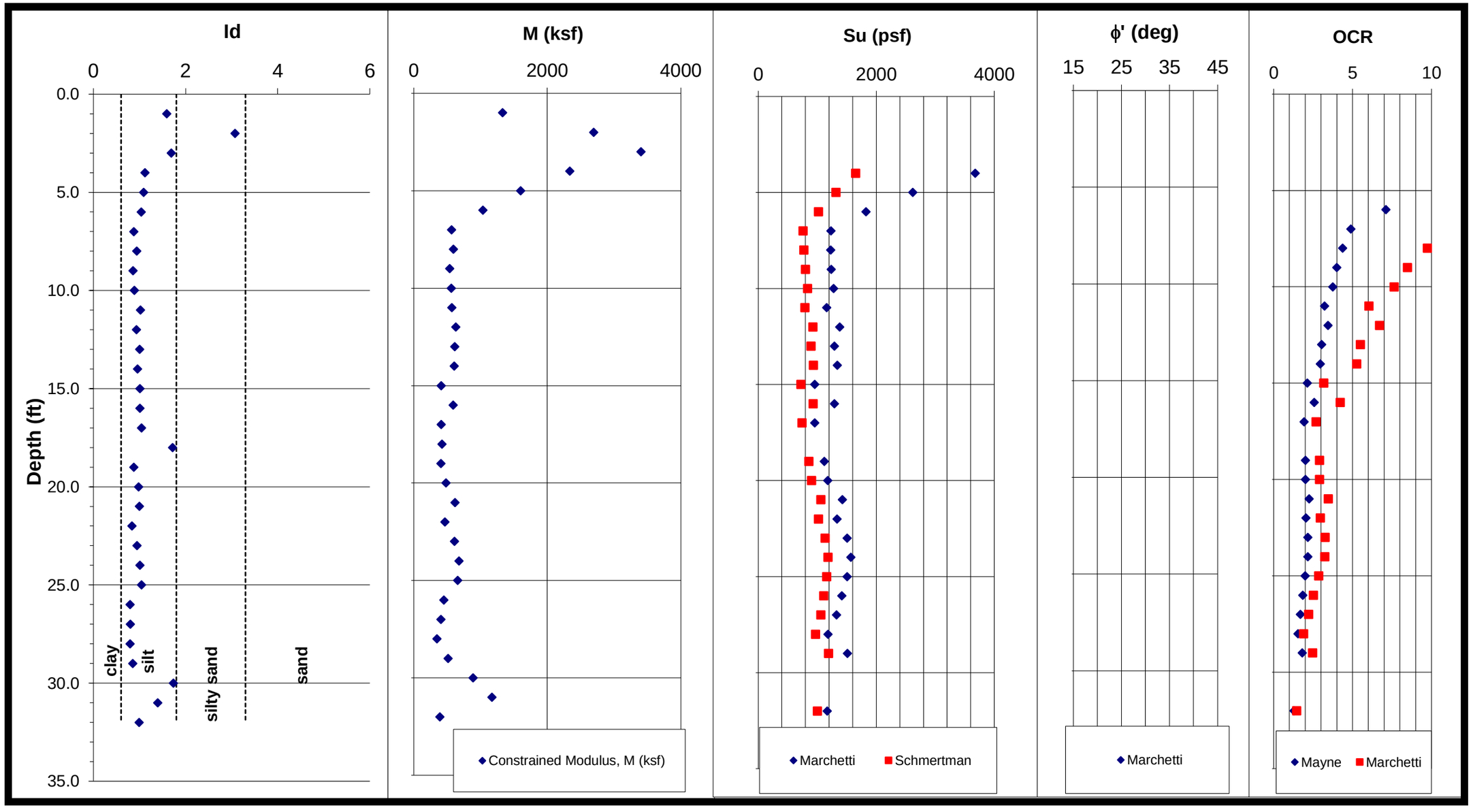
DILATOMETER TEST RESULTS

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	3.25	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

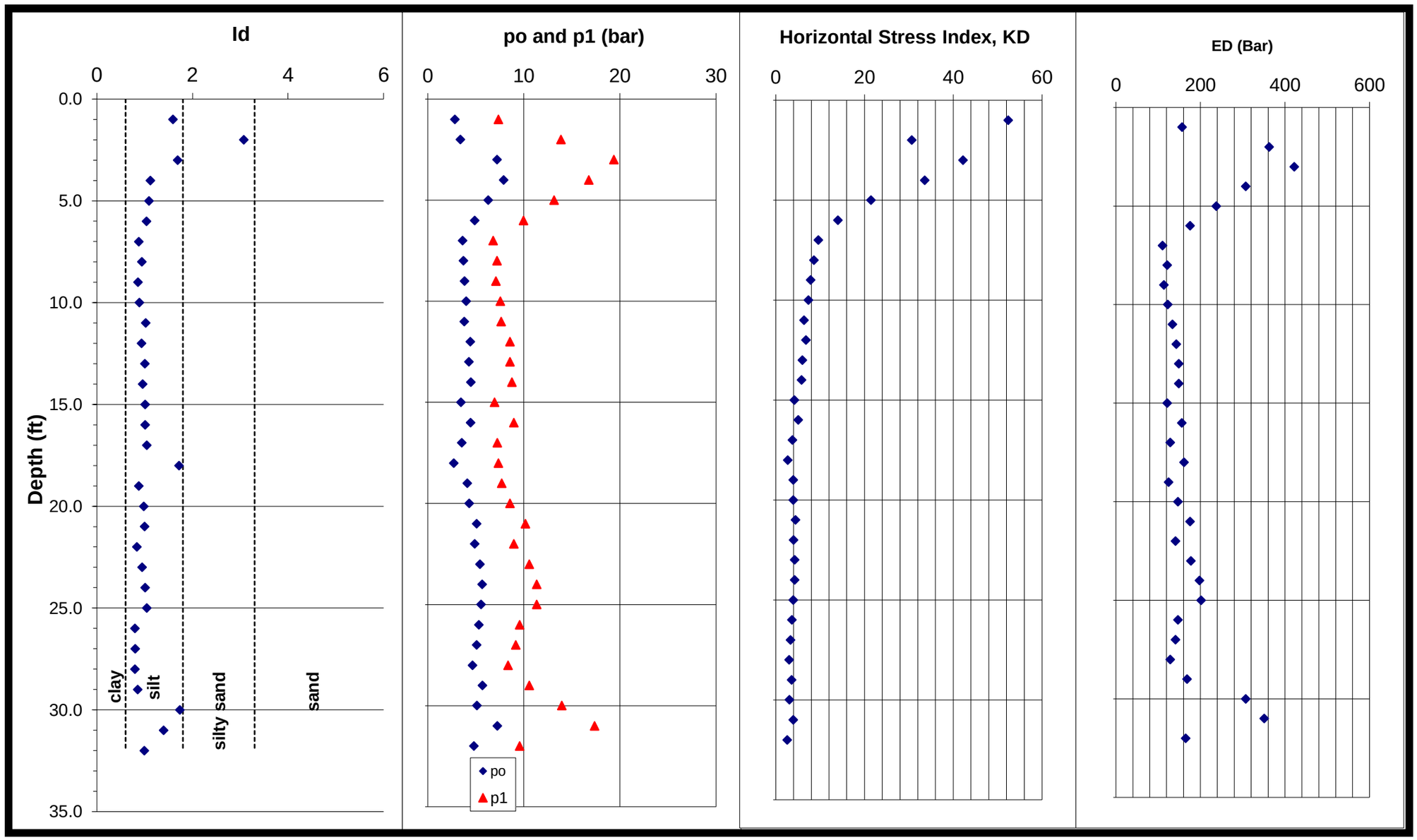
DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR6_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	

Northing 874724
Easting 1777577
Elevation 877.4

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

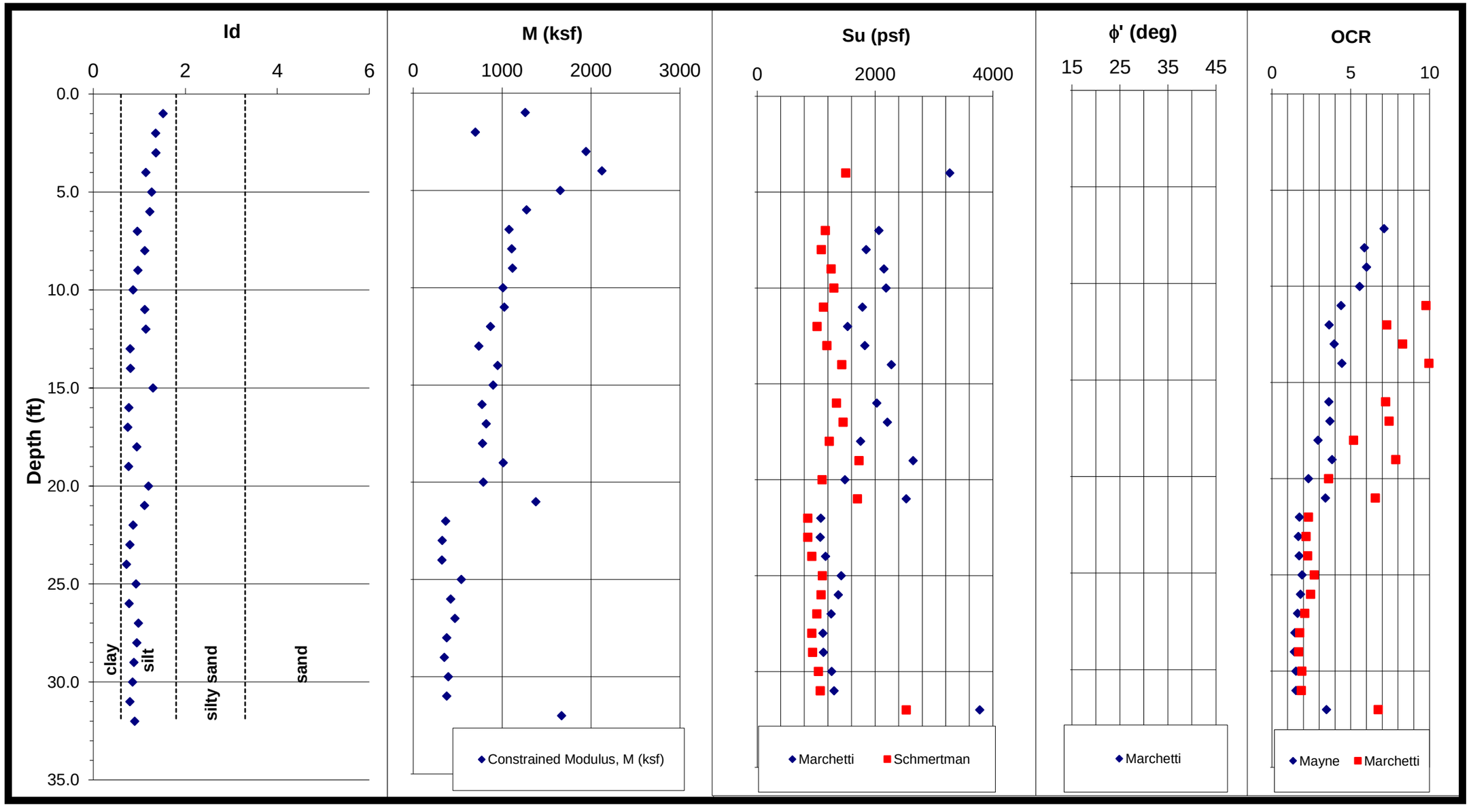
CONETEC

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

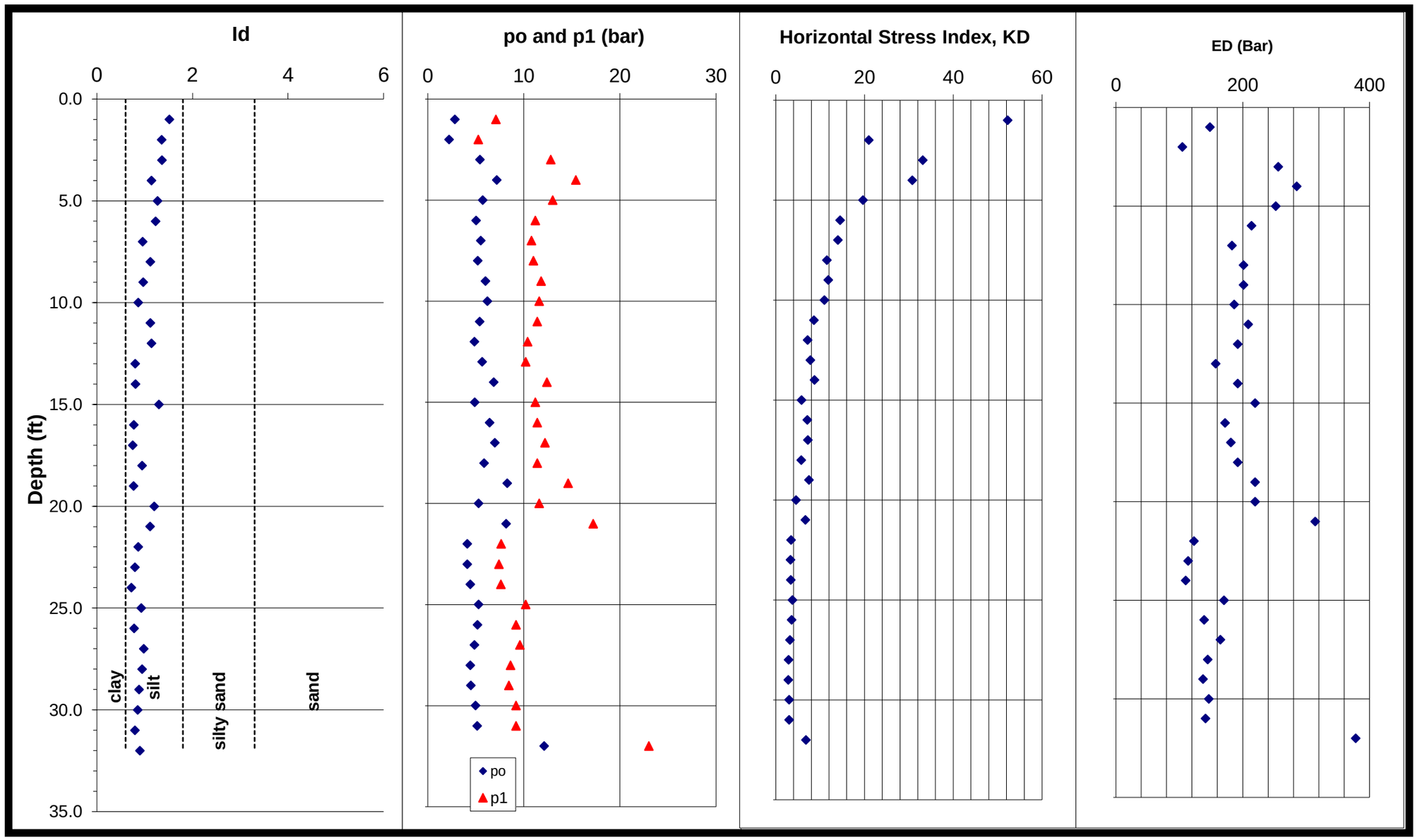
DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB1_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR6_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
Elevation 877.4

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

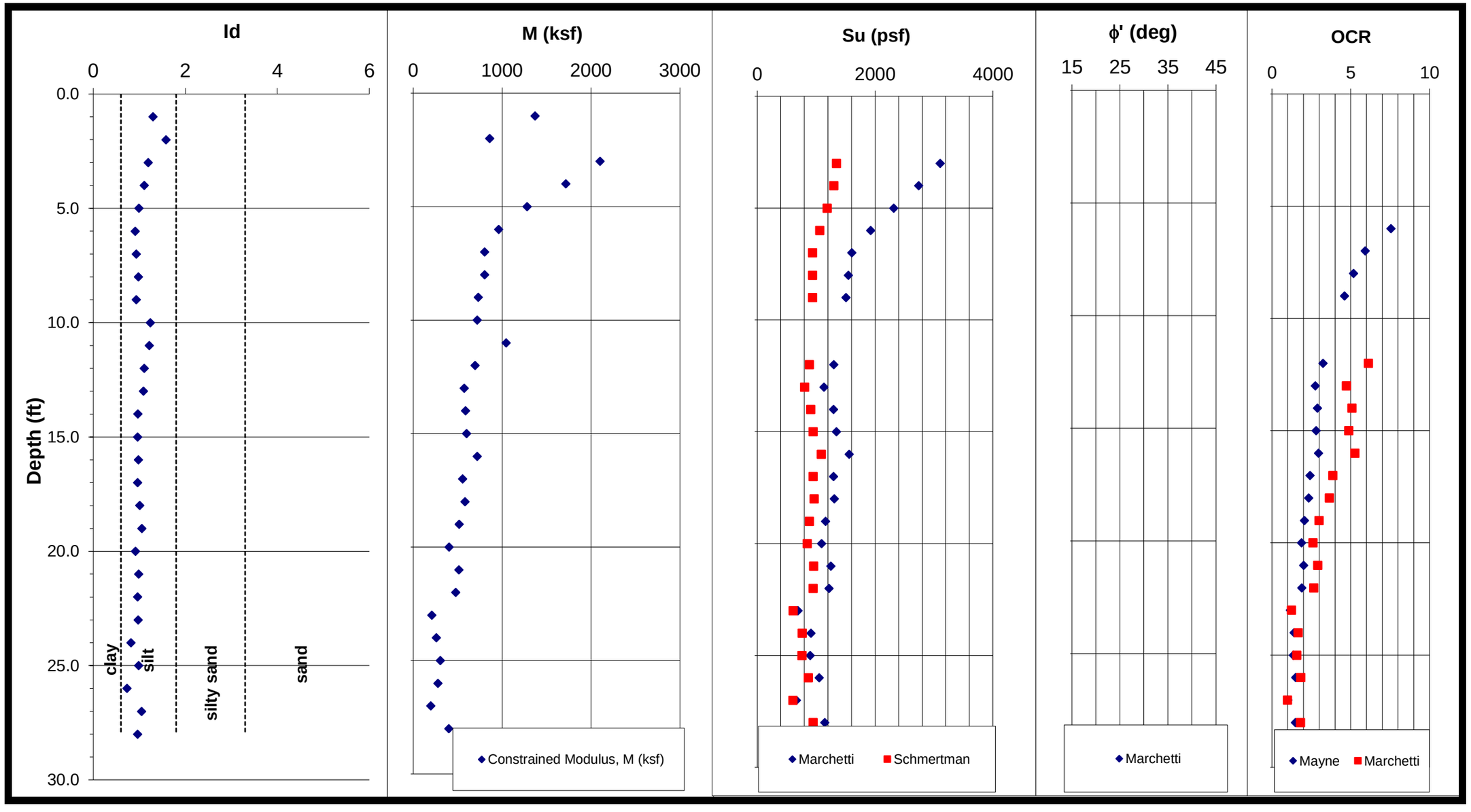
CONETEC

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

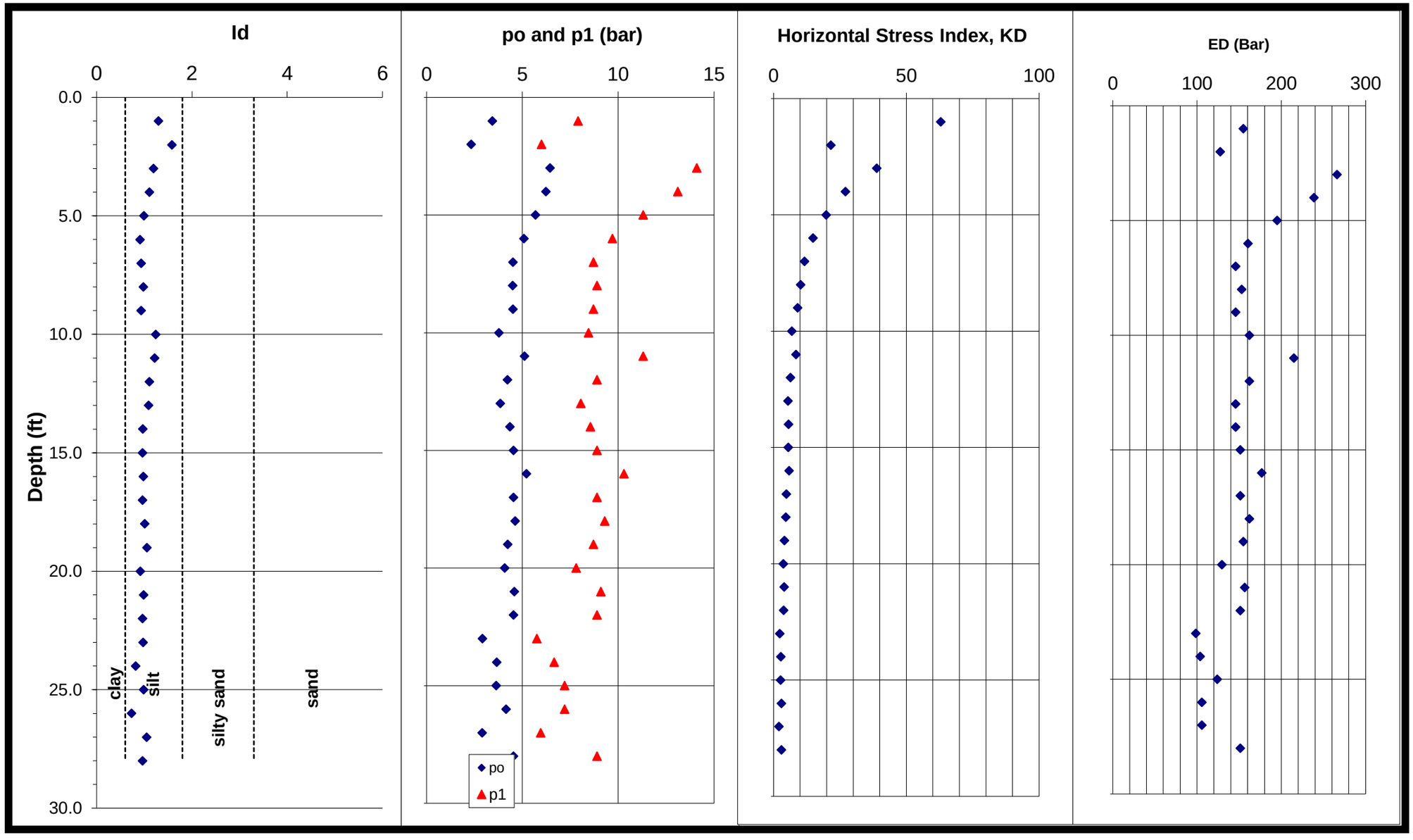
DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B1
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/21/16
Sounding No: STR6_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
Elevation 873.3

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

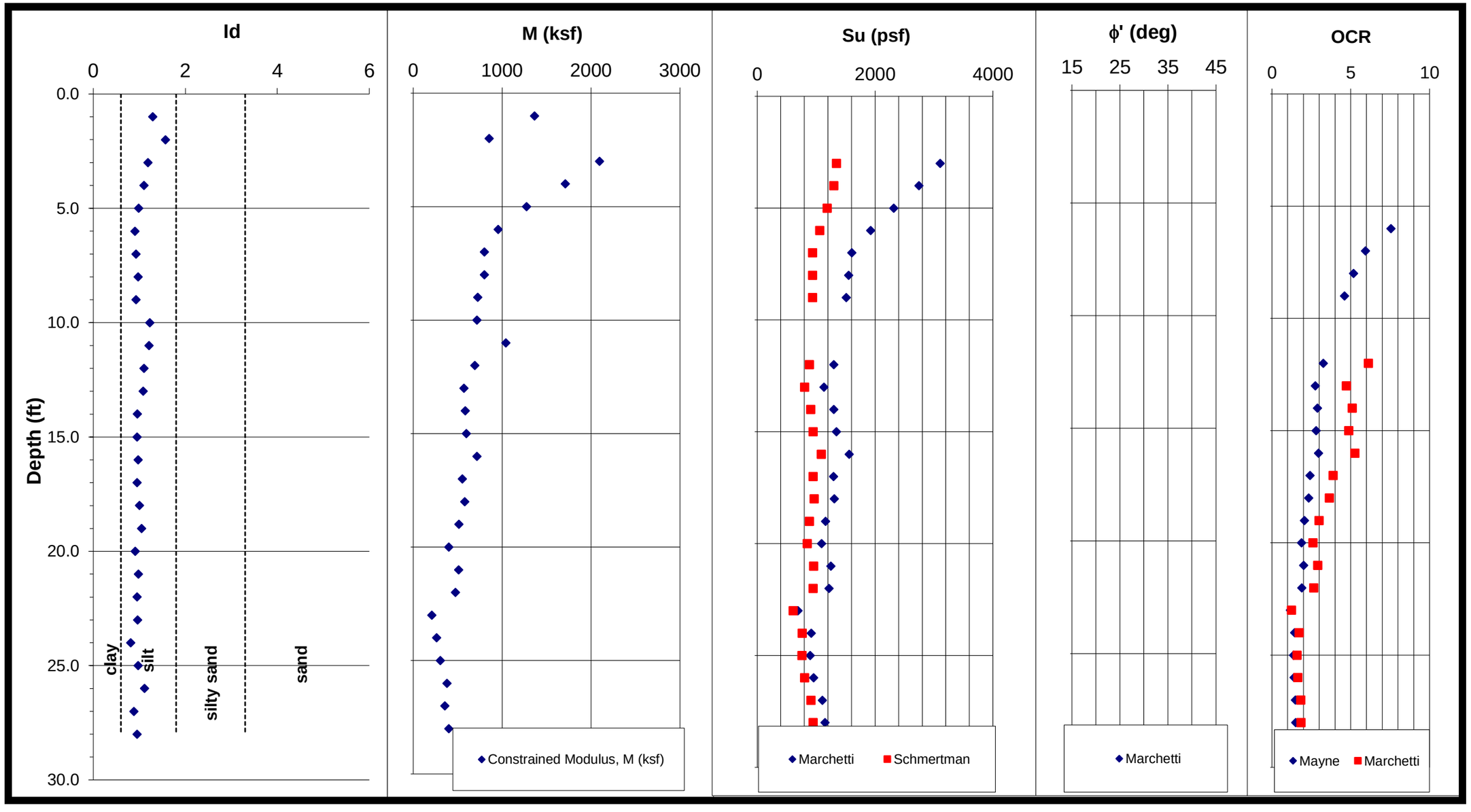
CONETEC

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

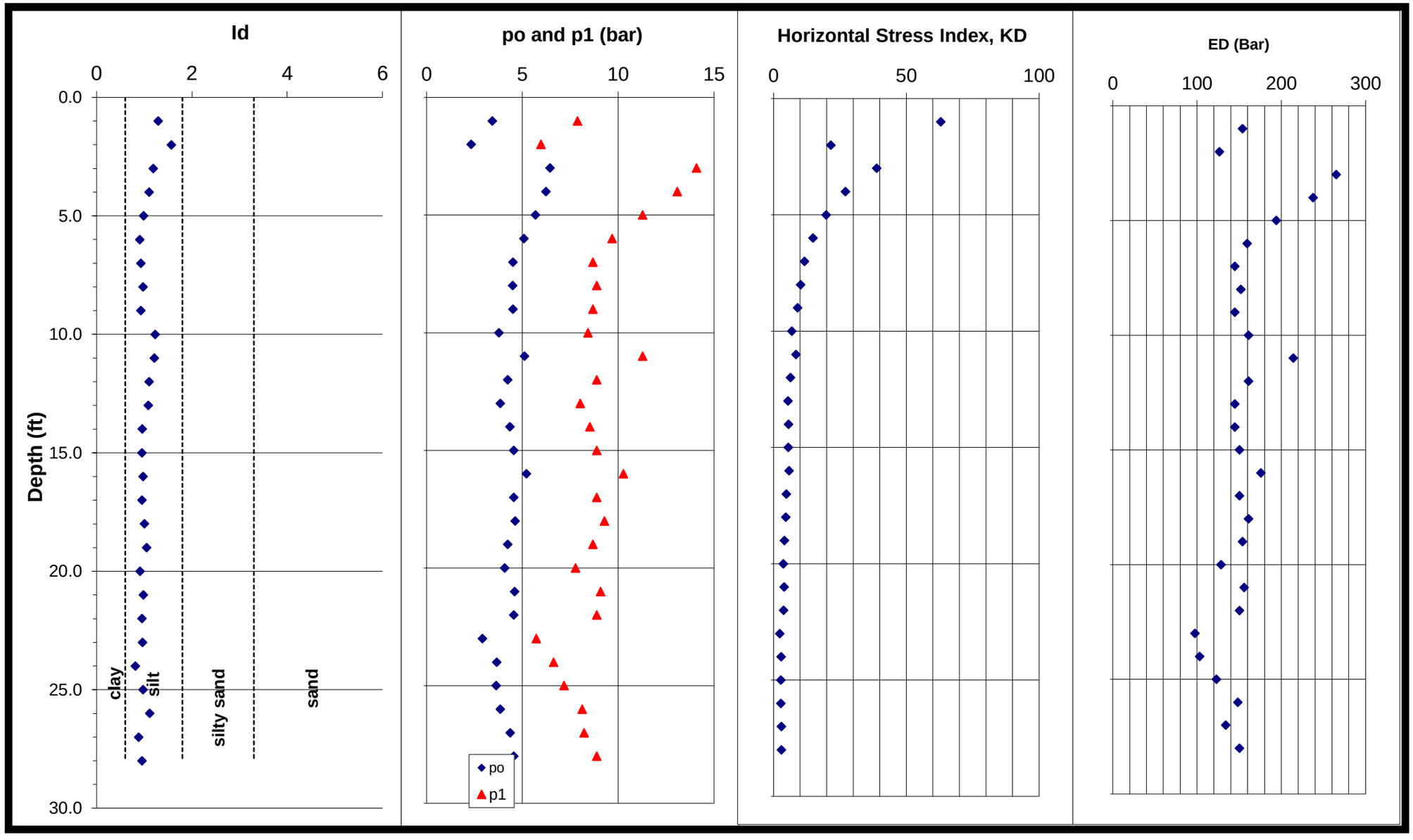
DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B2
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/20/16
Sounding No: STR6_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
Elevation 872.5

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

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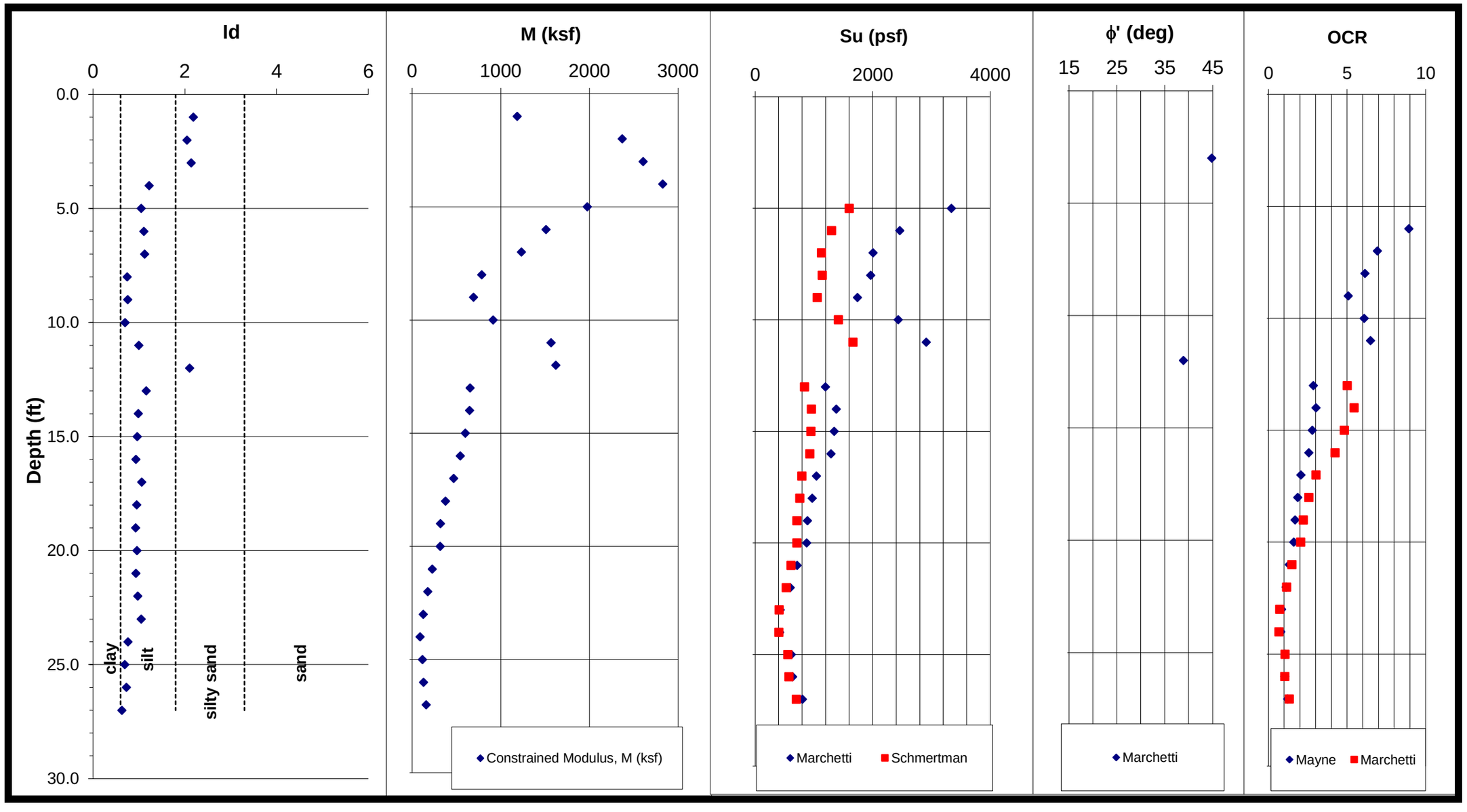
DILATOMETER TEST RESULTS

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	3.45	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

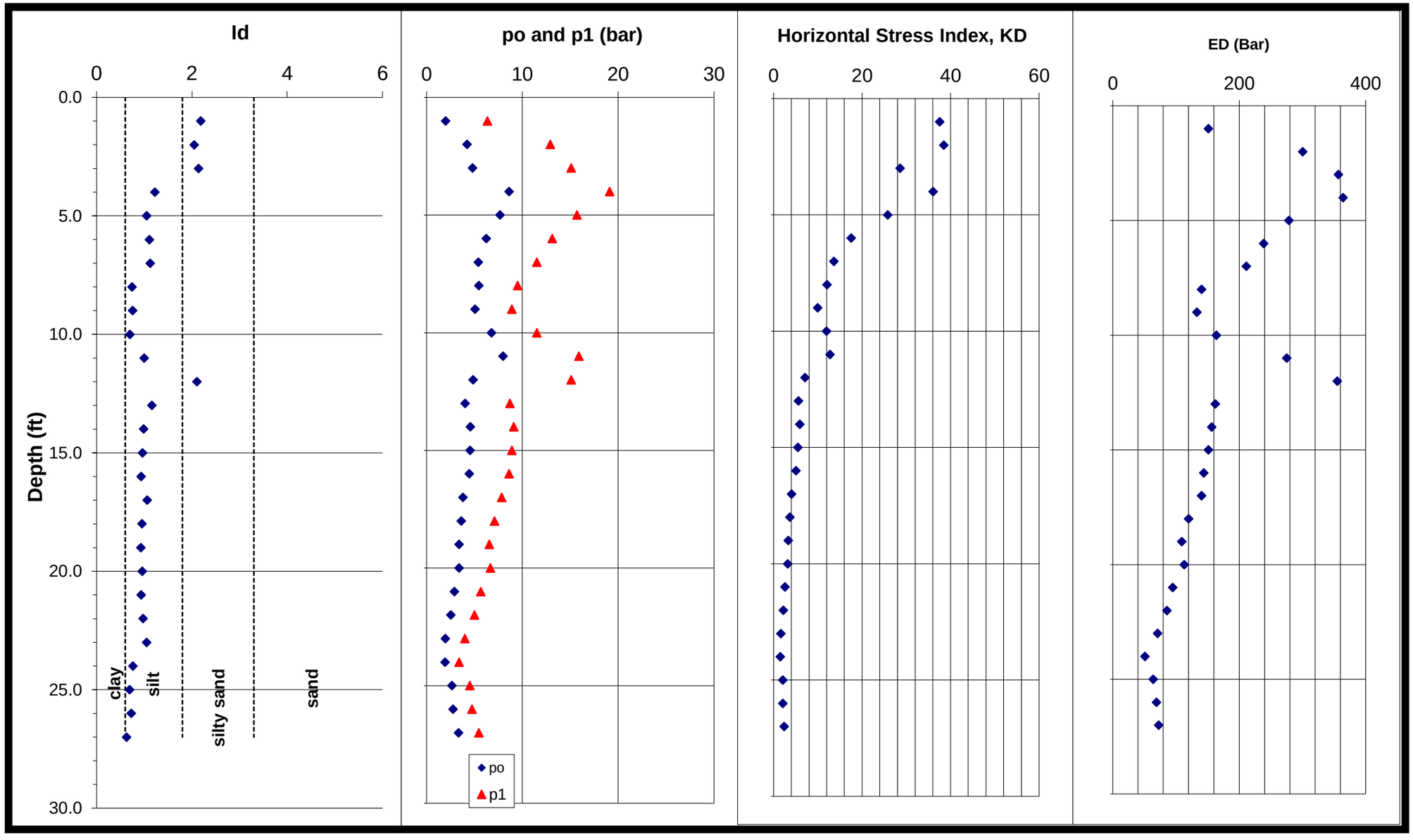
DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



DILATOMETER TEST RESULTS

Test ID: STR6_EB2_B3
Site: U-2525 C Site #4
Location: Greensboro, NC
Project No.: 16-54112



Job No: 16-54112
Job Name: U-2525 C Site #4
Job Location: Greensboro, NC
Date: 12/21/16
Sounding No: STR6_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
Elevation 872.2

[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	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	6

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

SITE DESCRIPTION MSE WALLS AT END BENT 1 AND END BENT 2 - SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245 ON SR 2523 (YANCEYVILLE ROAD) (-Y4-) OVER I-85 BYPASS (-L-)

RETAINING WALL INVESTIGATION

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.

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WEAVER, L. A.

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INVESTIGATED BY TERRACON CONSULTANTS

DRAWN BY FIELDS, W. D.

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SUBMITTED BY TERRACON CONSULTANTS

DATE OCTOBER 2017

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5228073BBA4F482...
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
- [ ] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [X] ACKER (TER0912-0)
- [X] D-50 (TER373)
- [X] D-50 (TER346)

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [X] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2⅝" STEEL TEETH
- [ ] TRICONE _____" TUNG.-CARB.
- [ ] CORE BIT
- [X] 3¼" HOLLOW STEM AUGER

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-31: N: 873,138; E: 1,770,787 - 36" REBAR WITH ALUMINUM CAP
ELEVATION: 837.00 FEET

NOTES:
FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROFILE ALONG MSE WALL AT END BENT 1

℄
-Y4-

0 20 40
FEET
VE = 2:1

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

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← LEES CHAPEL ROAD (SR 2359)

NORTH CHURCH STREET → (SR 1001)

SS-11 ST-2
RW1-1
400+10
79' LT -L-

SS-4
EB1-B
400+74
109' LT -L-

SS-3
EB1-C
401+33
86' LT -L-

SS-1 SS-2
EB1-A
401+72
85' LT -L-

SS-12
RW1-2
402+32
79' LT -L-

PAVEMENT (ASPHALT)

RESIDUAL, AND BROWN, TO MEDIUM MOIST, SILTY WITH LITTLE

RED SOFT STIFF, CLAY MANGANESE (A-7-6)

ORANGE-BROWN, TO HARD, MOIST AND FINE SANDY

ST-2 02/17

BT

RESIDUAL, RED-ORANGE, BROWN, GRAY, WHITE, BLACK AND GREEN-BROWN, MEDIUM STIFF TO WET, MICACEOUS, CLAYEY SILT WITH TRACE MICA, TRACE TO MANGANESE SEAMS (A-4, A-5)

WEATHERED ROCK (METAMORPHOSED GRANITE)

BT

CAVED DRY AT 27' 11/16

RESIDUAL, RED-TAN, TAN, RED-BROWN, TAN-GRAY, BLACK, TAN, MEDIUM STIFF TO HARD, MOIST TO WET, SILTY CLAY WITH SOME TRACE TO LITTLE MICA AND MANGANESE SEAMS (A-7-5, A-7-6)

BT

CAVED DRY AT 18.5' 11/16

RESIDUAL, BROWN, GRAY AND TAN, VERY DENSE, MOIST, SAPROLITIC, SILTY FINE SAND, WITH LITTLE TO SOME MICA (A-2-4)

BT

FIAD 11/16

BROWN AND GRAY,

02/17

BT

TYPICAL SKEW ANGLE 59°18'22" AT STA. 28+08 -Y4-

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ALONG PROPOSED WALL PROFILE. GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c ls tin.tin (DATED 01/20/2016)

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

Terracon
Consulting Engineers & Scientists
2401 BRENTWOOD ROAD, SUITE 107
RALEIGH, NORTH CAROLINA 27604
PHONE: (919) 873-2211 FAX: (919) 873-9555
NC REGISTERED FIRM: F-0869

0 20 40
FEET
VE = 2:1

PROFILE ALONG MSE WALL AT END BENT 2

℄
-Y4-

NORTH CHURCH STREET
(SR 1001)

LEES CHAPEL ROAD
(SR 2359)

SS-14
RW2-1
401+37
79' RT -L-

SS-7
EB2-A
400+73
87' RT -L-

SS-8
SS-9
EB2-C
400+29
87' RT -L-

ST-1
SS-10
EB2-B
377+78
80' RT -L-

SS-16
RW2-2
389+89
78' RT -L-

PAVEMENT (ASPHALT)

RESIDUAL, RED-BROWN, RED-ORANGE, CLAYEY SILT

TAN, BLACK, GRAY, RED-ORANGE, GRAY-TAN, AND FINE SANDY SILT, WITH TRACE MICA,

RED, BROWN AND ORANGE, SILTY CLAY, WITH TAN AND BLACK, MEDIUM STIFF TO VERY STIFF, MOIST TO WET, ST-1 TRACE MICA AND MANGANESE (A-7-5, A-7-6)

BROWN, GRAY AND WHITE, MICACEOUS, QUARTZ FRAGMENTS AND TRACE TO LITTLE MANGANESE SEAMS (A-4, A-5)

WEATHERED ROCK (METAMORPHOSED GRANITE)

11/16

02/17

BT
CAVED DRY
AT 28.4'
02/17

BT

BT
FIAD
11/16

BT
CAVED DRY
AT 7.5'
11/16

BT

Ⓑ RESIDUAL, TAN, ORANGE AND BLACK, STIFF, MOIST, SILTY CLAY, WITH TRACE TO LITTLE MICA (A-7-6)

Ⓒ RESIDUAL, GRAY, WHITE AND ORANGE, HARD, MOIST, SAPROLITIC, FINE SANDY SILT, WITH TRACE MICA (A-4)

TYPICAL SKEW ANGLE 59°18'22" AT STA. 29+90 -Y4-

NOTE: INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS PROJECTED ALONG PROPOSED WALL PROFILE. GROUND LINE TAKEN FROM PROVIDED TIN FILE u2525c_ls_tin.tin (DATED 01/20/2016)

LABORATORY TESTING SUMMARY

PROJECT NUMBER: 34821.1.1 **TIP:** U-2525C **COUNTY:** GUILFORD

DESCRIPTION: SITE NO. 4 (STRUCTURE NO. 6) - BRIDGE NO. 1245 ON SR 2523 (YANCEYVILLE ROAD) (-Y4-) OVER I-85 BYPASS (-L-)

Sample No.	Alignment	Station	Offset (feet)	Depth Interval (feet)	AASHTO Class.	L.L.	P.I.	% by Weight				% Retained #4 Sieve	% Passing (sieves)			% Moisture	% Organic	Ave. Wet Unit Wt. (pcf)	Shear Strength Values			
								Coarse Sand	Fine Sand	Silt	Clay		#10	#40	#200				Total Cohesion (psf)	Total Friction (ϕ)	Effective Cohesion (psf)	Effective Friction (ϕ')
SS-1	-L-	401+72	85 LT	17.8-19.3	A-7-5 (10)	52	14	5.0	45.5	36.3	13.2	0	100	99	67	40.6	N/D	N/D	N/D	N/D	N/D	N/D
SS-2	-L-	401+72	85 LT	42.8-44.3	A-7-6 (5)	41	12	23.2	32.6	35.2	9.0	0	100	85	54	23.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-3	-L-	401+33	86 LT	2.6-4.1	A-7-5 (53)	91	49	1.7	17	29	52.3	0	100	99	88	44.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-4	-L-	400+74	109 LT	13.5-15.0	A-5 (7)	51	9	5.5	44.8	40.5	9.2	0	100	97	65	34.8	N/D	N/D	N/D	N/D	N/D	N/D
SS-7	-L-	400+73	87 RT	3.5-5.0	A-7-5 (38)	78	37	3.0	18.8	31.2	47.0	1	99	98	84	33.1	N/D	N/D	N/D	N/D	N/D	N/D
SS-8	-L-	400+29	87 RT	2.6-4.1	A-7-5 (71)	106	61	1.6	8.4	17.7	72.3	0	100	99	93	49.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-9	-L-	400+29	87 RT	27.6-29.1	A-7-6 (29)	65	36	6.3	28.2	49.2	16.3	0	100	97	76	54.9	N/D	N/D	N/D	N/D	N/D	N/D
SS-10	-L-	377+78	80 RT	18.5-20.0	A-7-5 (10)	47	12	7.1	34.2	48.2	10.5	0	100	96	73	42.3	N/D	N/D	N/D	N/D	N/D	N/D
ST-1	-L-	377+78	80 RT	10.0-12.0	A-7-5 (21)	81	29	1.7	48.6	32.4	17.3	0	100	99	64	28.4	N/D	92.5	534	10º	219	29º
SS-11	-L-	400+10	79 LT	2.7-4.2	A-7-6 (18)	50	24	7.2	25.5	21.2	46.1	0	99	95	74	37.2	N/D	N/D	N/D	N/D	N/D	N/D
SS-12	-L-	402+32	79 LT	8.0-9.5	A-7-5 (29)	74	26	1.4	26.0	41.6	31.0	0	100	99	84	45.3	N/D	N/D	N/D	N/D	N/D	N/D
SS-13	-L-	402+32	79 LT	28.0-29.5	A-7-5 (7)	55	16	8.5	52.6	31.2	7.7	0	100	98	52	50.7	N/D	N/D	N/D	N/D	N/D	N/D
SS-14	-L-	401+37	79 RT	2.5-4.0	A-7-5 (20)	62	23	5.9	28.9	31.7	33.5	0	100	98	74	26.0	N/D	N/D	N/D	N/D	N/D	N/D
SS-15	-L-	401+37	79 RT	2.5-4.0	A-7-5 (6)	47	11	11.7	40.3	38.2	9.8	0	99	95	58	40.4	N/D	N/D	N/D	N/D	N/D	N/D
SS-16	-L-	398+89	78 RT	12.7-14.2	A-4 (6)	38	6	4.2	30.2	48.8	16.8	0	100	98	78	37.1	N/D	N/D	N/D	N/D	N/D	N/D
ST-2	-L-	400+10	79 LT	14.5-16.5	A-4 (0)	30	NP	12.7	39.0	41.4	6.9	0	100	94	61	42.6	N/D	111.5	210	24º	0	32º

N/D - NOT DETERMINED

LABORATORY TESTING OF SHELBY TUBE SAMPLES ST-1 AND ST-2 PERFORMED BY GEOTECHNICS

Stephanie H. Huffman

Certified Lab Technician Signature

114-01-1203

Certification Number

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	24

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

SITE DESCRIPTION SITE NO. 5 (STRUCTURE NO. 7) BRIDGE NO. 1246 ON SR 1001 (NORTH CHURCH STREET) (-Y5-) OVER GREENSBORO EASTERN LOOP I-85 BYPASS (-L-)

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.

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NOTES:
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PERSONNEL

C.R. PASTRANA

Trigon Exploration

INVESTIGATED BY ESP Associates, P.A.

DRAWN BY T.T. WALKER

CHECKED BY P. WEAVER

SUBMITTED BY ESP Associates, P.A.

DATE OCTOBER 2017

NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

DocuSigned by: Paul Weaver 01847D3739AD49C... 10/3/2017

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		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/FT²)
GENERALLY GRANULAR MATERIAL (NON-COHESIVE)	VERY LOOSE	< 4	
	LOOSE	4 TO 10	
	MEDIUM DENSE	10 TO 30	N/A
	DENSE	30 TO 50	
	VERY DENSE	> 50	
GENERALLY SILT-CLAY MATERIAL (COHESIVE)	VERY SOFT	< 2	< 0.25
	SOFT	2 TO 4	0.25 TO 0.5
	MEDIUM STIFF	4 TO 8	0.5 TO 1.0
	STIFF	8 TO 15	1 TO 2
	VERY STIFF	15 TO 30	2 TO 4
	HARD	> 30	> 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		
	- WET - (W)	SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE
PLASTIC RANGE (PI)		
PL — PLASTIC LIMIT		
	- MOIST - (M)	SOLID; AT OR NEAR OPTIMUM MOISTURE
OM — OPTIMUM MOISTURE SL — SHRINKAGE LIMIT		
	- DRY - (D)	REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE

PLASTICITY

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

COLOR

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

GRADATION

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

ANGULARITY OF GRAINS

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

MINERALOGICAL COMPOSITION

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

COMPRESSIBILITY

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

PERCENTAGE OF MATERIAL

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

GROUND WATER

- WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING
- STATIC WATER LEVEL AFTER 24 HOURS
- PW — PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA
- SPRING OR SEEP

MISCELLANEOUS SYMBOLS

- ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION
- SOIL SYMBOL
- ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT
- INFERRED SOIL BOUNDARY
- INFERRED ROCK LINE
- ALLUVIAL SOIL BOUNDARY
- 25/025 — DIP & DIP DIRECTION OF ROCK STRUCTURES
- SPT / CPT / DMT / VST / PMT — TEST BORING
- AUGER BORING
- CORE BORING
- MW — MONITORING WELL
- PIEZOMETER INSTALLATION
- SLOPE INDICATOR INSTALLATION
- CONE PENETROMETER TEST
- SOUNDING ROD
- TEST BORING WITH CORE
- SPT N-VALUE

RECOMMENDATION SYMBOLS

- UNDERCUT
- SHALLOW UNDERCUT
- UNCLASSIFIED EXCAVATION - UNSUITABLE WASTE
- UNCLASSIFIED EXCAVATION - ACCEPTABLE DEGRADABLE ROCK
- UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE USED IN THE TOP 3 FEET OF EMBANKMENT OR BACKFILL

ABBREVIATIONS

AR - AUGER REFUSAL
BT - BORING TERMINATED
CL. - CLAY
CPT - CONE PENETRATION TEST
CSE. - COARSE
DMT - DILATOMETER TEST
DPT - DYNAMIC PENETRATION TEST
e - VOID RATIO
F - FINE
FOSS. - FOSSILIFEROUS
FRAC. - FRACTURED, FRACTURES
FRAGS. - FRAGMENTS
HI. - HIGHLY
MED. - MEDIUM
MICA. - MICACEOUS
MOD. - MODERATELY
NP - NON PLASTIC
ORG. - ORGANIC
PMT - PRESSUREMETER TEST
SAP. - SAPROLITIC
SD. - SAND, SANDY
SL. - SILT, SILTY
SLI. - SLIGHTLY
TCR - TRICONE REFUSAL
w - MOISTURE CONTENT
V - VERY
VST - VANE SHEAR TEST
WEA. - WEATHERED
γ - UNIT WEIGHT
γ_d - DRY UNIT WEIGHT

SAMPLE ABBREVIATIONS

S - BULK
SS - SPLIT SPOON
ST - SHELBY TUBE
RS - ROCK
RT - RECOMPACTED TRIAXIAL
CBR - CALIFORNIA BEARING RATIO

EQUIPMENT USED ON SUBJECT PROJECT

DRILL UNITS:
- [ ] CME-45C
- [X] CME-55
- [ ] CME-550
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

ADVANCING TOOLS:
- [ ] CLAY BITS
- [ ] 6" CONTINUOUS FLIGHT AUGER
- [ ] 8" HOLLOW AUGERS
- [ ] HARD FACED FINGER BITS
- [ ] TUNG.-CARBIDE INSERTS
- [X] CASING [ ] W/ ADVANCER
- [X] TRICONE 2 15/16 " STEEL TEETH
- [ ] TRICONE _____ " TUNG.-CARB.
- [ ] CORE BIT
- [X] TRICONE 3 7/8" STEEL TEETH

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-42: N 870879.9347, E 1766681.5242

ELEVATION: 854.34 FEET

NOTES:

F.I.A.D.= FILLED IMMEDIATELY AFTER DRILLING

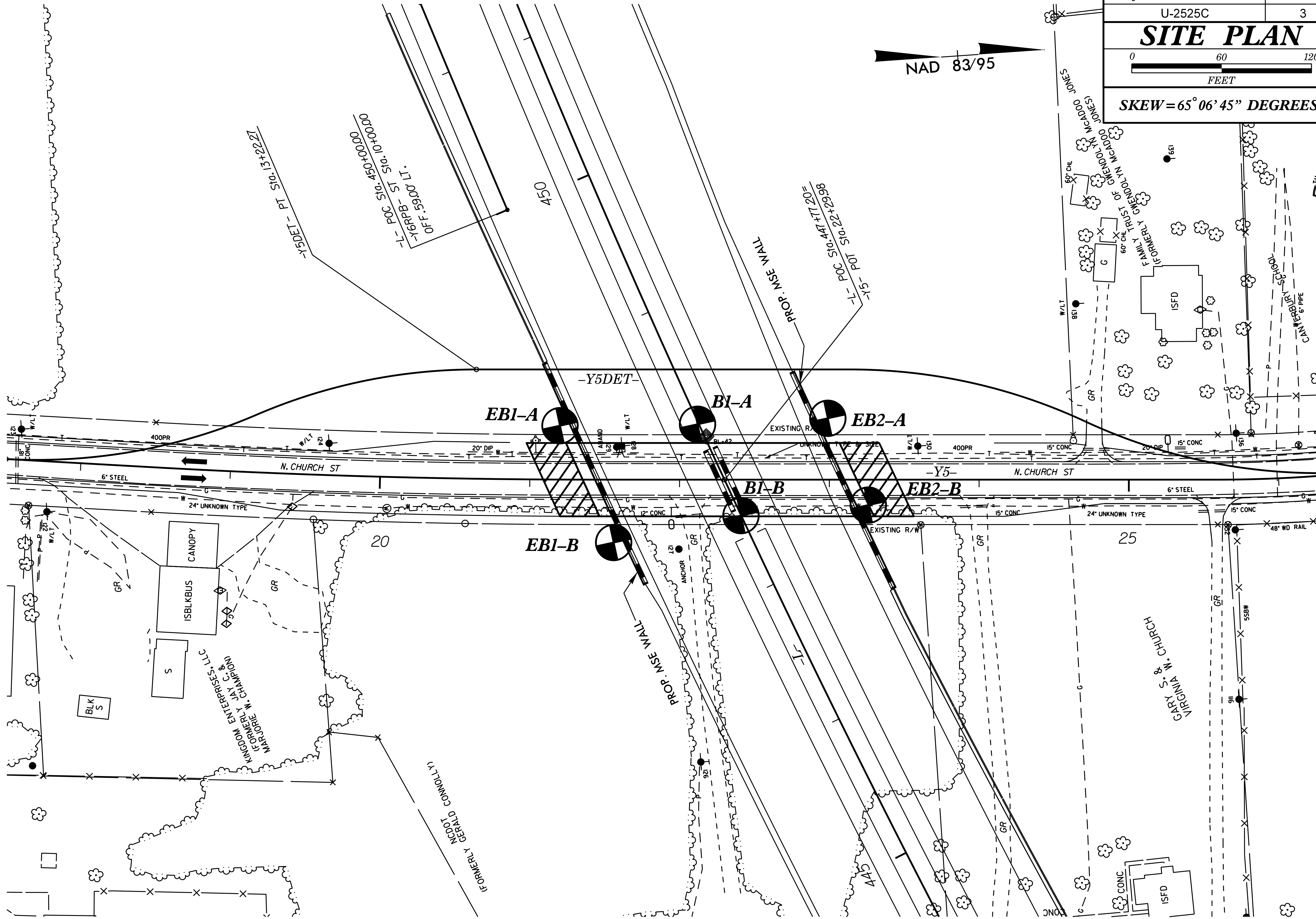
DATE: 8-15-14

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

SITE PLAN

0 60 120 FEET

SKEW = 65° 06' 45" DEGREES



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

PROFILE BORING PROJECTED ALONG –Y5–

0 20 40
FEET
2:1

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/06/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE

EB1–B
21+56
42' RT

B1–B
22+41
24' RT

EB2–B
23+26
17' RT

860
850
840
830
820
810
800
790
780

Ground Surface

Residual:
Moist, Medium Stiff to Very Stiff, Silty CLAY (A-7-5)

Wet to Dry, Red to Reddish Brown to Tan Brown to Greenish Brown, Soft to Hard, Fine Sandy SILT (A-4 & A-5)

Weathered Rock: Greenish Brown to Light Gray METAMORPHOSED GRANITIC ROCK

Manganese Seams, Trace Clay and Trace Rock Fragments

Residual:
Moist to Wet, Tan Brown to Greenish Brown, Soft to Stiff, Coarse to Fine Sandy Silty CLAY (A-7-5) with Manganese Seams

Weathered Rock: Greenish Brown METAMORPHOSED GRANITIC ROCK

Residual: Dry, Greenish Brown, Hard, Fine Sandy SILT (A-4)

Crystalline Rock: METAMORPHOSED GRANITIC ROCK

21+00
22+00
23+00

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

SECTION THROUGH END BENT 1
STA. 21+35.73
SKEW=65 DEGREES

0 10 20
FEET
VE = 1:1

℄

EB1-A
21+20
36' LT

EB1-B
21+56
42' RT

Ground Surface

Residual:

Moist, Red, Very Stiff, Silty CLAY (A-7-5), Trace Organics (Tree Roots)

Moist to Dry, Red to Tan to Reddish Brown to Tan Brown to Greenish Gray, Soft to Hard, Fine Sandy SILT (A-4 & A-5) with Manganese Seams, Trace Clay, and Trace Mica

Weathered Rock: Greenish Brown METAMORPHOSED GRANITIC ROCK

Residual: Dry, Greenish Brown, Hard, Fine Sandy SILT (A-4)

12/16

BT

BT

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/19/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

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

SECTION THROUGH BENT 1
STA. 22+29.98
SKEW=65 DEGREES

0 10 20
FEET
VE = 1:1

℄

B1–A
22+12
37' LT

B1–B
22+41
24' RT

Ground Surface

Residual:

Moist, Red, Medium Stiff to Very Stiff, Silty CLAY (A-7-5) with Trace Organics (Roots)

Moist to Dry, Red to Reddish Brown to Tan Brown to Light Gray to Greenish Brown,

Medium Stiff to Hard, Fine Sandy SILT (A-4 & A-5) with Manganese Seams,

Trace Mica, and Trace Rock Fragments

Weathered Rock: Greenish Brown to Light Gray METAMORPHOSED GRANITIC ROCK

12/16

Residual: Moist, Greenish Brown, Stiff, Fine Sandy Silty CLAY (A-7-5)

Weathered Rock: Greenish Brown METAMORPHOSED GRANITIC ROCK

Crystalline Rock: METAMORPHOSED GRANITIC ROCK

B1–A: 17, 10, 10, 9, 8, 11, 8, 12, 24, 56, 22, 93, 100/0.3, 100/0.6, 60/0.1 BT

B1–B: 10, 9, 10, 100/0.8, 16, 73, 9, 16, 13, 25, 34, 100/0.9, 100/0.7, 60/0.1 BT

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/19/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

860 850 840 830 820 810 800 790 780 770

50 40 30 20 10 0 10 20 30 40 50

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

SECTION THROUGH END BENT 2
STA. 23+17.98
SKEW=65 DEGREES

0 10 20
FEET
VE = 1:1

EB2-A
22+99
41' LT

EB2-B
23+26
17' RT

℄

Ground Surface

Residual:

Moist, Red, Stiff to Very Stiff, Silty CLAY (A-7-5)

Moist to Wet, Red to Reddish Brown to Tan Brown, Soft to Medium Stiff,
Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay

Wet, Reddish Brown to Tan Brown to Greenish Brown, Soft to Stiff,
Fine Sandy Silty CLAY (A-7-5) with Manganese Seams, Trace Clay

Moist to Dry, Tan Brown to Greenish Brown with White, Very Stiff to Hard,
Fine Sandy SILT (A-4) with Manganese Seams, Trace Mica

Weathered Rock: Greenish Brown METAMORPHOSED GRANITIC ROCK

Crystalline Rock: METAMORPHOSED GRANITIC ROCK

12/16

ST-1

BT.

BT.
FIAD

GROUNDLINE TAKEN FROM .TIN FILE PROVIDED BY NCDOT DATED 12/19/2016.
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 21+20	**OFFSET** 36 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 856.9 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 870,783	**EASTING** 1,766,668	**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** 12/08/16	**COMP. DATE** 12/09/16	**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										
										856.9 / 0.0 GROUND SURFACE
855										**RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5)
	853.4	3.5	6	9	11	20		M		
850	848.4	8.5	3	4	7	11		M		849.0 / 7.9 Red to Tan Brown to Greenish Gray to Greenish Brown, Medium Stiff to Very Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay, Trace Mica. Note: Rock Fragments from 44.1' to 44.3'
845	843.4	13.5	2	3	4	7		W		
840	838.4	18.5	2	3	3	6		W		
835	833.4	23.5	2	3	4	7		W		
830	828.4	28.5	2	3	4	7		W		
825	823.4	33.5	3	7	10	17	SS-1	47%		
820	818.4	38.5	1	2	6	8		W		
815	813.4	43.5	6	16	12	28		M		
810	808.4	48.5	14	14	15	29		M		810.8 / 46.1 Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams, Trace Mica
805	803.4	53.5	12	14	20	34		M		
800	798.4	58.5	53	47/0.2		100/0.7				799.1 / 57.8 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
795	793.4	63.5	100/0.2			100/0.2				
790	788.4	68.5	100/0.3			100/0.3				
785	783.4	73.5	100/0.4			100/0.4				783.0 / 73.9 Boring Terminated at Elevation 783.0 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-A	**STATION** 21+20	**OFFSET** 36 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 856.9 ft	**TOTAL DEPTH** 73.9 ft	**NORTHING** 870,783	**EASTING** 1,766,668	**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** 12/08/16	**COMP. DATE** 12/09/16	**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
780						Match Line				Caved In at 25.8'

NCDOT BORE DOUBLE U2525C_GEO_SITE7_ BRIDGE_GINTLOGS.GPJ NC_DOT.GDT 10/2/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 21+56	**OFFSET** 42 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 855.8 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 870,813	**EASTING** 1,766,748	**24 HR.** 26.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/12/16	**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											
855										855.8 GROUND SURFACE	0.0
	852.3	3.5	8	9	12	21		M		**RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5), Trace Organics (Roots)	
850	847.3	8.5	4	4	7	11		M		846.2	9.6
845	842.3	13.5	2	3	4	7		W		Reddish Brown to Tan Brown to Greenish Brown, Soft to Very Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay	
840	837.3	18.5	2	1	2	3		W			
835	832.3	23.5	1	2	2	4		W			
830	827.3	28.5	1	5	6	11		W			
825	822.3	33.5	3	6	7	13	SS-2	51%			
820	817.3	38.5	4	7	11	18		W			
815	812.3	43.5	16	15	18	33		M			
810	807.3	48.5	7	9	14	23		M			
805	802.3	53.5	5	11	19	30		M			
800	797.3	58.5	18	31	48	79		D			
795	792.3	63.5	100/0.4			100/0.4				793.1	62.7
790	787.3	68.5	78	22/0.1		100/0.6				**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK	
785	782.3	73.5	22	21	24	45		D		783.5	72.3
780										**RESIDUAL** Greenish Brown, Hard, Fine Sandy SILT (A-4)	
										780.6	75.2

NCDOT BORE DOUBLE U2525C_GEO_SITE7_ BRIDGE_GINTLOGS.GPJ NC_DOT.GDT 10/2/17

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB1-B	**STATION** 21+56	**OFFSET** 42 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 855.8 ft	**TOTAL DEPTH** 78.7 ft	**NORTHING** 870,813	**EASTING** 1,766,748	**24 HR.** 26.7
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/12/16	**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
780						Match Line				
	777.3	78.5	100/0.2			100/0.2				**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK *(continued)* 777.1 78.7
										Boring Terminated at Elevation 777.1 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+12	**OFFSET** 37 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 854.9 ft	**TOTAL DEPTH** 73.4 ft	**NORTHING** 870,875	**EASTING** 1,766,673	**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** 12/07/16	**COMP. DATE** 12/08/16	**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)
855										854.9 / 0.0 GROUND SURFACE
	851.6	3.3								**RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5)
850			6	8	9	17		M		
	846.6	8.3								846.0 / 8.9
845			3	4	6	10		M		Red to Reddish Brown to Greenish Brown, Medium Stiff to Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay, Trace Mica
	841.6	13.3								
840			3	4	6	10		M		
	836.6	18.3								
835			2	4	5	9		M		
	831.6	23.3								
830			3	3	5	8		M		
	826.6	28.3								
825			3	4	7	11		M		
	821.6	33.3								
820			2	3	5	8		M		
	816.6	38.3								
815			3	4	8	12	SS-3	31%		
	811.6	43.3								812.8 / 42.1
810			8	10	14	24		M		Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams, Trace Mica Note: Hard Drilling from 51.7' to 52.8'
	806.6	48.3								
805			12	20	36	56		M		
	801.6	53.3								
800			6	9	13	22		M		
	796.6	58.3								
795			11	29	64	93		D		
	791.6	63.3	100/0.3			100/0.3				793.0 / 61.9 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK
790										
	786.6	68.3	66	34/0.1		100/0.6				
785										
	781.6	73.3	60/0.1			60/0.1				781.8 / 73.1 781.5 / 73.4 **CRYSTALLINE ROCK** METAMORPHOSED GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 781.5 ft In Crystalline Rock: METAMORPHOSED GRANITIC ROCK

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-A	**STATION** 22+12	**OFFSET** 37 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 854.9 ft	**TOTAL DEPTH** 73.4 ft	**NORTHING** 870,875	**EASTING** 1,766,673	**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** 12/07/16	**COMP. DATE** 12/08/16	**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
775						Match Line				Caved In at 24.4'

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. B1-B	**STATION** 22+41	**OFFSET** 24 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 851.7 ft	**TOTAL DEPTH** 73.4 ft	**NORTHING** 870,899	**EASTING** 1,766,736	**24 HR.** 21.5
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**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)
855											
										851.7 GROUND SURFACE	0.0
850										**RESIDUAL** Red, Medium Stiff to Stiff, Silty CLAY (A-7-5) with Trace Organics (Roots) Note: No sample taken due to potential underground utilities	
845	843.2	8.5	3	4	6	10		M		843.9	7.8
840	838.2	13.5	3	4	5	9		M		Red to Tan Brown, Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay	
835	833.2	18.5	3	4	6	10		M		829.0	22.7
830	828.2	23.5	33	60	40/0.3	100/0.8				**WEATHERED ROCK** Greenish Brown to Light Gray METAMORPHOSED GRANITIC ROCK	
825	823.4	28.3	3	4	12	16		M		823.8	27.9
820	818.4	33.3	40	40	33	73		M		**RESIDUAL** Light Gray, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams, Trace Clay, Trace Rock Fragments	
815	813.4	38.3	3	3	6	9	SS-4	39%		814.5	37.2
810	808.4	43.3	5	6	10	16		M		Greenish Brown, Stiff, Fine Sandy Silty CLAY (A-7-5)	
805	803.4	48.3	3	5	8	13		M		810.0	41.7
800	798.4	53.3	5	10	15	25		D		Greenish Brown, Stiff to Hard, Fine Sandy SILT (A-4) with Maganese Seams	
795	793.4	58.3	11	12	22	34		D			
790	788.4	63.3	20	42	58/0.4	100/0.9				787.9	63.8
785	783.4	68.3	59	41/0.2		100/0.7				**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK	
780	778.4	73.3	60/0.1			60/0.1				778.8	72.9
										778.3 **CRYSTALLINE ROCK** METAMORPHOSED GRANITIC ROCK Boring Terminated with Standard	73.4

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				Penetration Test Refusal at Elevation 778.3 ft In Crystalline Rock: METAMORPHOSED GRANITIC ROCK

NCDOT BORE DOUBLE U2525C_GEO_SITE7_BRIDGE_GINTLOGS.GPJ NC_DOT.GDT 10/2/17

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 22+99	**OFFSET** 41 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 852.2 ft	**TOTAL DEPTH** 81.4 ft	**NORTHING** 870,962	**EASTING** 1,766,675	**24 HR.** 23.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/07/16	**COMP. DATE** 12/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft) / DEPTH (ft)
855										
850	848.8	3.4	6	9	12	21		M		852.2 GROUND SURFACE 0.0 **RESIDUAL** Red, Very Stiff, Silty CLAY (A-7-5)
845	843.8	8.4	3	3	5	8		M		842.6 9.6 Red to Reddish Brown, Medium Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay, Trace Mica
840	838.8	13.4	2	3	4	7		W		
835	833.8	18.4	2	2	3	5		W		
830	828.8	23.4	WOH	1	2	3		W		830.1 22.1 Reddish Brown to Tan Brown, Soft to Medium Stiff, Fine Sandy Silty CLAY (A-7-5) with Manganese Seams, Trace Mica
825	823.8	28.4	1	2	2	4		W		
820	818.8	33.4	WOH	1	2	3	SS-5	80%		
815	813.8	38.4	2	3	4	7		W		
810	808.8	43.4	3	6	10	16		M		809.3 42.9 Tan Brown to Greenish Brown with White, Very Stiff to Hard, Fine Sandy SILT (A-4) with Managese Seams, Trace Mica
805	803.8	48.4	6	8	11	19		M		
800	798.8	53.4	7	12	18	30		M		
795	793.8	58.4	10	17	27	44		D		
790	788.8	63.4	14	34	53	87		D		
785	783.8	68.4	12	20	24	44		D		
780	778.8	73.4	13	19	26	45		D		
775										775.0 77.2

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-A	**STATION** 22+99	**OFFSET** 41 ft LT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 852.2 ft	**TOTAL DEPTH** 81.4 ft	**NORTHING** 870,962	**EASTING** 1,766,675	**24 HR.** 23.4
DRILL RIG/HAMMER EFF./DATE TRI0055 CME-55 77% 02/22/2016		**DRILL METHOD** Mud Rotary	**HAMMER TYPE** Automatic	
DRILLER Toothman, R.	**START DATE** 12/07/16	**COMP. DATE** 12/07/16	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
775						Match Line				
	773.8	78.4	100/0.4			100/0.4				**WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK 771.5 80.7
	770.9	81.3	60/0.1			60/0.1				770.8 81.4 **CRYSTALLINE ROCK** METAMORPHOSED GRANITIC ROCK Boring Terminated with Standard Penetration Test Refusal at Elevation 770.8 ft In Crystalline Rock: METAMORPHOSED GRANITIC ROCK <u>Other Samples:</u> ST-8 (29.5 - 31.6)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 34821.1.1	**TIP** U-2525C	**COUNTY** GUILFORD	**GEOLOGIST** Pastrana, C.R.	
SITE DESCRIPTION Site #5 (Structure #7) - Bridge No. 1246 on SR 1001 (N. Church St.) (-Y5-) over I-85 Bypass (-L-)				**GROUND WTR (ft)**
BORING NO. EB2-B	**STATION** 23+26	**OFFSET** 17 ft RT	**ALIGNMENT** -Y5-	**0 HR.** N/A
COLLAR ELEV. 850.1 ft	**TOTAL DEPTH** 68.3 ft	**NORTHING** 870,985	**EASTING** 1,766,735	**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** 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)
855											
850										850.1 GROUND SURFACE	0.0
845										**RESIDUAL** Red, Stiff, Silty CLAY (A-7-5) Note: No sample taken due to potential underground utilities	
840	842.0	8.1	3	3	4	7		M		842.2	7.9
835	837.0	13.1	3	3	3	6		M		Red to Tan Brown, Soft to Medium Stiff, Fine Sandy SILT (A-5) with Manganese Seams, Trace Clay	
830	832.0	18.1	1	1	2	3		W			
825	827.0	23.1	1	2	2	4		W		827.8 Tan Brown to Greenish Brown, Soft to Stiff, Coarse to Fine Sandy Silty CLAY (A-7-5) with Manganese Seams	22.3
820	822.0	28.1	2	5	5	10	SS-6	60%			
815	817.0	33.1	2	4	6	10		W			
810	812.0	38.1	3	5	7	12		W			
805	807.0	43.1	5	8	9	17		M		807.4 Greenish Brown, Very Stiff to Hard, Fine Sandy SILT (A-4) with Manganese Seams	42.7
800	802.0	48.1	9	15	20	35		D			
795	797.0	53.1	53	47/0.3		100/0.8				798.3 **WEATHERED ROCK** Greenish Brown METAMORPHOSED GRANITIC ROCK	51.8
790	792.0	58.1	100/0.4			100/0.4					
785	787.0	63.1	28	72/0.4		100/0.9					
	782.0	68.1	100/0.2			100/0.2				781.8 Boring Terminated at Elevation 781.8 ft In Weathered Rock: METAMORPHOSED GRANITIC ROCK	68.3

NCDOT BORE DOUBLE U2525C_GEO_SITE7_BRIDGE_GINTLOGS.GPJ NC_DOT.GDT 10/2/17

SOILS LABORATORY TESTS RESULTS

WBS NO.: 34821.1.1

TIP NO.: U-2525C

COUNTY: Guilford

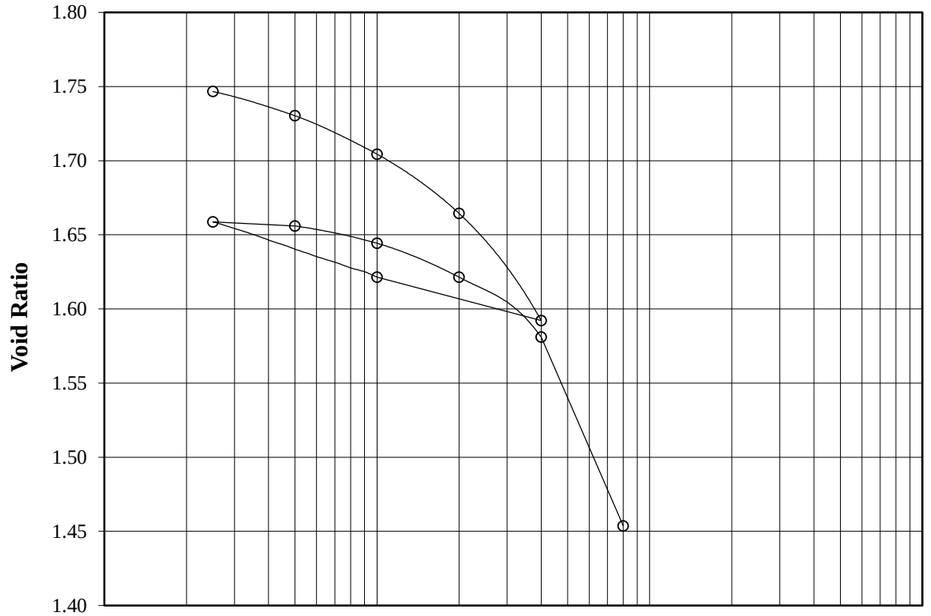
SITE DESCRIPTION: Site #5, (Structure #7 - Bridge No. 1246 on SR 1001 (North Church Street) (-Y5-) over Greensboro Eastern Loop, I-85 Bypass (-L-)

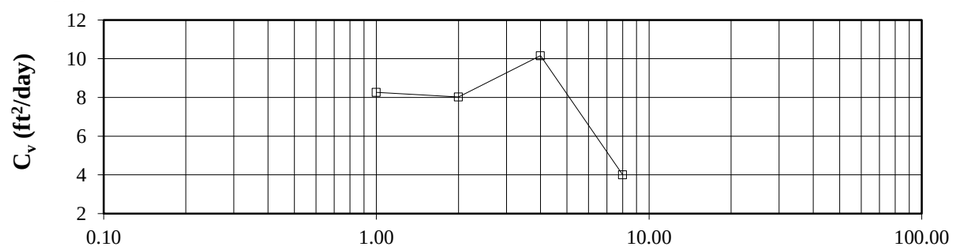
SAMPLE NO.	Boring	DEPTH INTERVAL (ft.)	AASHTO CLASS	N	L.L	P.I.	% BY WEIGHT				% PASSING SIEVES			% MOISTURE	% ORGANIC
							CSE. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-1	EB1-A	33.5-35.0	A-5 (4)	17	51	7	8	51	35	6	99	96	56	47.2	-
SS-2	EB1-B	33.5-35.0	A-5 (2)	13	45	3	13	43	38	6	98	90	58	50.8	-
SS-3	B1-A	38.3-39.8	A-5 (6)	12	41	8	5	42	47	6	100	99	70	31.2	-
SS-4	B1-B	38.3-39.8	A-7-5 (10)	9	50	11	9	30	49	12	99	94	73	38.9	-
SS-5	EB2-A	33.4-34.9	A-7-5 (24)	3	72	16	2	16	57	25	100	99	90	80.3	-
SS-6	EB2-B	28.1-29.6	A-7-5 (14)	10	58	12	7	23	51	19	99	95	79	60.3	-
ST-1	EB2-A1	29.5-31.6	A-7-5 (23)	N/A	67	17	3	16	54	27	100	98	89	65.5	-

Tony Dumoulin

Certification No. 121-01-1108

Consolidation Test - ASTM D2435
SUMMARY REPORT





	Before	After				
Moisture (%):	65.46	63.56	**Liquid Limits:**	67	**Test Date:**	1/5/2017
Dry Density (pcf):	61.20	62.20	**Plastic Limits:**	50		
Saturation (%):	100.75	100.36	**Plasticity Index (%):**	17		
Void Ratio:	1.7513	1.6990	**Specific Gravity:**	2.700	Assumed	
C_c	0.45	-	**Sample Type:**	Undisturbed		
C_r	0.051	-				
P_c (ksf)	2.95	-				

Soil Classification:	A-7-5 (Clayey Soils)/ MH (Elastic Silt)		
Project:	U2525C	**Depth:**	29.5'-31.6'
Sample Number:	ST-1	**Boring Number:**	EB2-A1

Project: U2525C
Client: NCDOT
Location: EB-2-A1 (29.5'-31.6")

Consolidation Test Results
(Sequence 1) Load 0.250 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3528	0.0000	0.0000	1.7513
1	00:00:01	0.3528	0.0000	0.0000	1.7513
2	00:00:02	0.3528	0.0001	0.0085	1.7511
3	00:00:03	0.3528	0.0001	0.0085	1.7511
4	00:00:04	0.3528	0.0001	0.0085	1.7511
5	00:00:05	0.3527	0.0002	0.0170	1.7508
6	00:00:06	0.3527	0.0002	0.0170	1.7508
7	00:00:12	0.3527	0.0002	0.0170	1.7508
8	00:00:15	0.3527	0.0002	0.0170	1.7508
9	00:00:30	0.3526	0.0003	0.0255	1.7506
10	00:01:00	0.3525	0.0003	0.0340	1.7504
11	00:02:00	0.3524	0.0004	0.0425	1.7501
12	00:04:00	0.3523	0.0005	0.0510	1.7499
13	00:08:00	0.3523	0.0005	0.0510	1.7499
14	00:10:00	0.3523	0.0005	0.0510	1.7499
15	00:15:01	0.3523	0.0005	0.0510	1.7499
16	00:30:01	0.3522	0.0007	0.0680	1.7494
17	01:00:03	0.3521	0.0008	0.0765	1.7492
18	02:00:06	0.3519	0.0009	0.0935	1.7487
19	04:00:13	0.3518	0.0010	0.1020	1.7485
20	08:00:26	0.3518	0.0010	0.1020	1.7485
21	12:00:40	0.3519	0.0009	0.0935	1.7487
22	16:00:53	0.3519	0.0009	0.0935	1.7487
23	20:01:06	0.3519	0.0009	0.0935	1.7487
24	23:59:57	0.3518	0.0010	0.1020	1.7485

Tested By: TS

Consolidation Test Results
(Sequence 2) Load 0.500 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Numbe 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3518	0.0010	0.1020	1.7485
1	00:00:01	0.3477	0.0052	0.5183	1.7370
2	00:00:02	0.3475	0.0054	0.5353	1.7366
3	00:00:03	0.3474	0.0054	0.5438	1.7363
4	00:00:04	0.3473	0.0055	0.5523	1.7361
5	00:00:05	0.3472	0.0056	0.5607	1.7359
6	00:00:06	0.3472	0.0056	0.5607	1.7359
7	00:00:12	0.3472	0.0057	0.5692	1.7356
8	00:00:15	0.3472	0.0057	0.5692	1.7356
9	00:00:30	0.3470	0.0059	0.5862	1.7352
10	00:01:00	0.3469	0.0059	0.5947	1.7349
11	00:02:00	0.3468	0.0060	0.6032	1.7347
12	00:04:00	0.3468	0.0060	0.6032	1.7347
13	00:08:00	0.3467	0.0061	0.6117	1.7345
14	00:10:00	0.3467	0.0061	0.6117	1.7345
15	00:15:01	0.3466	0.0063	0.6287	1.7340
16	00:30:02	0.3464	0.0065	0.6457	1.7335
17	01:00:03	0.3463	0.0065	0.6542	1.7333
18	02:00:07	0.3462	0.0066	0.6627	1.7331
19	04:00:13	0.3459	0.0070	0.6967	1.7321
20	08:00:26	0.3459	0.0070	0.6967	1.7321
21	12:00:40	0.3459	0.0070	0.6967	1.7321
22	16:00:53	0.3460	0.0069	0.6882	1.7324
23	20:01:06	0.3460	0.0069	0.6882	1.7324
24	23:59:57	0.3459	0.0070	0.6967	1.7321

Tested By:
Checked By:

Consolidation Test Results
(Sequence 3) Load 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

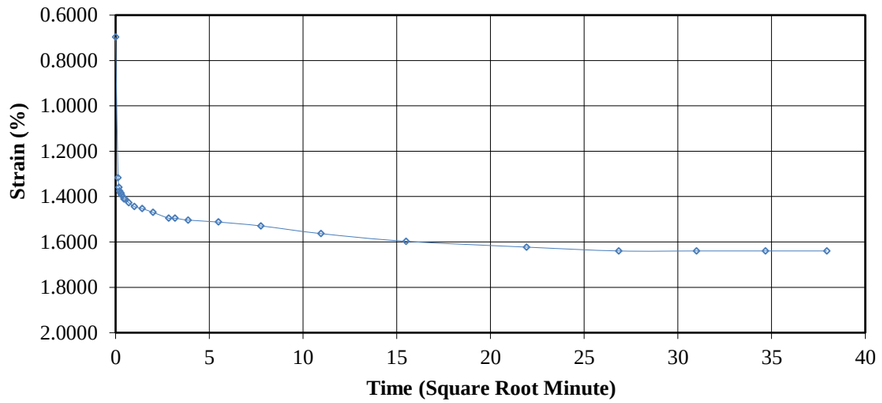
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.3459	0.0070	0.6967	1.7321
1	00:00:01	0.02	0.13	0.3397	0.0132	1.3169	1.7151
2	00:00:02	0.03	0.18	0.3393	0.0136	1.3594	1.7139
3	00:00:03	0.05	0.22	0.3391	0.0138	1.3764	1.7134
4	00:00:04	0.07	0.26	0.3390	0.0138	1.3849	1.7132
5	00:00:05	0.08	0.29	0.3390	0.0138	1.3849	1.7132
6	00:00:06	0.10	0.32	0.3389	0.0139	1.3934	1.7129
7	00:00:12	0.20	0.45	0.3387	0.0141	1.4104	1.7125
8	00:00:15	0.25	0.50	0.3387	0.0141	1.4104	1.7125
9	00:00:30	0.50	0.71	0.3386	0.0143	1.4274	1.7120
10	00:01:00	1.00	1.00	0.3384	0.0144	1.4443	1.7115
11	00:02:00	2.00	1.41	0.3383	0.0145	1.4528	1.7113
12	00:04:00	4.00	2.00	0.3381	0.0147	1.4698	1.7108
13	00:08:01	8.02	2.83	0.3379	0.0150	1.4953	1.7101
14	00:10:01	10.02	3.16	0.3379	0.0150	1.4953	1.7101
15	00:15:01	15.02	3.88	0.3378	0.0150	1.5038	1.7099
16	00:30:02	30.03	5.48	0.3377	0.0151	1.5123	1.7097
17	01:00:03	60.05	7.75	0.3376	0.0153	1.5293	1.7092
18	02:00:07	120.12	10.96	0.3372	0.0156	1.5633	1.7083
19	04:00:13	240.22	15.50	0.3369	0.0160	1.5973	1.7073
20	08:00:27	480.45	21.92	0.3366	0.0162	1.6228	1.7066
21	12:00:40	720.67	26.85	0.3364	0.0164	1.6398	1.7062
22	16:00:53	960.88	31.00	0.3364	0.0164	1.6398	1.7062
23	20:01:06	1201.88	34.67	0.3364	0.0164	1.6398	1.7062
24	23:59:57	1439.95	37.95	0.3364	0.0164	1.6398	1.7062

Tested By: TS

Consolidation Test Results
(Sequence 3) Load 1.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 4) Load 2.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

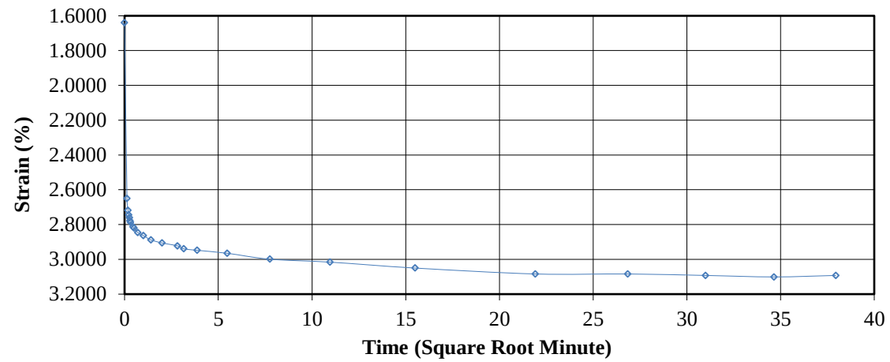
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.3364	0.0164	1.6398	1.7062
1	00:00:01	0.02	0.13	0.3263	0.0265	2.6508	1.6784
2	00:00:02	0.03	0.18	0.3257	0.0272	2.7188	1.6765
3	00:00:03	0.05	0.22	0.3254	0.0274	2.7443	1.6758
4	00:00:04	0.07	0.26	0.3252	0.0276	2.7613	1.6753
5	00:00:05	0.08	0.29	0.3251	0.0278	2.7782	1.6748
6	00:00:06	0.10	0.32	0.3250	0.0279	2.7867	1.6746
7	00:00:12	0.20	0.45	0.3247	0.0281	2.8122	1.6739
8	00:00:15	0.25	0.50	0.3246	0.0282	2.8207	1.6737
9	00:00:30	0.50	0.71	0.3244	0.0285	2.8462	1.6730
10	00:01:00	1.00	1.00	0.3242	0.0286	2.8632	1.6725
11	00:02:00	2.00	1.41	0.3240	0.0289	2.8887	1.6718
12	00:04:00	4.00	2.00	0.3238	0.0291	2.9057	1.6713
13	00:08:00	8.00	2.83	0.3236	0.0292	2.9227	1.6709
14	00:10:00	10.00	3.16	0.3234	0.0294	2.9397	1.6704
15	00:15:00	15.00	3.87	0.3234	0.0295	2.9482	1.6702
16	00:30:01	30.02	5.48	0.3232	0.0297	2.9652	1.6697
17	01:00:03	60.05	7.75	0.3229	0.0300	2.9992	1.6688
18	02:00:06	120.10	10.96	0.3227	0.0302	3.0161	1.6683
19	04:00:13	240.22	15.50	0.3223	0.0305	3.0501	1.6674
20	08:00:26	480.43	21.92	0.3220	0.0308	3.0841	1.6664
21	12:00:39	720.65	26.84	0.3220	0.0308	3.0841	1.6664
22	16:00:53	960.88	31.00	0.3219	0.0309	3.0926	1.6662
23	20:01:06	1201.10	34.66	0.3218	0.0310	3.1011	1.6660
24	23:59:59	1439.98	37.95	0.3219	0.0309	3.0926	1.6662

Tested By: TS

Consolidation Test Results
(Sequence 4) Load 2.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 5) Load 4.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

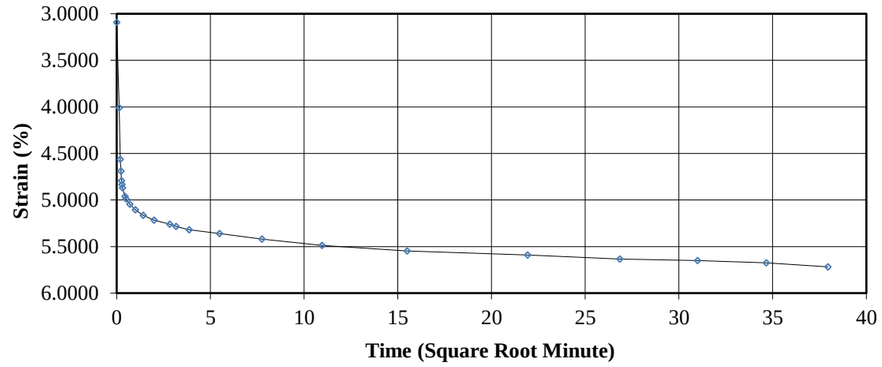
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time √min	Displacement (in)	Settlement (in)	Axial Strain (in)	Void Ratio
0	00:00:00	0.00	0.00	0.3219	0.0309	3.0926	1.6662
1	00:00:01	0.02	0.13	0.3127	0.0401	4.0102	1.6410
2	00:00:02	0.03	0.18	0.3072	0.0456	4.5624	1.6258
3	00:00:03	0.05	0.22	0.3059	0.0469	4.6899	1.6223
4	00:00:04	0.07	0.26	0.3049	0.0479	4.7918	1.6194
5	00:00:05	0.08	0.29	0.3045	0.0483	4.8343	1.6183
6	00:00:06	0.10	0.32	0.3042	0.0487	4.8683	1.6173
7	00:00:12	0.20	0.45	0.3032	0.0496	4.9618	1.6148
8	00:00:15	0.25	0.50	0.3030	0.0499	4.9873	1.6141
9	00:00:30	0.50	0.71	0.3024	0.0505	5.0467	1.6124
10	00:01:00	1.00	1.00	0.3018	0.0511	5.1062	1.6108
11	00:02:00	2.00	1.41	0.3012	0.0517	5.1657	1.6092
12	00:04:00	4.00	2.00	0.3007	0.0522	5.2167	1.6078
13	00:08:00	8.00	2.83	0.3003	0.0526	5.2591	1.6066
14	00:10:00	10.00	3.16	0.3000	0.0528	5.2846	1.6059
15	00:15:00	15.00	3.87	0.2997	0.0532	5.3186	1.6050
16	00:30:01	30.02	5.48	0.2992	0.0536	5.3611	1.6038
17	01:00:03	60.05	7.75	0.2986	0.0542	5.4206	1.6022
18	02:00:06	120.10	10.96	0.2980	0.0549	5.4885	1.6003
19	04:00:13	240.22	15.50	0.2974	0.0555	5.5480	1.5986
20	08:00:26	480.43	21.92	0.2969	0.0559	5.5905	1.5975
21	12:00:39	720.65	26.84	0.2965	0.0563	5.6330	1.5963
22	16:00:53	960.88	31.00	0.2963	0.0565	5.6500	1.5958
23	20:01:06	1201.10	34.66	0.2961	0.0568	5.6754	1.5951
24	23:59:57	1439.95	37.95	0.2957	0.0572	5.7179	1.5940

Tested By: TS

Consolidation Test Results
(Sequence 5) Load 4.000 ksf

Consolidation Graph (Squareroot Time)



Consolidation Test Results
(Sequence 6) Rebound 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.2957	0.0572	5.7179	1.5940
1	00:00:01	0.3038	0.0490	4.9023	1.6164
2	00:00:02	0.3043	0.0485	4.8513	1.6178
3	00:00:03	0.3045	0.0483	4.8343	1.6183
4	00:00:04	0.3047	0.0482	4.8173	1.6187
5	00:00:05	0.3047	0.0482	4.8173	1.6187
6	00:00:06	0.3048	0.0481	4.8088	1.6190
7	00:00:12	0.3049	0.0479	4.7918	1.6194
8	00:00:15	0.3050	0.0478	4.7833	1.6197
9	00:00:30	0.3052	0.0477	4.7664	1.6201
10	00:01:00	0.3053	0.0476	4.7579	1.6204
11	00:02:00	0.3054	0.0474	4.7409	1.6209
12	00:04:00	0.3056	0.0472	4.7239	1.6213
13	00:08:00	0.3058	0.0471	4.7069	1.6218
14	00:10:00	0.3057	0.0472	4.7154	1.6216
15	00:15:00	0.3058	0.0471	4.7069	1.6218
16	00:30:01	0.3059	0.0469	4.6899	1.6223
17	01:00:03	0.3059	0.0470	4.6984	1.6220
18	02:00:06	0.3061	0.0467	4.6729	1.6227
19	04:00:13	0.3062	0.0466	4.6644	1.6230
20	08:00:26	0.3062	0.0466	4.6644	1.6230
21	12:00:39	0.3063	0.0466	4.6559	1.6232
22	16:00:53	0.3063	0.0466	4.6559	1.6232
23	20:01:06	0.3065	0.0463	4.6304	1.6239
24	23:59:57	0.3063	0.0466	4.6559	1.6232

Tested By: TS

Consolidation Test Results
(Sequence 7) Rebound 0.250 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Numbe 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3063	0.0466	4.6559	1.6232
1	00:00:01	0.3129	0.0399	3.9932	1.6414
2	00:00:02	0.3139	0.0389	3.8912	1.6442
3	00:00:03	0.3146	0.0382	3.8233	1.6461
4	00:00:04	0.3152	0.0376	3.7638	1.6477
5	00:00:05	0.3155	0.0374	3.7383	1.6484
6	00:00:06	0.3156	0.0372	3.7213	1.6489
7	00:00:12	0.3162	0.0366	3.6619	1.6505
8	00:00:15	0.3163	0.0365	3.6534	1.6508
9	00:00:30	0.3167	0.0361	3.6109	1.6519
10	00:01:00	0.3170	0.0359	3.5854	1.6526
11	00:02:00	0.3173	0.0355	3.5514	1.6536
12	00:04:00	0.3177	0.0352	3.5174	1.6545
13	00:08:01	0.3180	0.0348	3.4834	1.6554
14	00:10:01	0.3181	0.0347	3.4749	1.6557
15	00:15:01	0.3182	0.0347	3.4664	1.6559
16	00:30:02	0.3184	0.0344	3.4410	1.6566
17	01:00:03	0.3187	0.0342	3.4155	1.6573
18	02:00:07	0.3189	0.0339	3.3900	1.6580
19	04:00:13	0.3192	0.0336	3.3645	1.6587
20	08:00:27	0.3195	0.0334	3.3390	1.6594
21	12:00:40	0.3196	0.0332	3.3220	1.6599
22	16:00:53	0.3197	0.0331	3.3135	1.6601
23	56:01:06	0.3198	0.0331	3.3050	1.6604
24	23:59:59	0.3199	0.0330	3.2965	1.6606

Tested By: TS

Consolidation Test Results
(Sequence 8) Load 0.500 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3199	0.0330	3.2965	1.6606
1	00:00:01	0.3193	0.0336	3.3560	1.6590
2	00:00:02	0.3193	0.0336	3.3560	1.6590
3	00:00:03	0.3193	0.0336	3.3560	1.6590
4	00:00:04	0.3193	0.0336	3.3560	1.6590
5	00:00:05	0.3193	0.0336	3.3560	1.6590
6	00:00:06	0.3193	0.0336	3.3560	1.6590
7	00:00:12	0.3193	0.0336	3.3560	1.6590
8	00:00:15	0.3193	0.0336	3.3560	1.6590
9	00:00:30	0.3193	0.0336	3.3560	1.6590
10	00:01:00	0.3192	0.0336	3.3645	1.6587
11	00:02:01	0.3192	0.0336	3.3645	1.6587
12	00:04:01	0.3192	0.0336	3.3645	1.6587
13	00:08:01	0.3191	0.0337	3.3730	1.6585
14	00:10:01	0.3190	0.0338	3.3815	1.6583
15	00:15:01	0.3190	0.0338	3.3815	1.6583
16	00:30:02	0.3191	0.0337	3.3730	1.6585
17	01:00:04	0.3190	0.0338	3.3815	1.6583
18	02:00:07	0.3190	0.0338	3.3815	1.6583
19	04:00:14	0.3189	0.0339	3.3900	1.6580
20	08:00:27	0.3189	0.0340	3.3985	1.6578
21	12:00:40	0.3189	0.0340	3.3985	1.6578
22	16:00:53	0.3189	0.0340	3.3985	1.6578
23	20:01:07	0.3189	0.0340	3.3985	1.6578
24	23:59:59	0.3189	0.0340	3.3985	1.6578

Tested By: TS

Consolidation Test Results
(Sequence 9) Load 1.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number:

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3189	0.0340	3.3985	1.6578
1	00:00:01	0.3161	0.0368	3.6788	1.6501
2	00:00:02	0.3159	0.0370	3.6958	1.6496
3	00:00:03	0.3158	0.0370	3.7043	1.6494
4	00:00:04	0.3157	0.0371	3.7128	1.6491
5	00:00:05	0.3157	0.0371	3.7128	1.6491
6	00:00:06	0.3157	0.0371	3.7128	1.6491
7	00:00:12	0.3156	0.0372	3.7213	1.6489
8	00:00:15	0.3155	0.0373	3.7298	1.6487
9	00:00:30	0.3155	0.0373	3.7298	1.6487
10	00:01:00	0.3155	0.0374	3.7383	1.6484
11	00:02:01	0.3155	0.0374	3.7383	1.6484
12	00:04:01	0.3154	0.0375	3.7468	1.6482
13	00:08:01	0.3153	0.0376	3.7553	1.6480
14	00:10:01	0.3152	0.0376	3.7638	1.6477
15	00:15:01	0.3152	0.0376	3.7638	1.6477
16	00:30:02	0.3153	0.0376	3.7553	1.6480
17	01:00:04	0.3151	0.0377	3.7723	1.6475
18	02:00:07	0.3150	0.0378	3.7808	1.6473
19	04:00:14	0.3150	0.0379	3.7893	1.6470
20	08:00:27	0.3148	0.0381	3.8063	1.6466
21	12:00:40	0.3148	0.0381	3.8063	1.6466
22	16:00:53	0.3148	0.0381	3.8063	1.6466
23	20:01:07	0.3147	0.0381	3.8148	1.6463
24	23:59:58	0.3146	0.0382	3.8233	1.6461

Tested By: TS

Consolidation Test Results
(Sequence 10) Load 2.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3146	0.0382	3.8233	1.6461
1	00:00:01	0.3085	0.0444	4.4350	1.6293
2	00:00:02	0.3082	0.0447	4.4690	1.6283
3	00:00:03	0.3080	0.0449	4.4860	1.6279
4	00:00:04	0.3079	0.0449	4.4945	1.6276
5	00:00:05	0.3078	0.0450	4.5030	1.6274
6	00:00:06	0.3078	0.0450	4.5030	1.6274
7	00:00:12	0.3076	0.0452	4.5200	1.6269
8	00:00:15	0.3076	0.0452	4.5200	1.6269
9	00:00:30	0.3076	0.0453	4.5285	1.6267
10	00:01:00	0.3075	0.0454	4.5370	1.6265
11	00:02:00	0.3073	0.0455	4.5539	1.6260
12	00:04:01	0.3072	0.0456	4.5624	1.6258
13	00:08:01	0.3071	0.0457	4.5709	1.6255
14	00:10:01	0.3071	0.0457	4.5709	1.6255
15	00:15:01	0.3071	0.0458	4.5794	1.6253
16	00:30:02	0.3070	0.0459	4.5879	1.6251
17	01:00:04	0.3068	0.0460	4.6049	1.6246
18	02:00:07	0.3066	0.0462	4.6219	1.6241
19	04:00:14	0.3066	0.0462	4.6219	1.6241
20	08:00:27	0.3065	0.0463	4.6304	1.6239
21	12:00:40	0.3065	0.0464	4.6389	1.6237
22	16:00:53	0.3065	0.0463	4.6304	1.6239
23	20:01:07	0.3065	0.0464	4.6389	1.6237
24	23:59:57	0.3063	0.0466	4.6559	1.6232

Tested By: TS

Consolidation Test Results
(Sequence 11) Load 4.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.3063	0.0466	4.6559	1.6232
1	00:00:01	0.2981	0.0547	5.4715	1.6007
2	00:00:02	0.2967	0.0562	5.6160	1.5968
3	00:00:03	0.2963	0.0565	5.6500	1.5958
4	00:00:04	0.2962	0.0567	5.6670	1.5954
5	00:00:05	0.2960	0.0568	5.6839	1.5949
6	00:00:06	0.2959	0.0569	5.6924	1.5947
7	00:00:12	0.2956	0.0573	5.7264	1.5937
8	00:00:15	0.2955	0.0573	5.7349	1.5935
9	00:00:30	0.2952	0.0577	5.7689	1.5926
10	00:01:00	0.2950	0.0579	5.7859	1.5921
11	00:02:00	0.2946	0.0582	5.8199	1.5912
12	00:04:01	0.2944	0.0585	5.8454	1.5905
13	00:08:01	0.2941	0.0587	5.8709	1.5898
14	00:10:01	0.2941	0.0588	5.8794	1.5895
15	00:15:01	0.2939	0.0590	5.8963	1.5891
16	00:30:02	0.2936	0.0592	5.9218	1.5884
17	01:00:04	0.2933	0.0596	5.9558	1.5874
18	02:00:07	0.2929	0.0599	5.9898	1.5865
19	04:00:14	0.2926	0.0602	6.0238	1.5856
20	08:00:27	0.2923	0.0606	6.0578	1.5846
21	12:00:40	0.2920	0.0608	6.0833	1.5839
22	16:00:53	0.2919	0.0609	6.0918	1.5837
23	20:01:07	0.2918	0.0611	6.1088	1.5832
24	23:59:57	0.2916	0.0613	6.1257	1.5827

Tested By: TS

Consolidation Test Results
(Sequence 12) Load 8.000 ksf

Project: U2525C
Location: EB-2-A1 (29.5'-31.6")
Job Number: 34821

Project Number: CS34.348
Test Date: 1/5/2017
Test Number: -

Sample Number: ST-1
Boring Number: EB2-A1
Depth: 29.5'-31.6'
Sample Type: Undisturbed

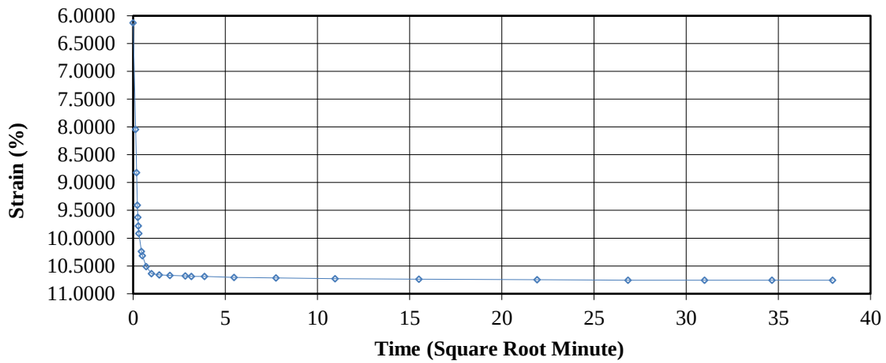
Soil Classification: A-7-5 (23) (Clayey Soils)
Remarks: Undisturbed

Index	Time	Elapsed Time (min)	Square Root of Time (√min)	Displacement (in)	Settlement (in)	Axial Strain (%)	Void Ratio
0	00:00:00	0.00	0.00	0.2916	0.0613	6.1257	1.5827
1	00:00:01	0.02	0.13	0.2724	0.0805	8.0459	1.5299
2	00:00:02	0.03	0.18	0.2647	0.0882	8.8190	1.5086
3	00:00:03	0.05	0.22	0.2588	0.0941	9.4053	1.4925
4	00:00:04	0.07	0.26	0.2566	0.0963	9.6262	1.4864
5	00:00:05	0.08	0.29	0.2551	0.0978	9.7791	1.4822
6	00:00:06	0.10	0.32	0.2537	0.0992	9.9150	1.4785
7	00:00:12	0.20	0.45	0.2505	0.1024	10.2379	1.4696
8	00:00:15	0.25	0.50	0.2497	0.1031	10.3144	1.4675
9	00:00:30	0.50	0.71	0.2477	0.1051	10.5098	1.4621
10	00:01:00	1.00	1.00	0.2465	0.1064	10.6372	1.4586
11	00:02:01	2.02	1.42	0.2462	0.1066	10.6627	1.4579
12	00:04:01	4.02	2.00	0.2461	0.1067	10.6712	1.4577
13	00:08:01	8.02	2.83	0.2460	0.1068	10.6797	1.4575
14	00:10:01	10.02	3.16	0.2460	0.1069	10.6882	1.4572
15	00:15:01	15.02	3.88	0.2460	0.1069	10.6882	1.4572
16	00:30:02	30.03	5.48	0.2458	0.1071	10.7052	1.4568
17	01:00:04	60.07	7.75	0.2457	0.1071	10.7137	1.4565
18	02:00:07	120.12	10.96	0.2455	0.1073	10.7307	1.4561
19	04:00:14	240.23	15.50	0.2455	0.1074	10.7392	1.4558
20	08:00:27	480.45	21.92	0.2454	0.1075	10.7477	1.4556
21	12:00:40	720.67	26.85	0.2453	0.1076	10.7562	1.4554
22	16:00:53	960.88	31.00	0.2453	0.1076	10.7562	1.4554
23	20:01:07	1201.12	34.66	0.2453	0.1076	10.7562	1.4554
24	23:59:58	1439.97	37.95	0.2453	0.1076	10.7562	1.4554

Tested By: TS

Consolidation Test Results
(Sequence 12) Load 8.000 ksf

Consolidation Graph (Squareroot Time)



SITE PHOTOGRAPHS

State Project No. 34821 – TIP No. U-2525C – Site # 5 (Structure # 7) Bridge No. 1246 on SR 1001 (N. Church Street) (-Y5-) over Greensboro Eastern Loop, I-85 Bypass (-L-) - Guilford County, NC

View Looking Upstation Along -Y5-

View Looking Downstation Along -Y5-

View Looking Upstation Along -L-

View Looking Downstation Along -L-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-2525C	1	51

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

SITE DESCRIPTION *SITE NO. 5 (STRUCTURE NO. 7) – BRIDGE NO. 1246 ON SR 1001 (NORTH CHURCH STREET) (-Y5-) OVER GREENSBORO EASTERN LOOP, I-85 BYPASS (-L-)*

CONTENTS

CPT & DILATOMETER TESTING

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SITE PLAN
3-51	CPT & DMT REPORT/DATA

PERSONNEL

C.R. PASTRANA

CONETEC

INVESTIGATED BY *ESP Associates, P.A.*

DRAWN BY *C.R. PASTRANA*

CHECKED BY *P. WEAVER*

SUBMITTED BY *ESP Associates, P.A.*

DATE *OCTOBER 2017*

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7011 ALBERT PICK RD
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GREENSBORO, NC 27409
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NORTH CAROLINA LICENSED SEAL 1500 GEOLOGIST PAUL M. WEAVER

DocuSigned by:
Paul Weaver
01847D3739AD49C...
SIGNATURE

10/3/2017
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

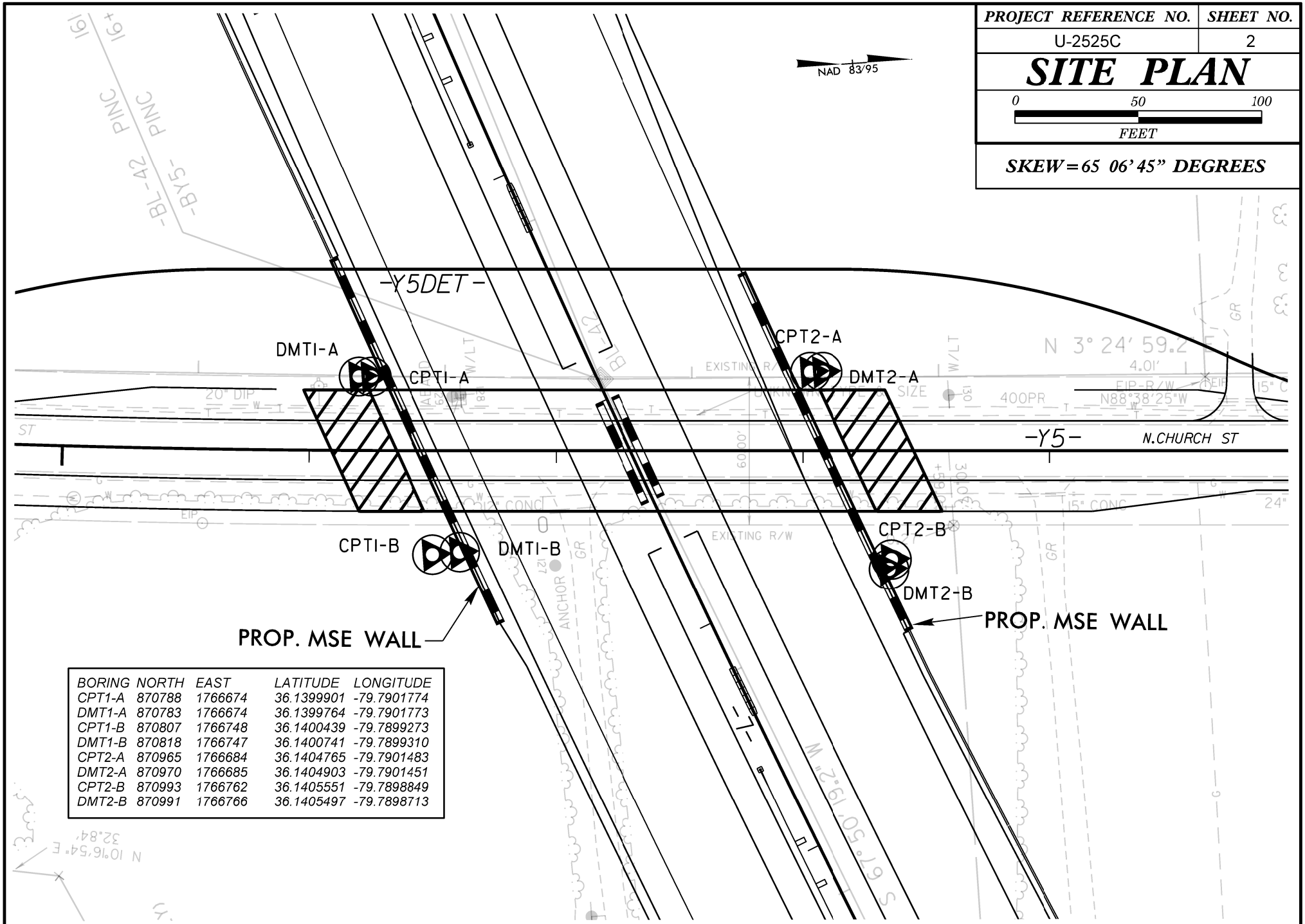
PROJECT REFERENCE NO.	SHEET NO.
U-2525C	2

SITE PLAN

0 50 100

FEET

SKEW = 65 06' 45" DEGREES



BORING	NORTH	EAST	LATITUDE	LONGITUDE
CPT1-A	870788	1766674	36.1399901	-79.7901774
DMT1-A	870783	1766674	36.1399764	-79.7901773
CPT1-B	870807	1766748	36.1400439	-79.7899273
DMT1-B	870818	1766747	36.1400741	-79.7899310
CPT2-A	870965	1766684	36.1404765	-79.7901483
DMT2-A	870970	1766685	36.1404903	-79.7901451
CPT2-B	870993	1766762	36.1405551	-79.7898849
DMT2-B	870991	1766766	36.1405497	-79.7898713

PRESENTATION OF SITE INVESTIGATION RESULTS

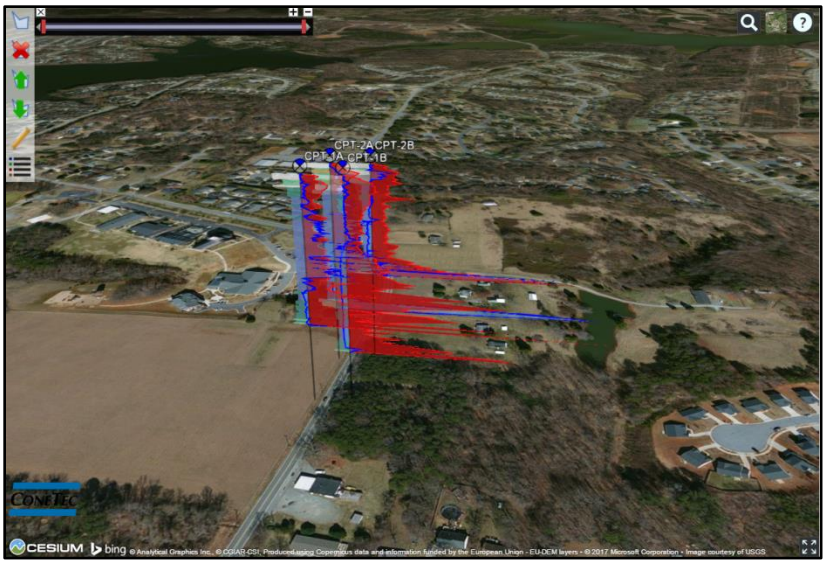
U-2525C

Prepared for:

ESP Associates

ConeTec Job No: 17-54039

Project Start Date: 01-May-2017
Project End Date: 02-May-2017
Report Date: 31-May-2017



Prepared by:

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Introduction

The enclosed report presents the results of the site investigation program conducted by ConeTec Inc. for ESP Associates in Greenboro, North Carolina. The program consisted of four cone penetration tests (CPTu), and four Flat Plate Dilatometer Tests (DMT). The field work was carried out under the direction of ESP Associates.

Project Information

Project	
Client	ESP Associates
Project	U-2525C
ConeTec project number	17-54039

A map from Cesium including the CPT test locations is presented below.

Rig Description	Deployment System	Test Type
20 Ton Track Rig – TC6	Integrated Ramset	CPT, DMT

Coordinates			
Test Type	Collection Method	EPSG Number	Comments
CPT, DMT	GPS Survey	4326	Coordinates provide by client

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)
AD349:T1500F15U500	AD349	225	15	1500	15	500
Cone 349 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). Soils were classified as either drained or undrained based on the Normalized Soil Behaviour Type, SBT Qtn (PKR 2009) classification chart.

Flat Plate Dilatometer Test (DMT)	
Depth reference	Depths are referenced to the existing ground surface at the time of each test.
Phreatic surface determination	Based on adjacent CPT pore pressure dissipation tests
Assumption for equilibrium pore pressure profile	Hydrostatic equilibrium pore pressure profile assumed

Limitations

This report has been prepared for the exclusive use of ESP Associates (Client) for the project titled "U-2525C". 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.

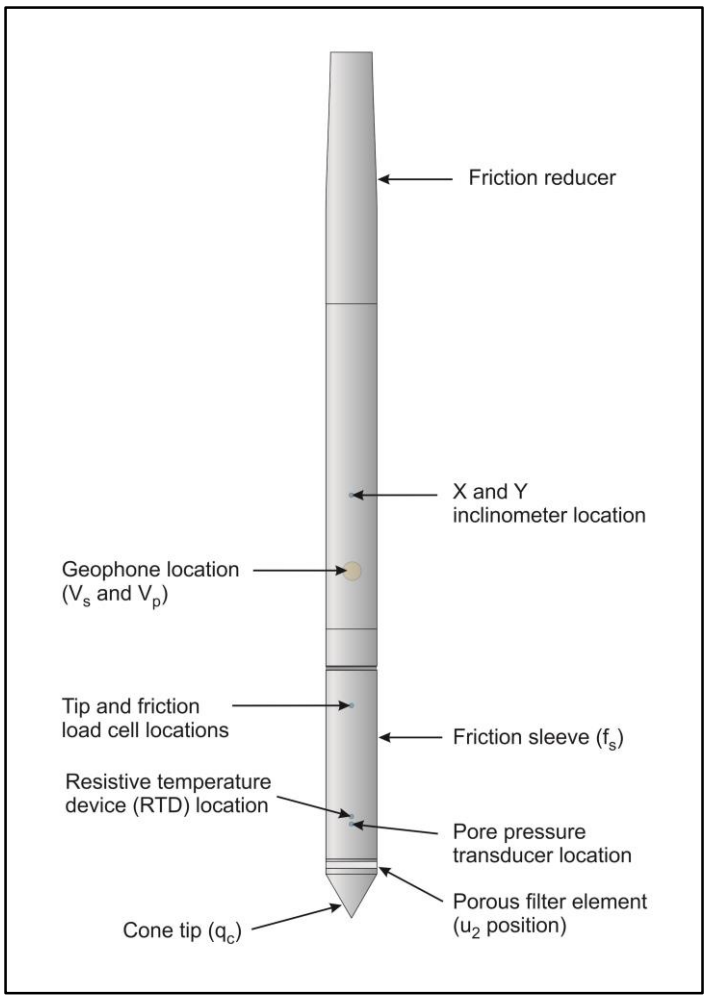

Figure CPTu. Piezocone Penetrometer (15 cm^2)

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).

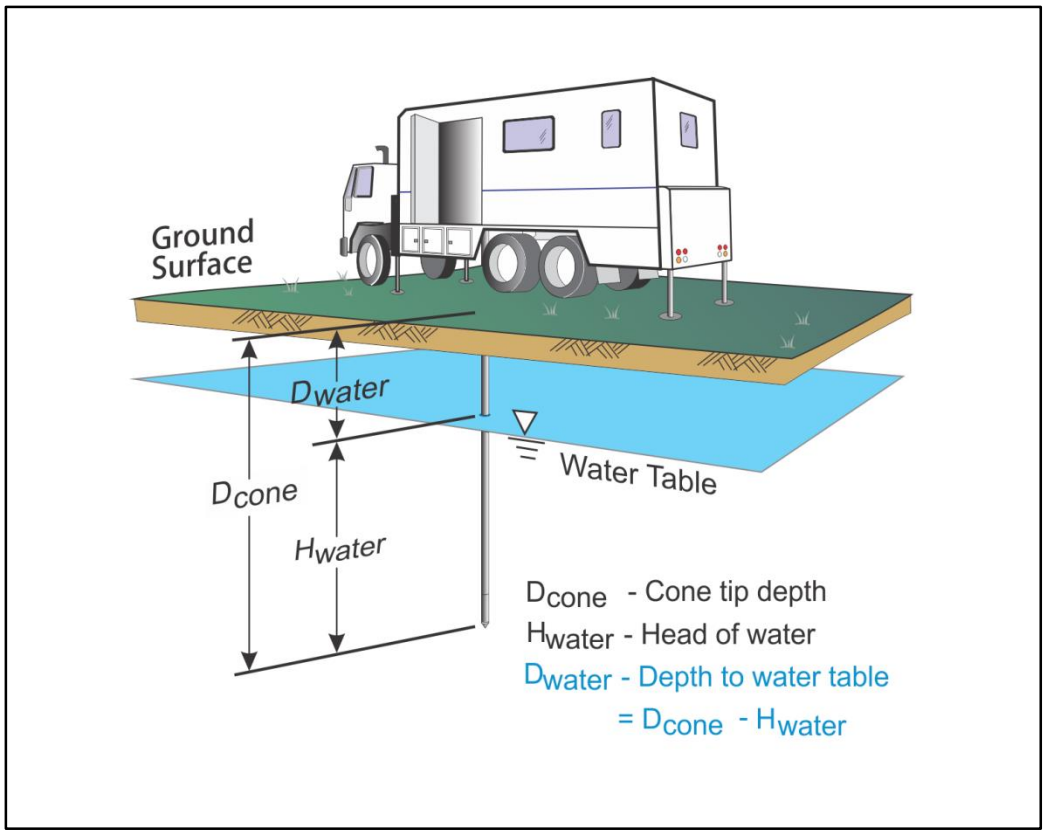

Figure PPD-1. Pore pressure dissipation test setup

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.

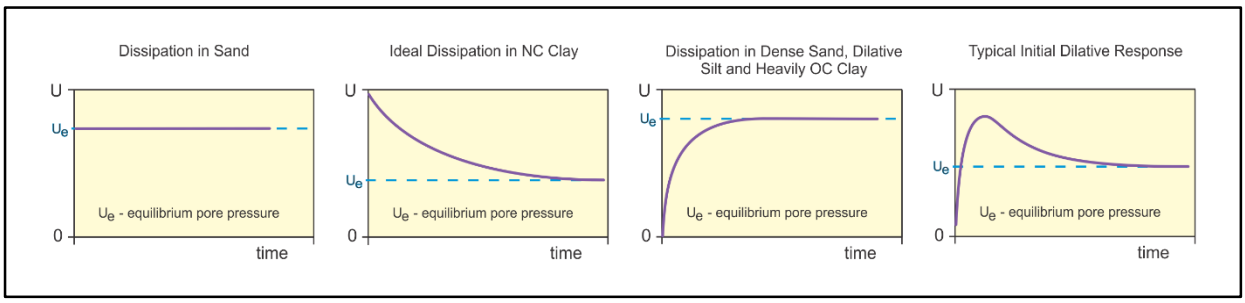

Figure PPD-2. Pore pressure dissipation curve examples

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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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.

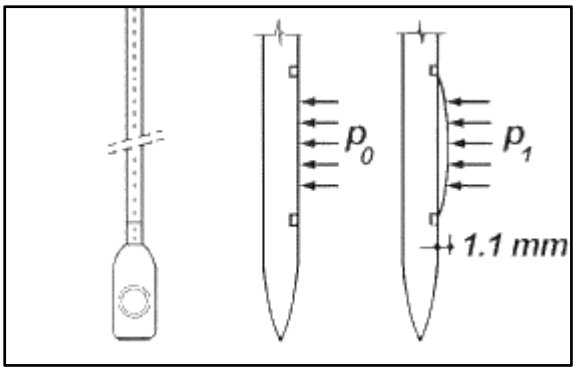

Figure DMT-2. Flat plate dilatometer p_0 and p_1
(Marchetti, http://www.marchetti-dmt.it/)

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.

References

ASTM D6635-01, Reapproved 2007, "Standard Test Method for Performing the Flat Plate Dilatometer ", ASTM, West Conshohocken, US.

Foti, D., Lancellotta, R., Marchetti, D., Monaco, P., and Totani, P., 2006, “Interpretation of SDMT tests in a transversely isotropic medium”, Proceedings from the Second International Conference on the Flat Dilatometer, Washington, DC., April 2-5.

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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:	17-54039
Client:	ESP Associates
Project:	U-2525C
Start Date:	01-May-2017
End Date:	02-May-2017

CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Assumed Phreatic Surface[1] (ft)	Final Depth (ft)	Latitude[2] (Degrees)	Longitude[2] (Degrees)	Elevation[3] (ft)
CPT-1A	17-54039_CP CPT-1A	01-May-2017	AD349	24	55.3	36.13999	-79.79018	856.8
CPT-1B	17-54039_CP CPT-1B	02-May-2017	AD349	26	66.1	36.14004	-79.78993	855.8
CPT-2A	17-54039_CP CPT-2A	01-May-2017	AD349	18	59.1	36.14048	-79.79015	852.0
CPT-2B	17-54039_CP CPT-2B	02-May-2017	AD349	18	45.3	36.14056	-79.78988	851.1
Totals	4 soundings				225.718			

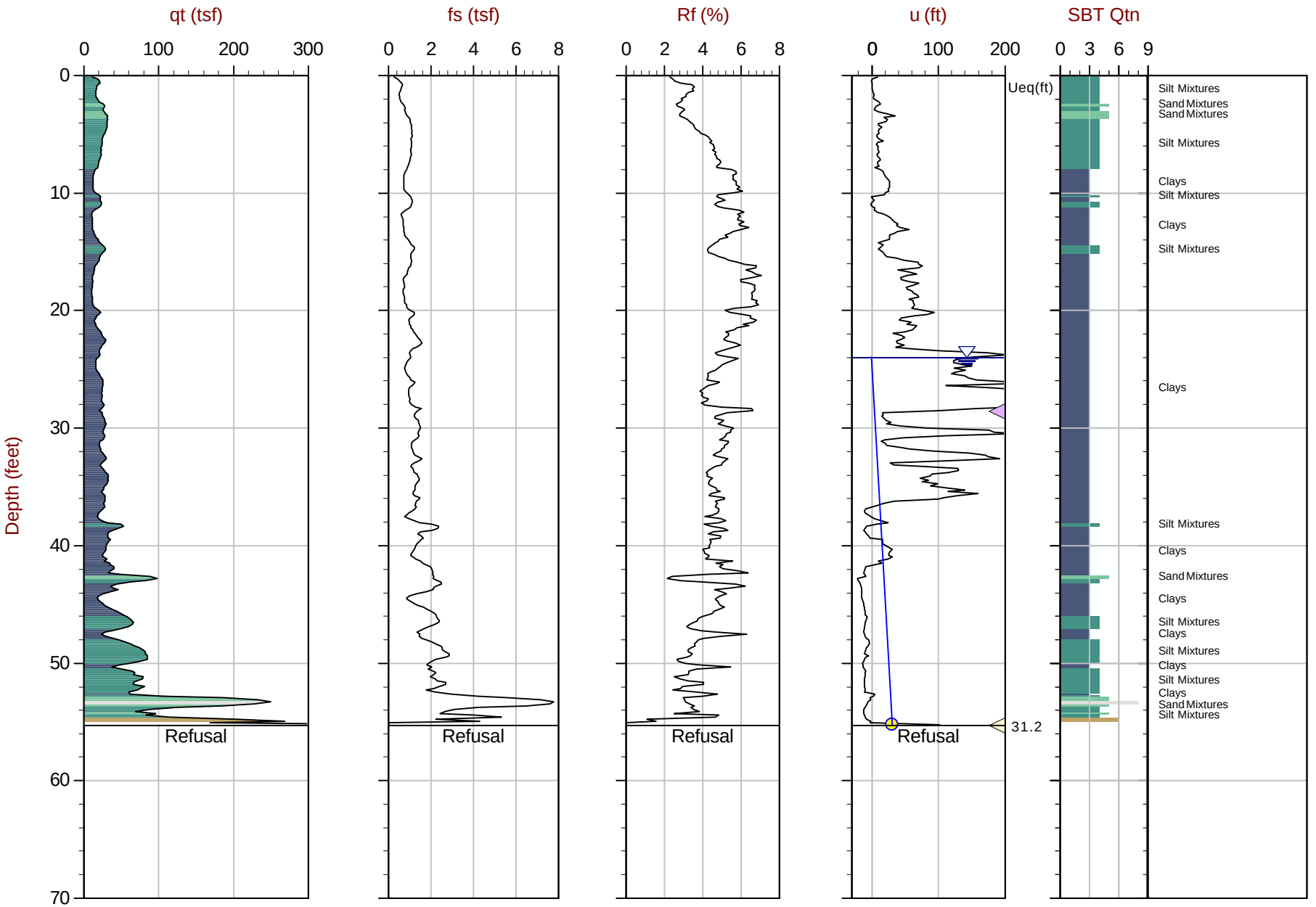
1. Phreatic surface based on pore pressure dissipation test unless otherwise noted. Hydrostatic profile applied to interpretation tables
2. Coordinates were provided by client - WGS 84
3. Elevations are referenced to the exisiting ground surface at the time of testing.

CONETEC

ESP Associates

Job No: 17-54039
Date: 05:01:17 15:53
Site: U-2525C

Sounding: CPT-1A
Cone: 349:T1500F15U500



Max Depth: 16.850 m / 55.28 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-54039_CPCPT-1A.COR
Unit Wt: SBT Zones

SBT: Robertson, 2009 and 2010
Coords: N: 36.140 E: -79.790 Elev: 856.8ft

△ Dissipation with estimated Ueq value △ Dissipation, equilibrium not achieved ○ Equilibrium Pore Pressure (Ueq)

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

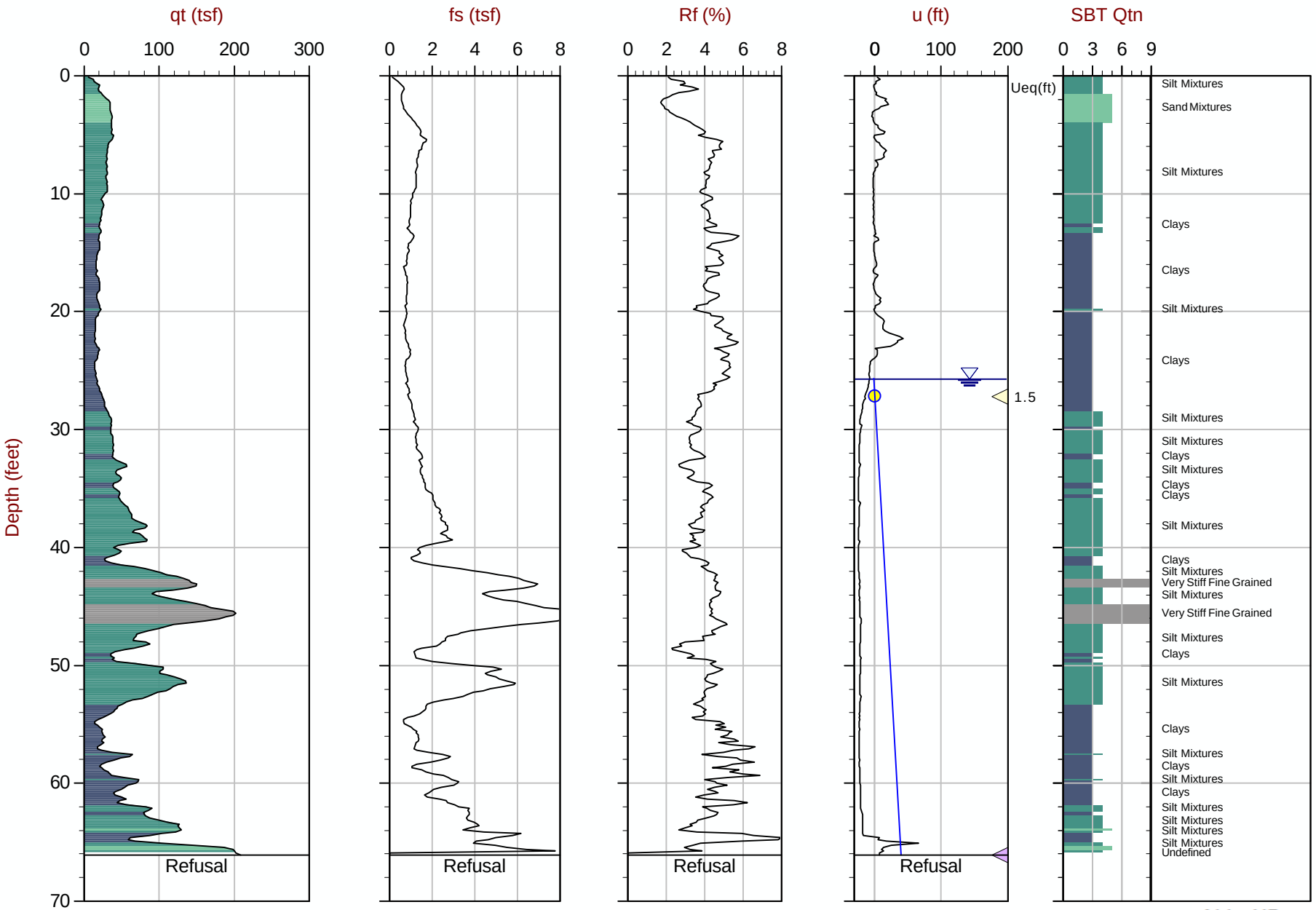
ALI: -Y5-
STN: 21+25
OFFSET: 30'LT
N: 870788
E: 1766674

CONETEC

ESP Associates

Job No: 17-54039
Date: 05:02:17 09:07
Site: U-2525C

Sounding: CPT-1B
Cone: 349:T1500F15U500



Max Depth: 20.150 m / 66.11 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-54039_CPCPT-1B.COR
Unit Wt: SBT Zones

SBT: Robertson, 2009 and 2010
Coords: N: 36.140 E: -79.790 Elev: 855.8ft

△ Dissipation with estimated Ueq value △ Dissipation, equilibrium not achieved ○ Equilibrium Pore Pressure (Ueq)

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

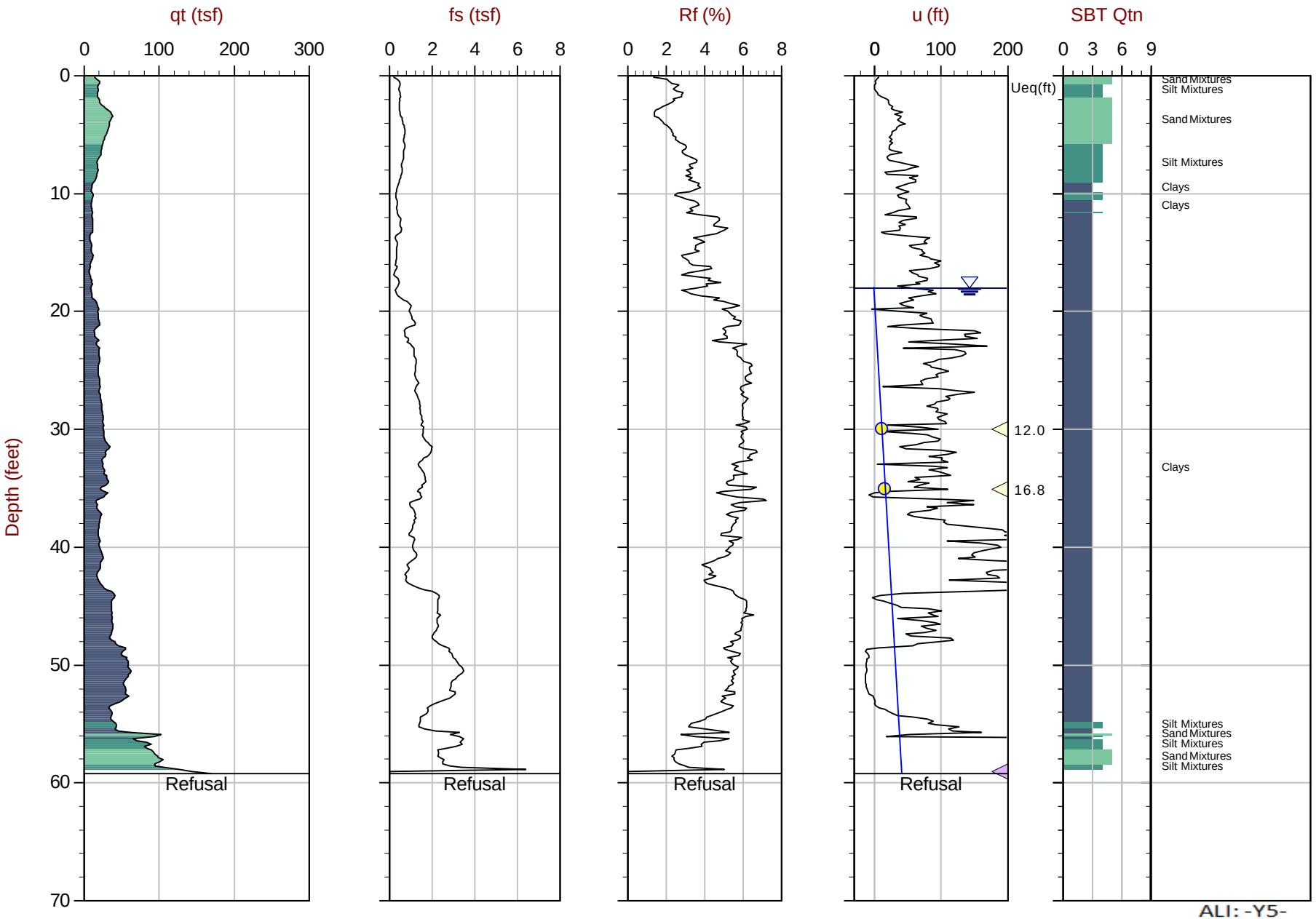
ALI: -Y5-
STN: 21+50
OFFSET: 42'RT
N: 870807
E: 1766748

CONETEC

ESP Associates

Job No: 17-54039
Date: 05:01:17 12:52
Site: U-2525C

Sounding: CPT-2A
Cone: 349:T1500F15U500



Max Depth: 18.050 m / 59.22 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-54039_CPCPT-2A.COR
Unit Wt: SBT Zones

SBT: Robertson, 2009 and 2010
Coords: N: 36.140 E: -79.790 Elev: 852.0ft

△ Dissipation with estimated Ueq value △ Dissipation, equilibrium not achieved ○ Equilibrium Pore Pressure (Ueq)

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

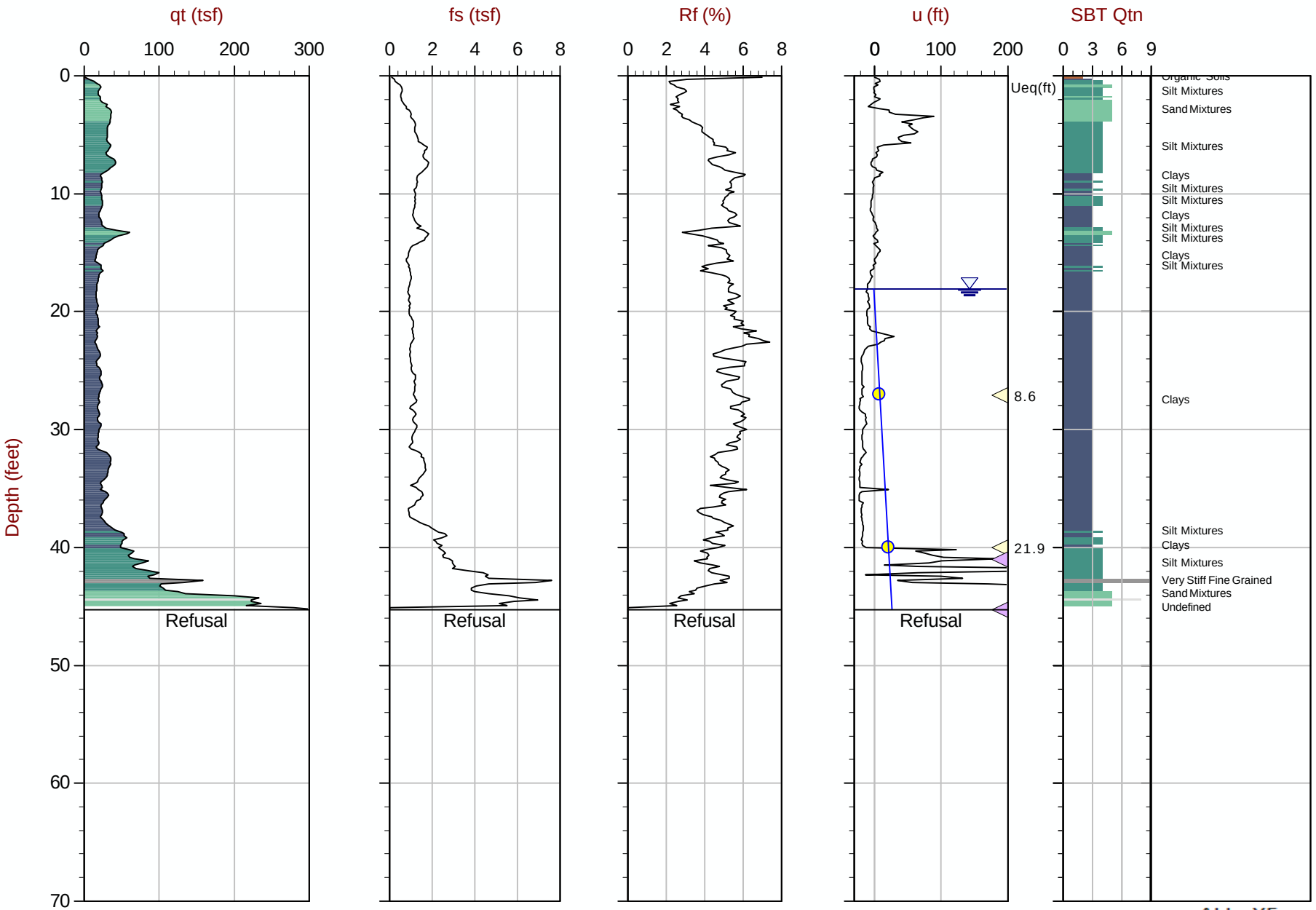
ALI: -Y5-
STN: 23+03
OFFSET: 32'LT
N: 870965
E: 1766684

CONETEC

ESP Associates

Job No: 17-54039
Date: 05:02:17 13:54
Site: U-2525C

Sounding: CPT-2B
Cone: 349:T1500F15U500



Max Depth: 13.800 m / 45.28 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: Every Point

File: 17-54039_CP CPT-2B.COR
Unit Wt: SBT Zones

SBT: Robertson, 2009 and 2010
Coords: N: 36.141 E: -79.790 Elev: 851.1ft

△ Dissipation with estimated Ueq value △ Dissipation, equilibrium not achieved ○ Equilibrium Pore Pressure (Ueq)

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

ALI: -Y5-
STN: 23+36
OFFSET: 44'RT
N: 870993
E: 1766762

Pore Pressure Dissipation Summary and

Pore Pressure Dissipation Plots

CONETEC

Job No:	17-54039
Client:	ESP Associates
Project:	U-2525C
Start Date:	01-May-17
End Date:	02-May-17

CPTu PORE PRESSURE DISSIPATION SUMMARY

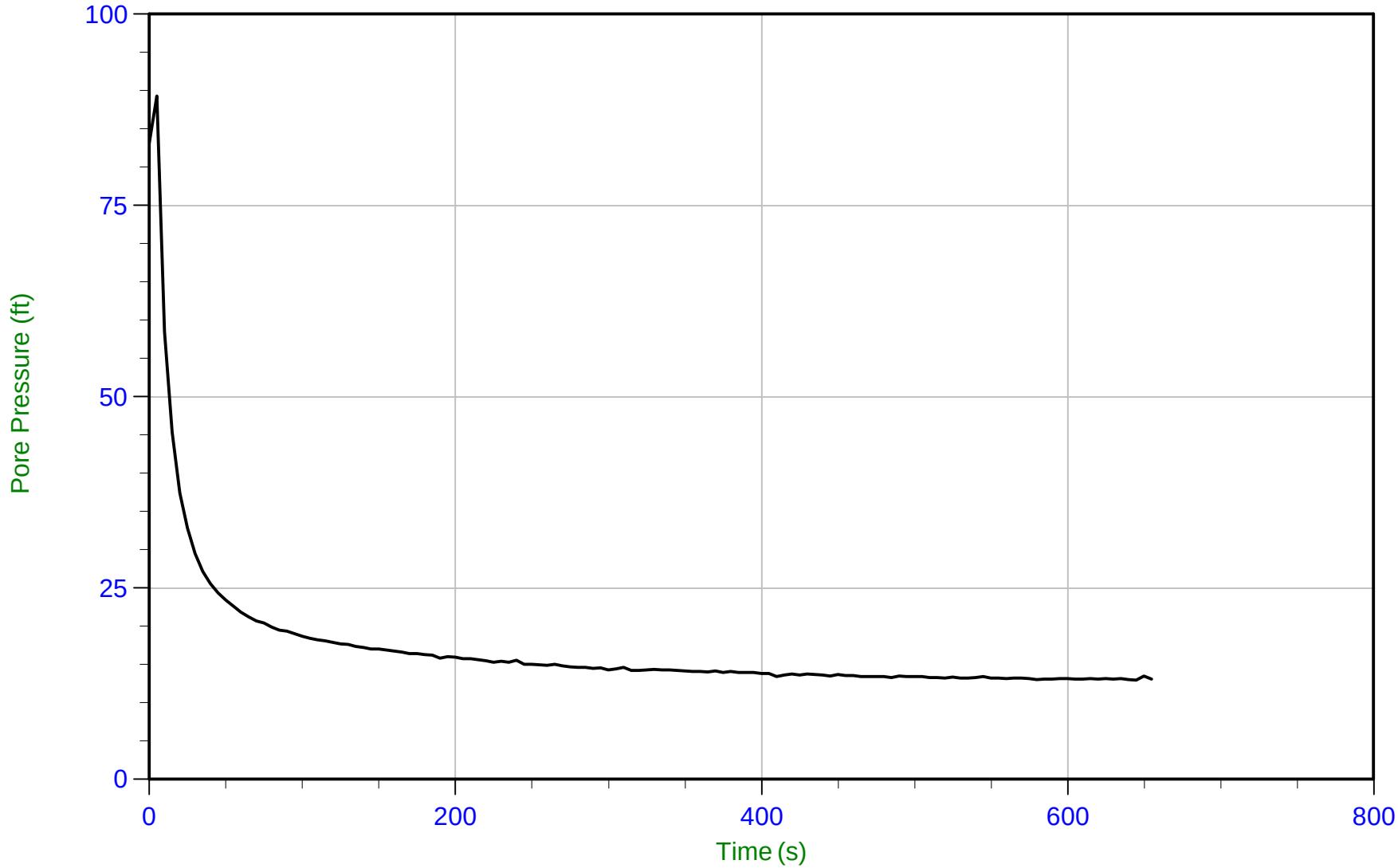
Sounding ID	File Name	Cone Area (cm^2)	Duration (s)	Test Depth (ft)	Estimated Equilibrium Pore Pressure U_{eq} (ft)	Calculated Phreatic Surface (ft)
CPT-1A	17-54039_CP CPT-1A	15.0	655	28.5		
CPT-1A	17-54039_CP CPT-1A	15.0	795	55.3	31	24
CPT-1B	17-54039_CP CPT-1B	15.0	400	27.2	2	26
CPT-1B	17-54039_CP CPT-1B	15.0	190	66.1		
CPT-2A	17-54039_CP CPT-2A	15.0	315	30.0	12	18
CPT-2A	17-54039_CP CPT-2A	15.0	420	35.1	17	18
CPT-2A	17-54039_CP CPT-2A	15.0	210	59.1		
CPT-2B	17-54039_CP CPT-2B	15.0	665	27.1	9	18
CPT-2B	17-54039_CP CPT-2B	15.0	1200	40.0	22	18
CPT-2B	17-54039_CP CPT-2B	15.0	200	41.0		
CPT-2B	17-54039_CP CPT-2B	15.0	145	45.3		
Totals	11		86.6 min			

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/01/2017 15:53
Site: U-2525C

Sounding: CPT-1A
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-1A.PPD
Depth: 8.700 m / 28.543 ft
Duration: 655.0 s

U Min: 13.0 ft
U Max: 89.3 ft

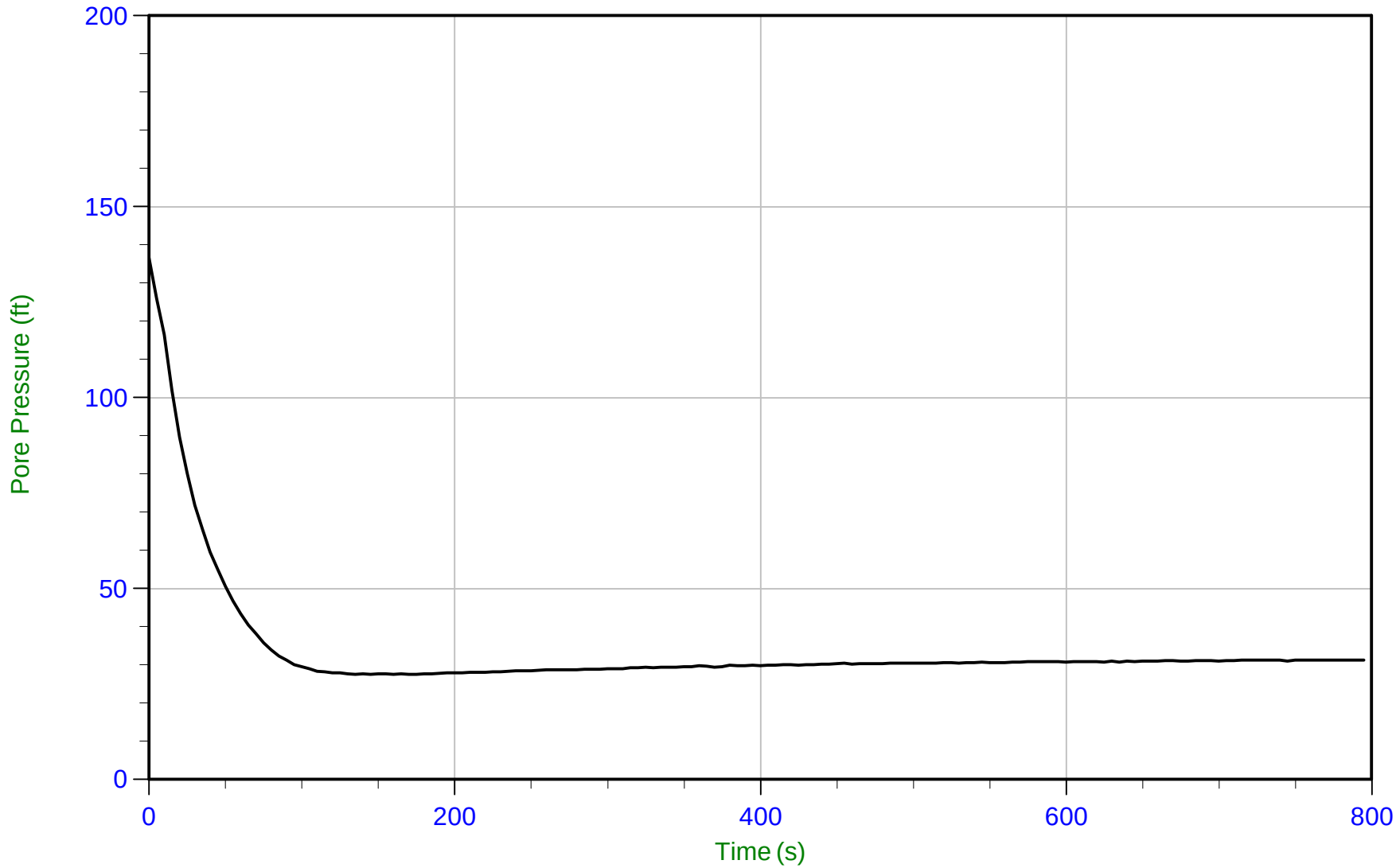
ALI: -Y5-
STN: 21+25
OFFSET: 30'LT
N: 870788
E: 1766674

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/01/2017 15:53
Site: U-2525C

Sounding: CPT-1A
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-1A.PPD
Depth: 16.850 m / 55.281 ft
Duration: 795.0 s

U Min: 27.5 ft
U Max: 136.5 ft

WT: 7.326 m / 24.035 ft
Ueq: 31.2 ft

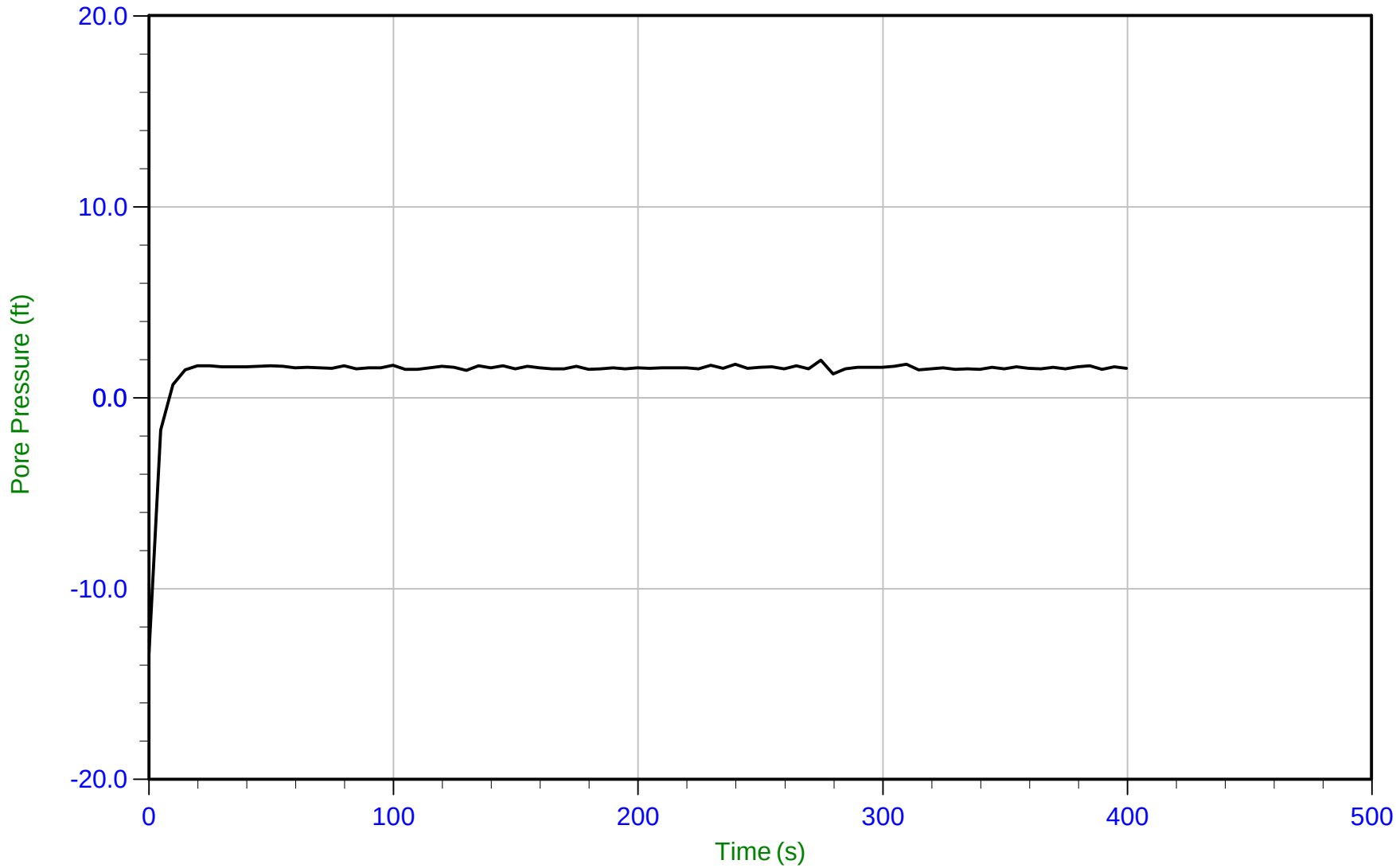
ALI: -Y5-
STN: 21+25
OFFSET: 30'LT
N: 870788
E: 1766674

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 09:07
Site: U-2525C

Sounding: CPT-1B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-1B.PPD
Depth: 8.300 m / 27.231 ft
Duration: 400.0 s

U Min: -13.4 ft
U Max: 2.0 ft

WT: 7.830 m / 25.689 ft
Ueq: 1.5 ft

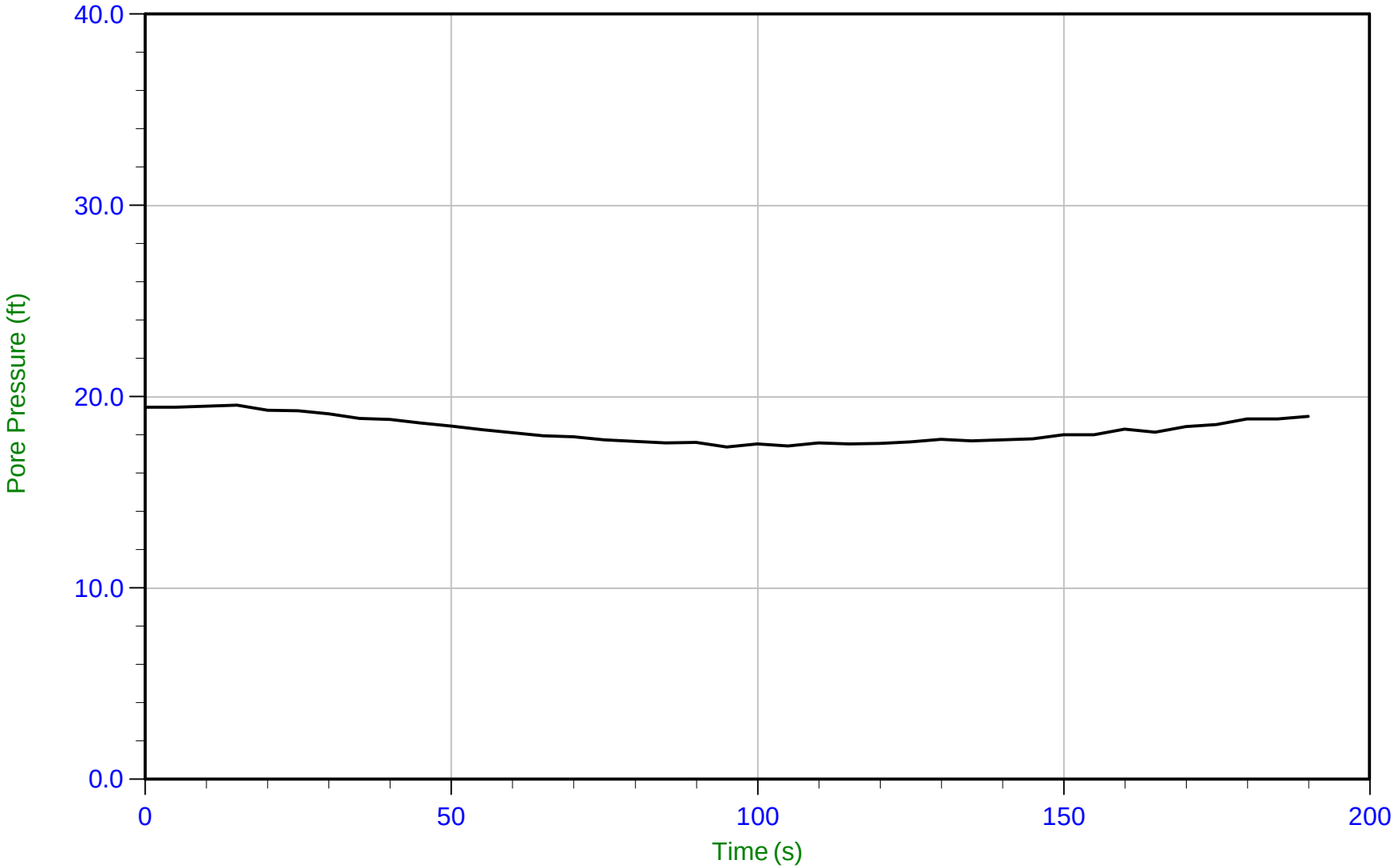
ALI: -Y5-
STN: 21+50
OFFSET: 42'RT
N: 870807
E: 1766748

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 09:07
Site: U-2525C

Sounding: CPT-1B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-1B.PPD
Depth: 20.150 m / 66.108 ft
Duration: 190.0 s

U Min: 17.4 ft
U Max: 19.5 ft

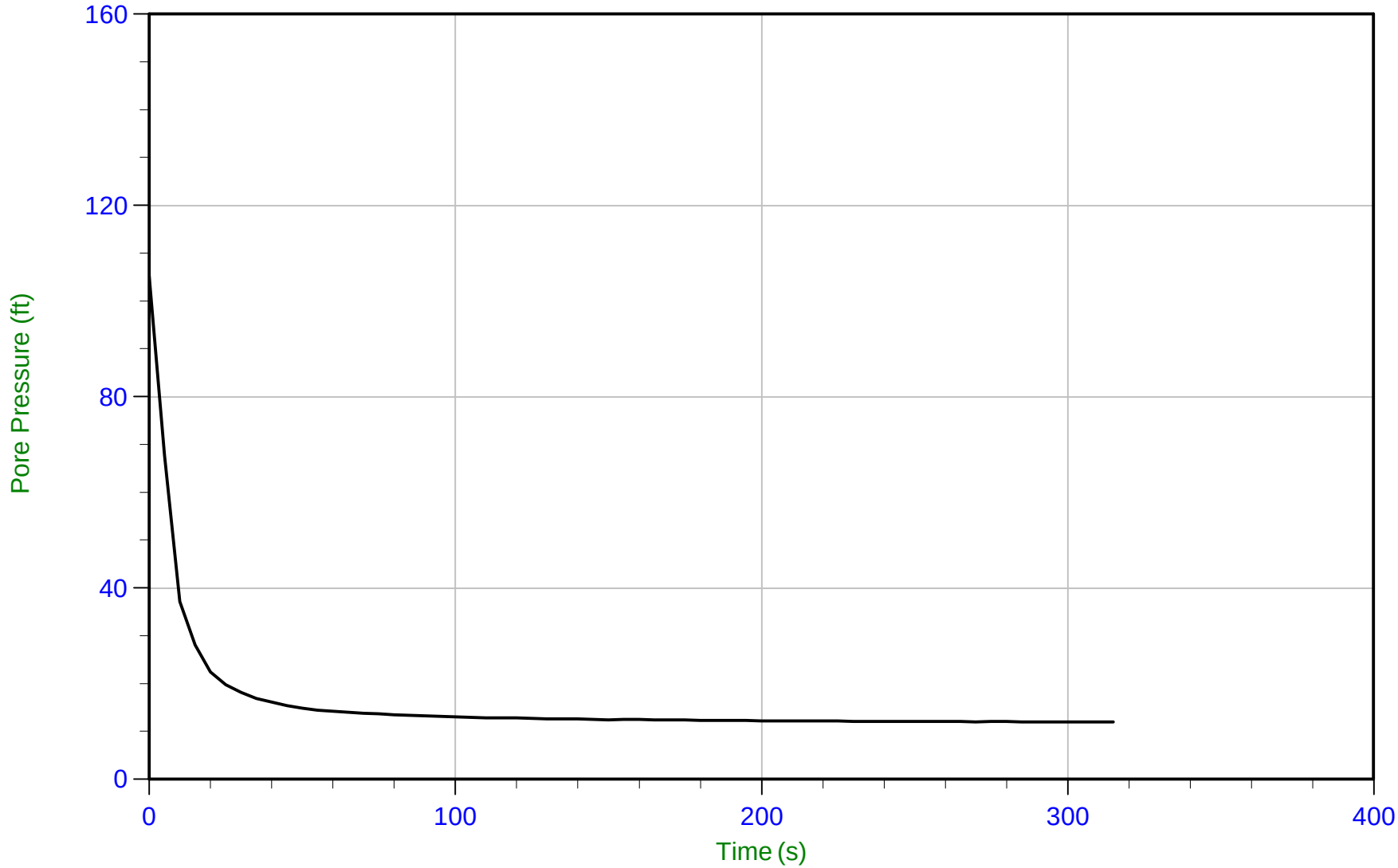
ALI: -Y5-
STN: 21+50
OFFSET: 42'RT
N: 870807
E: 1766748

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/01/2017 12:52
Site: U-2525C

Sounding: CPT-2A
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2A.PPD
Depth: 9.150 m / 30.019 ft
Duration: 315.0 s

U Min: 12.0 ft
U Max: 105.2 ft

WT: 5.487 m / 18.001 ft
Ueq: 12.0 ft

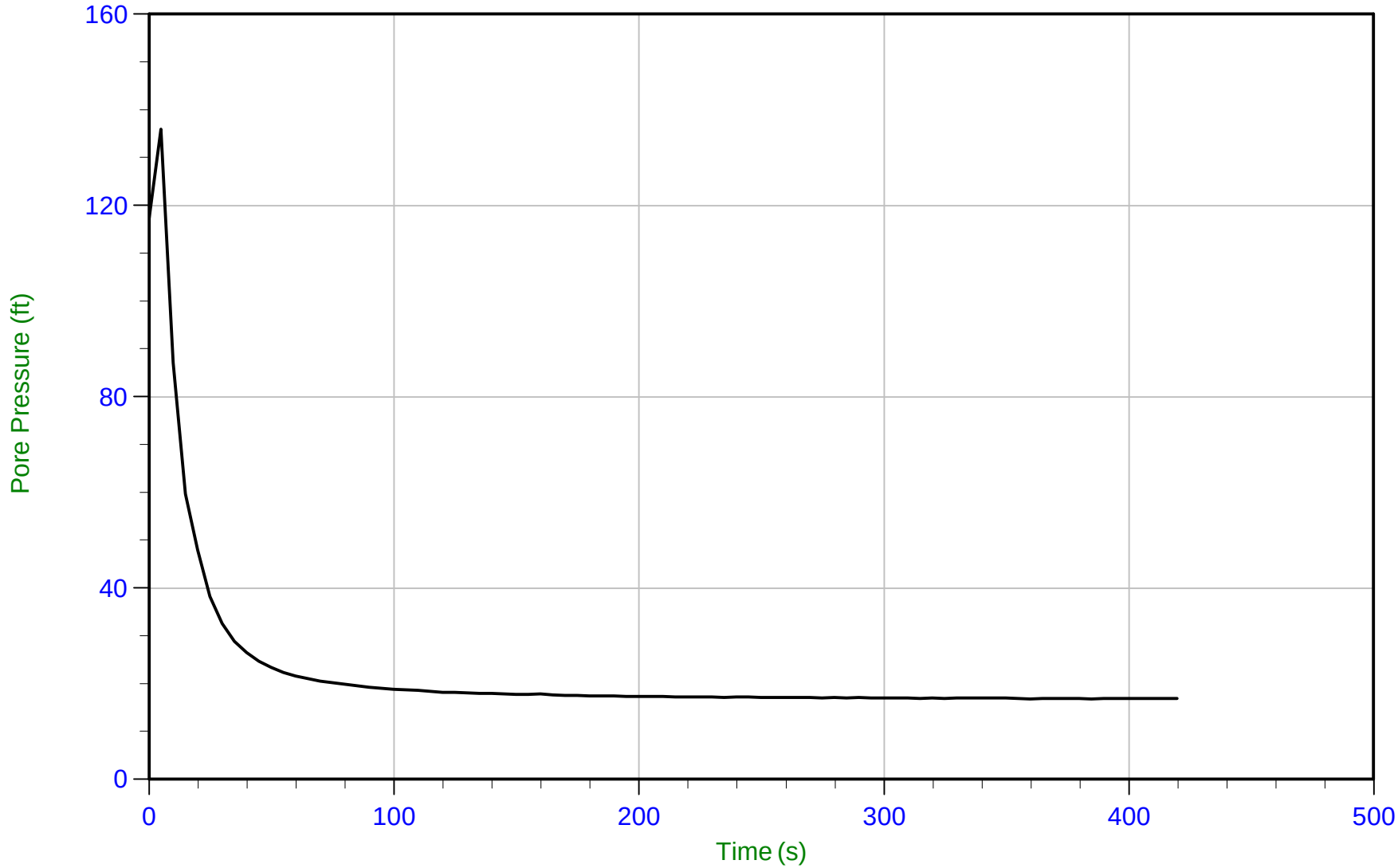
ALI: -Y5-
STN: 23+03
OFFSET: 32'LT
N: 870965
E: 1766684

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/01/2017 12:52
Site: U-2525C

Sounding: CPT-2A
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2A.PPD
Depth: 10.700 m / 35.105 ft
Duration: 420.0 s

U Min: 16.8 ft
U Max: 136.0 ft

WT: 5.565 m / 18.257 ft
Ueq: 16.8 ft

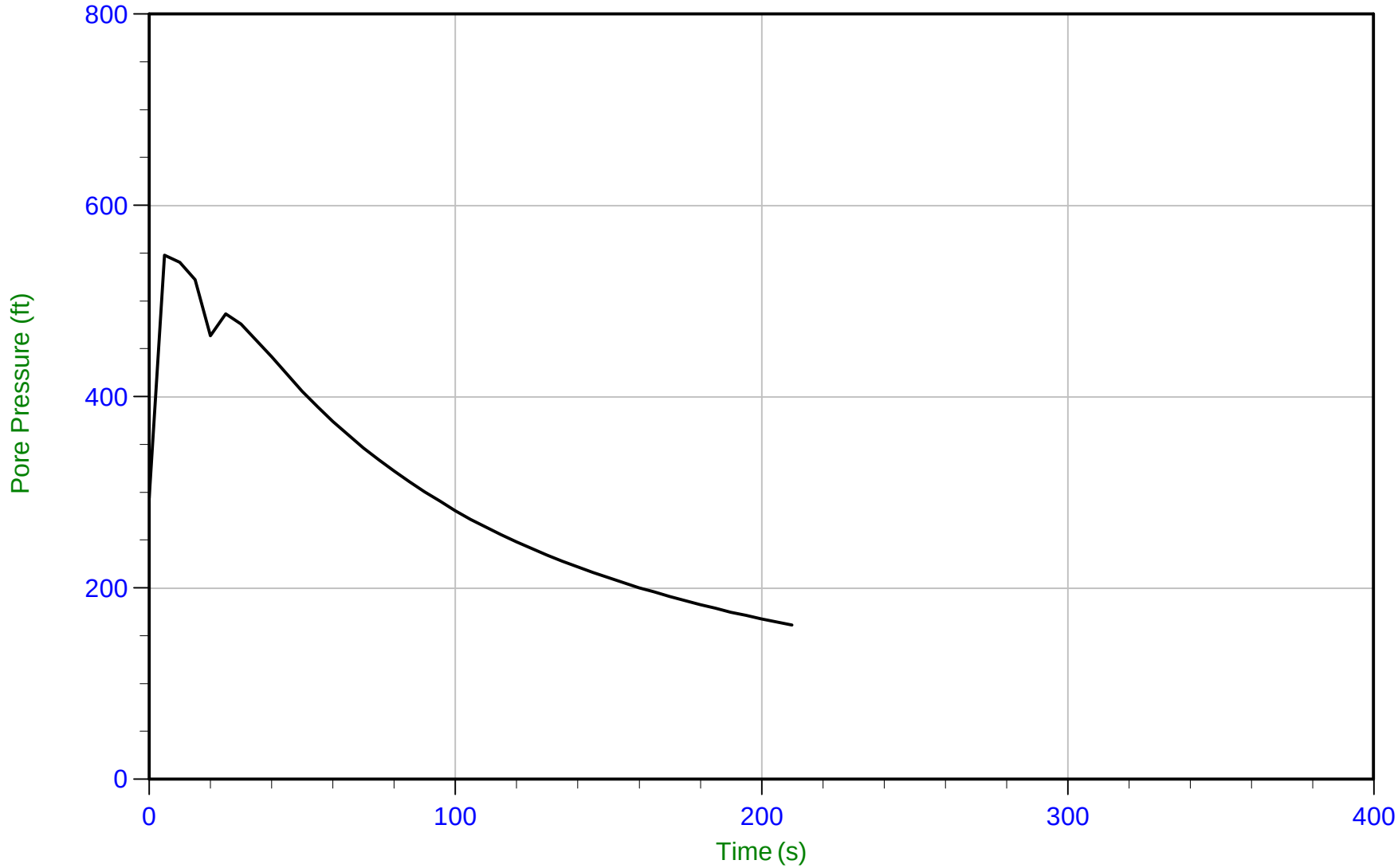
ALI: -Y5-
STN: 23+03
OFFSET: 32'LT
N: 870965
E: 1766684

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/01/2017 12:52
Site: U-2525C

Sounding: CPT-2A
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2A.PPD
Depth: 18.000 m / 59.054 ft
Duration: 210.0 s

U Min: 161.2 ft
U Max: 547.8 ft

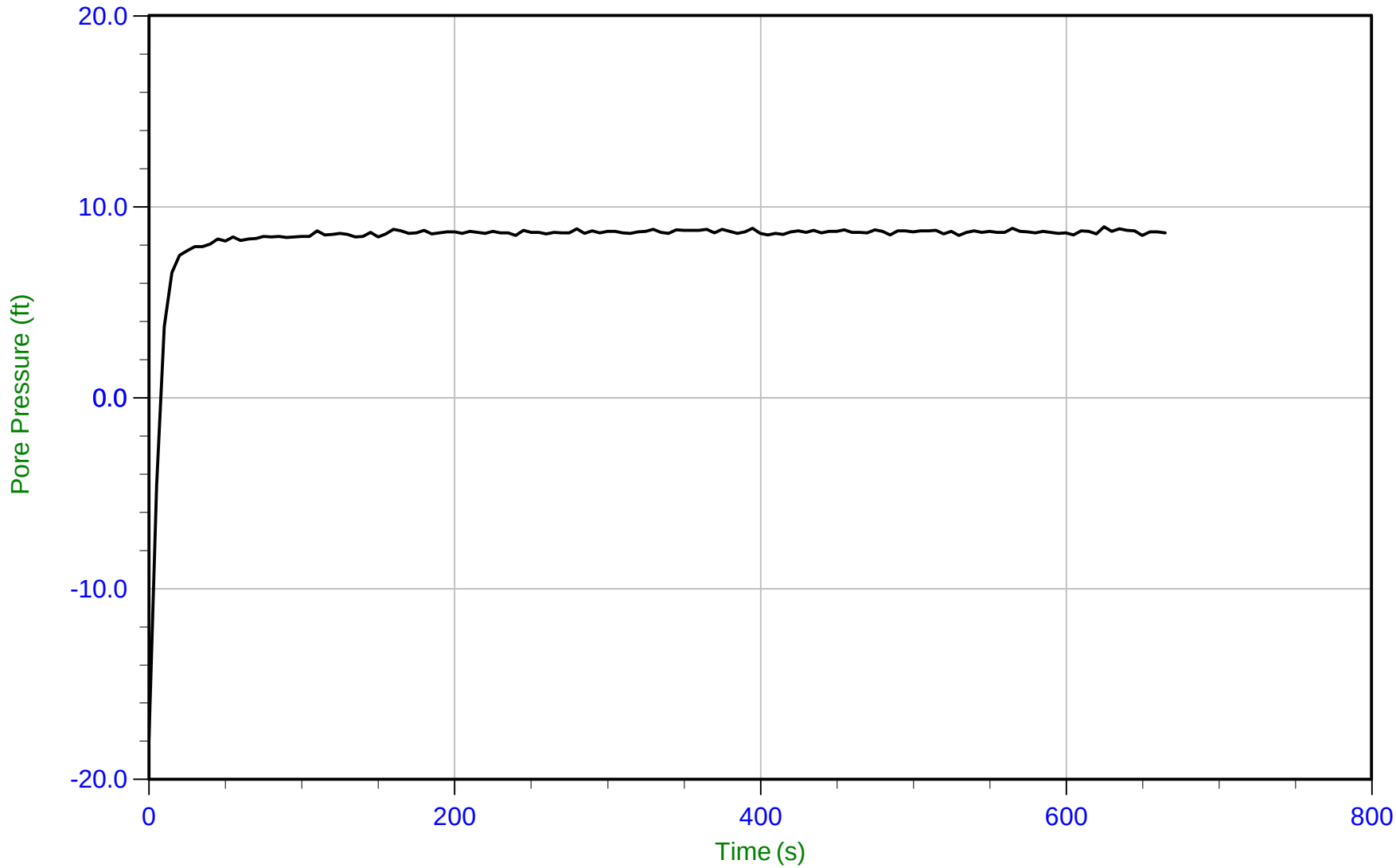
ALI: -Y5-
STN: 23+03
OFFSET: 32'LT
N: 870965
E: 1766684

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 13:54
Site: U-2525C

Sounding: CPT-2B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2B.PPD
Depth: 8.250 m / 27.067 ft
Duration: 665.0 s

U Min: -17.9 ft
U Max: 8.9 ft

WT: 5.617 m / 18.427 ft
Ueq: 8.6 ft

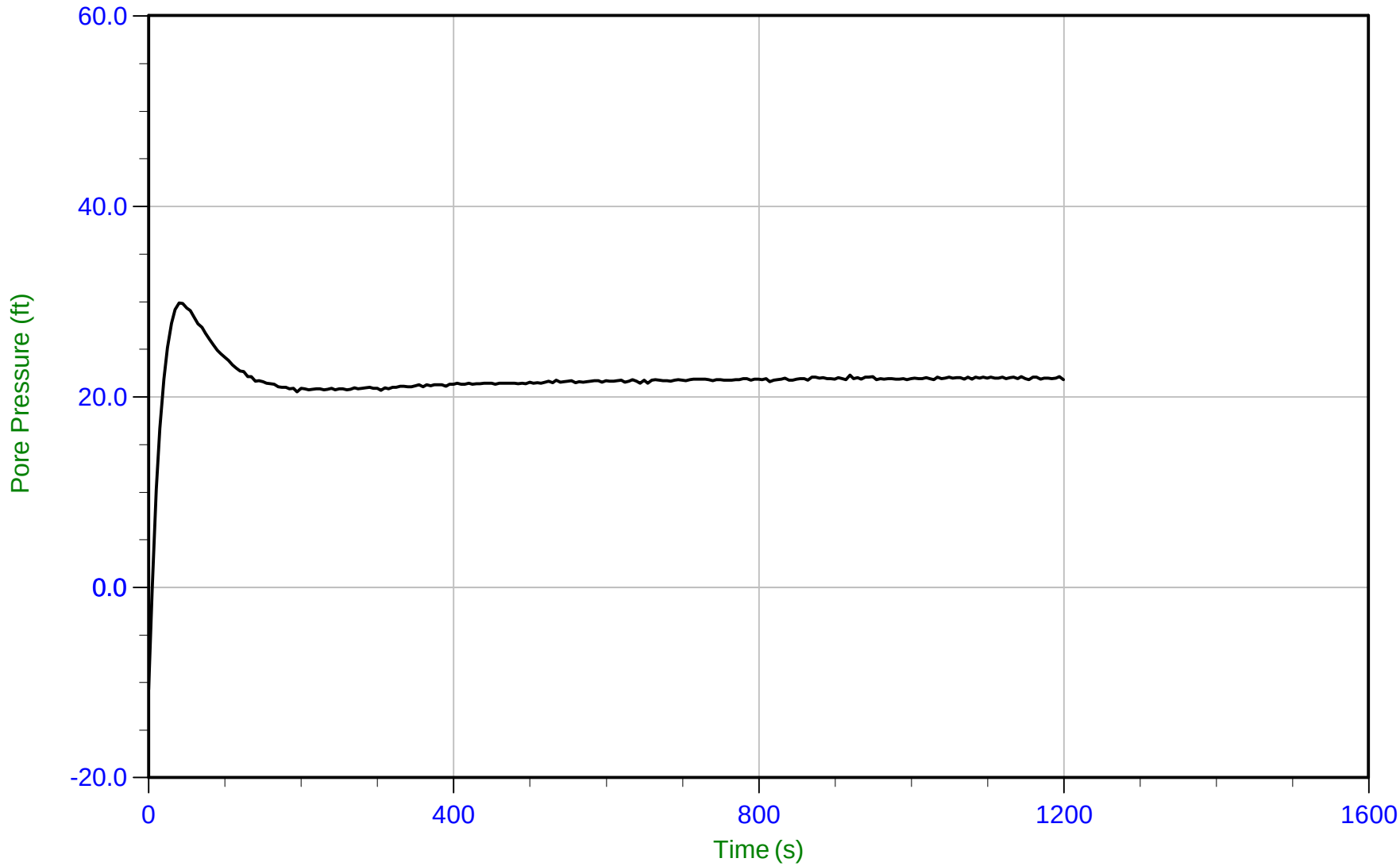
ALI: -Y5-
STN: 23+36
OFFSET: 44'RT
N: 870993
E: 1766762

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 13:54
Site: U-2525C

Sounding: CPT-2B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2B.PPD
Depth: 12.200 m / 40.026 ft
Duration: 1200.0 s

U Min: -10.8 ft
U Max: 29.8 ft

WT: 5.513 m / 18.087 ft
Ueq: 21.9 ft

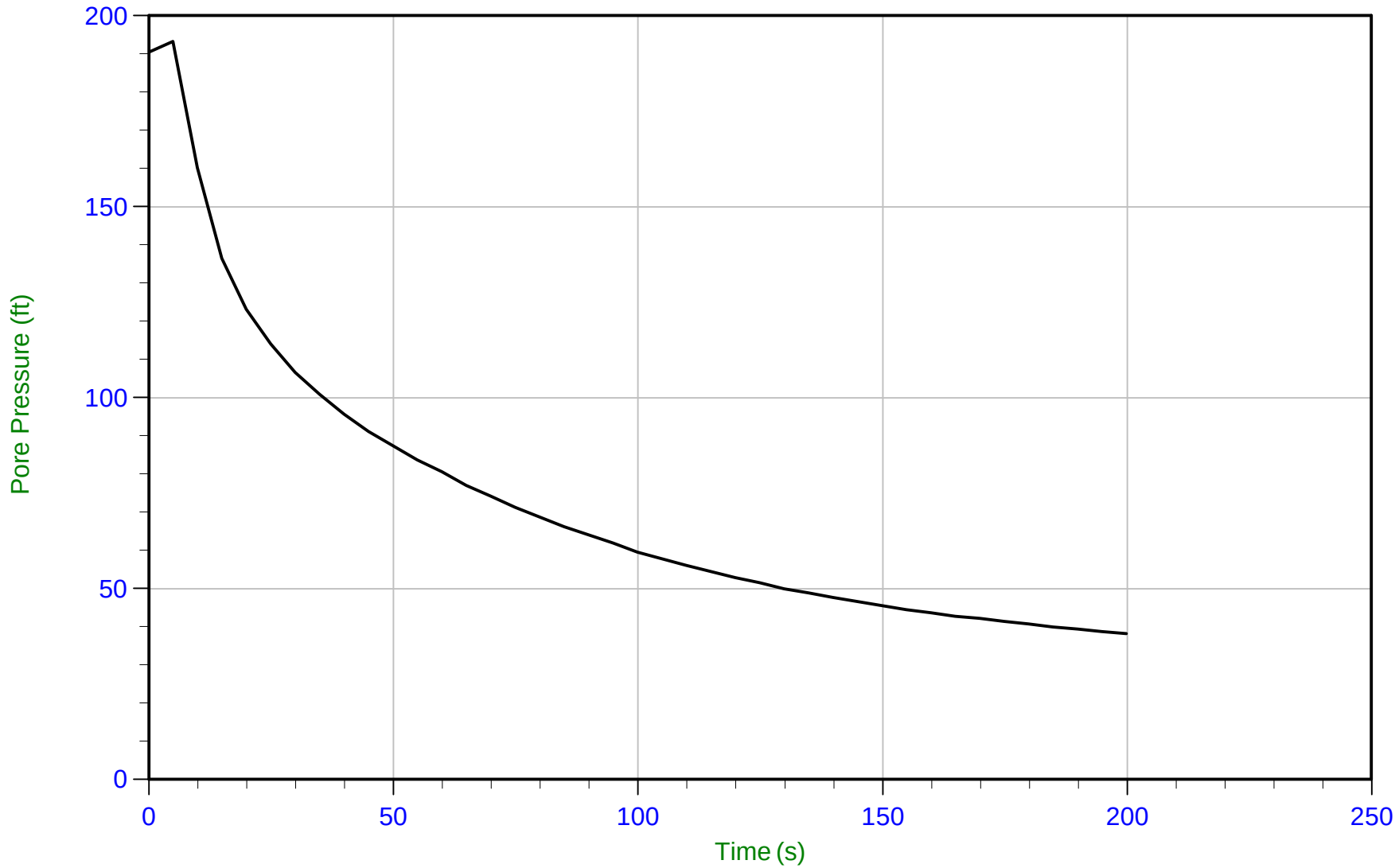
ALI: -Y5-
STN: 23+36
OFFSET: 44'RT
N: 870993
E: 1766762

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 13:54
Site: U-2525C

Sounding: CPT-2B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2B.PPD
Depth: 12.500 m / 41.010 ft
Duration: 200.0 s

U Min: 38.3 ft
U Max: 193.3 ft

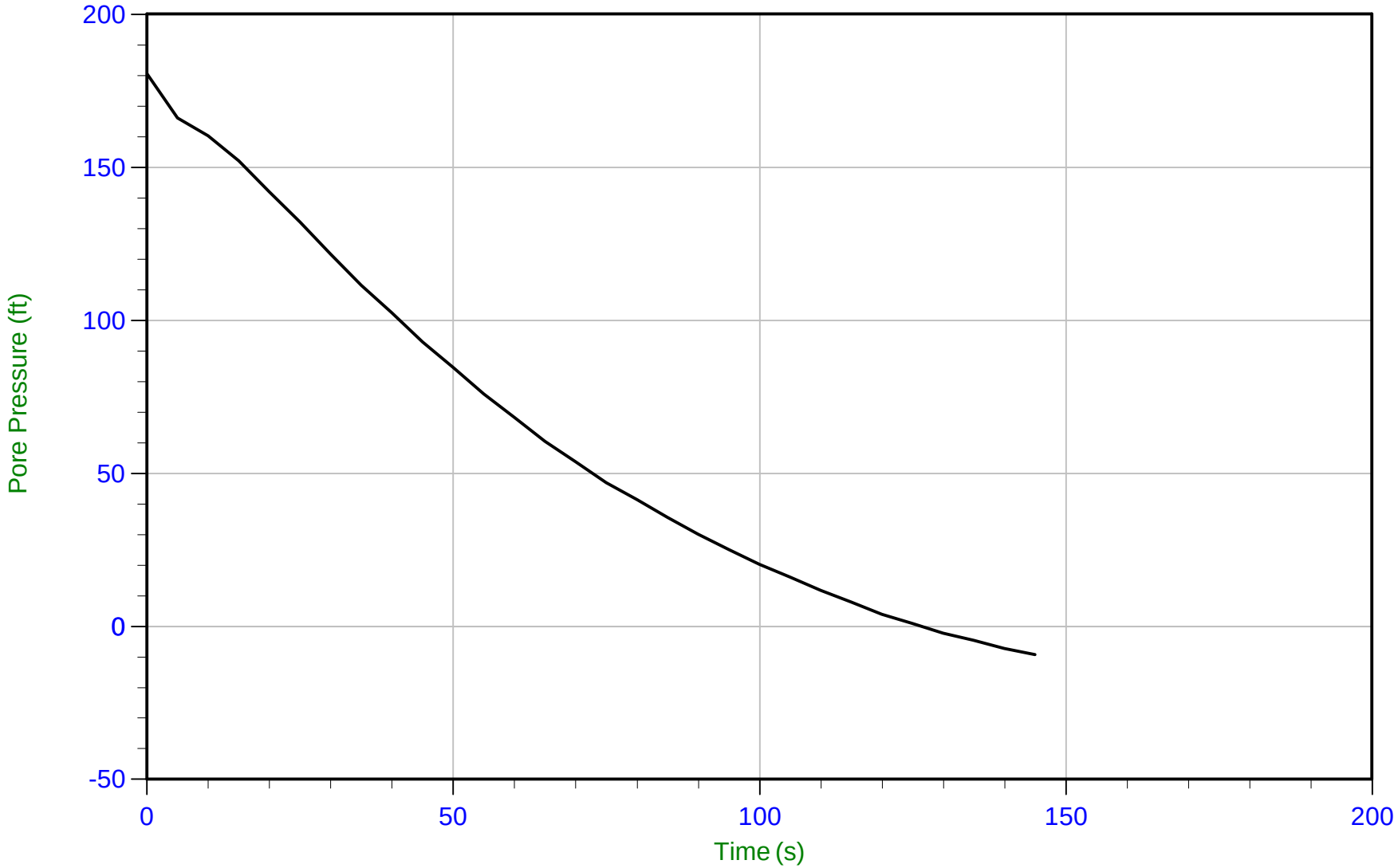
ALI: -Y5-
STN: 23+36
OFFSET: 44'RT
N: 870993
E: 1766762

CONETEC

ESP Associates

Job No: 17-54039
Date: 05/02/2017 13:54
Site: U-2525C

Sounding: CPT-2B
Cone: 349:T1500F15U500
Cone Area: 15 sq cm



Trace Summary:

Filename: 17-54039_CP CPT-2B.PPD
Depth: 13.800 m / 45.275 ft
Duration: 145.0 s

U Min: -9.3 ft
U Max: 180.7 ft

ALI: -Y5-
STN: 23+36
OFFSET: 44'RT
N: 870993
E: 1766762

Flat Plate Dilatometer Test Summary, Plots and Tabular Results

CONETEC

Job No:	17-54039
Client:	ESP Associates
Project:	U-2525C
Start Date:	01-May-2017
End Date:	02-May-2017

FLAT PLATE DILATOMETER TEST SUMMARY

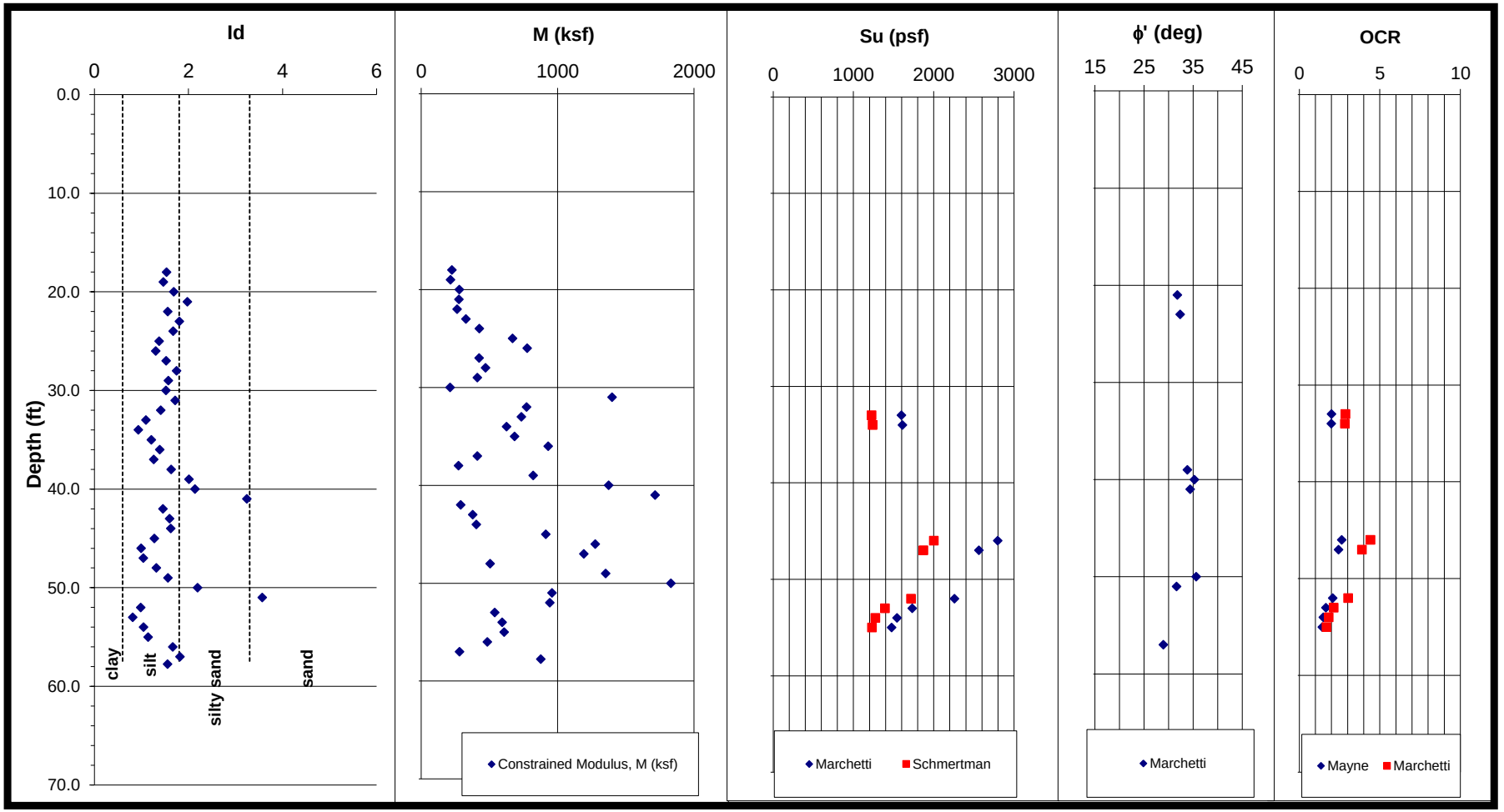
Sounding ID	File Name	Date	Depth From (ft)	Depth To (ft)	Assumed Phreatic Surface (ft)	Latitude[2] (deg)	Longitude[2] (deg)	Elevation[3] (ft)
DMT-1A	17-54039_DMT-1A	01-May-17	18.00	57.75	24.00	36.139976	-79.790177	856.8
DMT-1B	17-54039_DMT-1B	02-May-17	18.00	62.50	26.00	36.140074	-79.789931	855.9
DMT-2A	17-54039_DMT-2A	01-May-17	17.00	53.50	18.00	36.140490	-79.790145	851.9
DMT-2B	17-54039_DMT-2B	02-May-17	14.00	41.00	18.00	36.140550	-79.789871	851.1

1. Assumed phreatic surface based on adjacent CPT dissipation tests
2. Coordinates were provided by client - WGS 84 UTM
3. Elevations are referenced to the exisiting ground surface at the time of testing.

DILATOMETER TEST RESULTS

Test ID: DMT-1A
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

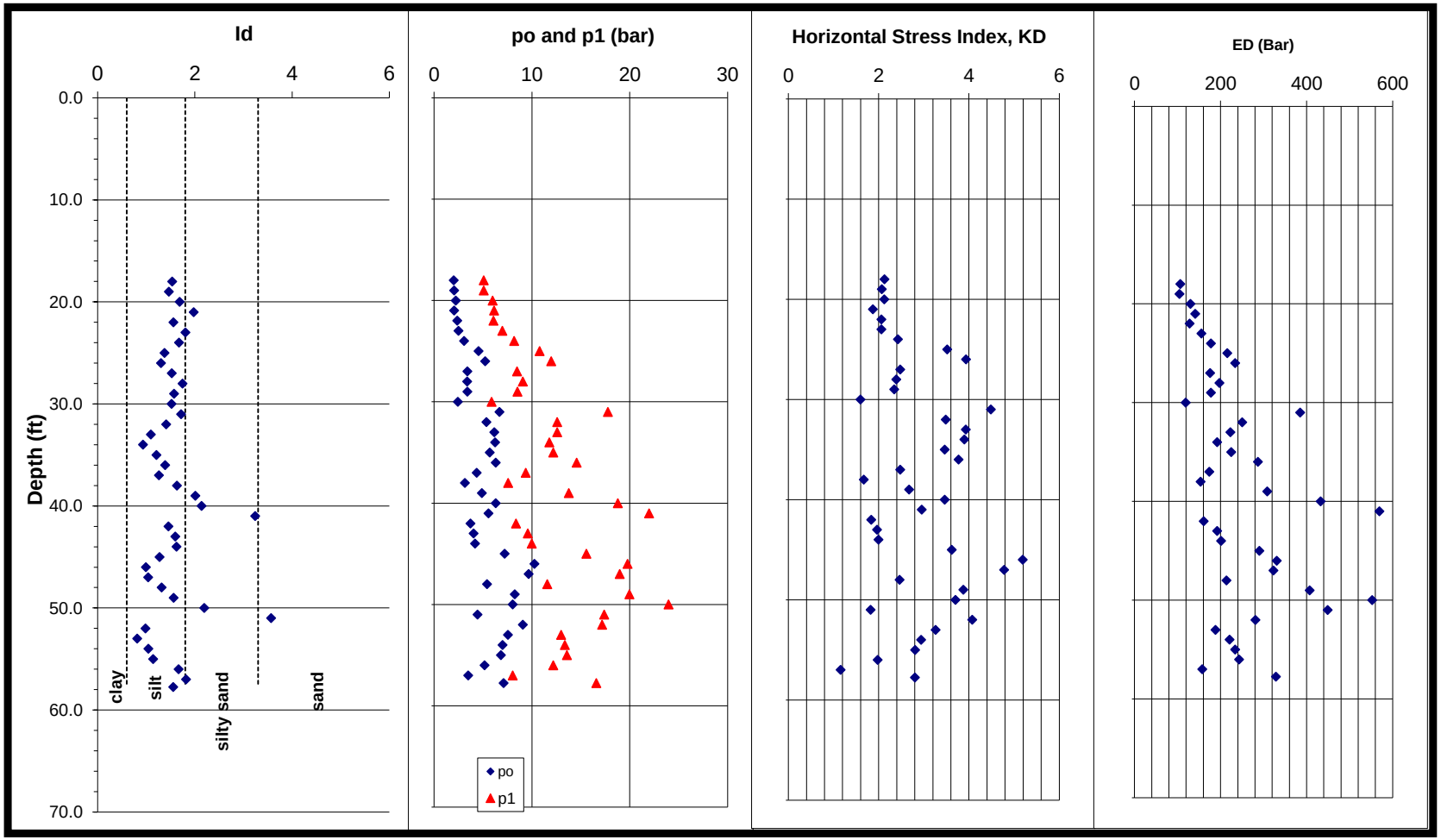
Alignment -Y5-
Station 21+20
Offset 30'LT
Northing 870783
Easting 1766674



DILATOMETER TEST RESULTS

Test ID: DMT-1A
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

Alignment -Y5-
Station 21+20
Offset 30'LT
Northing 870783
Easting 1766674



Job No: 17-54039
Job Name: U-2525C
Job Location: Greensboro, North Carolina
Date: 5-1-17
Sounding No: DMT-1A
Ground Water Depth (ft): 24

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.15	0	0
ΔB =	0.575	0	0
Zm=	0.05	bar	

Latitude: 36.13998
Longitude: -79.79018

Alignment -Y5-
Station 21+20
Offset 30'LT
Northing 870783
Easting 1766674

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

CONETEC

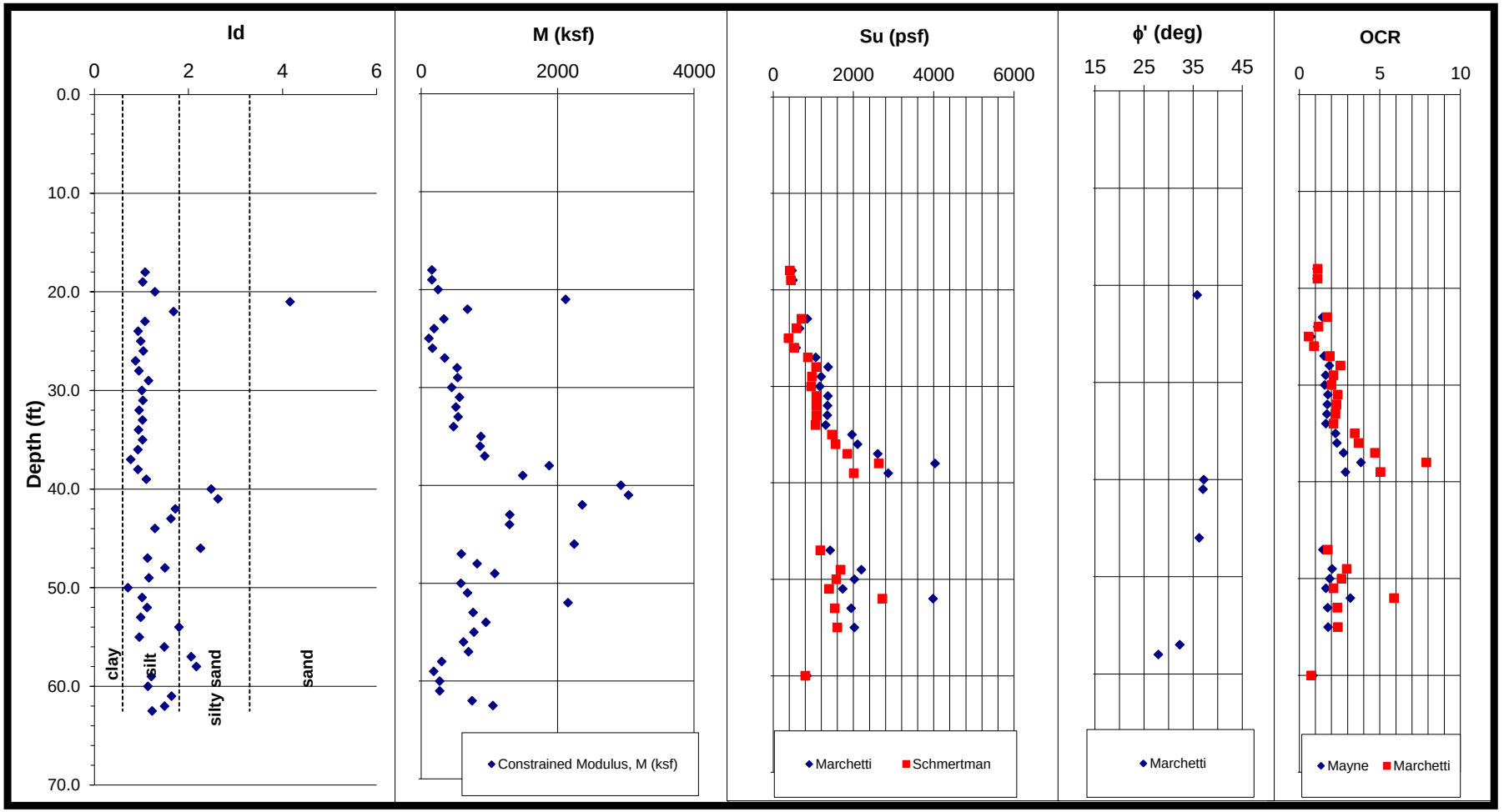
DILATOMETER TEST RESULTS

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)
18.0	2.05	5.7		2.0	5.075		0	109	1962	1962	1.53	2.1	107					1.01	223			225
19.0	2.1	5.7		2.1	5.075		0	109	2071	2071	1.47	2.1	105					0.98	219			214
20.0	2.3	6.6	0	2.2	5.975		0	111	2181	2181	1.69	2.1	130					1.02	272			278
21.0	2.15	6.75		2.1	6.125		0	111	2292	2292	1.98	1.9	141				31.8	0.93	295			275
22.0	2.45	6.7		2.4	6.075		0	111	2403	2403	1.56	2.1	128					0.98	268			263
23.0	2.6	7.6		2.5	6.975		0	112	2515	2515	1.81	2.1	156				32.4	1.01	325			328
24.0	3.2	8.8		3.1	8.175		0	114	2629	2629	1.67	2.4	178					1.15	371			426
25.0	4.75	11.4	0	4.6	10.775		62	118	2747	2684	1.38	3.5	216					1.48	451			668
26.0	5.45	12.6		5.2	11.975		125	119	2866	2741	1.31	3.9	234					1.59	489			776
27.0	3.55	9.1		3.4	8.475		187	115	2980	2793	1.53	2.5	176					1.16	367			424
28.0	3.55	9.7		3.4	9.075		250	115	3095	2846	1.75	2.4	198					1.14	413			471
29.0	3.55	9.15		3.4	8.525		312	115	3210	2898	1.57	2.3	178					1.11	371			410
30.0	2.5	6.5	0	2.4	5.875		374	110	3320	2946	1.52	1.6	119					0.85	249			212
31.0	7.1	18.4		6.7	17.775		437	123	3443	3007	1.72	4.5	385					1.74	805			1398
32.0	5.6	13.2		5.4	12.575		499	119	3563	3063	1.41	3.5	250					1.48	523			772
33.0	6.35	13.2		6.1	12.575		562	119	3682	3120	1.09	3.9	223	1.0	2.0	2.9		1.57	466	1598	1227	733
34.0	6.4	12.4		6.2	11.775		624	119	3801	3177	0.93	3.9	192	1.0	2.0	2.8		1.56	401	1612	1240	625
35.0	5.9	12.8	0.1	5.7	12.175	0.20	686	119	3919	3233	1.21	3.5	225					1.46	470			684
36.0	6.6	15.2		6.3	14.575		749	121	4040	3291	1.39	3.8	287					1.55	599			930
37.0	4.5	10		4.4	9.375		811	116	4156	3345	1.26	2.5	174					1.13	363			411
38.0	3.25	8.2		3.1	7.575		874	113	4269	3395	1.63	1.7	154					0.85	322			273
39.0	5.2	14.4		4.9	13.775		936	120	4388	3452	2.01	2.7	309				33.9	1.27	645			820
40.0	6.8	19.4	0.5	6.3	18.775	0.60	998	123	4511	3513	2.14	3.5	433				35.3	1.52	904			1374
41.0	6.25	22.6		5.6	21.975		1061	124	4636	3575	3.24	3.0	569				34.4	1.44	1189			1714
42.0	3.85	9		3.7	8.375		1123	114	4749	3626	1.46	1.8	161					0.86	337			289
43.0	4.2	10.2		4.0	9.575		1186	115	4865	3679	1.60	2.0	192					0.94	401			377
44.0	4.35	10.6		4.2	9.975		1248	116	4981	3733	1.62	2.0	201					0.96	420			403
45.0	7.5	16.2	0	7.2	15.575		1310	122	5102	3792	1.27	3.6	291					1.50	607			912
46.0	10.6	20.4		10.2	19.775		1373	125	5227	3854	0.99	5.2	331	1.2	2.6	4.4		1.85	691	2797	2003	1275
47.0	10	19.6		9.7	18.975		1435	124	5351	3916	1.04	4.8	323	1.1	2.4	3.9		1.77	675	2563	1873	1192
48.0	5.6	12.2		5.4	11.575		1498	118	5469	3971	1.32	2.5	214					1.13	447			505
49.0	8.7	20.6		8.2	19.975		1560	124	5593	4033	1.57	3.9	407					1.59	850			1352
50.0	8.7	24.6	0	8.0	23.975		1622	126	5719	4097	2.19	3.7	553				35.6	1.58	1155			1830
51.0	4.95	18		4.4	17.375		1685	121	5840	4155	3.57	1.8	449				31.7	1.02	938			958
52.0	9.35	17.8		9.1	17.175		1747	123	5963	4216	0.99	4.1	281	1.0	2.1	3.0		1.60	588	2258	1718	942
53.0	7.7	13.6		7.5	12.975		1810	119	6082	4272	0.81	3.3	189	0.8	1.7	2.1		1.37	394	1733	1394	539
54.0	7.2	14		7.0	13.375		1872	120	6201	4329	1.05	2.9	221	0.8	1.5	1.8		1.28	462	1543	1274	593
55.0	7.05	14.2	0.2	6.8	13.575	0.30	1934	120	6321	4387	1.14	2.8	234	0.7	1.4	1.7		1.24	489	1476	1233	608
56.0	5.4	12.8		5.2	12.175		1997	118	6439	4442	1.66	2.0	243					0.95	508			484
57.0	3.6	8.65		3.5	8.025		2059	112	6551	4492	1.82	1.2	158				28.9	0.85	329			280
57.8	7.45	17.2	1.15	7.1	16.575	1.25	2106	122	6643	4537	1.56	2.8	329					1.28	687			876

DILATOMETER TEST RESULTS

Test ID: DMT-1B
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

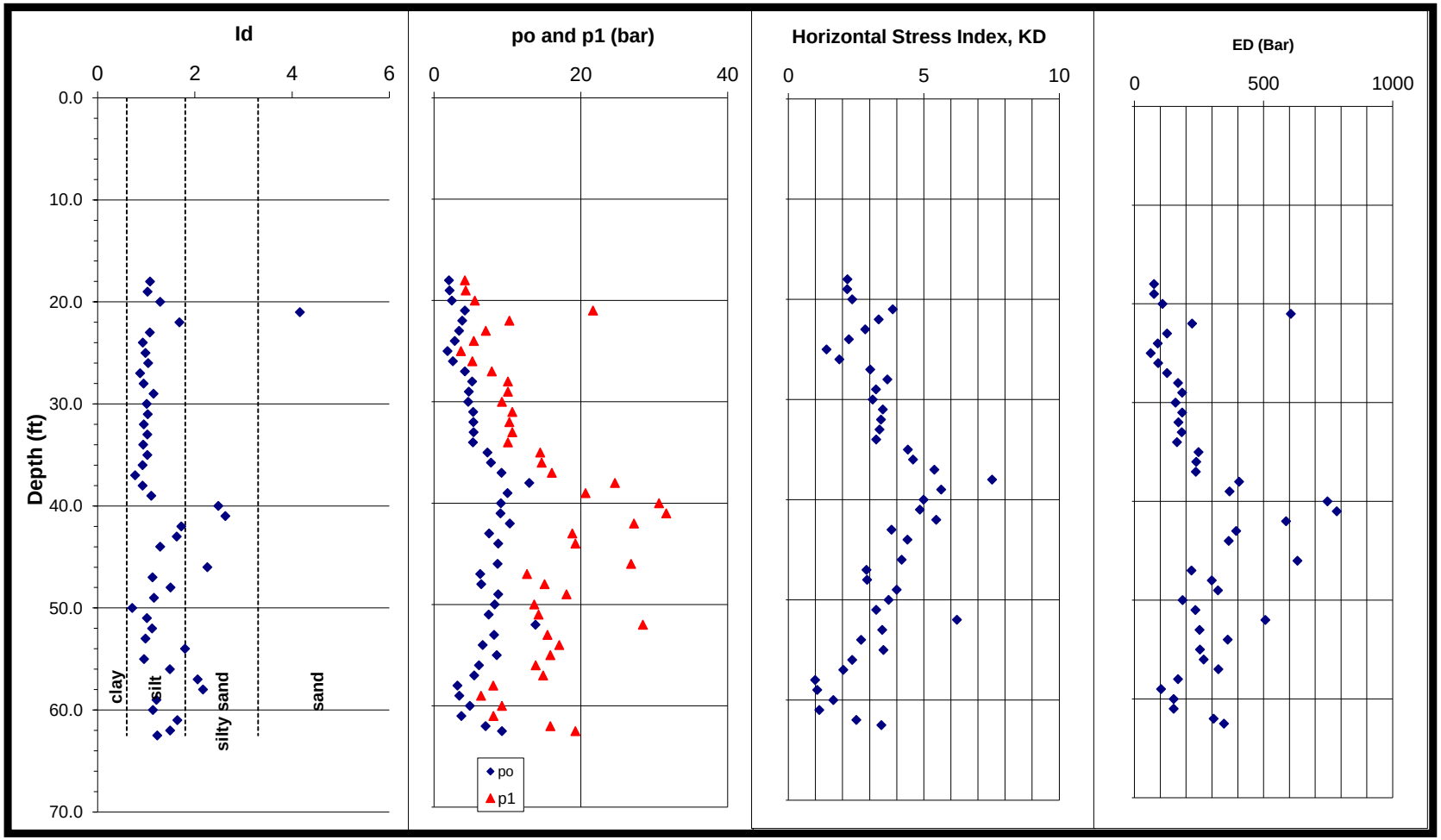
Alignment -Y5-
Station 21+61
Offset 41'RT
Northing 870818
Easting 1766747



DILATOMETER TEST RESULTS

Test ID: DMT-1B
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

Alignment -Y5-
Station 21+61
Offset 41'RT
Northing 870818
Easting 1766747



Job No: 17-54039
Job Name: U-2525C
Job Location: Greensboro, North Carolina
Date: 5-2-17
Sounding No: DMT-1B
Ground Water Depth (ft): 26

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.175	0	0
ΔB =	0.5	0	0
Zm=	0.05	bar	

Latitude: 36.14007
Longitude: -79.78993

Alignment -Y5-
Station 21+61
Offset 41'RT
Northing 870818
Easting 1766747

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

CONETEC

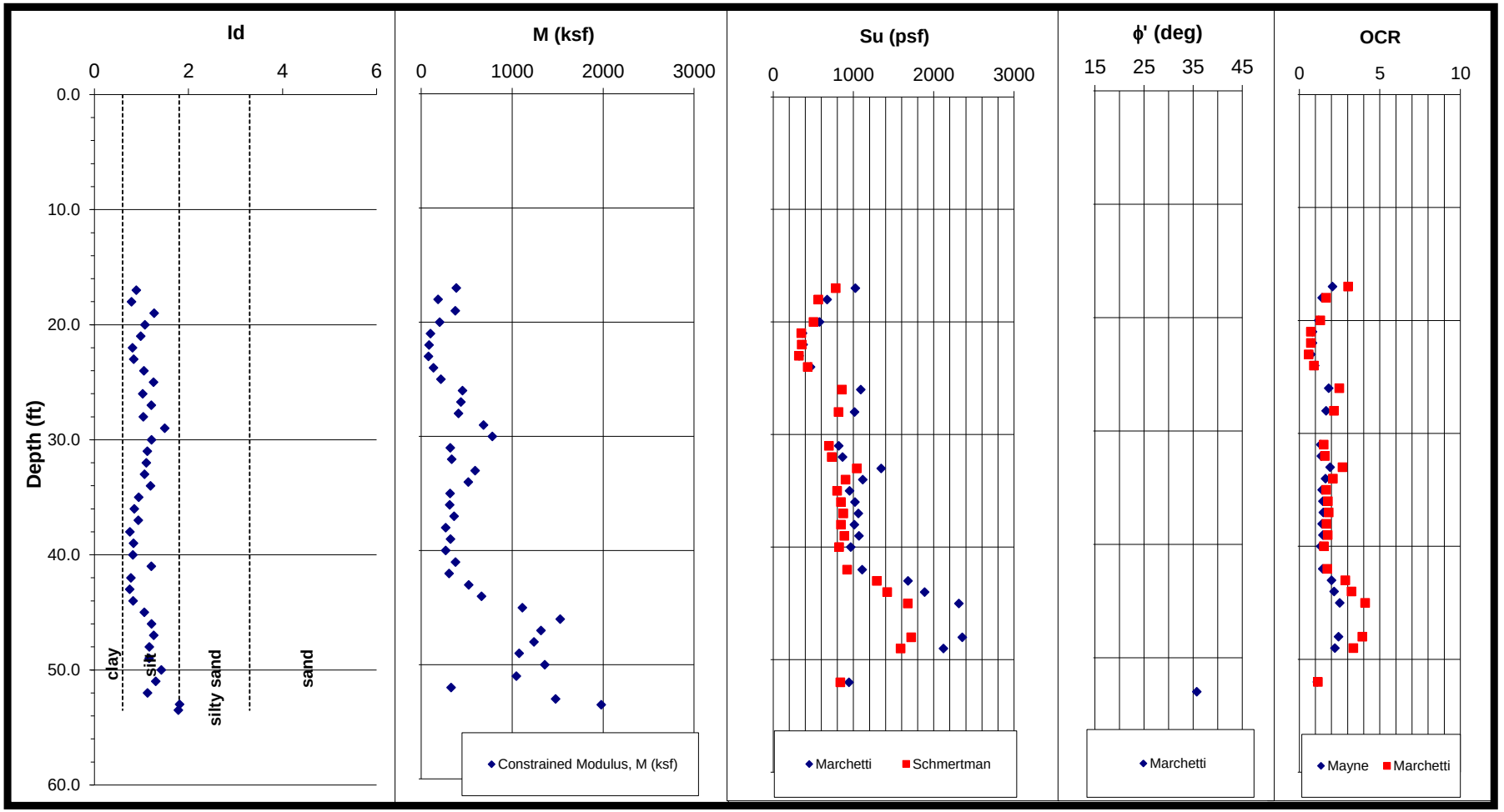
DILATOMETER TEST RESULTS

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)
18.0	2	4.75		2.0	4.2		0	107	1929	1929	1.08	2.2	76	0.6	1.1	1.2		0.99	158	475	422	156
19.0	2.1	4.85		2.1	4.3		0	107	2036	2036	1.03	2.2	76	0.6	1.1	1.1		0.98	158	498	443	155
20.0	2.45	6.1	0	2.4	5.55		0	110	2147	2147	1.29	2.4	108					1.09	226			246
21.0	4.9	22.2		4.2	21.65		0	123	2270	2270	4.16	3.9	606				35.8	1.67	1265			2116
22.0	4	10.8		3.8	10.25		0	117	2387	2387	1.68	3.3	223					1.45	466			678
23.0	3.45	7.6		3.4	7.05		0	113	2500	2500	1.07	2.8	127	0.8	1.4	1.7		1.25	264	853	710	330
24.0	2.8	5.95		2.8	5.4		0	110	2609	2609	0.93	2.2	90	0.6	1.1	1.2		1.00	188	662	585	188
25.0	1.8	4.2	0	1.8	3.65		0	106	2715	2715	0.99	1.4	63	0.4	0.7	0.6		0.85	131	387	384	112
26.0	2.55	5.75		2.5	5.2		0	109	2825	2825	1.04	1.9	92	0.5	1.0	0.9		0.85	192	577	532	163
27.0	4.25	8.4		4.2	7.85		62	114	2939	2876	0.87	3.0	127	0.8	1.5	1.9		1.30	264	1063	871	343
28.0	5.3	10.6		5.2	10.05		125	117	3056	2931	0.95	3.7	169	0.9	1.9	2.6		1.49	352	1372	1072	525
29.0	4.85	10.6		4.7	10.05		187	117	3172	2985	1.15	3.2	185	0.8	1.6	2.1		1.39	386	1201	967	535
30.0	4.75	9.8	0	4.7	9.25		250	116	3288	3039	1.01	3.1	159	0.8	1.6	2.0		1.34	333	1165	948	445
31.0	5.45	11.2		5.3	10.65		312	117	3406	3094	1.03	3.5	185	0.9	1.8	2.4		1.45	386	1366	1080	560
32.0	5.45	10.8		5.3	10.25		374	117	3523	3148	0.95	3.4	170	0.9	1.7	2.3		1.43	356	1357	1078	507
33.0	5.5	11.2		5.4	10.65		437	117	3640	3203	1.02	3.4	183	0.9	1.7	2.3		1.41	382	1352	1079	541
34.0	5.4	10.6		5.3	10.05		499	117	3757	3257	0.94	3.2	165	0.8	1.7	2.1		1.37	344	1312	1057	472
35.0	7.5	15	0	7.3	14.45		562	121	3878	3316	1.02	4.4	249	1.1	2.2	3.4		1.69	519	1965	1465	875
36.0	7.95	15.2		7.7	14.65		624	121	3999	3375	0.93	4.6	240	1.1	2.3	3.7		1.72	500	2108	1555	862
37.0	9.4	16.6		9.2	16.05		686	122	4121	3435	0.77	5.4	238	1.2	2.7	4.7		1.87	497	2611	1853	931
38.0	13.4	25.2		13.0	24.65		749	128	4249	3500	0.93	7.5	405	1.5	3.8	7.9		2.21	847	4035	2634	1875
39.0	10.4	21.2		10.0	20.65		811	125	4374	3563	1.10	5.6	369	1.3	2.9	5.0		1.93	770	2868	2011	1489
40.0	10	31.2	0.5	9.1	30.65	0.63	874	129	4503	3630	2.48	5.0	748				37.2	1.87	1562			2926
41.0	10	32.2		9.0	31.65		936	130	4633	3697	2.63	4.9	784				37.0	1.86	1638			3039
42.0	11	27.8		10.3	27.25		998	129	4762	3763	1.72	5.5	588					1.92	1227			2361
43.0	7.9	19.4		7.5	18.85		1061	124	4885	3825	1.63	3.8	394					1.58	824			1298
44.0	9.1	19.8		8.7	19.25		1123	124	5010	3886	1.29	4.4	365					1.70	763			1293
45.0	19.6	60+					1186	130	5140	3954												
46.0	9.4	27.4	0	8.7	26.85		1248	128	5267	4019	2.26	4.2	631				36.3	1.70	1318			2244
47.0	6.45	13.2		6.3	12.65		1310	119	5386	4076	1.13	2.9	221	0.8	1.5	1.8		1.27	462	1422	1179	588
48.0	6.7	15.6		6.4	15.05		1373	121	5507	4135	1.50	2.9	300					1.31	626			818
49.0	9.05	18.6		8.7	18.05		1435	123	5631	4196	1.16	4.0	323	1.0	2.0	3.0		1.60	675	2198	1680	1077
50.0	8.4	14.2	1.95	8.3	13.65	2.08	1498	120	5751	4253	0.71	3.7	187	0.9	1.9	2.6		1.49	390	2025	1577	581
51.0	7.65	14.8		7.5	14.25		1560	120	5871	4311	1.01	3.2	236	0.8	1.7	2.1		1.38	493	1739	1400	679
52.0	14.4	29		13.8	28.45		1622	129	6000	4378	1.12	6.2	507	1.4	3.2	5.9		2.03	1060	3983	2726	2152
53.0	8.4	16		8.2	15.45		1685	121	6122	4437	0.99	3.5	252	0.9	1.8	2.4		1.44	527	1944	1540	760
54.0	7	17.6		6.6	17.05		1747	122	6244	4497	1.80	2.7	362					1.26	755			949
55.0	8.75	16.4	0.75	8.5	15.85	0.88	1810	122	6366	4556	0.96	3.5	254	0.9	1.8	2.4		1.45	531	2026	1600	770
56.0	6.35	14.4		6.1	13.85		1872	120	6486	4614	1.49	2.4	269					1.10	561			619
57.0	5.8	15.4		5.5	14.85		1934	120	6606	4671	2.06	2.0	325				32.3	1.02	679			693
58.0	3.3	8.6		3.2	8.05		1997	112	6718	4721	2.17	1.0	169				27.9	0.85	352			299
59.0	3.45	6.95		3.4	6.4		2059	110	6828	4768	1.21	1.1	103					0.85	215			183
60.0	4.95	9.8	0	4.9	9.25		2122	115	6942	4821	1.14	1.7	152	0.5	0.8	0.8		0.85	318	845	804	270
61.0	3.8	8.65		3.7	8.1		2184	113	7055	4871	1.64	1.1	152					0.85	318			270
62.0	7.3	16.4		7.0	15.85		2246	121	7176	4930	1.49	2.5	307					1.16	641			746
62.5	9.6	19.8	0.95	9.2	19.25	1.08	2278	124	7238	4960	1.23	3.4	347					1.45	725			1050

DILATOMETER TEST RESULTS

Test ID: DMT-2A
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

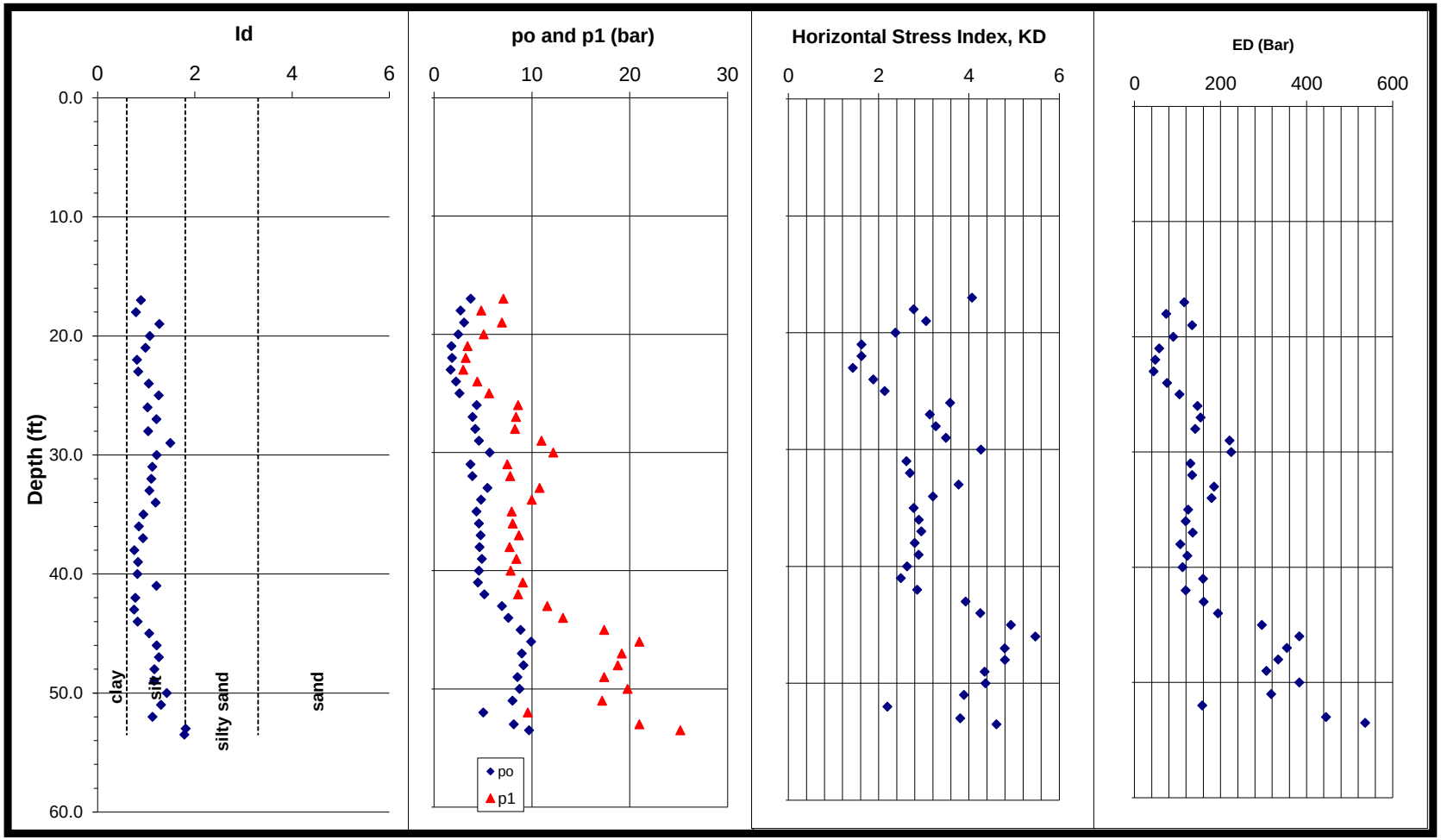
Alignment -Y5-
Station 23+08
Offset 32'LT
Northing 870970
Easting 1766685



DILATOMETER TEST RESULTS

Test ID: DMT-2A
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

Alignment -Y5-
Station 23+08
Offset 32'LT
Northing 870970
Easting 1766685



Job No: 17-54039
Job Name: U-2525C
Job Location: Greensboro, North Carolina
Date: 5-1-17
Sounding No: DMT-2A
Ground Water Depth (ft): 18

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.1	0	0
ΔB =	0.575	0	0
Zm=	0.05	bar	

Latitude: 36.14049
Longitude: -79.79015

Alignment -Y5-
Station 23+08
Offset 32'LT
Northing 870970
Easting 1766685

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

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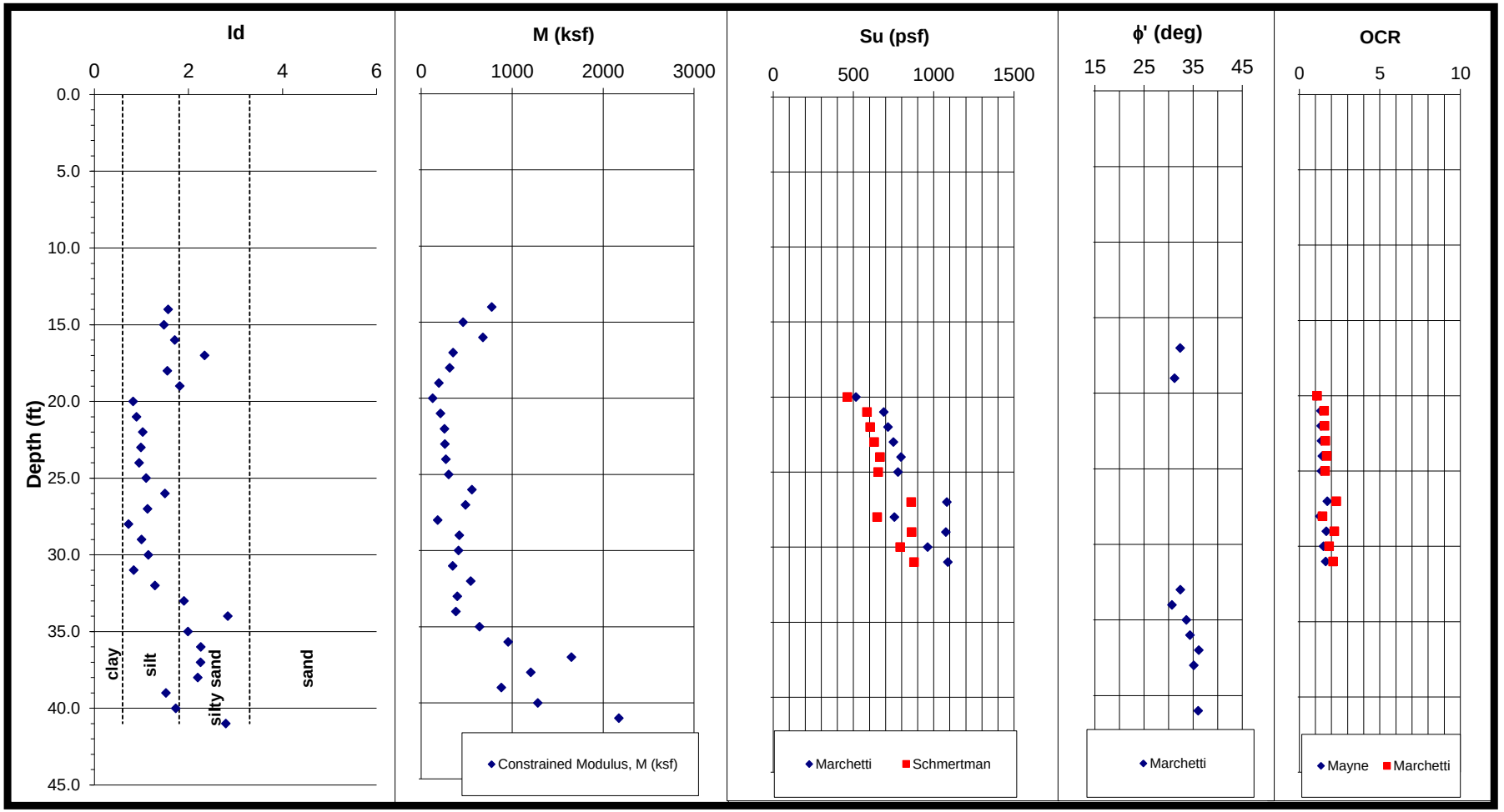
DILATOMETER TEST RESULTS

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)
17.0	3.85	7.7		3.7	7.075		0	113	1919	1919	0.89	4.1	116	1.0	2.1	3.0		1.60	242	1027	781	386
18.0	2.75	5.45	0	2.7	4.825		0	109	2028	2028	0.79	2.8	74	0.7	1.4	1.7		1.20	154	673	564	185
19.0	3.2	7.55		3.1	6.925		62	113	2140	2078	1.27	3.1	134					1.34	280			373
20.0	2.55	5.7		2.5	5.075		125	109	2249	2125	1.08	2.4	90	0.6	1.2	1.3		1.07	188	580	505	202
21.0	1.8	4.05		1.8	3.425		187	105	2354	2167	0.98	1.6	57	0.4	0.8	0.7		0.85	120	367	351	102
22.0	1.85	3.85		1.8	3.225		250	104	2458	2208	0.81	1.6	48	0.4	0.8	0.7		0.85	101	374	358	86
23.0	1.7	3.6		1.7	2.975		312	103	2561	2249	0.84	1.4	45	0.4	0.7	0.6		0.85	93	325	322	79
24.0	2.3	5.05	0	2.2	4.425		374	107	2668	2294	1.05	1.9	76	0.5	1.0	0.9		0.85	158	468	432	134
25.0	2.7	6.25		2.6	5.625		437	110	2778	2341	1.26	2.1	105					0.99	219			216
26.0	4.5	9.2		4.3	8.575		499	115	2893	2394	1.03	3.6	147	0.9	1.8	2.5		1.48	306	1093	858	453
27.0	4.1	9		3.9	8.375		562	114	3007	2446	1.21	3.1	154					1.36	322			436
28.0	4.35	8.9		4.2	8.275		624	114	3122	2498	1.04	3.3	141	0.8	1.7	2.2		1.39	295	1015	816	409
29.0	4.85	11.6		4.6	10.975		686	117	3239	2553	1.49	3.5	221					1.48	462			686
30.0	5.95	12.8	0	5.7	12.175		749	119	3358	2609	1.22	4.3	225					1.66	470			781
31.0	3.85	8.1		3.7	7.475		811	113	3471	2660	1.13	2.6	130	0.7	1.3	1.5		1.17	272	819	696	319
32.0	4.05	8.4		3.9	7.775		874	113	3584	2711	1.10	2.7	134	0.7	1.4	1.6		1.20	280	866	731	335
33.0	5.65	11.4		5.4	10.775		936	117	3701	2765	1.07	3.8	185	0.9	1.9	2.7		1.53	386	1346	1044	591
34.0	5	10.6		4.8	9.975		998	116	3818	2819	1.20	3.2	179	0.8	1.6	2.1		1.38	375	1118	903	516
35.0	4.45	8.55		4.3	7.925		1061	113	3931	2870	0.94	2.8	125	0.7	1.4	1.7		1.22	261	953	798	317
36.0	4.7	8.65	0.25	4.6	8.025	0.30	1123	114	4045	2921	0.85	2.9	119	0.8	1.5	1.8		1.25	249	1020	846	311
37.0	4.9	9.3		4.8	8.675		1186	114	4159	2973	0.93	2.9	136	0.8	1.5	1.8		1.27	283	1062	876	361
38.0	4.75	8.35		4.7	7.725		1248	113	4272	3024	0.76	2.8	107	0.7	1.4	1.7		1.21	223	1014	847	269
39.0	5	9.05		4.9	8.425		1310	114	4386	3075	0.83	2.9	123	0.8	1.5	1.8		1.25	257	1071	888	320
40.0	4.7	8.45		4.6	7.825		1373	113	4499	3126	0.82	2.6	112	0.7	1.3	1.5		1.15	234	969	823	269
41.0	4.65	9.7		4.5	9.075		1435	115	4614	3178	1.21	2.5	159					1.13	333			377
42.0	5.25	9.2	0	5.1	8.575		1498	114	4728	3230	0.78	2.9	119	0.8	1.5	1.7		1.23	249	1110	923	307
43.0	7.1	12.2		6.9	11.575		1560	118	4845	3285	0.75	3.9	161	1.0	2.0	2.9		1.55	337	1681	1291	523
44.0	7.8	13.8		7.6	13.175		1622	119	4965	3342	0.82	4.3	194	1.0	2.2	3.2		1.64	405	1888	1422	663
45.0	9.2	18		8.8	17.375		1685	123	5088	3403	1.06	4.9	296	1.1	2.5	4.1		1.80	618	2314	1679	1111
46.0	10.4	21.6		9.9	20.975		1747	125	5213	3466	1.22	5.5	383					1.91	801			1527
47.0	9.4	19.8		9.0	19.175		1810	124	5337	3528	1.26	4.8	354					1.78	740			1316
48.0	9.55	19.4	0.05	9.1	18.775	0.10	1872	124	5461	3589	1.17	4.8	334	1.1	2.4	3.9		1.77	698	2357	1722	1239
49.0	8.9	18		8.5	17.375		1934	123	5584	3649	1.16	4.4	307	1.0	2.2	3.4		1.68	641	2121	1588	1076
50.0	9.2	20.4		8.7	19.775		1997	124	5708	3711	1.42	4.4	383					1.70	801			1358
51.0	8.4	17.8		8.0	17.175		2059	123	5831	3771	1.30	3.9	318					1.58	664			1046
52.0	5.2	10.2		5.0	9.575		2122	115	5946	3824	1.13	2.2	158	0.6	1.1	1.2		1.00	329	945	839	328
53.0	8.7	21.6		8.1	20.975		2184	125	6070	3886	1.81	3.8	445				35.8	1.59	930			1477
53.5	10.4	25.8		9.7	25.175		2215	127	6134	3919	1.79	4.6	537					1.77	1121			1979

DILATOMETER TEST RESULTS

Test ID: DMT-2B
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

Alignment -Y5-
Station 23+35
Offset 48'RT
Northing 870991
Easting 1766766



DILATOMETER TEST RESULTS

Test ID: DMT-2B
Site: U-2525C
Location: Greensboro, North Carolina
Project No.: 17-54039

Alignment -Y5-
Station 23+35
Offset 48'RT
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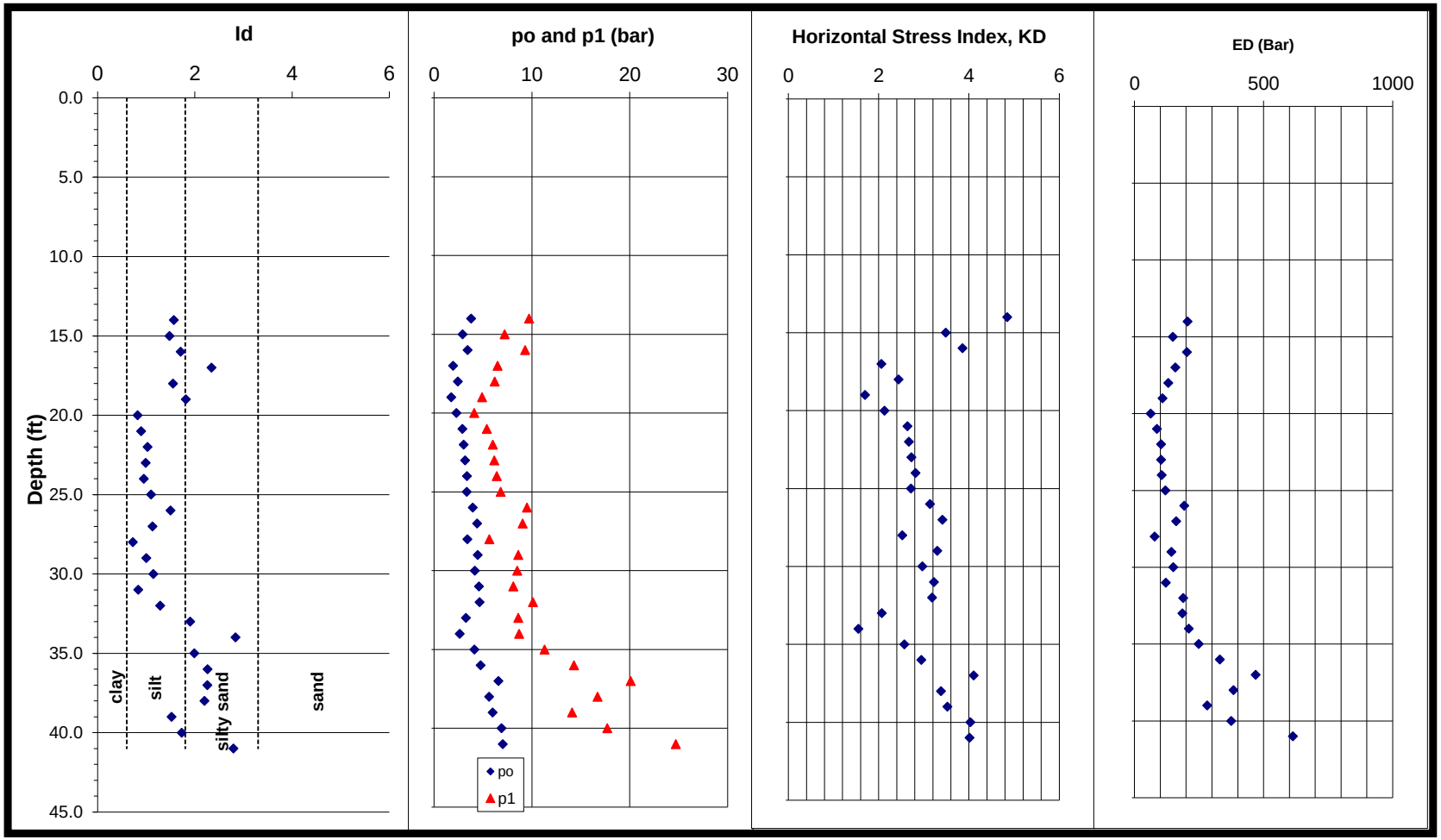
Easting 1766766



Job No: 17-54039
Job Name: U-2525C
Job Location: Greensboro, North Carolina
Date: 5-2-17
Sounding No: DMT-2B
Ground Water Depth (ft): 18

	Membrane 1	Membrane 2	Membrane 3
ΔA =	0.11	0	0
ΔB =	0.45	0	0
Zm=	0.05	bar	

Latitude: 36.14055
Longitude: -79.78987

Alignment -Y5-
Station 23+35
Offset 48'RT
Northing 870991
Easting 1766766

[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)
14.0	4	10.2		3.8	9.7		0	116	1627	1627	1.57	4.8	205					1.80	429			774
15.0	3.05	7.7	0	2.9	7.2		0	113	1740	1740	1.48	3.5	149					1.48	311			461
16.0	3.65	9.8		3.4	9.3		0	116	1856	1856	1.71	3.9	204					1.59	425			678
17.0	2.1	7		1.9	6.5		0	111	1967	1967	2.35	2.1	158				32.4	1.06	330			351
18.0	2.55	6.7		2.4	6.2		0	111	2078	2078	1.55	2.4	131					1.14	273			312
19.0	1.85	5.4		1.8	4.9		62	108	2186	2124	1.81	1.7	109				31.3	0.85	228			193
20.0	2.3	4.6	0	2.3	4.1		125	107	2293	2168	0.83	2.1	63	0.6	1.1	1.1		0.94	132	517	462	124
21.0	2.95	5.9		2.9	5.4		187	110	2403	2216	0.90	2.6	87	0.7	1.3	1.5		1.16	182	690	585	211
22.0	3.1	6.5		3.0	6		250	111	2514	2264	1.03	2.7	103	0.7	1.4	1.6		1.18	216	716	605	256
23.0	3.25	6.65		3.2	6.15		312	111	2625	2313	0.99	2.7	103	0.7	1.4	1.6		1.20	216	749	630	259
24.0	3.45	6.9		3.4	6.4		374	111	2736	2362	0.95	2.8	105	0.7	1.4	1.7		1.23	220	797	665	271
25.0	3.45	7.3	0.3	3.3	6.8	0.36	437	112	2848	2411	1.10	2.7	120	0.7	1.4	1.6		1.21	250	778	655	302
26.0	4.15	10		3.9	9.5		499	116	2964	2465	1.50	3.1	193					1.38	403			556
27.0	4.55	9.55		4.4	9.05		562	115	3079	2518	1.13	3.4	162	0.9	1.7	2.3		1.44	338	1082	860	485
28.0	3.45	6.15		3.4	5.65		624	110	3189	2565	0.72	2.5	78	0.7	1.3	1.4		1.10	163	756	648	179
29.0	4.6	9.1		4.5	8.6		686	115	3304	2617	1.00	3.3	144	0.8	1.7	2.2		1.39	300	1076	863	417
30.0	4.3	9	0	4.2	8.5		749	114	3418	2669	1.15	3.0	151	0.8	1.5	1.9		1.30	315	962	792	409
31.0	4.7	8.6		4.6	8.1		811	114	3532	2721	0.83	3.2	122	0.8	1.6	2.1		1.36	254	1089	878	345
32.0	4.85	10.6		4.7	10.1		874	116	3648	2775	1.29	3.2	189					1.38	395			545
33.0	3.45	9.1		3.3	8.6		936	114	3762	2826	1.90	2.1	185				32.4	1.02	387			396
34.0	2.85	9.2		2.6	8.7		998	113	3876	2877	2.84	1.6	211				30.7	0.86	441			381
35.0	4.4	11.8		4.1	11.3		1061	117	3993	2932	1.99	2.6	249				33.6	1.23	520			641
36.0	5.15	14.8	0.9	4.8	14.3	0.96	1123	120	4112	2989	2.26	2.9	331				34.4	1.38	692			955
37.0	7.15	20.6		6.6	20.1		1186	124	4236	3051	2.26	4.1	470				36.2	1.68	981			1652
38.0	6.1	17.2		5.6	16.7		1248	122	4358	3110	2.20	3.4	384				35.1	1.50	802			1204
39.0	6.3	14.6		6.0	14.1		1310	120	4478	3168	1.52	3.5	282					1.49	589			880
40.0	7.35	18.2	1.1	6.9	17.7	1.16	1373	123	4601	3228	1.73	4.0	375					1.64	783			1282
41.0	7.8	25.2	1.5	7.0	24.7	1.56	1435	126	4727	3292	2.79	4.0	614				36.1	1.70	1281			2173