STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	U-5818	1	23

REFERENCE: U-5818

PROJECT: 44390

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *MCDOWELL*

PROJECT DESCRIPTION *SR 1001 (SUGAR HILL RD.) FROM I-40 WB RAMPS TO 0.3 MI. WEST OF I-40 EB RAMPS*

SITE DESCRIPTION *MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS*

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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2. BY HAVING REQUESTED THIS INFORMATION, THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

PERSONNEL

J. SWARTLEY

M. STEPHENSON

R. KRAL

INVESTIGATED BY *S&ME, Inc.*

DRAWN BY *J.R. SWARTLEY*

CHECKED BY *R. KRAL*

SUBMITTED BY *S. LANEY*

DATE *JULY 2018*

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NORTH CAROLINA PROFESSIONAL SEAL 031013 ENGINEER STEWART S. LANEY

DocuSigned by:
Stewart S. Laney
75BB4AB1AB3B4CB...
SIGNATURE

08/22/2018
DATE

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PROJECT REFERENCE NO.	SHEET NO.
U-5818	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
- [ ] PORTABLE HOIST
- [X] DIEDRICH D-50
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: •SEE NOTE

ELEVATION: FEET

NOTES:

- ELEVATIONS DERIVED FROM GEOPAK AND •.TIN FILE 'U5818_LS_TNL.TIN' DATED 9/27/17

FIAD = FILLED IN AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
U-5818	3

SITE PLAN

0 50 100
FEET

476+00
I-40 WEST ON RAMP
30" CMP
8 ", DIP, City W
MTL
-Y-
INV=1360.14'
25+00
PROP. RETAINING WALL
8:1
W1-1A
W1-2
W1-3
W1-4
W1-5
I-40 WB 37.8' BST
I-40 EB 37.8' BST
TYPE III
WOODS
W2-1
W2-2
W2-3
W2-4
W2-5
PROP. RETAINING WALL
TYPE-III
15"
CONC
EX. P.S.
14' 4' P.S.
EX
20
27.00
RIP RAP
48" WW & 3SBW
CAT-
480+00
END C&G
36+00
GREU TL-3
-L-
MTL
BL-4
R HILL RD) VARIABLE WIDTH
CAT-1
INV=1386.46'
8" HDPE
INV=1363.88'
18" CMP
BY-15
66" CMP
END
GREU
BM•2 ELEVATION = 1394.48
N 703619 E 1098038
BL STATION 24+03.00 40 RIGHT
BENCH TIE NAIL SET IN 18" SWEET GUM
Frontier Communications of America Inc., COPPER
Frontier Communications of America Inc., F.O.
SOIL
NAD 83
48" WW

PROJECT REFERENCE NO.	SHEET NO.
U-5818	4

PROFILE PROJECTED ALONG FACE OF WALL #1

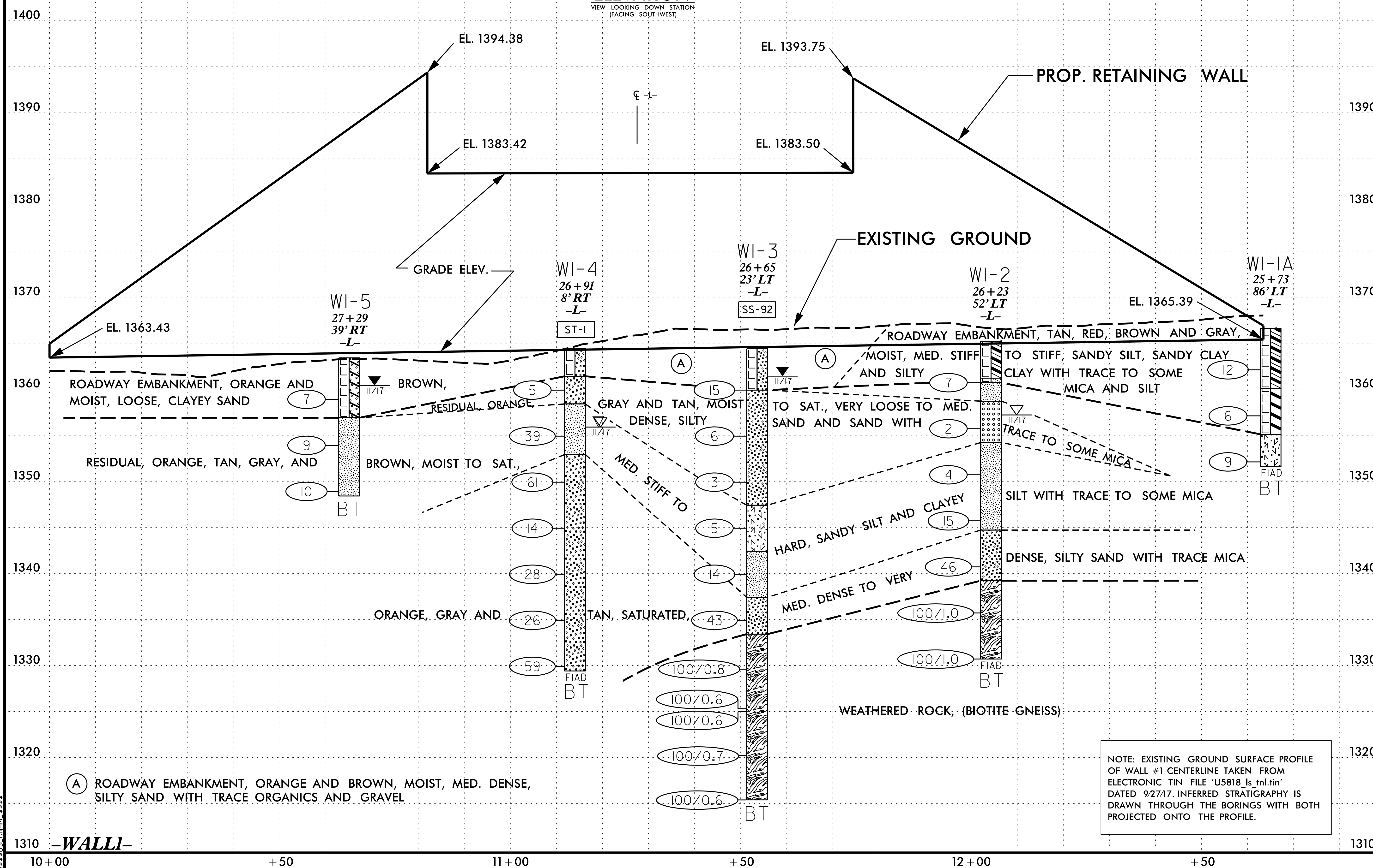
0 20 40 FEET

VE = 2:1

END BENT NO. 1 MSE WALL ENVELOPE (WALL #1)

ELEVATION

VIEW LOOKING DOWN STATION (FACING SOUTHWEST)



1400
1390
1380
1370
1360
1350
1340
1330
1320
1310
EL. 1394.38
EL. 1393.75
PROP. RETAINING WALL
℄ -L-
EL. 1383.42
EL. 1383.50
EXISTING GROUND
GRADE ELEV.
EL. 1363.43
EL. 1365.39
WI-5
27+29
39' RT
-L-
WI-4
26+91
8' RT
-L-
ST-1
WI-3
26+65
23' LT
-L-
SS-92
WI-2
26+23
52' LT
-L-
WI-1A
25+73
86' LT
-L-
ROADWAY EMBANKMENT, ORANGE AND BROWN, MOIST, LOOSE, CLAYEY SAND
RESIDUAL, ORANGE, TAN, GRAY, AND BROWN, MOIST TO SAT.,
RESIDUAL, ORANGE,
GRAY AND TAN, MOIST DENSE, SILTY
TO SAT., VERY LOOSE TO MED. SAND AND SAND WITH
MED. STIFF TO
HARD, SANDY SILT AND CLAYEY
MED. DENSE TO VERY
ORANGE, GRAY AND
TAN, SATURATED,
ROADWAY EMBANKMENT, TAN, RED, BROWN AND GRAY, MOIST, MED. STIFF TO STIFF, SANDY SILT, SANDY CLAY AND SILTY CLAY WITH TRACE TO SOME MICA AND SILT
TRACE TO SOME MICA
SILT WITH TRACE TO SOME MICA
DENSE, SILTY SAND WITH TRACE MICA
WEATHERED ROCK, (BIOTITE GNEISS)
A
A
11/17
11/17
11/17
11/17
7
9
10
5
39
61
14
28
26
59
15
6
3
5
14
43
100/0.8
100/0.6
100/0.6
100/0.7
100/0.6
7
2
4
15
46
100/1.0
100/1.0
12
6
9
BT
FIAD BT
BT
FIAD BT
FIAD BT
(A) ROADWAY EMBANKMENT, ORANGE AND BROWN, MOIST, MED. DENSE, SILTY SAND WITH TRACE ORGANICS AND GRAVEL
NOTE: EXISTING GROUND SURFACE PROFILE OF WALL #1 CENTERLINE TAKEN FROM ELECTRONIC TIN FILE 'U5818_ls_tnl.tin' DATED 9/27/17. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.
-WALL1-
10+00
+50
11+00
+50
12+00
+50

END BENT NO. 2
MSE WALL ENVELOPE
(WALL #2)

PROJECT REFERENCE NO.	SHEET NO.
U-5818	5

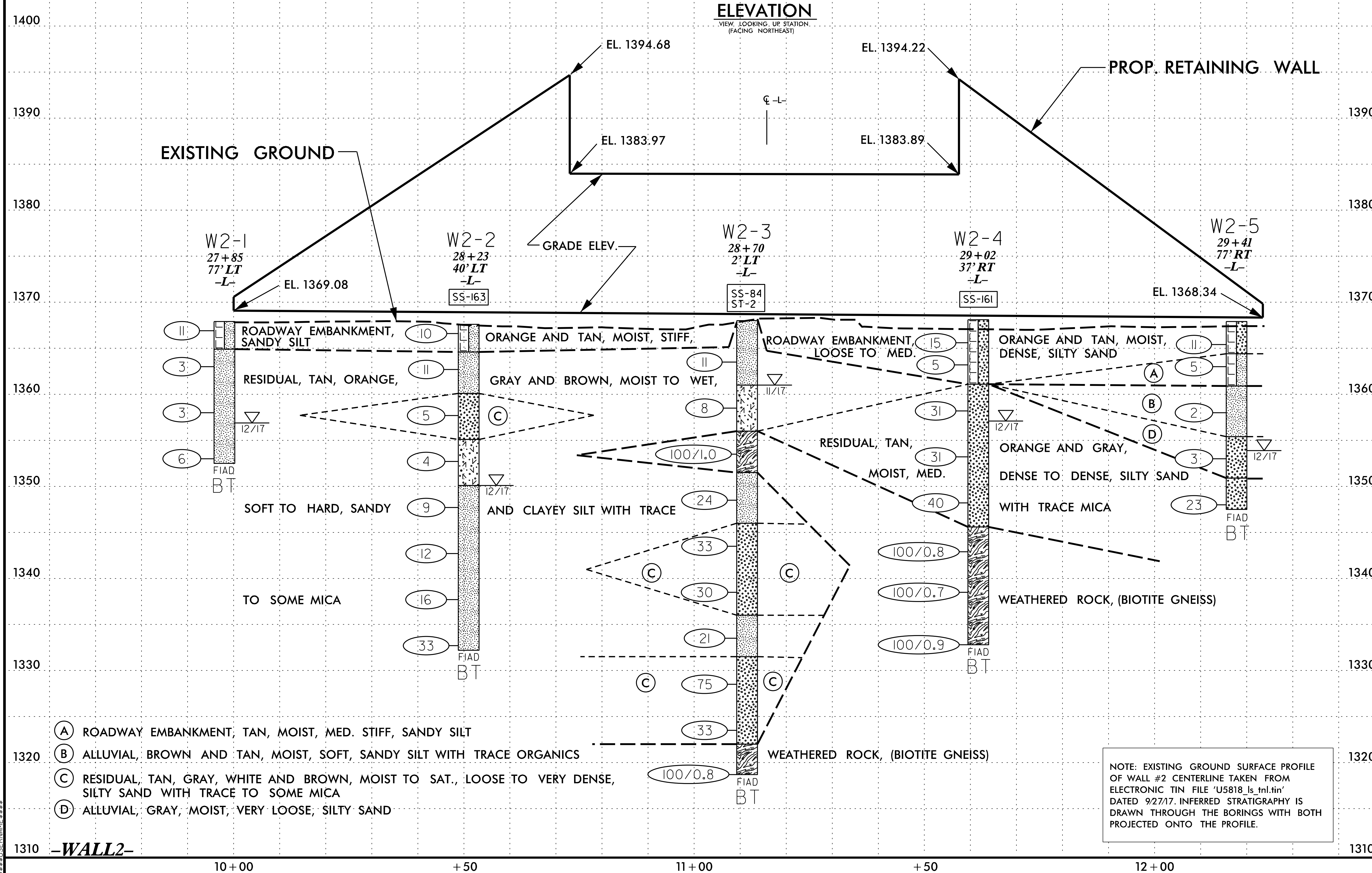
PROFILE PROJECTED ALONG FACE OF WALL #2

Scale: 0 – 20 – 40 FEET

VE = 2:1

ELEVATION

VIEW LOOKING UP STATION (FACING NORTHEAST)



Ⓐ ROADWAY EMBANKMENT, TAN, MOIST, MED. STIFF, SANDY SILT

Ⓑ ALLUVIAL, BROWN AND TAN, MOIST, SOFT, SANDY SILT WITH TRACE ORGANICS

Ⓒ RESIDUAL, TAN, GRAY, WHITE AND BROWN, MOIST TO SAT., LOOSE TO VERY DENSE, SILTY SAND WITH TRACE TO SOME MICA

Ⓓ ALLUVIAL, GRAY, MOIST, VERY LOOSE, SILTY SAND

NOTE: EXISTING GROUND SURFACE PROFILE OF WALL #2 CENTERLINE TAKEN FROM ELECTRONIC TIN FILE 'U5818_ls_tnl.tin' DATED 9/27/17. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

5/14/99

$$$$$$SYSTIME$$$$$ $$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$ $$$$USERNAME$$$$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W1-1A	**STATION** 25+73	**OFFSET** 86 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 1,366.6 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 703,903	**EASTING** 1,098,063	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 11/21/17	**COMP. DATE** 11/21/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
1370												
										1,366.6 GROUND SURFACE		0.0
1365										**ROADWAY EMBANKMENT** RED, SANDY CLAY (A-6) WITH TRACE MICA AND SILT		
	1,363.1	3.5	3	5	7	12		M				
1360										RED-BROWN, SILTY CLAY (A-7-5)	1,360.1	6.5
	1,358.1	8.5	3	3	3	6		M				
1355										**RESIDUAL** ORANGE-TAN, SANDY SILT (A-5) WITH TRACE MICA	1,355.1	11.5
	1,353.1	13.5	3	5	4	9		W				
										Boring Terminated at Elevation 1,351.6 ft in Stiff Sandy SILT	1,351.6	15.0

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W1-2	**STATION** 26+23	**OFFSET** 52 ft LT	**ALIGNMENT** -L-	**0 HR.** 8.0
COLLAR ELEV. 1,365.2 ft	**TOTAL DEPTH** 34.5 ft	**NORTHING** 703,919	**EASTING** 1,098,121	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 11/21/17	**COMP. DATE** 11/21/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
1370												
										1,365.2 GROUND SURFACE		0.0
1365										**ROADWAY EMBANKMENT** TAN-RED, SANDY CLAY (A-6)		
	1,361.7	3.5	5	4	3	7		M			1,361.2	4.0
1360										GRAY-TAN, SANDY SILT (A-4) WITH SOME MICA	1,360.7	4.5
	1,356.7	8.5	2	1	1	2		Sat.			1,358.7	6.5
1355										**RESIDUAL** ORANGE-GRAY-TAN, SILT (A-4) WITH SOME MICA		
	1,351.7	13.5	2	2	2	4		W		TAN-GRAY, SAND (A-3)	1,354.2	11.0
1350										ORANGE-GRAY, SANDY SILT (A-4) WITH SOME MICA		
	1,346.7	18.5	3	5	10	15		W				
1345										GRAY, SILTY SAND (A-2-5) WITH TRACE MICA	1,344.7	20.5
	1,341.7	23.5	18	21	25	46		Sat.				
1340										**WEATHERED ROCK** GRAY, BIOTITE GNEISS	1,339.2	26.0
	1,336.7	28.5	29	71/0.5		100/1.0						
1335												
	1,331.7	33.5	31	69/0.5		100/1.0					1,330.7	34.5
										Boring Terminated at Elevation 1,330.7 ft in Weathered Rock (BIOTITE GNEISS)		

1. Attempted to obtain a Shelby Tube sample at depth 15'-17', no recovery.

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W1-3	**STATION** 26+65	**OFFSET** 23 ft LT	**ALIGNMENT** -L-	**0 HR.** 10.0
COLLAR ELEV. 1,364.4 ft	**TOTAL DEPTH** 49.1 ft	**NORTHING** 703,930	**EASTING** 1,098,170	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 11/20/17	**COMP. DATE** 11/20/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
1365										1,364.4 GROUND SURFACE	0.0
	1,360.9	3.5	3	9	6	15		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, SILTY SAND (A-2-4) WITH TRACE ORGANICS AND GRAVEL	
1360										1,359.9 **RESIDUAL** TAN-GRAY, SILTY SAND (A-2-5) WITH SOME MICA	4.5
	1,355.9	8.5	3	3	3	6		Sat.			
1355											
	1,350.9	13.5	WOH	2	1	3		Sat.			
1350										1,347.4 ORANGE, CLAYEY SILT (A-5) WITH TRACE MICA	17.0
	1,345.9	18.5	2	2	3	5	SS-92	62%			
1345										1,342.4 ORANGE-BROWN, SANDY SILT (A-4) WITH SOME MICA	22.0
	1,340.9	23.5	4	6	8	14		W			
1340										1,337.4 TAN-GRAY, SILTY SAND (A-2-4) WITH TRACE MICA	27.0
	1,335.9	28.5	12	24	19	43		Sat.			
1335										1,333.4 **WEATHERED ROCK** GRAY, BIOTITE GNEISS	31.0
	1,330.9	33.5	25	65	35/0.3	100/0.8					
1330											
	1,325.9	38.5	78	22/0.1		100/0.6					
1325	1,325.6	38.8	85	15/0.1		100/0.6					
	1,320.9	43.5	57	43/0.2		100/0.7					
1320											
	1,315.9	48.5	91	9/0.1		100/0.6				1,315.3 Boring Terminated at Elevation 1,315.3 ft in Weathered Rock (BIOTITE GNEISS)	49.1

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W1-4	**STATION** 26+91	**OFFSET** 8 ft RT	**ALIGNMENT** -L-	**0 HR.** 8.5
COLLAR ELEV. 1,364.4 ft	**TOTAL DEPTH** 35.0 ft	**NORTHING** 703,931	**EASTING** 1,098,211	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 11/21/17	**COMP. DATE** 11/21/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
1365										1,364.4 GROUND SURFACE 0.0
	1,360.9	3.5	2	2	3	5		M		**ROADWAY EMBANKMENT** ORANGE-BROWN, SILTY SAND (A-2-4) WITH TRACE ORGANICS AND GRAVEL 1,361.4 3.0
1360										**RESIDUAL** ORANGE-GRAY-TAN, SILTY SAND (A-2-4) WITH TRACE MICA 1,358.4 6.0
	1,355.9	8.5	9	15	24	39		W		TAN-GRAY, FINE SANDY SILT (A-4) WITH TRACE MICA
1355										1,352.9 11.5
	1,350.9	13.5	10	23	38	61		Sat.		ORANGE-GRAY, SILTY SAND (A-2-4) WITH TRACE MICA
1350										
	1,345.9	18.5	4	5	9	14		Sat.		
1345										
	1,340.9	23.5	10	13	15	28		Sat.		
1340										
	1,335.9	28.5	5	12	14	26		Sat.		
1335										
	1,330.9	33.5	18	29	30	59		Sat.		1,329.4 Boring Terminated at Elevation 1,329.4 ft in Silty SAND 35.0
1330										Other Samples: ST-1 (6.0 - 8.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W1-5	**STATION** 27+29	**OFFSET** 39 ft RT	**ALIGNMENT** -L-	**0 HR.** 12.0
COLLAR ELEV. 1,363.4 ft	**TOTAL DEPTH** 15.0 ft	**NORTHING** 703,938	**EASTING** 1,098,260	**24 HR.** 3.0
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Blizzard, B.	**START DATE** 11/20/17	**COMP. DATE** 11/20/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
1365										ELEV. (ft) DEPTH (ft)
										1,363.4 GROUND SURFACE 0.0
										ROADWAY EMBANKMENT
1360	1,359.9	3.5	3	3	4	7		M		ORANGE-BROWN, CLAYEY SAND (A-2-6)
										1,356.9 6.5
										RESIDUAL
1355	1,354.9	8.5	4	4	5	9		W		ORANGE-GRAY-TAN, SANDY SILT (A-4) WITH SOME MICA
1350	1,349.9	13.5	5	4	6	10		W		1,348.4 15.0
										Boring Terminated at Elevation 1,348.4 ft in Stiff Sandy SILT

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W2-1	**STATION** 27+85	**OFFSET** 77 ft LT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 1,367.9 ft	**TOTAL DEPTH** 15.4 ft	**NORTHING** 704,057	**EASTING** 1,098,209	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers		**HAMMER TYPE** Automatic
DRILLER Blizzard, B.	**START DATE** 12/11/17	**COMP. DATE** 12/11/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
1370										
	1,367.9	0.0	3	5	6	11		M		1,367.9 GROUND SURFACE 0.0
1365										**ROADWAY EMBANKMENT**
	1,364.0	3.9	2	2	1	3		M		ORANGE, SANDY SILT (A-4)
										1,364.9 3.0
1360	1,359.0	8.9	1	1	2	3				**RESIDUAL**
								▽		TAN-ORANGE, SANDY SILT (A-4)
1355	1,354.0	13.9	2	3	3	6		W		1,352.5 15.4
										Boring Terminated at Elevation 1,352.5 ft in Medium Stiff Sandy SILT

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W2-2	**STATION** 28+23	**OFFSET** 40 ft LT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 1,367.6 ft	**TOTAL DEPTH** 35.4 ft	**NORTHING** 704,065	**EASTING** 1,098,265	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 12/11/17	**COMP. DATE** 12/11/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION / ELEV. (ft)	DEPTH (ft)
1370											
	1,367.6	0.0	3	4	6	10		M		1,367.6 GROUND SURFACE	0.0
1365										**ROADWAY EMBANKMENT** TAN, SANDY SILTY (A-4)	
	1,363.7	3.9	3	3	8	11		M		1,364.6 **RESIDUAL** TAN, SANDY SILT (A-4)	3.0
1360										1,360.1 TAN, SILTY SAND (A-2-4)	7.5
	1,358.7	8.9	2	2	3	5		▽			
1355										1,355.1 TAN-ORANGE, CLAYEY SILT (A-5)	12.5
	1,353.7	13.9	2	2	2	4	SS-163	49%			
1350										1,350.1 TAN-GRAY, SANDY SILT (A-4)	17.5
	1,348.7	18.9	2	4	5	9		W			
1345											
	1,343.7	23.9	3	5	7	12		W			
1340											
	1,338.7	28.9	4	4	12	16		W			
1335											
	1,333.7	33.9	7	13	20	33		W		1,332.2 Boring Terminated at Elevation 1,332.2 ft in Hard Sandy SILT	35.4

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Stephenson, M.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W2-3	**STATION** 28+70	**OFFSET** 2 ft LT	**ALIGNMENT** -L-	**0 HR.** 7.0
COLLAR ELEV. 1,368.0 ft	**TOTAL DEPTH** 49.3 ft	**NORTHING** 704,072	**EASTING** 1,098,321	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 11/17/17	**COMP. DATE** 11/17/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
1370										
										1,368.0 GROUND SURFACE 0.0
1365	1,364.5	3.5	3	4	7	11		M		**RESIDUAL** TAN-GRAY, SANDY SILT (A-4) WITH SOME MICA
1360	1,359.5	8.5	2	3	5	8		W		1,361.0 TAN-GRAY, CLAYEY SILT (A-5) WITH SOME MICA 7.0
1355	1,354.5	13.5	36	64/1.0		100/1.0				1,356.0 **WEATHERED ROCK** GRAY-TAN, BIOTITE GNEISS 12.0
1350	1,349.5	18.5	12	11	13	24		W		1,351.5 **RESIDUAL** BROWN-GRAY, SANDY SILT (A-4) WITH SOME MICA 16.5
1345	1,344.5	23.5	6	15	18	33	SS-84	25%		1,346.0 TAN-GRAY, SILTY SAND (A-2-4) WITH SOME MICA 22.0
1340	1,339.5	28.5	8	9	21	30		Sat.		
1335	1,334.5	33.5	6	10	11	21		W		1,336.0 TAN-GRAY, SANDY SILTY (A-4) WITH TRACE MICA 32.0
1330	1,329.5	38.5	20	32	43	75		Sat.		1,331.5 GRAY-WHITE-BROWN, SILTY SAND (A-2-4) WITH TRACE MICA 36.5
1325	1,324.5	43.5	10	15	18	33		Sat.		
1320	1,319.5	48.5	40	60/0.3		100/0.8				1,322.0 **WEATHERED ROCK** GRAY-BROWN, BIOTITE GNEISS 46.0
										1,318.7 Boring Terminated at Elevation 1,318.7 ft in Weathered Rock (BIOTITE GNEISS) 49.3

Other Samples:
ST-2 (10.0 - 12.0)

GEOTECHNICAL BORING REPORT
BORE LOG

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W2-4	**STATION** 29+02	**OFFSET** 37 ft RT	**ALIGNMENT** -L-	**0 HR.** 11.0
COLLAR ELEV. 1,368.1 ft	**TOTAL DEPTH** 35.3 ft	**NORTHING** 704,070	**EASTING** 1,098,372	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 12/07/17	**COMP. DATE** 12/07/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION ELEV. (ft)	DEPTH (ft)
1370										1,368.1 PAVEMENT	0.0
	1,366.6	1.5						M		**ROADWAY EMBANKMENT** ORANGE, SILTY SAND (A-2-4)	
1365			6	5	10	15		M			
	1,364.2	3.9	2	2	3	5				1,361.1 **RESIDUAL** TAN-ORANGE, SILTY SAND (A-2-4), WITH TRACE MICA	7.0
1360											
	1,359.2	8.9	7	9	22	31					
1355								Sat.			
	1,354.2	13.9	12	16	15	31					
1350											
	1,349.2	18.9	12	18	22	40	SS-161	14%			
1345										1,345.6 **WEATHERED ROCK** GRAY, BIOTITE GNEISS	22.5
	1,344.2	23.9	30	61	39/0.3	100/0.8					
1340											
	1,339.2	28.9	73	27/0.2		100/0.7					
1335											
	1,334.2	33.9	17	38	62/0.4	100/0.9				1,332.8 Boring Terminated at Elevation 1,332.8 ft in Weathered Rock (BIOTITE GNEISS)	35.3

WBS 44390.1.1	**TIP** U-5818	**COUNTY** McDOWELL	**GEOLOGIST** Swartley, J. R.	
SITE DESCRIPTION MSE WALLS FOR BRIDGE NO. 128 ABUTMENTS				**GROUND WTR (ft)**
BORING NO. W2-5	**STATION** 29+41	**OFFSET** 77 ft RT	**ALIGNMENT** -L-	**0 HR.** 14.0
COLLAR ELEV. 1,367.9 ft	**TOTAL DEPTH** 20.4 ft	**NORTHING** 704,073	**EASTING** 1,098,428	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE SME267 DIEDRICH D-50 74% 10/20/2017		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER Blizzard, B.	**START DATE** 12/07/17	**COMP. DATE** 12/07/17	**SURFACE WATER DEPTH** N/A	

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT 0.5ft	0.5ft	0.5ft	BLOWS PER FOOT 0 25 50 75 100	SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION
1370										1,367.9 PAVEMENT 0.0
	1,366.4	1.5						M		**ROADWAY EMBANKMENT** TAN, SILTY SAND (A-2-4)
1365			6	5	6	11		M		
	1,364.0	3.9	3	3	2	5				1,364.4 TAN, SANDY SILT (A-4) 3.5
1360								M		1,360.9 **ALLUVIAL** BROWN-TAN, SANDY SILT (A-4) WITH TRACE ORGANICS 7.0
	1,359.0	8.9	1	1	1	2				
1355								Sat.		1,355.4 GRAY, SILTY SAND (A-2-4) 12.5
	1,354.0	13.9	1	2	1	3				
1350										1,350.9 **RESIDUAL** TAN-GRAY, SILTY FINE SAND (A-2-4) 17.0
	1,349.0	18.9	7	11	12	23		Sat.		1,347.5 Boring Terminated at Elevation 1,347.5 ft in Medium Dense Silty SAND 20.4

SUMMARY OF LABORATORY TEST DATA

Soil Classification and Gradation

S&ME, Inc. Raleigh, 3201 Spring Forest Road, Raleigh, North Carolina 27616

S&ME Project #:	6235-17-016			Date Report:	2/27/2018
State Project No.:	44390.1.1	County:	McDowell	Date Tested:	2/1/18-2/24/18
Federal ID No.:	N/A	TIP No.:	U-5818		
Project Name:	MSE Walls for Bridge No. 128 Abutments				
Client Name:	Wetherill Engineering, Inc.	Client Address:	1223 Jones Franklin Road, Raleigh, NC 27606		

Sample No.	Station	Offset	Alignment	Sample Depth (ft)	AASHTO Classification		Total % Passing Sieve #				Total Mortar Fraction (%)				LL	PL	PI	Moist. %
							10	40	60	200	Coarse Sand	Fine Sand	Silt	Clay				
SS-84	28+70	2 LT	-L-	23.5-25.0	A-2-4	(0)	100	86	68	26.5	32	46	16	6	28	0	N.P.	25.2
SS-92	26+65	23 LT	-L-	18.5-20.0	A-5	(0)	100	87	78	45.8	22	39	27	12	47	0	N.P.	61.9
SS-161	29+02	37 RT	-L-	18.9-20.4	A-2-4	(0)	99	80	62	23.4	37	48	11	4	36	33	3	14.0
SS-163	28+23	40 LT	-L-	13.9-15.4	A-5	(0)	100	96	82	45.7	18	47	27	8	49	47	2	48.9

References / Comments / Deviations: ND=Not Detemined.

AASHTO T88: Particle Size Analysis of Soils as Modified by the NCDOT

AASHTO T89: Determining the Liquid Limit of Soils

AASHTO T90: Determining the Plastic Limit & Plasticity Index of Soils

AASHTO T265: Laboratory Determination of Moisture Content of Soils

AASHTO M145: The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes

Mal Krajan, ET		104-01-0703	Stewart Laney, PE	Project Manager
Technician Name:	Signature	Certification #	Technical Responsibility:	Position

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
M T FORM 503

SUMMIT
ENGINEERING • LABORATORY • TESTING

SUMMIT Engineering Laboratory & Testing, Inc.

COMPANY NAME AND CERTIFICATION NO. **SUMMIT** (119-0705)

NCDOT Project 623517016 Phase 01 **Tested By:** F. Gonzalez

Project Name Sugar Hill Road (U-5818) **Checked By** Mimi Hourani
Marion, NC

Client S&ME, Inc. - Charlotte **Date:** 2/12/2018

TEST RESULTS

Boring No.		W1-4	W2-3					
Sample No.		ST-1	ST-2					
Depth (ft)		6-8	10-12					
Retained #4 Sieve	%	0	0					
Passing #10 Sieve	%	98	100					
Passing #40 Sieve	%	94	98					
Passing #200 Sieve	%	41	49					

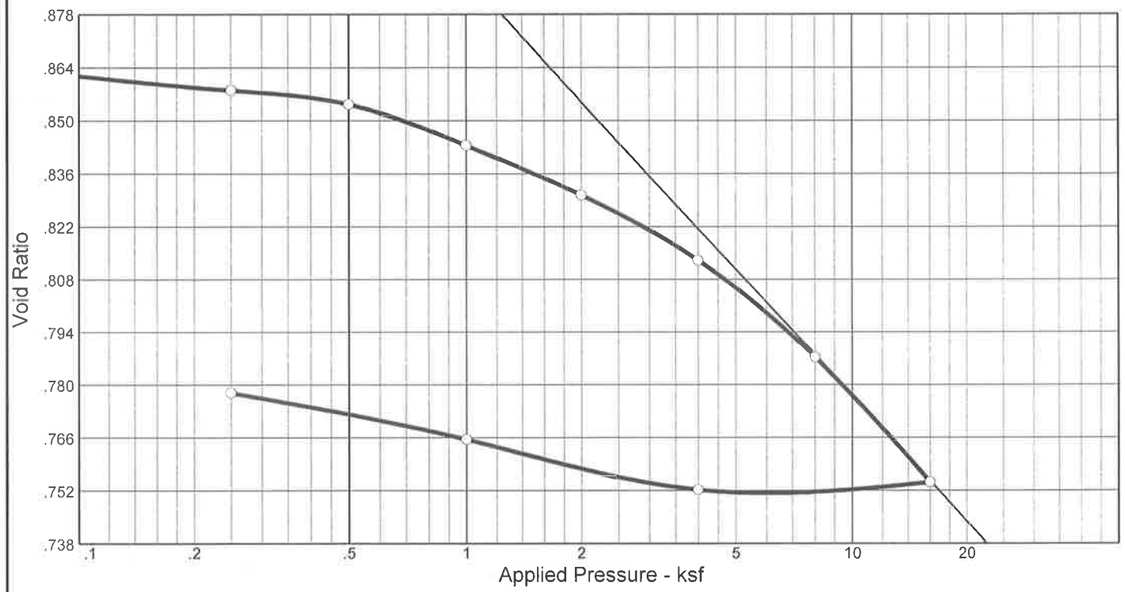
MINUS NO. 10 FRACTION

SOIL MORTAR - 100%								
Coarse Sand Ret - #60	%	12.3	8.2					
Fine Sand Ret - #270	%	59.2	58.4					
Silt 0.05 - 0.005 mm	%	22.2	27.0					
Clay < 0.005 mm	%	6.2	6.3					
Passing #40 Sieve	%	95.5	98.2					
Passing #200 Sieve	%	41.8	49.1					

Liquid Limit	NP	41					
Plasticity Index	NP	3					
AASHTO Classification	A-4(0)	A-5(0)					

Mimi Hourani
Lab Manager

Consolidation Test Report



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	C_v (in.2/min.)	C_α	No.	Load (ksf)	C_v (in.2/min.)	C_α	No.	Load (ksf)	C_v (in.2/min.)	C_α
1	0.25	0.323									
2	0.50	0.636									
3	1.00	0.009									
4	2.00	0.021									
5	4.00	0.246									
6	8.00	0.073									
7	16.00	0.072									
8	4.00	0.568									
9	1.00	0.528									
10	0.25	0.547									

MATERIAL DESCRIPTION	USCS	AASHTO
Grey-Brown Silty Sand	SM	A-5(0)

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf) Init.	Dry Dens. (pcf) Final	Moisture Init.	Moisture Final	Saturation Init.	Saturation Final	Void Ratio Init.	Void Ratio Final	P_c (ksf)	C_c
41	3	2.70		90.5		27.0 %	28.1 %	84.6 %	97.6 %	0.862	0.778	2.40	0.11

Preparation Process:	D2435 Method	C_r	Swell Press. (ksf)	Heave %
Condition of Test:		0.02		

Project No. 623517016.01 **Client:** S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)

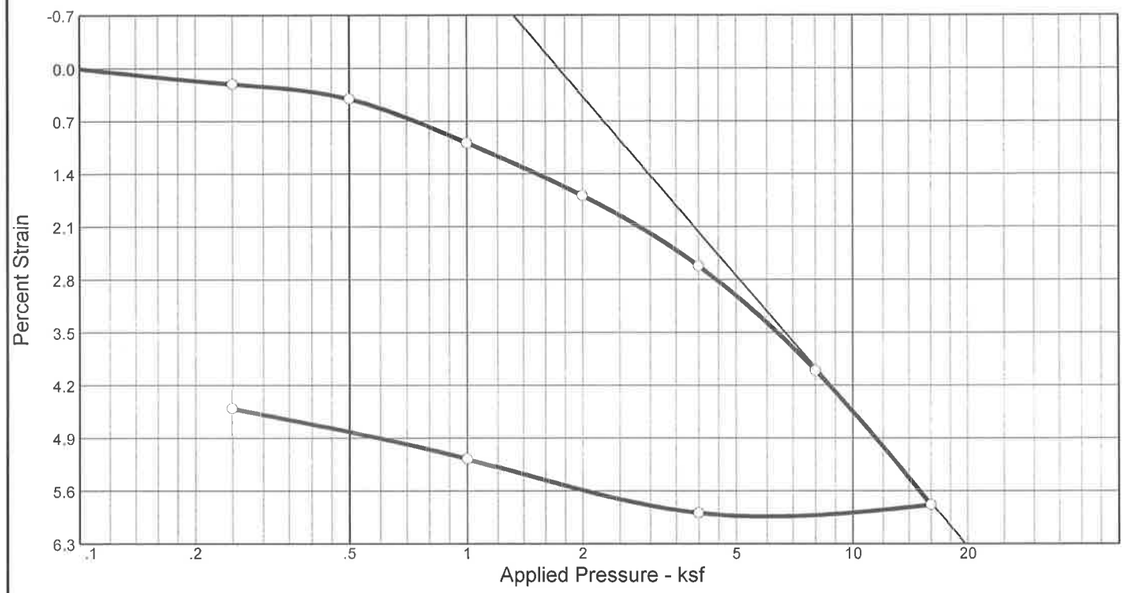
Summit Engineering
Ft. Mill, South Carolina

Remarks:

Checked By:
Title:

Figure

Consolidation Test Report



Coefficients of Consolidation and Secondary Consolidation

No.	Load (ksf)	C_v (in.^{2}/min.)	C_α	No.	Load (ksf)	C_v (in.^{2}/min.)	C_α	No.	Load (ksf)	C_v (in.^{2}/min.)	C_α
1	0.25	0.323									
2	0.50	0.636									
3	1.00	0.009									
4	2.00	0.021									
5	4.00	0.246									
6	8.00	0.073									
7	16.00	0.072									
8	4.00	0.568									
9	1.00	0.528									
10	0.25	0.547									

MATERIAL DESCRIPTION	USCS	AASHTO
Grey-Brown Silty Sand	SM	A-5(0)

LL	PI	Sp. Gr.	Overburden (ksf)	Dry Dens. (pcf) Init.	Dry Dens. (pcf) Final	Moisture Init.	Moisture Final	Saturation Init.	Saturation Final	Void Ratio Init.	Void Ratio Final	P_c (ksf)	C_c
41	3	2.70		90.5		27.0 %	28.1 %	84.6 %	97.6 %	0.862	0.778	2.40	0.11

Preparation Process:	D2435 Method	C_r	Swell Press. (ksf)	Heave %
Condition of Test:		0.02		

Project No. 623517016.01 **Client:** S&ME, Inc. - Charlotte
Project: Sugar Hill Road, Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)

Summit Engineering
Ft. Mill, South Carolina

Remarks:

Checked By:
Title:

Figure

CONSOLIDATION TEST DATA

Client: S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Marion, NC
Project Number: 623517016.01

Sample Data

Source:
Sample No.:
Elev. or Depth: **Sample Length(in./cm.):**
Location: W 2-3 UD @ 10'-12' (ST-2)
Description: Grey-Brown Silty Sand
Liquid Limit: 41 **Plasticity Index:** 3
USCS: SM **AASHTO:** A-5(0) **Figure No.:**
Testing Remarks:

Test Specimen Data

TOTAL SAMPLE	BEFORE TEST	AFTER TEST
Wet w+t = 148.14 g.	Consolidometer # = 1	Wet w+t = 149.46 g.
Dry w+t = 116.65 g.		Dry w+t = 116.65 g.
Tare Wt. = .00 g.	Spec. Gravity = 2.70	Tare Wt. = .00 g.
Height = 1.00 in.	Height = 1.00 in.	
Diameter = 2.50 in.	Diameter = 2.50 in.	
Weight = 148.14 g.	Defl. Table = 1	
Moisture = 27.0 %	Ht. Solids = 0.5371 in.	Moisture = 28.1 %
Wet Den. = 115.0 pcf	Dry Wt. = 116.65 g.	Dry Wt. = 116.65 g.*
Dry Den. = 90.5 pcf	Void Ratio = 0.862	Void Ratio = 0.778
	Saturation = 84.6 %	

* Final dry weight used in calculations

End-of-Load Summary

Pressure (ksf)	Final Dial (in.)	Machine Defl. (in.)	C_v (in.^{2}/min.)	C_α	Void Ratio	% Compression /Swell
start	0.00000				0.862	
0.25	0.00230	0.00030	0.323		0.858*	0.2 Comprs.*
0.50	0.00490	0.00060	0.636		0.854*	0.4 Comprs.*
1.00	0.01110	0.00100	0.009		0.843*	1.0 Comprs.*
2.00	0.01910	0.00140	0.021		0.830*	1.7 Comprs.*
4.00	0.02970	0.00170	0.246		0.813*	2.6 Comprs.*
8.00	0.04520	0.00230	0.073		0.787*	4.0 Comprs.*
16.00	0.06530	0.00310	0.072		0.754*	5.8 Comprs.*
4.00	0.06140	0.00250	0.568		0.752*	5.9 Comprs.*
1.00	0.05320	0.00200	0.528		0.766*	5.2 Comprs.*
0.25	0.04560	0.00160	0.547		0.778*	4.5 Comprs.*

*CALCULATED USING D_{100} INSTEAD OF FINAL READING

C_c = 0.11 P_c = 2.40 ksf C_r = 0.02

Pressure: 0.25 ksf — **TEST READINGS** — **Load No. 1**

No.	Elapsed Time	Dial Reading
1	0.00	0.00000
2	0.10	0.00210
3	0.25	0.00220
4	0.50	0.00230
5	1.00	0.00230
6	2.00	0.00230
7	4.00	0.00230
8	8.00	0.00230
9	15.00	0.00230

Void Ratio = 0.858 **Compression =** 0.2 % >>> CALCULATED USING D_{100}
D_0 = 0.00164 D_{90} = 0.00200 D_{100} = 0.00204
C_v at 0.7 min. = 0.323 in.^{2}/min.

Pressure: 0.50 ksf — **TEST READINGS** — **Load No. 2**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00230	11	60.00	0.00490
2	0.10	0.00450	12	120.00	0.00490
3	0.25	0.00460			
4	0.50	0.00460			
5	1.00	0.00460			
6	2.00	0.00460			
7	4.00	0.00470			
8	8.00	0.00470			
9	15.00	0.00480			
10	30.00	0.00490			

Void Ratio = 0.854 **Compression =** 0.4 % >>> CALCULATED USING D_{100}
D_0 = 0.00373 D_{90} = 0.00400 D_{100} = 0.00403
C_v at 0.3 min. = 0.636 in.^{2}/min.

Pressure: 1.00 ksf — **TEST READINGS** — **Load No. 3**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.00490	11	60.00	0.01090
2	0.10	0.01020	12	120.00	0.01100
3	0.25	0.01030	13	240.00	0.01110
4	0.50	0.01030			
5	1.00	0.01040			
6	2.00	0.01040			
7	4.00	0.01050			
8	8.00	0.01050			
9	15.00	0.01080			
10	30.00	0.01080			

Void Ratio = 0.843 **Compression =** 1.0 % >>> CALCULATED USING D_{100}
D_0 = 0.00912 D_{90} = 0.00980 D_{100} = 0.00988
C_v at 22.3 min. = 0.009 in.^{2}/min.

Pressure: 2.00 ksf — **TEST READINGS** — **Load No. 4**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01110	11	60.00	0.01840
2	0.10	0.01730	12	120.00	0.01880
3	0.25	0.01740	13	240.00	0.01900
4	0.50	0.01750	14	480.00	0.01910
5	1.00	0.01760	15	720.00	0.01910
6	2.00	0.01770			
7	4.00	0.01800			
8	8.00	0.01820			
9	15.00	0.01820			
10	30.00	0.01830			

Void Ratio = 0.830 **Compression =** 1.7 % >>> CALCULATED USING D_{100}
D_0 = 0.01582 D_{90} = 0.01680 D_{100} = 0.01691
C_v at 9.8 min. = 0.021 in.^{2}/min.

Pressure: 4.00 ksf — **TEST READINGS** — **Load No. 5**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.01910	11	60.00	0.02920
2	0.10	0.02710	12	120.00	0.02940
3	0.25	0.02720	13	240.00	0.02970
4	0.50	0.02770			
5	1.00	0.02780			
6	2.00	0.02790			
7	4.00	0.02810			
8	8.00	0.02850			
9	15.00	0.02860			
10	30.00	0.02880			

Void Ratio = 0.813 **Compression =** 2.6 % >>> CALCULATED USING D_{100}
D_0 = 0.02484 D_{90} = 0.02607 D_{100} = 0.02620
C_v at 0.8 min. = 0.246 in.^{2}/min.

Pressure: 8.00 ksf — **TEST READINGS** — **Load No. 6**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.02970	11	60.00	0.04380
2	0.10	0.04030	12	120.00	0.04400
3	0.25	0.04070	13	240.00	0.04450
4	0.50	0.04130	14	480.00	0.04470
5	1.00	0.04150	15	720.00	0.04480
6	2.00	0.04200	16	960.00	0.04520
7	4.00	0.04230			
8	8.00	0.04260			
9	15.00	0.04300			
10	30.00	0.04320			

Void Ratio = 0.787 **Compression =** 4.0 % >>> CALCULATED USING D_{100}
D_0 = 0.03768 D_{90} = 0.03981 D_{100} = 0.04005
C_v at 2.7 min. = 0.073 in.^{2}/min.

Pressure: 16.00 ksf — **TEST READINGS** — **Load No. 7**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.04520	11	60.00	0.06300
2	0.10	0.05820	12	120.00	0.06330
3	0.25	0.05900	13	240.00	0.06390
4	0.50	0.05930	14	480.00	0.06460
5	1.00	0.05990	15	720.00	0.06480
6	2.00	0.06050	16	960.00	0.06520
7	4.00	0.06080	17	1200.00	0.06530
8	8.00	0.06150	18	1440.00	0.06530
9	15.00	0.06200			
10	30.00	0.06230			

Void Ratio = 0.754 **Compression =** 5.8 % >>> CALCULATED USING D_{100}
D_0 = 0.05472 D_{90} = 0.05750 D_{100} = 0.05781
C_v at 2.6 min. = 0.072 in.^{2}/min.

Pressure: 4.00 ksf — **TEST READINGS** — **Load No. 8**

No.	Elapsed Time	Dial Reading
1	0.00	0.06530
2	0.10	0.06150
3	0.25	0.06140
4	0.50	0.06140
5	1.00	0.06140
6	2.00	0.06140
7	4.00	0.06140
8	8.00	0.06140
9	15.00	0.06140

Void Ratio = 0.752 **Compression =** 5.9 % >>> CALCULATED USING D_{100}
D_0 = 0.05917 D_{90} = 0.05890 D_{100} = 0.05887
C_v at 0.3 min. = 0.568 in.^{2}/min.

Pressure: 1.00 ksf — **TEST READINGS** — **Load No. 9**

No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.06140	11	60.00	0.05320
2	0.10	0.05430	12	120.00	0.05320
3	0.25	0.05390			
4	0.50	0.05380			
5	1.00	0.05380			
6	2.00	0.05370			
7	4.00	0.05370			
8	8.00	0.05360			
9	15.00	0.05330			
10	30.00	0.05320			

Void Ratio = 0.766 **Compression =** 5.2 % >>> CALCULATED USING D_{100}
D_0 = 0.05299 D_{90} = 0.05185 D_{100} = 0.05173
C_v at 0.4 min. = 0.528 in.^{2}/min.

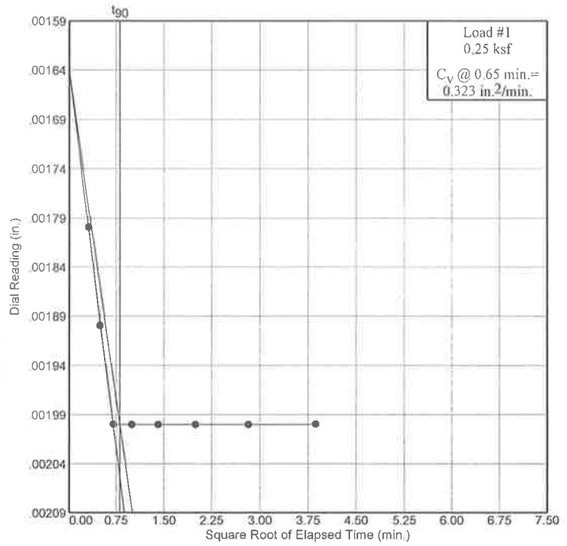
Pressure: 0.25 ksf — **TEST READINGS** — **Load No. 10**

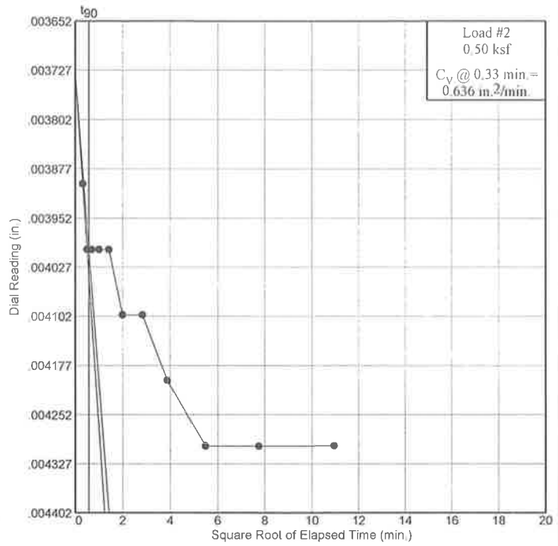
No.	Elapsed Time	Dial Reading	No.	Elapsed Time	Dial Reading
1	0.00	0.05320	11	60.00	0.04610
2	0.10	0.04740	12	120.00	0.04600
3	0.25	0.04690	13	240.00	0.04590
4	0.50	0.04680	14	480.00	0.04580
5	1.00	0.04670	15	720.00	0.04580
6	2.00	0.04670	16	960.00	0.04570
7	4.00	0.04660	17	1440.00	0.04560
8	8.00	0.04650			
9	15.00	0.04650			
10	30.00	0.04640			

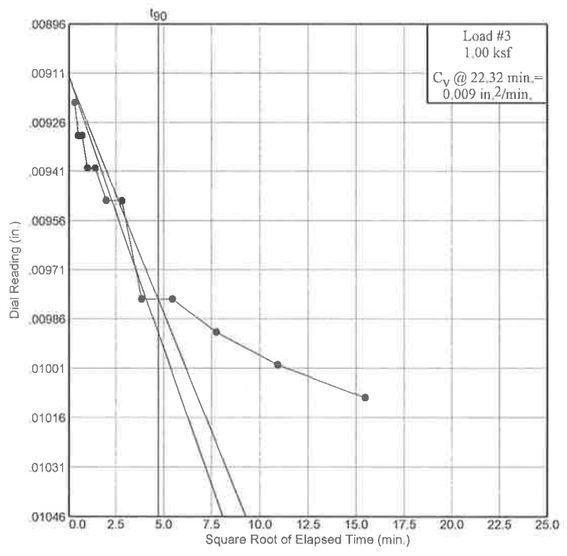
Void Ratio = 0.778 **Compression =** 4.5 % >>> CALCULATED USING D_{100}
D_0 = 0.04666 D_{90} = 0.04525 D_{100} = 0.04510
C_v at 0.4 min. = 0.547 in.^{2}/min.

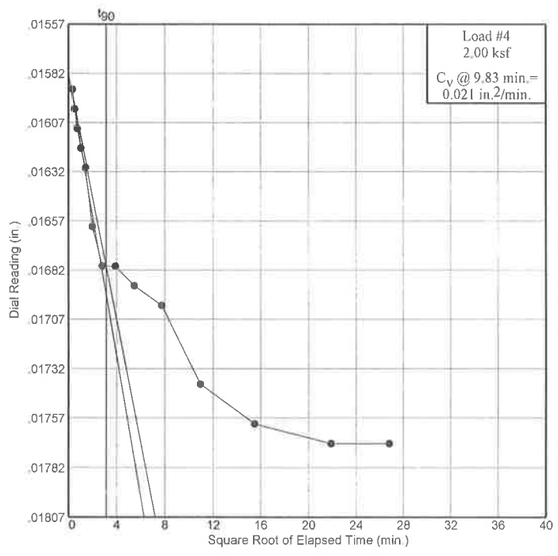
Dial Reading vs. Time

Project No.: 623517016.01
Project: Sugar Hill Road
Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)







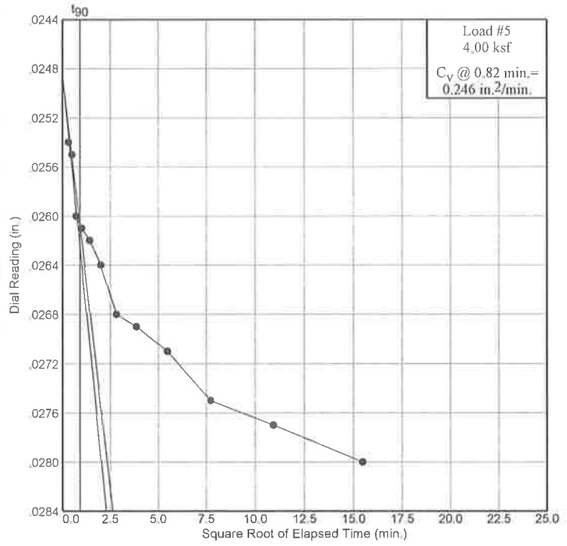


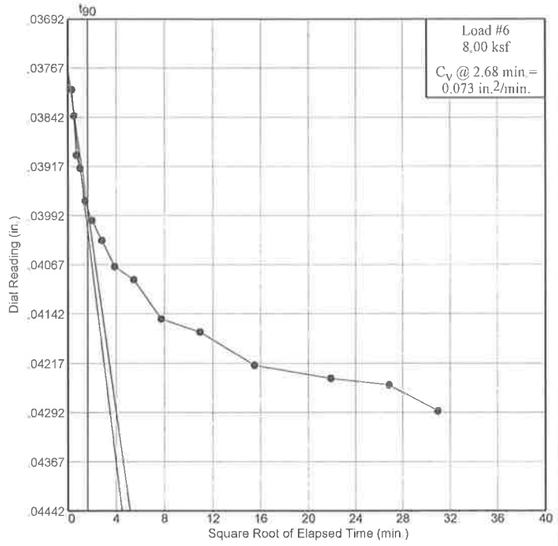
Summit Engineering
Ft. Mill, South Carolina

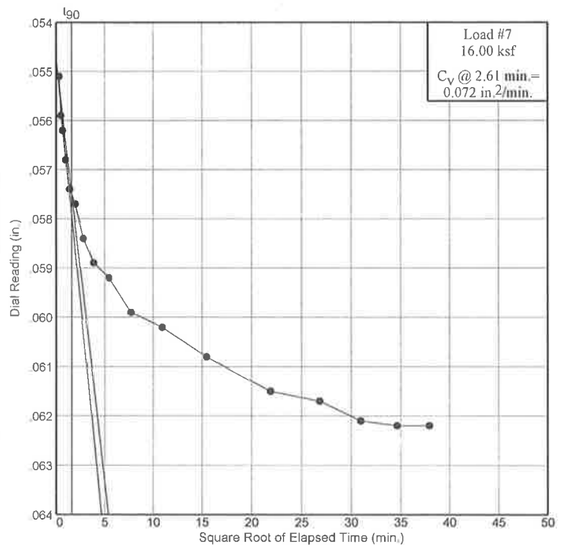
Figure

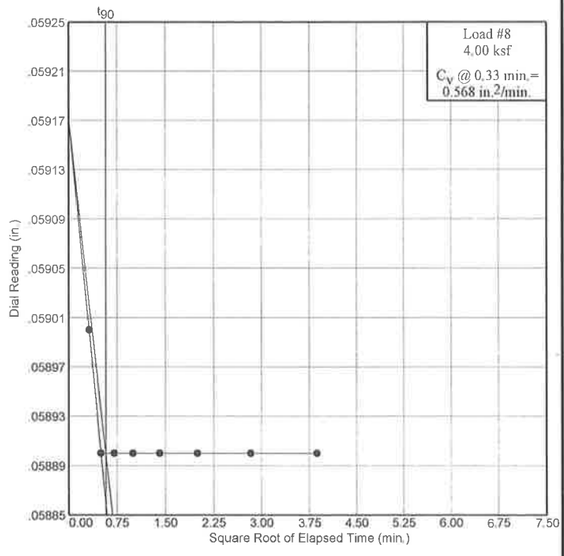
Dial Reading vs. Time

Project No.: 623517016.01
Project: Sugar Hill Road
Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)









Summit Engineering
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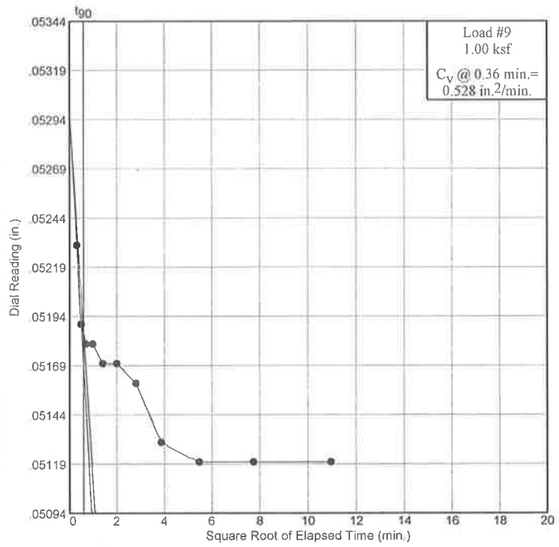
Figure

Dial Reading vs. Time

Project No.: 623517016.01
Project: Sugar Hill Road
Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)



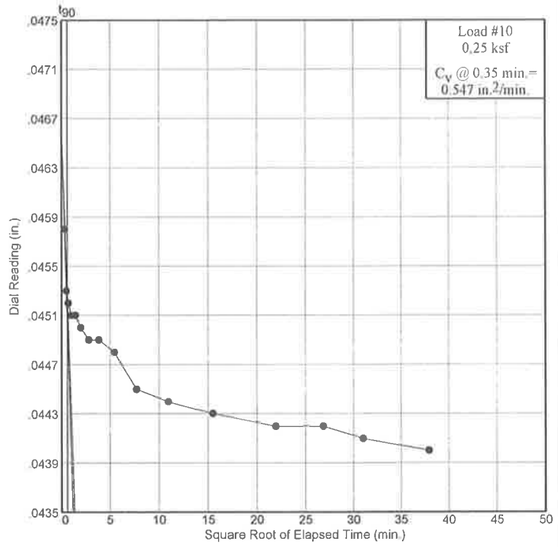


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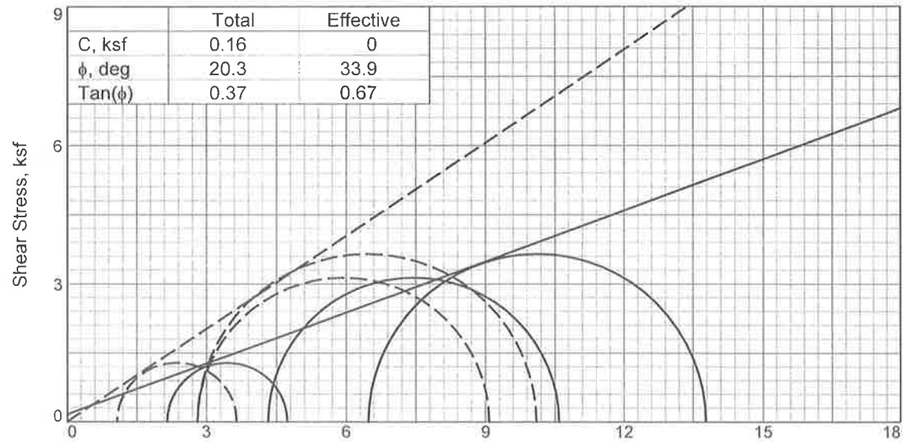
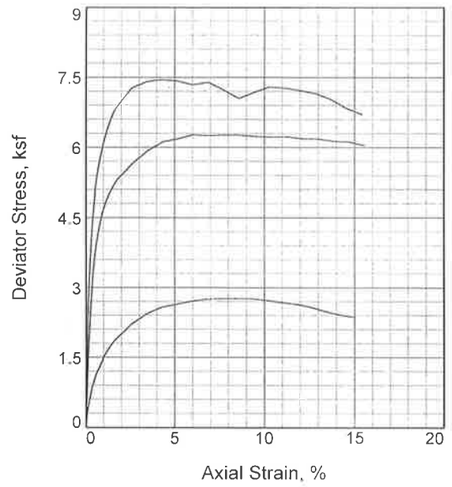
Figure





Sample No.		1	2	3
Initial	Water Content, %	46.2	39.0	33.1
	Dry Density, pcf	75.7	78.7	85.0
	Saturation, %	100.0	90.4	89.0
	Void Ratio	1.2753	1.1897	1.0263
	Diameter, in.	2.880	2.886	2.875
	Height, in.	6.028	5.991	6.016
At Test	Water Content, %	44.8	35.0	32.1
	Dry Density, pcf	77.0	87.6	91.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	1.2363	0.9668	0.8855
	Diameter, in.	2.867	2.779	2.813
	Height, in.	5.980	5.805	5.849
Strain rate, %/min.		0.07	0.07	0.07
Back Pressure, psi		60.00	60.00	60.00
Cell Pressure, psi		75.00	90.00	105.00
Fail. Stress, ksf		2.6	6.3	7.3
Total Pore Pr., ksf		9.7	10.2	12.3
Ult. Stress, ksf				
Total Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf		3.6	9.1	10.1
$\bar{\sigma}_3$ Failure, ksf		1.1	2.8	2.8

Type of Test:
CU with Pore Pressures
Sample Type: Shelby Tube
Description: Grey-Brown Silty Sand

LL= 41 **PL=** 38 **PI=** 3
Assumed Specific Gravity= 2.76
Remarks:

Figure _____

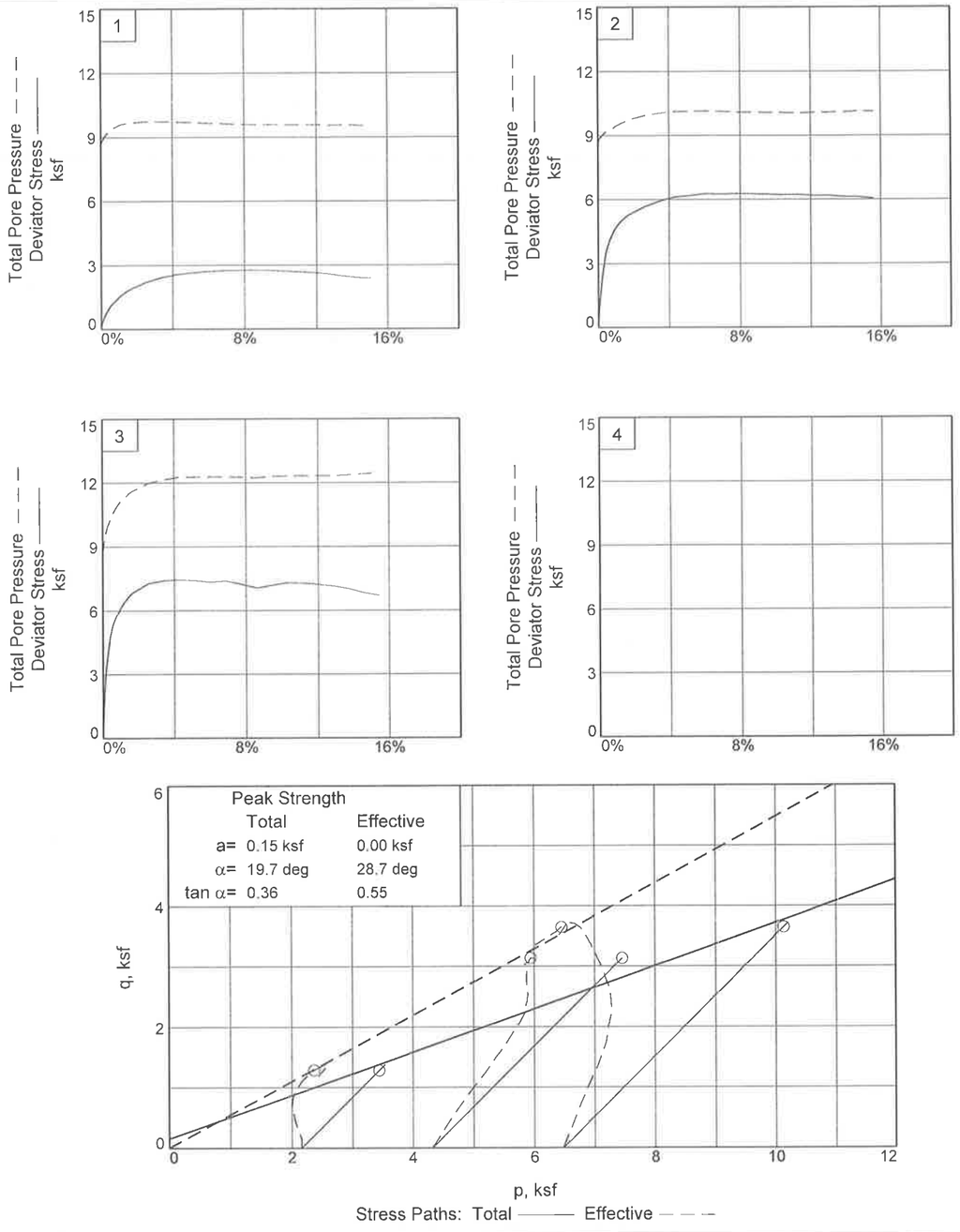
Client: S&ME, Inc. - Charlotte

Project: Sugar Hill Road
Marion, NC
Location: W 2-3 UD @ 10'-12' (ST-2)

Proj. No.: 623517016.01 **Date Sampled:** 01-22-18

TRIAXIAL SHEAR TEST REPORT
Summit Engineering
Ft. Mill, South Carolina

Tested By: FG **Checked By:** MH



Client: S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Location: W 2-3 UD @ 10'-12' (ST-2)
Project No.: 623517016.01

Figure _____

Summit Engineering

Tested By: FG **Checked By:** MH

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

2/13/2018
2:09 PM

Date: 01-22-18
Client: S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Marion, NC
Project No.: 623517016.01
Location: W 2-3 UD @ 10'-12' (ST-2)
Description: Grey-Brown Silty Sand
Remarks:
Type of Sample: Shelby Tube
Assumed Specific Gravity=2.76 **LL=**41 **PL=**38 **PI=**3
Test Method: ASTM D 4767 Method B

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1141.220			1130.220
Moisture content: Dry soil+tare, gms.	780.570			780.570
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	46.2	47.4	44.8	44.8
Moist specimen weight, gms.	1141.22			
Diameter, in.	2.880	2.899	2.867	
Area, in.²	6.514	6.600	6.454	
Height, in.	6.028	6.033	5.980	
Net decrease in height, in.		-0.005	0.053	
Net decrease in water volume, cc.			20.000	
Wet density, pcf	110.7	110.1	111.6	
Dry density, pcf	75.7	74.7	77.0	
Void ratio	1.2753	1.3070	1.2363	
Saturation, %	100.0	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Consolidation cell pressure = 75.00 psi (10.80 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 2.16 ksf
Strain rate, %/min. = 0.07
Fail. Stress = 2.57 ksf **at reading no.** 23

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Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	2.16	2.16	1.00	60.00	2.16	0.00
1	0.0040	13.8	14	0.1	0.31	2.00	2.31	1.15	61.10	2.16	0.15
2	0.0100	23.9	24	0.2	0.53	1.84	2.38	1.29	62.20	2.11	0.27
3	0.0150	30.9	31	0.3	0.69	1.74	2.43	1.39	62.90	2.09	0.34
4	0.0200	36.9	37	0.3	0.82	1.66	2.48	1.50	63.50	2.07	0.41
5	0.0250	42.0	42	0.4	0.93	1.58	2.52	1.59	64.00	2.05	0.47
6	0.0290	46.4	46	0.5	1.03	1.53	2.56	1.67	64.40	2.04	0.52
7	0.0340	50.7	51	0.6	1.12	1.47	2.59	1.77	64.80	2.03	0.56
8	0.0390	54.5	55	0.7	1.21	1.41	2.62	1.86	65.20	2.02	0.60
9	0.0450	57.7	58	0.8	1.28	1.37	2.65	1.93	65.50	2.01	0.64
10	0.0500	60.9	61	0.8	1.35	1.32	2.67	2.02	65.80	2.00	0.67
11	0.0550	64.1	64	0.9	1.42	1.30	2.71	2.09	66.00	2.00	0.71
12	0.0590	67.3	67	1.0	1.49	1.27	2.75	2.17	66.20	2.01	0.74
13	0.0640	69.9	70	1.1	1.54	1.24	2.78	2.25	66.40	2.01	0.77
14	0.0690	72.6	73	1.2	1.60	1.21	2.81	2.32	66.60	2.01	0.80
15	0.0740	74.9	75	1.2	1.65	1.20	2.85	2.38	66.70	2.02	0.83
16	0.0790	77.3	77	1.3	1.70	1.18	2.88	2.44	66.80	2.03	0.85
17	0.0840	79.5	80	1.4	1.75	1.17	2.92	2.50	66.90	2.04	0.87
18	0.0890	81.6	82	1.5	1.79	1.15	2.95	2.56	67.00	2.05	0.90
19	0.0940	83.7	84	1.6	1.84	1.14	2.98	2.62	67.10	2.06	0.92
20	0.1000	85.7	86	1.7	1.88	1.12	3.00	2.67	67.20	2.06	0.94
21	0.1500	101.0	101	2.5	2.20	1.07	3.26	3.06	67.60	2.16	1.10
22	0.2040	112.6	113	3.4	2.43	1.07	3.49	3.28	67.60	2.28	1.21
23	0.2540	120.2	120	4.2	2.57	1.08	3.65	3.38	67.50	2.36	1.28
24	0.3050	124.7	125	5.1	2.64	1.11	3.75	3.38	67.30	2.43	1.32
25	0.3500	128.5	129	5.9	2.70	1.14	3.84	3.37	67.10	2.49	1.35
26	0.4050	132.0	132	6.8	2.75	1.17	3.91	3.35	66.90	2.54	1.37
27	0.4500	134.0	134	7.5	2.76	1.20	3.96	3.31	66.70	2.58	1.38
28	0.5000	135.1	135	8.4	2.76	1.21	3.97	3.28	66.60	2.59	1.38
29	0.5550	136.2	136	9.3	2.76	1.21	3.97	3.28	66.60	2.59	1.38
30	0.6050	135.8	136	10.1	2.72	1.22	3.95	3.22	66.50	2.59	1.36
31	0.6500	135.0	135	10.9	2.68	1.22	3.91	3.19	66.50	2.57	1.34
32	0.7050	134.0	134	11.8	2.64	1.22	3.86	3.15	66.50	2.54	1.32
33	0.7510	132.3	132	12.6	2.58	1.24	3.82	3.08	66.40	2.53	1.29
34	0.8010	128.5	129	13.4	2.48	1.24	3.72	3.01	66.40	2.48	1.24
35	0.8500	125.8	126	14.2	2.41	1.25	3.66	2.92	66.30	2.46	1.20
36	0.9000	124.4	124	15.1	2.36	1.25	3.61	2.88	66.30	2.43	1.18

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1124.920			1093.070
Moisture content: Dry soil+tare, gms.	809.500			809.500
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	39.0	38.5	35.0	35.0
Moist specimen weight, gms.	1124.92			
Diameter, in.	2.886	2.796	2.779	
Area, in.²	6.542	6.140	6.064	
Height, in.	5.991	6.016	5.805	
Net decrease in height, in.		-0.025	0.211	
Net decrease in water volume, cc.			28.400	
Wet density, pcf	109.3	115.7	118.3	
Dry density, pcf	78.7	83.5	87.6	
Void ratio	1.1897	1.0637	0.9668	
Saturation, %	90.4	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Consolidation cell pressure = 90.00 psi (12.96 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 4.32 ksf
Strain rate, %/min. = 0.07
Fail. Stress = 6.27 ksf **at reading no.** 26

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	4.32	4.32	1.00	60.00	4.32	0.00
1	0.0050	44.6	45	0.1	1.06	4.13	5.19	1.26	61.30	4.66	0.53
2	0.0100	78.7	79	0.2	1.87	4.02	5.88	1.46	62.10	4.95	0.93
3	0.0150	105.1	105	0.3	2.49	3.95	6.43	1.63	62.60	5.19	1.24
4	0.0200	126.0	126	0.3	2.98	3.87	6.86	1.77	63.10	5.36	1.49
5	0.0240	142.3	142	0.4	3.37	3.83	7.20	1.88	63.40	5.51	1.68
6	0.0290	155.3	155	0.5	3.67	3.77	7.44	1.97	63.80	5.61	1.83
7	0.0340	165.7	166	0.6	3.91	3.73	7.64	2.05	64.10	5.69	1.96
8	0.0390	174.3	174	0.7	4.11	3.70	7.81	2.11	64.30	5.76	2.06
9	0.0440	181.7	182	0.8	4.28	3.66	7.94	2.17	64.60	5.80	2.14
10	0.0490	188.0	188	0.8	4.43	3.63	8.06	2.22	64.80	5.84	2.21
11	0.0530	193.6	194	0.9	4.56	3.57	8.13	2.28	65.20	5.85	2.28
12	0.0580	198.6	199	1.0	4.67	3.53	8.20	2.32	65.50	5.86	2.33
13	0.0630	202.8	203	1.1	4.76	3.48	8.25	2.37	65.80	5.87	2.38
14	0.0680	207.1	207	1.2	4.86	3.46	8.32	2.41	66.00	5.89	2.43
15	0.0730	210.9	211	1.3	4.95	3.41	8.36	2.45	66.30	5.89	2.47
16	0.0780	214.3	214	1.3	5.02	3.38	8.40	2.48	66.50	5.89	2.51
17	0.0830	217.4	217	1.4	5.09	3.36	8.44	2.52	66.70	5.90	2.54
18	0.0880	220.2	220	1.5	5.15	3.31	8.46	2.55	67.00	5.89	2.57
19	0.0930	222.8	223	1.6	5.21	3.28	8.49	2.59	67.20	5.89	2.60
20	0.0980	225.3	225	1.7	5.26	3.25	8.51	2.62	67.40	5.88	2.63
21	0.1030	227.5	228	1.8	5.31	3.23	8.53	2.65	67.60	5.88	2.65
22	0.1530	245.0	245	2.6	5.66	3.04	8.70	2.86	68.90	5.87	2.83
23	0.2030	258.6	259	3.5	5.93	2.92	8.85	3.03	69.70	5.89	2.96

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	0.2520	269.2	269	4.3	6.11	2.85	8.97	3.14	70.20	5.91	3.06
25	0.3030	274.8	275	5.2	6.18	2.82	9.01	3.19	70.40	5.91	3.09
26	0.3520	281.1	281	6.1	6.27	2.81	9.08	3.23	70.50	5.94	3.14
27	0.4020	282.9	283	6.9	6.25	2.84	9.09	3.20	70.30	5.96	3.13
28	0.4520	286.2	286	7.8	6.27	2.87	9.13	3.19	70.10	6.00	3.13
29	0.5030	288.7	289	8.7	6.26	2.88	9.14	3.17	70.00	6.01	3.13
30	0.5520	290.1	290	9.5	6.23	2.88	9.11	3.16	70.00	6.00	3.12
31	0.6040	292.3	292	10.4	6.22	2.89	9.11	3.15	69.90	6.00	3.11
32	0.6530	295.5	296	11.2	6.23	2.91	9.14	3.14	69.80	6.02	3.11
33	0.7020	296.4	296	12.1	6.19	2.89	9.08	3.14	69.90	5.99	3.09
34	0.7540	299.2	299	13.0	6.18	2.88	9.06	3.15	70.00	5.97	3.09
35	0.8030	299.6	300	13.8	6.13	2.87	9.00	3.14	70.10	5.93	3.07
36	0.8530	301.9	302	14.7	6.12	2.82	8.94	3.17	70.40	5.88	3.06
37	0.9040	301.2	301	15.6	6.04	2.82	8.86	3.14	70.40	5.84	3.02

Parameters for Specimen No. 3

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1160.080			1151.370
Moisture content: Dry soil+tare, gms.	871.710			871.710
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	33.1	36.1	32.1	32.1
Moist specimen weight, gms.	1160.08			
Diameter, in.	2.875	2.846	2.813	
Area, in.²	6.492	6.360	6.213	
Height, in.	6.016	6.051	5.849	
Net decrease in height, in.		-0.035	0.202	
Net decrease in water volume, cc.			35.100	
Wet density, pcf	113.2	117.5	120.7	
Dry density, pcf	85.0	86.3	91.4	
Void ratio	1.0263	0.9966	0.8855	
Saturation, %	89.0	100.0	100.0	

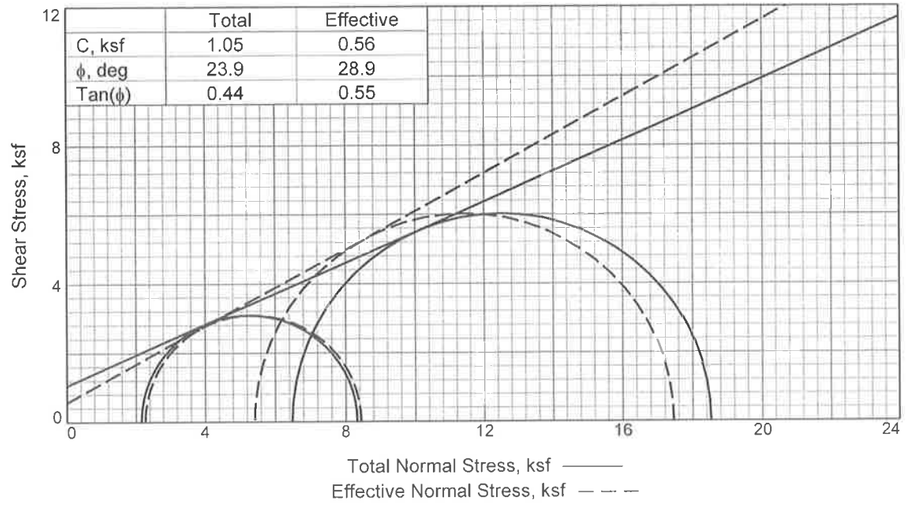
Test Readings for Specimen No. 3

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Consolidation cell pressure = 105.00 psi (15.12 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 6.48 ksf
Strain rate, %/min. = 0.07
Fail. Stress = 7.30 ksf **at reading no.** 31

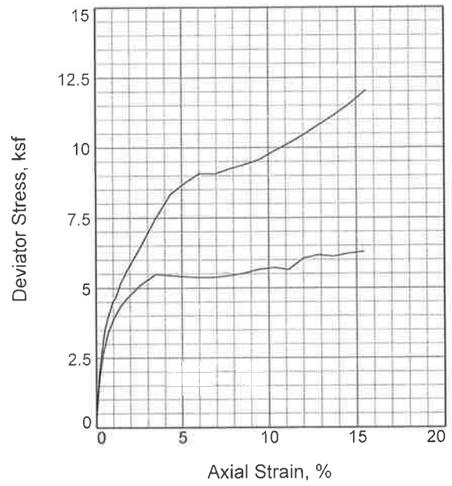
No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	6.48	6.48	1.00	60.00	6.48	0.00
1	0.0040	63.5	64	0.1	1.47	6.03	7.50	1.24	63.10	6.77	0.74
2	0.0080	115.8	116	0.1	2.68	5.70	8.38	1.47	65.40	7.04	1.34
3	0.0130	151.0	151	0.2	3.49	5.44	8.94	1.64	67.20	7.19	1.75
4	0.0180	176.4	176	0.3	4.08	5.20	9.27	1.78	68.90	7.24	2.04
5	0.0230	195.6	196	0.4	4.52	5.03	9.54	1.90	70.10	7.28	2.26

Test Readings for Specimen No. 3

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
6	0.0280	210.9	211	0.5	4.86	4.84	9.70	2.01	71.40	7.27	2.43
7	0.0320	223.4	223	0.5	5.15	4.68	9.83	2.10	72.50	7.25	2.57
8	0.0370	233.8	234	0.6	5.38	4.54	9.92	2.19	73.50	7.23	2.69
9	0.0420	242.6	243	0.7	5.58	4.39	9.97	2.27	74.50	7.18	2.79
10	0.0470	250.4	250	0.8	5.76	4.28	10.03	2.35	75.30	7.16	2.88
11	0.0520	257.2	257	0.9	5.91	4.16	10.07	2.42	76.10	7.12	2.95
12	0.0570	263.8	264	1.0	6.05	4.08	10.13	2.49	76.70	7.10	3.03
13	0.0620	269.6	270	1.1	6.18	3.97	10.16	2.56	77.40	7.07	3.09
14	0.0670	275.0	275	1.1	6.30	3.89	10.19	2.62	78.00	7.04	3.15
15	0.0720	279.9	280	1.2	6.41	3.82	10.22	2.68	78.50	7.02	3.20
16	0.0770	284.1	284	1.3	6.50	3.76	10.26	2.73	78.90	7.01	3.25
17	0.0820	288.3	288	1.4	6.59	3.69	10.27	2.79	79.40	6.98	3.29
18	0.0870	291.8	292	1.5	6.66	3.61	10.28	2.84	79.90	6.95	3.33
19	0.0910	295.3	295	1.6	6.74	3.57	10.31	2.89	80.20	6.94	3.37
20	0.0960	298.2	298	1.6	6.80	3.51	10.31	2.93	80.60	6.91	3.40
21	0.1020	301.3	301	1.7	6.86	3.47	10.33	2.98	80.90	6.90	3.43
22	0.1510	321.9	322	2.6	7.27	3.14	10.41	3.32	83.20	6.77	3.63
23	0.2020	331.2	331	3.5	7.41	2.97	10.38	3.50	84.40	6.67	3.71
24	0.2510	335.7	336	4.3	7.45	2.87	10.31	3.60	85.10	6.59	3.72
25	0.3010	337.4	337	5.1	7.42	2.85	10.27	3.60	85.20	6.56	3.71
26	0.3520	336.9	337	6.0	7.34	2.84	10.18	3.59	85.30	6.51	3.67
27	0.4020	342.4	342	6.9	7.39	2.84	10.23	3.61	85.30	6.53	3.70
28	0.4520	338.2	338	7.7	7.23	2.87	10.10	3.52	85.10	6.48	3.62
29	0.5030	332.6	333	8.6	7.05	2.89	9.94	3.43	84.90	6.42	3.52
30	0.5520	342.0	342	9.4	7.18	2.82	10.00	3.54	85.40	6.41	3.59
31	0.6020	350.9	351	10.3	7.30	2.81	10.10	3.60	85.50	6.46	3.65
32	0.6530	353.0	353	11.2	7.27	2.79	10.06	3.60	85.60	6.43	3.63
33	0.7030	353.9	354	12.0	7.22	2.79	10.01	3.58	85.60	6.40	3.61
34	0.7530	354.0	354	12.9	7.15	2.79	9.94	3.56	85.60	6.37	3.57
35	0.8030	351.2	351	13.7	7.02	2.75	9.77	3.55	85.90	6.26	3.51
36	0.8530	345.2	345	14.6	6.83	2.71	9.54	3.52	86.20	6.12	3.42
37	0.9030	342.0	342	15.4	6.70	2.66	9.37	3.52	86.50	6.02	3.35



	Total	Effective
C, ksf	1.05	0.56
ϕ, deg	23.9	28.9
Tan(ϕ)	0.44	0.55



Sample No.		1	2
Initial	Water Content, %	29.9	18.2
	Dry Density, pcf	88.4	107.9
	Saturation, %	88.9	87.5
	Void Ratio	0.9073	0.5618
	Diameter, in.	2.850	2.845
	Height, in.	6.054	6.003
At Test	Water Content, %	24.2	18.7
	Dry Density, pcf	101.9	112.1
	Saturation, %	100.0	100.0
	Void Ratio	0.6536	0.5042
	Diameter, in.	2.699	2.839
	Height, in.	5.852	5.807
Strain rate, %/min.		0.07	0.07
Back Pressure, psi		60.00	60.00
Cell Pressure, psi		75.00	105.00
Fail. Stress, ksf		6.2	12.0
Total Pore Pr., ksf		8.5	9.7
Ult. Stress, ksf			
Total Pore Pr., ksf			
$\bar{\sigma}_1$ Failure, ksf		8.4	17.5
$\bar{\sigma}_3$ Failure, ksf		2.3	5.4

Type of Test:
CU with Pore Pressures
Sample Type: Shelby Tube
Description: Dark Grey-Brown Silty Sand

LL= NP **PI=** NP
Assumed Specific Gravity= 2.70
Remarks:

Figure _____

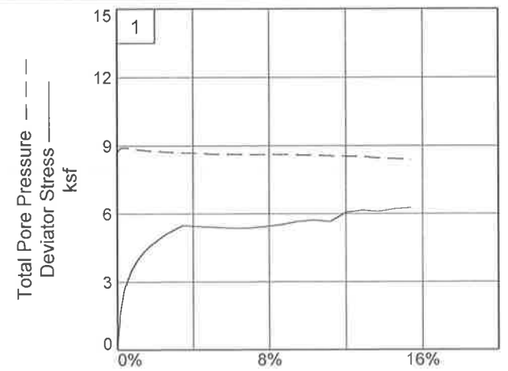
Client: S&ME, Inc. - Charlotte

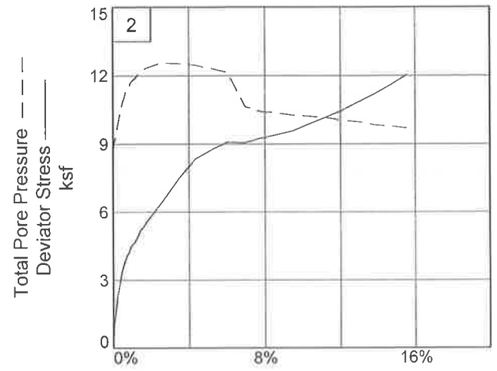
Project: Sugar Hill Road
Marion, NC
Location: W 1-4 UD @ 6'-8' (ST-1)

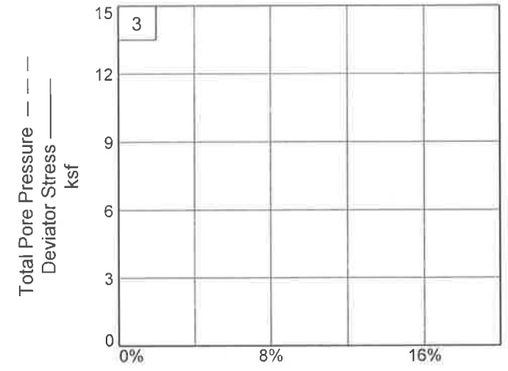
Proj. No.: 623517016.01 **Date Sampled:** 01-22-18

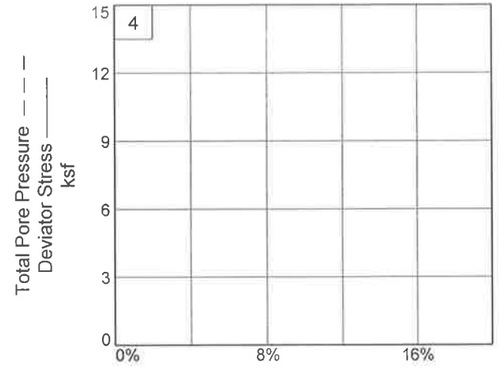
TRIAXIAL SHEAR TEST REPORT
Summit Engineering
Ft. Mill, South Carolina

Tested By: FG **Checked By:** MH









Client: S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Location: W 1-4 UD @ 6'-8' (ST-1)
Project No.: 623517016.01 **Figure** _____

Summit Engineering

Tested By: FG **Checked By:** MH

TRIAXIAL COMPRESSION TEST

CU with Pore Pressures

2/13/2018
2:34 PM

Date: 01-22-18
Client: S&ME, Inc. - Charlotte
Project: Sugar Hill Road
Marion, NC
Project No.: 623517016.01
Location: W 1-4 UD @ 6'-8' (ST-1)
Description: Dark Grey-Brown Silty Sand
Remarks:
Type of Sample: Shelby Tube
Assumed Specific Gravity=2.70 **LL=**NP **PL=** **PI=**NP
Test Method: ASTM D 4767 Method B

Parameters for Specimen No. 1

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1163.540			1112.790
Moisture content: Dry soil+tare, gms.	895.920			895.920
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	29.9	25.6	24.2	24.2
Moist specimen weight, gms.	1163.54			
Diameter, in.	2.850	2.695	2.699	
Area, in.²	6.379	5.706	5.722	
Height, in.	6.054	6.000	5.852	
Net decrease in height, in.		0.054	0.148	
Net decrease in water volume, cc.			12.300	
Wet density, pcf	114.8	125.2	126.6	
Dry density, pcf	88.4	99.7	101.9	
Void ratio	0.9073	0.6906	0.6536	
Saturation, %	88.9	100.0	100.0	

Test Readings for Specimen No. 1

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Consolidation cell pressure = 75.00 psi (10.80 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 2.16 ksf
Strain rate, %/min. = 0.07
Fail. Stress = 6.17 ksf **at reading no.** 35

Test Readings for Specimen No. 1

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	2.16	2.16	1.00	60.00	2.16	0.00
1	0.0030	24.0	24	0.1	0.60	2.03	2.63	1.30	60.90	2.33	0.30
2	0.0050	32.9	33	0.1	0.83	2.00	2.83	1.41	61.10	2.42	0.41
3	0.0090	55.7	56	0.2	1.40	1.93	3.33	1.73	61.60	2.63	0.70
4	0.0140	74.6	75	0.2	1.87	1.90	3.77	1.99	61.80	2.84	0.94
5	0.0190	90.1	90	0.3	2.26	1.89	4.15	2.20	61.90	3.02	1.13
6	0.0230	102.9	103	0.4	2.58	1.89	4.47	2.37	61.90	3.18	1.29
7	0.0280	113.7	114	0.5	2.85	1.89	4.73	2.51	61.90	3.31	1.42
8	0.0330	122.8	123	0.6	3.07	1.90	4.97	2.62	61.80	3.44	1.54
9	0.0380	130.7	131	0.6	3.27	1.92	5.18	2.71	61.70	3.55	1.63
10	0.0430	137.6	138	0.7	3.44	1.93	5.37	2.78	61.60	3.65	1.72
11	0.0480	143.6	144	0.8	3.58	1.94	5.53	2.84	61.50	3.74	1.79
12	0.0530	148.8	149	0.9	3.71	1.96	5.67	2.89	61.40	3.81	1.86
13	0.0580	154.0	154	1.0	3.84	1.96	5.80	2.96	61.40	3.88	1.92
14	0.0630	158.5	159	1.1	3.95	1.97	5.92	3.00	61.30	3.95	1.97
15	0.0680	163.0	163	1.2	4.05	1.97	6.03	3.06	61.30	4.00	2.03
16	0.0730	166.5	167	1.2	4.14	1.99	6.13	3.08	61.20	4.06	2.07
17	0.0780	170.2	170	1.3	4.23	1.99	6.21	3.13	61.20	4.10	2.11
18	0.0830	173.8	174	1.4	4.31	2.00	6.31	3.15	61.10	4.16	2.16
19	0.0880	176.9	177	1.5	4.39	2.00	6.39	3.19	61.10	4.19	2.19
20	0.0930	179.9	180	1.6	4.46	2.02	6.47	3.21	61.00	4.24	2.23
21	0.0980	183.0	183	1.7	4.53	2.02	6.54	3.25	61.00	4.28	2.26
22	0.1030	185.7	186	1.8	4.59	2.02	6.61	3.28	61.00	4.31	2.30
23	0.1520	208.4	208	2.6	5.11	2.07	7.18	3.46	60.60	4.63	2.55
24	0.2030	225.7	226	3.5	5.48	2.10	7.59	3.61	60.40	4.84	2.74
25	0.2530	225.8	226	4.3	5.44	2.13	7.57	3.55	60.20	4.85	2.72
26	0.3020	226.3	226	5.2	5.40	2.17	7.58	3.48	59.90	4.88	2.70
27	0.3530	227.1	227	6.0	5.37	2.17	7.55	3.47	59.90	4.86	2.69
28	0.4020	229.3	229	6.9	5.37	2.19	7.56	3.46	59.80	4.88	2.69
29	0.4520	233.7	234	7.7	5.43	2.19	7.62	3.48	59.80	4.90	2.71
30	0.5040	240.0	240	8.6	5.52	2.19	7.71	3.52	59.80	4.95	2.76
31	0.5530	248.0	248	9.4	5.65	2.20	7.85	3.57	59.70	5.03	2.83
32	0.6030	253.2	253	10.3	5.72	2.22	7.93	3.58	59.60	5.08	2.86
33	0.6530	252.7	253	11.2	5.65	2.25	7.90	3.52	59.40	5.07	2.83
34	0.7030	273.3	273	12.0	6.05	2.26	8.31	3.68	59.30	5.29	3.03
35	0.7530	281.3	281	12.9	6.17	2.28	8.44	3.71	59.20	5.36	3.08
36	0.8030	281.4	281	13.7	6.11	2.35	8.46	3.60	58.70	5.40	3.06
37	0.8530	289.5	290	14.6	6.22	2.38	8.60	3.62	58.50	5.49	3.11
38	0.9030	295.3	295	15.4	6.29	2.40	8.69	3.61	58.30	5.55	3.14

Parameters for Specimen No. 2

Specimen Parameter	Initial	Saturated	Consolidated	Final
Moisture content: Moist soil+tare, gms.	1277.950			1282.930
Moisture content: Dry soil+tare, gms.	1081.060			1081.060
Moisture content: Tare, gms.	0.000			0.000
Moisture, %	18.2	21.4	18.7	18.7
Moist specimen weight, gms.	1277.95			
Diameter, in.	2.845	2.862	2.839	
Area, in.²	6.357	6.432	6.329	
Height, in.	6.003	5.991	5.807	
Net decrease in height, in.		0.012	0.184	
Net decrease in water volume, cc.			29.200	
Wet density, pcf	127.6	129.7	133.0	
Dry density, pcf	107.9	106.9	112.1	
Void ratio	0.5618	0.5771	0.5042	
Saturation, %	87.5	100.0	100.0	

Test Readings for Specimen No. 2

Membrane modulus = 0.124105 kN/cm²
Membrane thickness = 0.02 cm
Consolidation cell pressure = 105.00 psi (15.12 ksf)
Consolidation back pressure = 60.00 psi (8.64 ksf)
Consolidation effective confining stress = 6.48 ksf
Strain rate, %/min. = 0.07
Fail. Stress = 12.04 ksf **at reading no.** 39

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
0	0.0000	0.0	0	0.0	0.00	6.48	6.48	1.00	60.00	6.48	0.00
1	0.0030	47.5	48	0.1	1.08	6.11	7.19	1.18	62.60	6.65	0.54
2	0.0050	50.8	51	0.1	1.15	6.03	7.19	1.19	63.10	6.61	0.58
3	0.0090	77.2	77	0.2	1.75	5.69	7.44	1.31	65.50	6.56	0.88
4	0.0140	99.5	100	0.2	2.26	5.33	7.59	1.42	68.00	6.46	1.13
5	0.0190	117.3	117	0.3	2.66	5.00	7.66	1.53	70.30	6.33	1.33
6	0.0230	132.1	132	0.4	2.99	4.71	7.70	1.64	72.30	6.21	1.50
7	0.0260	144.3	144	0.4	3.27	4.48	7.75	1.73	73.90	6.11	1.63
8	0.0300	155.3	155	0.5	3.52	4.28	7.79	1.82	75.30	6.03	1.76
9	0.0350	164.7	165	0.6	3.72	4.09	7.81	1.91	76.60	5.95	1.86
10	0.0390	172.6	173	0.7	3.90	3.87	7.77	2.01	78.10	5.82	1.95
11	0.0440	180.7	181	0.8	4.08	3.77	7.85	2.08	78.80	5.81	2.04
12	0.0500	188.0	188	0.9	4.24	3.63	7.87	2.17	79.80	5.75	2.12
13	0.0530	194.7	195	0.9	4.39	3.50	7.89	2.25	80.70	5.69	2.19
14	0.0580	201.0	201	1.0	4.53	3.38	7.91	2.34	81.50	5.65	2.26
15	0.0660	206.0	206	1.1	4.63	3.28	7.92	2.41	82.20	5.60	2.32
16	0.0710	212.5	213	1.2	4.78	3.20	7.97	2.49	82.80	5.58	2.39
17	0.0750	218.0	218	1.3	4.90	3.11	8.01	2.57	83.40	5.56	2.45
18	0.0800	223.4	223	1.4	5.01	3.05	8.07	2.64	83.80	5.56	2.51
19	0.0820	228.6	229	1.4	5.13	3.00	8.12	2.71	84.20	5.56	2.56
20	0.0870	233.5	234	1.5	5.23	2.92	8.16	2.79	84.70	5.54	2.62
21	0.0920	238.1	238	1.6	5.33	2.88	8.21	2.85	85.00	5.55	2.67
22	0.0980	243.1	243	1.7	5.44	2.84	8.27	2.92	85.30	5.56	2.72
23	0.1020	247.6	248	1.8	5.53	2.81	8.34	2.97	85.50	5.58	2.77

Test Readings for Specimen No. 2

No.	Def. Dial in.	Load Dial	Load lbs.	Strain %	Deviator Stress ksf	Minor Eff. Stress ksf	Major Eff. Stress ksf	1:3 Ratio	Pore Press. psi	P ksf	Q ksf
24	0.1500	290.6	291	2.6	6.44	2.58	9.02	3.50	87.10	5.80	3.22
25	0.2000	338.7	339	3.4	7.44	2.59	10.03	3.87	87.00	6.31	3.72
26	0.2520	382.8	383	4.3	8.33	2.66	11.00	4.13	86.50	6.83	4.17
27	0.3040	406.2	406	5.2	8.76	2.84	11.60	4.09	85.30	7.22	4.38
28	0.3500	424.8	425	6.0	9.08	3.01	12.09	4.02	84.10	7.55	4.54
29	0.4030	427.9	428	6.9	9.06	4.52	13.58	3.00	73.60	9.05	4.53
30	0.4530	441.1	441	7.8	9.25	4.69	13.95	2.97	72.40	9.32	4.63
31	0.5020	451.9	452	8.6	9.39	4.78	14.17	2.96	71.80	9.48	4.70
32	0.5500	464.2	464	9.5	9.56	4.87	14.43	2.96	71.20	9.65	4.78
33	0.6030	484.8	485	10.4	9.89	4.92	14.81	3.01	70.80	9.87	4.94
34	0.6540	503.9	504	11.3	10.17	5.00	15.17	3.04	70.30	10.08	5.09
35	0.7000	522.7	523	12.1	10.46	5.08	15.54	3.06	69.70	10.31	5.23
36	0.7530	547.0	547	13.0	10.83	5.16	15.99	3.10	69.20	10.57	5.42
37	0.8040	570.8	571	13.8	11.19	5.28	16.47	3.12	68.30	10.88	5.59
38	0.8530	596.5	597	14.7	11.58	5.34	16.92	3.17	67.90	11.13	5.79
39	0.9040	626.7	627	15.6	12.04	5.41	17.45	3.22	67.40	11.43	6.02