STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	R-5864	1	20

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

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY *HAYWOOD*

PROJECT DESCRIPTION *SR 1395 (COVE CREEK ROAD) SOUTH OF COVE CREEK GAP IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK*

SITE DESCRIPTION *RETAINING WALL NO. 1 FROM -L- STA. 13+48.15, 15.52' LT, TO -L- STA. 18+60, 13.57' LT*

REFERENCE: R-5864

PROJECT:

CONTENTS

APPENDIX

CAUTION NOTICE

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

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

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

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

PERSONNEL

HPC

LANE, R.W.

CROCKETT, S.C.

INVESTIGATED BY *LANE, R.W.*

DRAWN BY *CROCKETT, S.C.*

CHECKED BY *HAMM, J.R.*

SUBMITTED BY *FALCON ENG.*

DATE *JULY 2019*

NORTH CAROLINA PROFESSIONAL SEAL 39779 ENGINEER JEREMY R HAMM

DocuSigned by:
Jeremy R. Hamm 07-02-2019
ED7938089E22487...
SIGNATURE DATE

PROJECT REFERENCE NO.	SHEET NO.
R-5864	2

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION

SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6

SOIL LEGEND AND AASHTO CLASSIFICATION

GENERAL CLASS.	GRANULAR MATERIALS (≤ 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)				ORGANIC MATERIALS		
GROUP CLASS.	A-1		A-3	A-2				A-4	A-5	A-6	A-7	A-1, A-2 A-3	A-4, A-5 A-6, A-7	
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7				A-7-5, A-7-6			
SYMBOL														
% PASSING #10	50 MX													
#40	30 MX	50 MX	51 MN									GRANULAR SOILS	SILT-CLAY SOILS	MUCK, PEAT
#200	15 MX	25 MX	10 MX	35 MX	35 MX	35 MX	35 MX	36 MN	36 MN	36 MN	36 MN			
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 EXCAVATION
- 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
- [X] CME-550X
- [ ] VANE SHEAR TEST
- [ ] PORTABLE HOIST
- [ ] _____
- [ ] _____

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

HAMMER TYPE:
- [X] AUTOMATIC [ ] MANUAL

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

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

ROCK DESCRIPTION

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

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

WEATHERING

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

ROCK HARDNESS

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

FRACTURE SPACING

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

BEDDING

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

INDURATION

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

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

TERMS AND DEFINITIONS

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

AQUIFER - A WATER BEARING FORMATION OR STRATA.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

BENCH MARK: ELEVATIONS TAKEN FROM TIN FILE SR-1395-43_LS_TIN.TIN
DATED FEBRUARY 2019
ELEVATION: FEET

NOTES:

FIAD - FILLED IMMEDIATELY AFTER DRILLING

DATE: 8-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-5864	3

0 40 80
FEET

NC GRID NAD 83 NA 2011

NOTE: SPARSE EXPOSED WEATHERED ROCK AND/OR CRYSTALLINE ROCK WAS OBSERVED WITHIN EXISTING ROADWAY CUTS IN THE OUTLINED AREA. THIS OUTLINE IS NOT INTENDED TO INDICATE CONTINOUS ROCK OUTCROPPING.

VATE DRIVE
BST
GR
O/H WIRE HGT 3944.68'
18" CMP
BEGIN RETAINING WALL -RW1-
-L- STA.13+48.15, 15.52' LT
B-01
B-02
B-03
LANDSCAPE AREA
14+00
15+00
16+00
17+00
18+00
END RETAINING WALL -RW-1
-L- STA.18+60.00, 13.57' LT
WOODS
PROP RETAINING WALL
65/165
65/170
B-04
B-05
B-06
RIP-RAP
18" CMP
SLIDE AREA
-BL- BM #2
STA 11+20.07
0.28 RIGHT
ELEV. 3924.24'

DATE: 9-15-14

PROJECT REFERENCE NO.	SHEET NO.
R-5864	4

RETAINING WALL ON SR 1395 SOUTH OF COVE CREEK GAP IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

0 50 100
FEET
VE = 5

SOIL TEST RESULTS

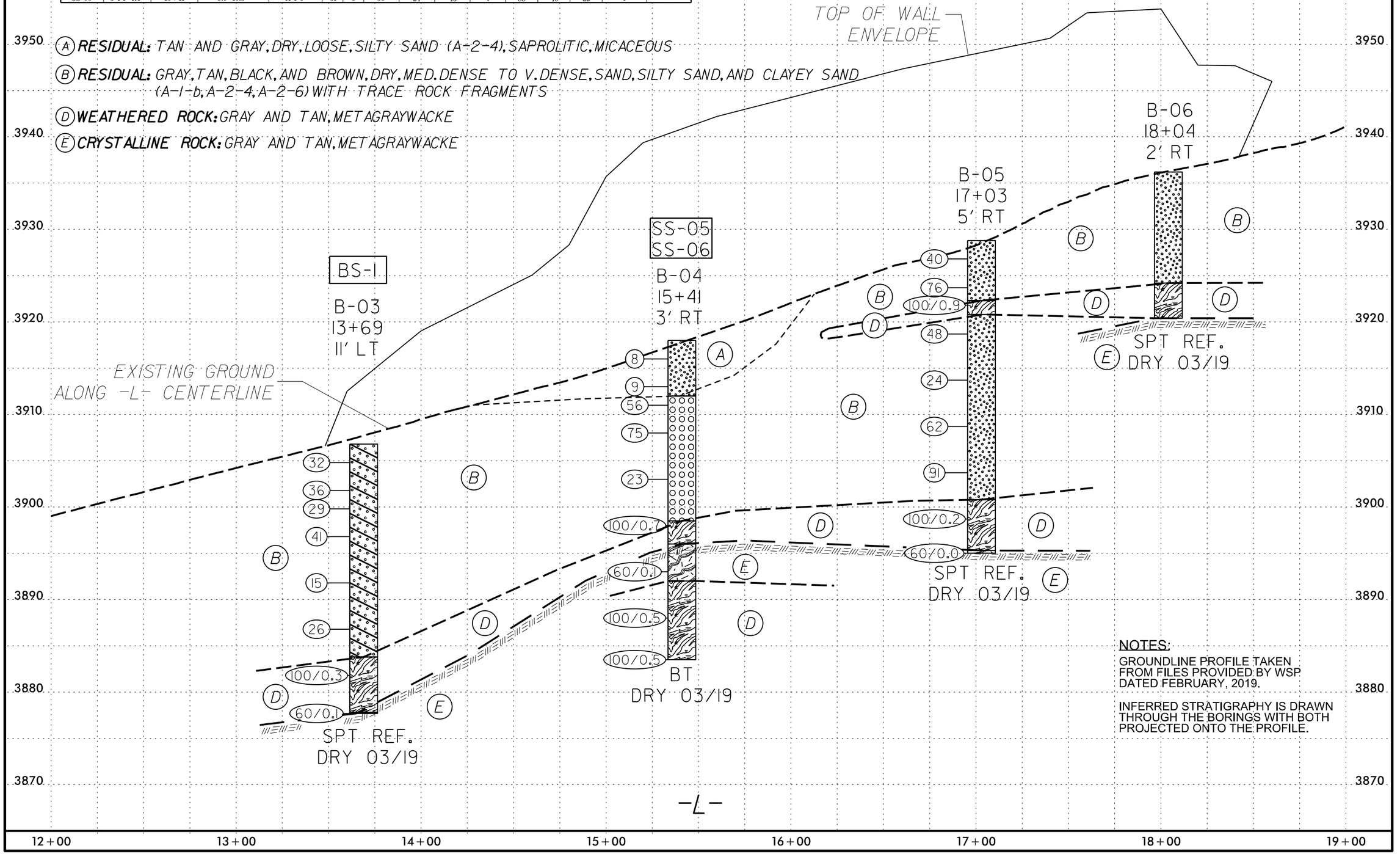
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
BS-1	11 FT LT	13+69	1.0'-9.0'	A-2-6	34	11	30	35	24	10	82	77	35	–	–
SS-05	3 FT RT	15+41	4.0'-5.5'	A-2-4	29	3	29	42	17	12	66	53	24	13	–
SS-06	3 FT RT	15+41	9.0'-10.5'	A-1-b	31	5	56	24	13	7	88	48	22	4	–

(A) **RESIDUAL:** TAN AND GRAY, DRY, LOOSE, SILTY SAND (A-2-4), SAPROLITIC, MICACEOUS

(B) **RESIDUAL:** GRAY, TAN, BLACK, AND BROWN, DRY, MED. DENSE TO V. DENSE, SAND, SILTY SAND, AND CLAYEY SAND (A-1-b, A-2-4, A-2-6) WITH TRACE ROCK FRAGMENTS

(D) **WEATHERED ROCK:** GRAY AND TAN, METAGRAYWACKE

(E) **CRYSTALLINE ROCK:** GRAY AND TAN, METAGRAYWACKE



NOTES:

GROUNDLINE PROFILE TAKEN FROM FILES PROVIDED BY WSP DATED FEBRUARY, 2019.

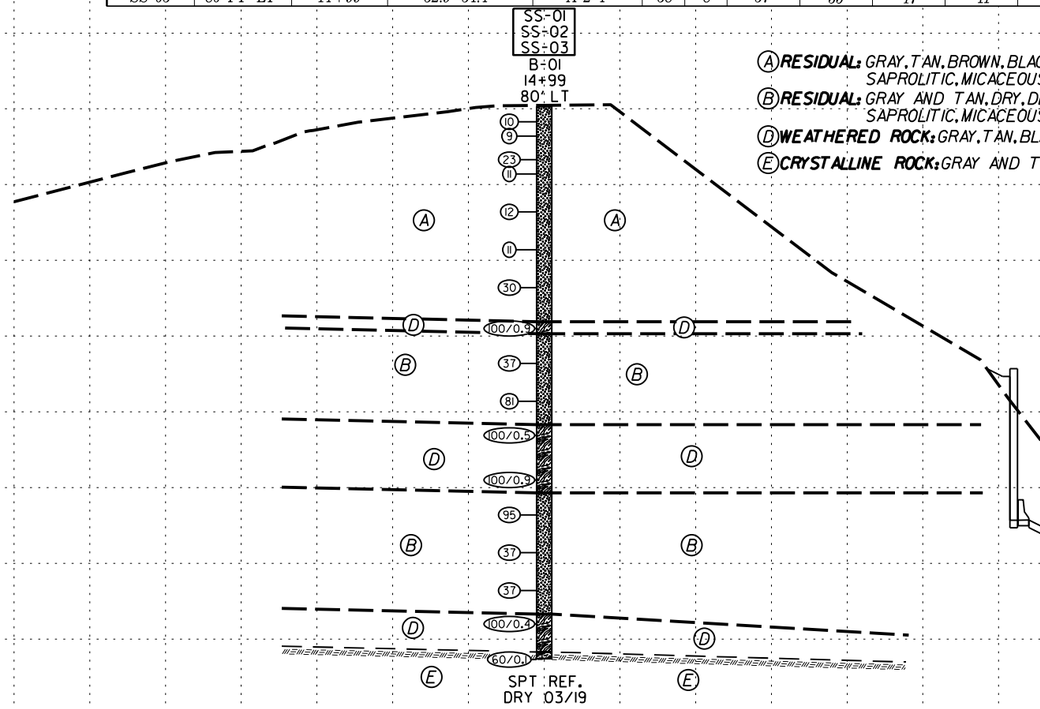
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE.

8/23/9

0 20 40
FEET

SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT C. SAND	F. SAND	SILT	CLAY	% PASSING (SIEVES) 10	40	200	% MOISTURE	% ORGANIC
SS-01	80 FT LT	14+99	6.0'-7.5'	A-2-4	32	3	38	45	10	7	77	56	20	7	-
SS-02	80 FT LT	14+99	17.9'-19.4'	A-2-4	29	3	33	46	12	9	99	79	30	10	-
SS-03	80 FT LT	14+99	32.9'-34.4'	A-2-4	38	8	37	35	17	11	88	63	31	16	-



(A) **RESIDUAL:** GRAY, TAN, BROWN, BLACK, AND WHITE, DRY, LOOSE TO MED. DENSE, SILTY SAND (A-2-4) SAPROLITIC, MICACEOUS

(B) **RESIDUAL:** GRAY AND TAN, DRY, DENSE TO V. DENSE, SILTY SAND (A-2-4) SAPROLITIC, MICACEOUS, WITH TRACE ROCK FRAGS.

(D) **WEATHERED ROCK:** GRAY, TAN, BLACK, AND RED, METAGRAYWACKE

(E) **CRYSTALLINE ROCK:** GRAY AND TAN, METAGRAYWACKE

NOTES:

GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA IN ELECTRONIC FILES RECEIVED FROM WSP DATED FEBRUARY 2019.

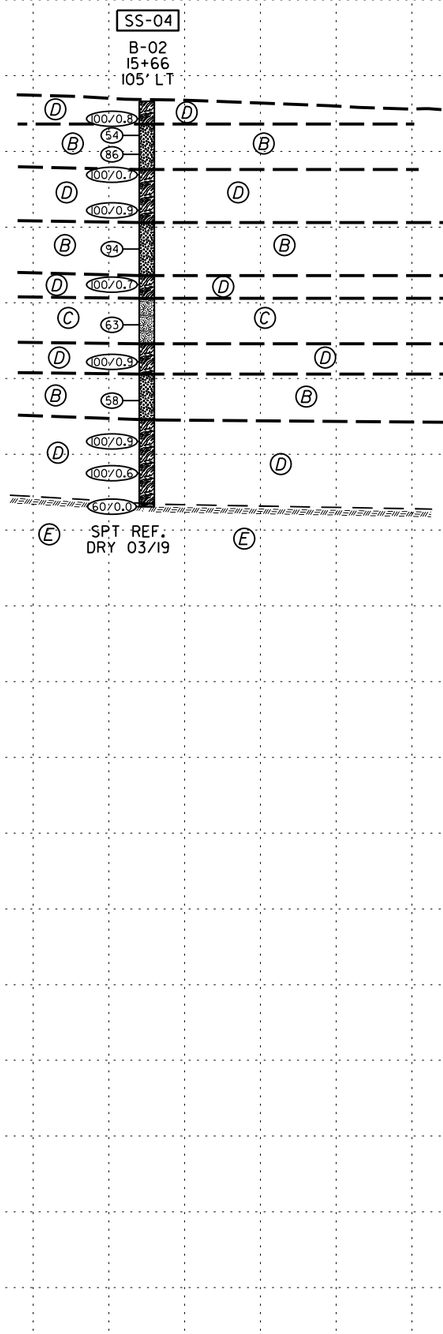
INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.

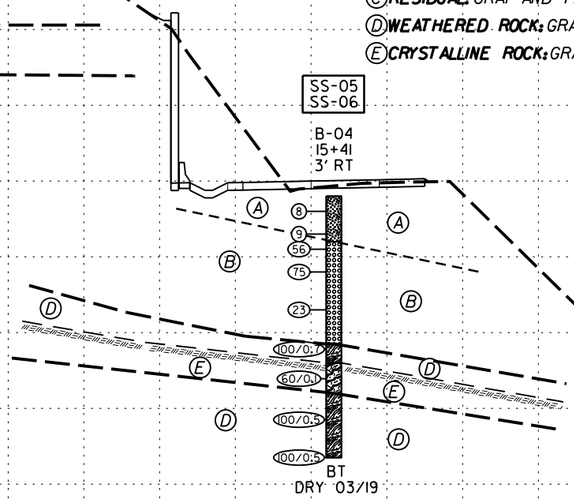
15+00.00

-L-

$DATE$

0 20 40
FEET





SOIL TEST RESULTS

SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			% MOISTURE	% ORGANIC
							C. SAND	F. SAND	SILT	CLAY	10	40	200		
SS-05	3 FT RT	15+41	4.0'-5.5'	A-2-4	29	3	29	42	17	12	66	53	24	13	-
SS-06	3 FT RT	15+41	9.0'-10.5'	A-1-b	29	3	56	24	13	7	88	48	22	4	-
SS-04	105 FT LT	15+66	28.5'-30.0'	A-4	35	10	25	35	25	15	92	76	44	15	-

(A) **RESIDUAL:** TAN AND GRAY, DRY, LOOSE, SILTY SAND (A-2-4), SPROLITIC, MICACEOUS
(B) **RESIDUAL:** GRAY, BROWN, AND TAN, DRY, MED. DENSE TO V. DENSE, SAND AND SILTY SAND (A-1-b, A-2-4) SAPROLITIC, MICACEOUS, WITH TRACE ROCK FRAGS.
(C) **RESIDUAL:** GRAY AND TAN, DRY, HARD, SANDY SILT (A-4), SAPROLITIC, MICACEOUS
(D) **WEATHERED ROCK:** GRAY AND TAN, METAGRAYWACKE
(E) **CRYSTALLINE ROCK:** GRAY AND TAN, METAGRAYWACKE

NOTES:

GROUNDLINE CROSS SECTION ALONG BENT LINE DRAWN FROM TOPOGRAPHIC DATA IN ELECTRONIC FILES RECEIVED FROM WSP DATED FEBRUARY 2019.

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

15+60.00

-L-

8/23/9

$DATE$

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-01	**STATION** 14+99	**OFFSET** 80 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,970.3 ft	**TOTAL DEPTH** 73.0 ft	**NORTHING** 707,807	**EASTING** 797,602	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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
3975										ELEV. (ft) DEPTH (ft)
3970										3,970.3 .4' TOPSOIL 0.0
	3,969.3	1.0								**RESIDUAL**
	3,967.4	2.9	4	5	5	10		D		GRAY TAN BLACK AND WHITE, SILTY SAND (A-2-4) SAP., MICA.
3965			4	4	5	9		D		
	3,964.3	6.0								
	3,962.4	7.9	12	11	12	23	SS-01	7%		
3960			6	5	6	11		D		
	3,957.4	12.9								
3955			5	6	6	12		D		
	3,952.4	17.9								
			5	5	6	11	SS-02	10%		
3950										
	3,947.4	22.9								
			11	15	15	30		D		
3945										
	3,942.4	27.9								
			37	46	54/0.4	100/0.9				
3940										
	3,937.4	32.9								
			17	16	21	37	SS-03	16%		
3935										
	3,932.4	37.9								
			26	36	45	81		D		
3930										
	3,927.4	42.9								3,941.9 28.4
			100/0.5			100/0.5				**WEATHERED ROCK**
3925										3,940.3 30.0 GRAY TAN BLACK AND RED, METAGRAYWACKE
	3,922.4	47.9								**RESIDUAL**
			23	23	77/0.4	100/0.9				TAN AND GRAY, SILTY SAND (A-2-4) SAP., MICA.
3920										
	3,917.4	52.9								3,928.3 42.0
			38	48	47	95		D		**WEATHERED ROCK**
3915										GRAY AND TAN, METAGRAYWACKE
	3,912.4	57.9								
			11	19	18	37		D		
3910										
	3,907.4	62.9								3,919.3 51.0
			24	14	23	37		D		**RESIDUAL**
3905										GRAY AND TAN, SILTY SAND (A-2-4) SAP., MICA.
	3,902.4	67.9								
			100/0.4			100/0.4				3,903.3 67.0
3900										**WEATHERED ROCK**
	3,897.4	72.9								GRAY, METAGRAYWACKE
			60/0.1			60/0.1				3,898.3 72.0
										3,897.4 72.9 **CRYSTALLINE ROCK**
										METAGRAYWACKE
										Boring Terminated WITH STANDARD

NCDOT BORE SINGLE R5864_GINT.GPJ NC_DOT.GDT 7/1/19

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-01	**STATION** 14+99	**OFFSET** 80 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,970.3 ft	**TOTAL DEPTH** 73.0 ft	**NORTHING** 707,807	**EASTING** 797,602	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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
3895						Match Line				ELEV. (ft) DEPTH (ft)
										PENETRATION TEST REFUSAL at Elevation 3,897.3 ft IN CR: METAGRAYWACKE
										HOLE LEFT OPEN FOR APPROXIMATELY 5 HOURS AND REMAINED DRY

NCDOT BORE SINGLE R5864_GINT.GPJ NC_DOT.GDT 7/1/19

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-02	**STATION** 15+66	**OFFSET** 105 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,976.6 ft	**TOTAL DEPTH** 53.5 ft	**NORTHING** 707,871	**EASTING** 797,569	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/29/19	**COMP. DATE** 03/29/19	**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)
										3,976.6 .4' TOPSOIL	0.0
	3,975.6	1.0								**WEATHERED ROCK** GRAY AND TAN, METAGRAYWACKE	
	3,973.1	3.5	21	49	51/0.3	100/0.8				3,973.6	3.0
			33	27	27	54 86		D		**RESIDUAL** GRAY AND TAN, SILTY SAND (A-2-4) SAP., MICA.	
	3,970.6	6.0	17	29	57			D			
	3,968.1	8.5	28	62	38/0.2	100/0.7				3,967.6	9.0
										WEATHERED ROCK GRAY AND TAN, METAGRAYWACKE	
	3,963.1	13.5	40	60/0.4		100/0.9				3,960.6	16.0
										RESIDUAL GRAY AND TAN, SILTY SAND (A-2-4) SAP., MICA.	
	3,958.1	18.5	45	47	47	94		D			
	3,953.1	23.5	72	28/0.2		100/0.7				3,953.6	23.0
										WEATHERED ROCK GRAY AND TAN, METAGRAYWACKE	
	3,948.1	28.5	41	32	31	100/0.7 63	SS-04	15%		3,950.6	26.0
										RESIDUAL GRAY AND TAN, SANDY SILT (A-4) SAP., MICA.	
	3,943.1	33.5	50	50/0.4		100/0.9				3,944.6	32.0
										WEATHERED ROCK GRAY AND TAN, METAGRAYWACKE	
	3,938.1	38.5	17	27	31	100/0.9 58		D		3,940.6	36.0
										RESIDUAL GRAY AND TAN, SILTY SAND (A-2-4) SAP., MICA.	
	3,933.1	43.5	37	50	50/0.4					3,934.6	42.0
										WEATHERED ROCK GRAY AND TAN, METAGRAYWACKE	
	3,928.1	48.5	60	40/0.1		100/0.9 100/0.6					
	3,923.1	53.5	60/0.0			60/0.0				3,923.5 53.1 3,923.1 53.5 **CRYSTALLINE ROCK** METAGRAYWACKE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 3,923.1 ft IN CR: METAGRAYWACKE	

NCDOT BORE SINGLE R5864_GINT.GPJ NC_DOT.GDT 7/1/19

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-03	**STATION** 13+69	**OFFSET** 11 ft LT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,906.8 ft	**TOTAL DEPTH** 29.1 ft	**NORTHING** 707,711	**EASTING** 797,633	**24 HR.** Dry
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/28/19	**COMP. DATE** 03/28/19	**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)
										3,906.8 .3' GRAVEL	0.0
	3,905.8	1.0						D		**RESIDUAL** GRAY BLACK TAN AND BROWN, CLAYEY SAND (A-2-6) MICA., SAP.	
			13	15	17	32		D			
	3,902.8	4.0	19	19	17	36	S-1				
	3,900.8	6.0	21	15	14	29		D			
	3,897.8	9.0	22	22	19	41		D			
	3,892.8	14.0	7	7	8	15		D			
	3,887.8	19.0	12	11	15	26		D			
	3,882.8	24.0	100/0.3			100/0.3				3,883.8	23.0
										WEATHERED ROCK TAN AND GRAY, METAGRAYWACKE	
	3,877.8	29.0	60/0.1			60/0.1				3,877.8 29.0 3,877.7 29.1 **CRYSTALLINE ROCK** TAN AND GRAY, METAGRAYWACKE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 3,877.7 ft IN CR: METAGRAYWACKE	

NCDOT BORE SINGLE R5864_GINT.GPJ NC_DOT.GDT 7/1/19

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-04	**STATION** 15+41	**OFFSET** 3 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,918.0 ft	**TOTAL DEPTH** 34.5 ft	**NORTHING** 707,859	**EASTING** 797,679	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/28/19	**COMP. DATE** 03/28/19	**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)
3920										3,918.0 .4' GRAVEL	0.0
	3,917.0	1.0	5	4	4	8		D		**RESIDUAL** TAN AND GRAY, SILTY SAND (A-2-4) SAP., MICA.	
3915	3,914.0	4.0	6	4	5	9	SS-05	13%			
	3,912.0	6.0	19	34	22	56		D		3,912.0 GRAY BROWN AND TAN, SAND (A-1-b) WITH SOME SILT AND TRACE ROCK FRAGS.	6.0
3910	3,909.0	9.0	10	45	30	75	SS-06	4%			
3905	3,904.0	14.0	23	11	12	23		D			
3900	3,899.0	19.0	28	69	31/0.2	100/0.7				3,898.5 **WEATHERED ROCK** GRAY AND TAN, METAGRAYWACKE	19.5
3895	3,894.0	24.0	60/0.1			60/0.1				3,896.0 **CRYSTALLINE ROCK** METAGRAYWACKE	22.0
3890	3,889.0	29.0	100/0.5			100/0.5				3,892.0 **WEATHERED ROCK** GRAY AND TAN, METAGRAYWACKE	26.0
3885	3,884.0	34.0	100/0.5			100/0.5				3,883.5 Boring Terminated at Elevation 3,883.5 ft IN WR: METAGRAYWACKE	34.5

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-05	**STATION** 17+03	**OFFSET** 5 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,928.8 ft	**TOTAL DEPTH** 33.8 ft	**NORTHING** 708,015	**EASTING** 797,706	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** Automatic	
DRILLER ODOM, C.	**START DATE** 03/28/19	**COMP. DATE** 03/28/19	**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)
3930										3,928.8 .4' GRAVEL	0.0
	3,927.8	1.0	10	13	27	40		D		**RESIDUAL** GRAY TAN AND RED, SILTY SAND (A-2-4) SAP., MICA., TRACE ROCK FRAGS.	
3925	3,924.7	4.1	26	44	32	76		D			
	3,922.8	6.0	23	35	65/0.4	100/0.9				3,922.3	6.5
3920	3,919.7	9.1	20	26	22	48		D		3,920.8 **WEATHERED ROCK** GRAY AND TAN, METAGRAYWACKE	8.0
3915	3,914.7	14.1	9	11	13	24		D		**RESIDUAL** GRAY AND TAN, SILTY SAND (A-2-4) SAP., MICA., TRACE ROCK FRAGS.	
3910	3,909.7	19.1	28	30	32	62		D			
3905	3,904.7	24.1	21	22	69	91		D			
3900	3,899.7	29.1	100/0.2			100/0.2				3,900.8 **WEATHERED ROCK** GRAY, METAGRAYWACKE	28.0
3895	3,895.0	33.8	60/0.0			60/0.0				3,895.3 3,895.0 **CRYSTALLINE ROCK** METAGRAYWACKE Boring Terminated WITH STANDARD PENETRATION TEST REFUSAL at Elevation 3,895.0 ft IN CR: METAGRAYWACKE	33.5 33.8

GEOTECHNICAL BORING REPORT
BORE LOG

WBS -	**TIP** R-5864	**COUNTY** HAYWOOD	**GEOLOGIST** LANE, R. W.	
SITE DESCRIPTION Retaining Wall on SR 1395 South of Cove Creek Gap in the Great Smokey Mountains National Park				**GROUND WTR (ft)**
BORING NO. B-06	**STATION** 18+04	**OFFSET** 2 ft RT	**ALIGNMENT** -L-	**0 HR.** Dry
COLLAR ELEV. 3,936.2 ft	**TOTAL DEPTH** 15.8 ft	**NORTHING** 708,098	**EASTING** 797,651	**24 HR.** FIAD
DRILL RIG/HAMMER EFF./DATE HPC8513 CME-550 81% 06/06/2016		**DRILL METHOD** H.S. Augers	**HAMMER TYPE** N/A	
DRILLER ODOM, C.	**START DATE** 03/28/19	**COMP. DATE** 03/28/19	**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)
3940										3,936.2 .5' GRAVEL	0.0
3935										**RESIDUAL** TAN, SILTY SAND (A-2-4) WITH THIN LAYERS OF WEATHERED ROCK	
3930											
3925										3,924.2	12.0
										WEATHERED ROCK METAGRAYWACKE	
										3,920.4	15.8
										Boring Terminated BY AUGER REFUSAL at Elevation 3,920.4 ft 0N CR: METAGRAYWACKE	

PROJECT REFERENCE NO.	SHEET NO.
R–5864	11

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

APPENDIX
LABORATORY RESULTS

REFERENCE: R–5864

PROJECT:

SIEVE AND HYDROMETER ANALYSIS

NCDOT MOD. AASHTO T-88,

Client	Falcon Engineering	Boring No.	B-3
Client Reference	R-5864 Slide Repair	Depth (ft)	1.0-9.0
Project No.	R-2019-098-001	Sample No.	BS-1
Lab ID	R-2019-098-001-001	Soil Color	**BROWN**

	SIEVE ANALYSIS			*HYDROMETER*
USCS	cobbles	gravel	sand	silt and clay fraction
AASHTO	cobbles	gravel	sand	silt and clay fraction

Sieve Size (mm)	Percent Finer	USCS	%	AASHTO	%	NCDOT SOIL MORTAR	%
100	100.00	*Gravel*	8.38	*Gravel*	18.28	*Coarse Sand Ret. #60*	30.47
2	81.72	*Sand*	57.24	*Coarse Sand*	18.64	*Fine Sand Ret. #270*	34.95
0.075	34.38	*Silt&Clay*	34.38	*Fine Sand*	28.70	*Silt 0.05-0.005mm*	24.23
				Silt & Clay	34.38	Clay <0.005mm	10.35
AASHTO (GI)		***A-2-6***	**(0)**				

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WASH SIEVE ANALYSIS

NCDOT MOD. AASHTO T-88,

Client	Falcon Engineering	Boring No.	B-3
Client Reference	R-5864 Slide Repair	Depth (ft)	1.0-9.0
Project No.	R-2019-098-001	Sample No.	BS-1
Lab ID	R-2019-098-001-001	Soil Color	**BROWN**

Minus #10 for Hygroscopic (10-15gm)		Hydrometer Specimen 50 or 100gms	
Tare No.	G	Air Dried Hydrometer Material (gm)	72.31
Wgt.Tare + Wet Specimen (gm)	26.65	Corrected Dry Wt. of Hydro Mtrl. (gm)	68.65
Wgt.Tare + Dry Specimen (gm)	26.06		
Weight of Tare (gm)	15.00	Weight of -#270 Material	23.74
Weight of Water (gm)	0.59	Weight of -#10; +#270 Material	44.91
Weight of Dry Soil (gm)	11.06		
Moisture Content (%)	**5.3**		

Tare No.	161		
Wgt. Tare + Air Dry Soil (gm)	1464.40	Dry Weight of Material Ret. #10 (gm)	214.56
Weight of Tare (gm)	239.63	Corrected Dry Sample Wt - #10 (gm)	959.05
Air Dried Wgt.Total Sample (gm)	1224.77		
Total Dry Weight Sample (gm)	1173.6	**J - Factor (Percent Finer than #10)**	**0.8172**

Sieve Size	Sieve Opening (mm)	Wgt.of Soil Retained (gm)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	**Accumulated Percent Finer (%)**
12"	300	0.00	0.00	0.00	100.00	**100.00**
6"	150	0.00	0.00	0.00	100.00	**100.00**
3"	75	0.00	0.00	0.00	100.00	**100.00**
2"	50	0.00	0.00	0.00	100.00	**100.00**
1 1/2"	37.5	0.00	0.00	0.00	100.00	**100.00**
1"	25.0	0.00	0.00	0.00	100.00	**100.00**
3/4"	19.0	0.00	0.00	0.00	100.00	**100.00**
1/2"	12.5	32.11	2.74	2.74	97.26	**97.26**
3/8"	9.5	12.63	1.08	3.81	96.19	**96.19**
#4	4.75	53.62	4.57	8.38	91.62	**91.62**
#10	2.00	116.20	9.90	18.28	81.72	**81.72**
#20	0.85	8.33	12.13	12.13	87.87	**71.80**
#40	0.425	7.33	10.68	22.81	77.19	**63.08**
#60	0.25	5.26	7.66	30.47	69.53	**56.81**
#140	0.106	12.46	18.15	48.62	51.38	**41.98**
#200	0.075	6.39	9.31	57.93	42.07	**34.38**
#270	0.053	5.14	7.49	65.42	34.58	**28.26**
Pan	-	23.74	34.58	100.00	-	**-**

Tested By 129-05-0411 Date 4/5/19 Checked By SFS Date 4/5/19

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HYDROMETER ANALYSIS

NCDOT MOD. AASHTO T-88,

Client	Falcon Engineering	Boring No.	B-3
Client Reference	R-5864 Slide Repair	Depth (ft)	1.0-9.0
Project No.	R-2019-098-001	Sample No.	BS-1
Lab ID	R-2019-098-001-001	Soil Color	**BROWN**

Elapsed Time	(min)	R Measured	Temp. (°C)	Composite Correction	R Corrected	N (%)	K Factor	Diameter (mm)	N' (%)
10:08:00	0	NA	NA	NA	NA	NA	NA	NA	NA
10:08:34	0.57	32.0	22.3	-2.08	28.1	40.7	0.01316	0.0581	**33.2**
11:08:00	60.00	11.0	22.6	-2.15	7.1	10.3	0.01311	0.0064	**8.5**

Corrections	
a - Factor	0.994
Percent Finer than # 10	81.72
Specific Gravity	2.68 Assumed

Note: *Hydrometer test is performed on - #10 sieve material.*

LL = 34

PL = 23

PI = 11

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ATTERBERG LIMITS

AASHTO T-89, T-90 *(DOT Modified)*

Client	Falcon Engineering	Boring No.	B-3
Client Reference	R-5864 Slide Repair	Depth (ft)	1.0-9.0
Project No.	R-2019-098-001	Sample No.	BS-1
Lab ID	R-2019-098-001-001	Soil Description	**BROWN LEAN CLAY**

***Note: The* USCS symbol used with this test refers only to the minus No. 40 sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.** (Minus No. 40 sieve material, Airdried)

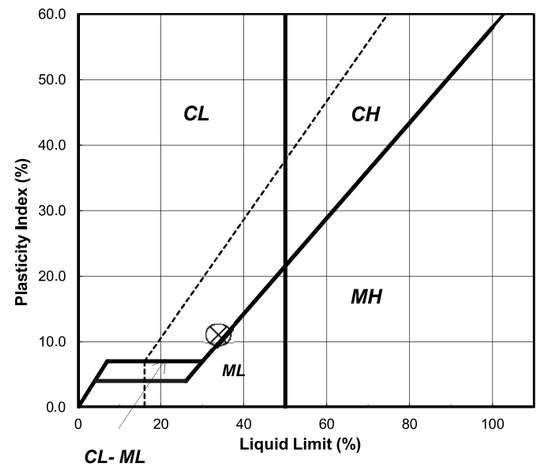
Liquid Limit Test	**1**
Tare Number	B-2
Wt. of Tare & WS (gm)	29.89
Wt. of Tare & DS (gm)	26.22
Wt. of Tare (gm)	15.39
Wt. of Water (gm)	3.7
Wt. of DS (gm)	10.8
Moisture Content (%)	**33.9**
Number of Blows	**25**

Plastic Limit Test	**1**	**2**	**Range**
Tare Number	A-B	B-B	
Wt. of Tare & WS (gm)	22.89	21.94	
Wt. of Tare & DS (gm)	21.48	20.72	
Wt. of Tare (gm)	15.51	15.49	
Wt. of Water (gm)	1.4	1.2	
Wt. of DS (gm)	6.0	5.2	
Moisture Content (%)	**23.6**	**23.3**	**0.3**

Note: The acceptable range of the two Moisture contents is ± 2.6

Test Results	
Liquid Limit (%)	**34**
Plastic Limit (%)	**23**
Plasticity Index (%)	**11**
USCS Symbol	**CL**

Plasticity Chart



Tested By 129-05-0411 Date 4/4/19 Checked By SFS Date 4/5/19

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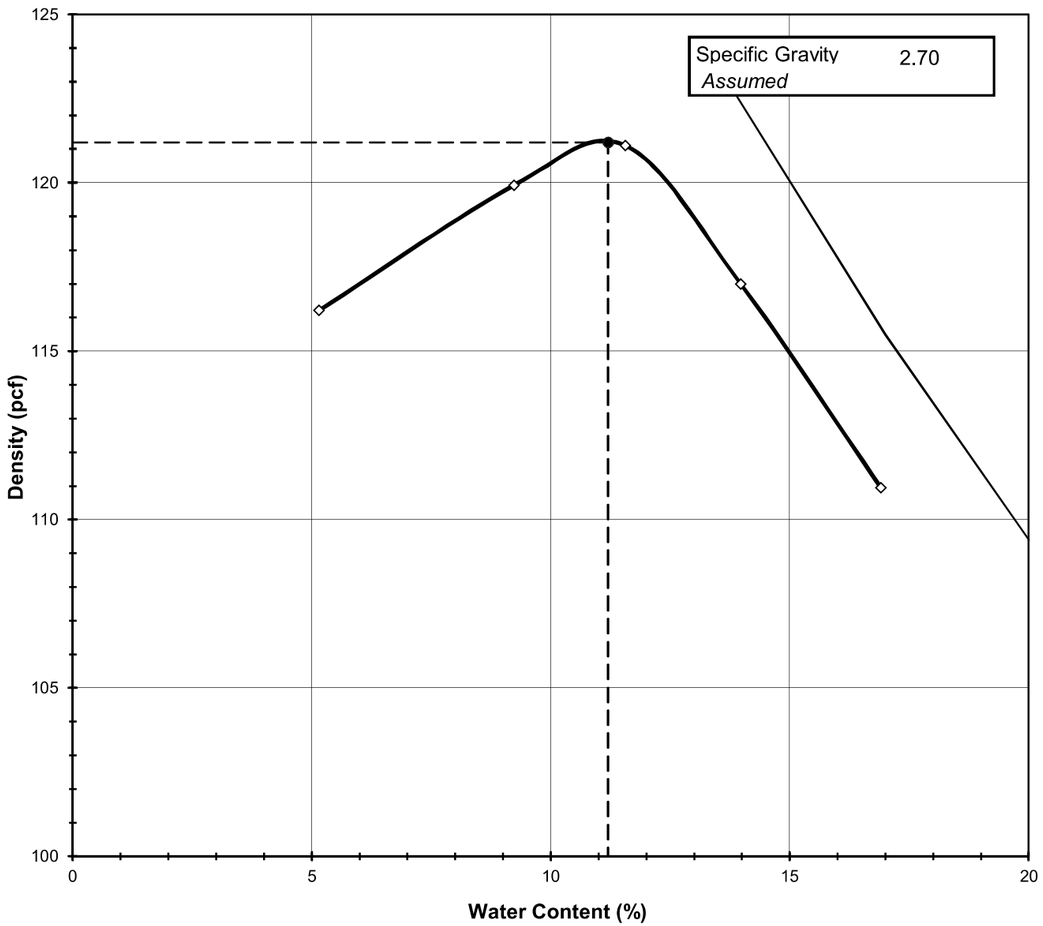
MOISTURE DENSITY RELATIONSHIP

AASHTO T99-18

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001	Test Method	**STANDARD**

Visual Description: Brown Sandy Silty Clay

Optimum Water Content	**11.2**
Maximum Dry Density	**121.2**



Tested By THM *Date* 4/9/19 *Checked By* GEM *Date* 4/10/19

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MOISTURE - DENSITY RELATIONSHIP

AASHTO T99-18

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: Brown Sandy Silty Clay

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

Test Type		**STANDARD**
Rammer Weight (lb)		5.5
Rammer Drop (in)		12
Rammer Type		MECHANICAL
Machine ID	R	606
Mold ID	R	173
Mold diameter		6"
Weight of the Mold (g)		5490
Volume of the Mold (cm^3)		2119

Mold / Specimen

Point No.	**1**	**2**	**3**	**4**	**5**
Wt. of Mold & Wet Sample (g)	9640	9939	10078	10019	9895
Wt.of Mold (g)	5490	5490	5490	5490	5490
Wt. of Wet Sample (g)	4150	4449	4589	4529	4405
Mold Volume (cm^3)	2119	2119	2119	2119	2119

Moisture Content / Density

Tare Number	851	860	825	852	826
Wt. of Tare & Wet Sample (g)	503.00	493.80	643.50	438.00	580.60
Wt. of Tare & Dry Sample (g)	485.19	463.49	590.99	400.99	515.96
Wt. of Tare (g)	139.70	135.10	136.70	136.20	133.70
Wt. of Water (g)	17.81	30.31	52.51	37.01	64.64
Wt. of Dry Sample (g)	345.49	328.39	454.29	264.79	382.26
Wet Density (g/cm^3)	1.96	2.10	2.17	2.14	2.08
Wet Density (pcf)	122.2	131.0	135.1	133.3	129.7
Moisture Content (%)	**5.2**	**9.2**	**11.6**	**14.0**	**16.9**
Dry Density (pcf)	**116.2**	**119.9**	**121.1**	**117.0**	**110.9**

Zero Air Voids

Moisture Content (%)	13.5	17.0	20.0	
Dry Unit Weight (pcf)	123.5	115.5	109.4	

Tested By THM *Date* 4/9/19 *Checked By* GEM *Date* 4/10/19

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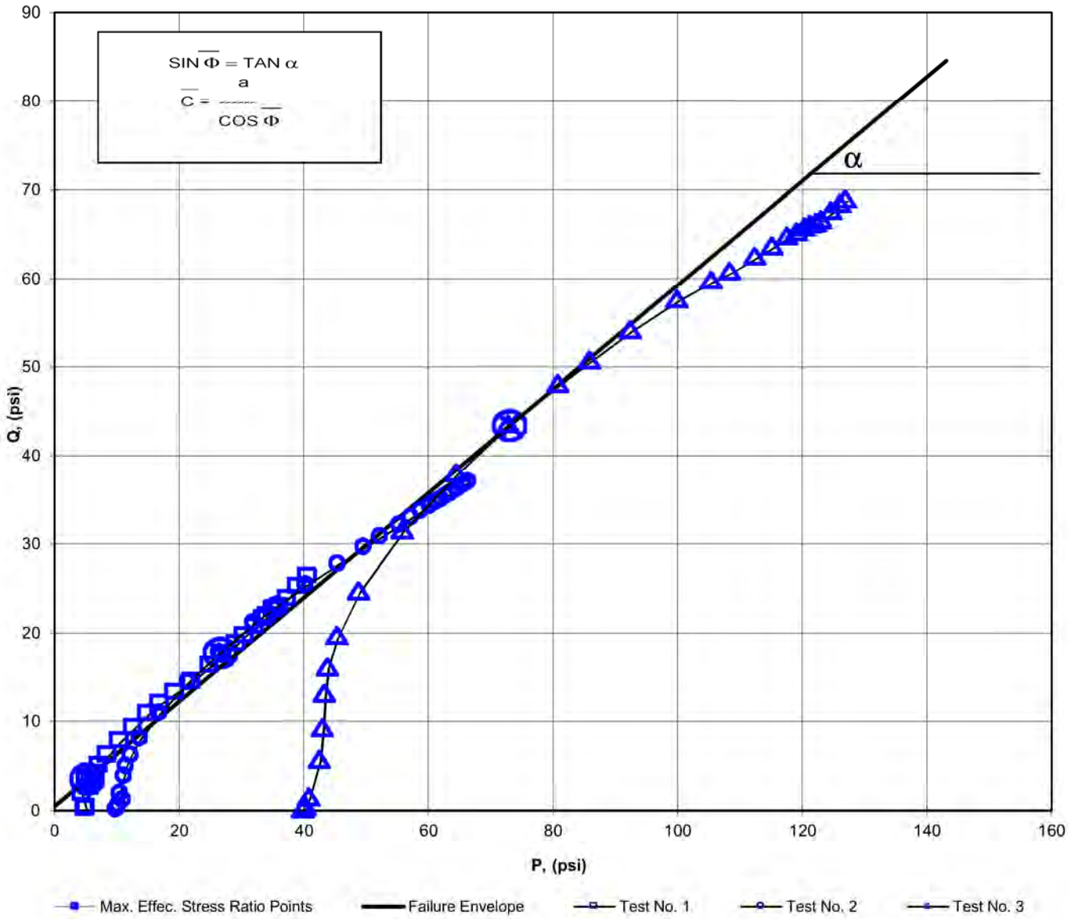
CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Consolidated Undrained Triaxial Test with Pore Pressure



a	=	0.47	C	=	0.58
α	=	30.4	Φ	=	35.98

Tested By: 129-04-0411 Date: 4/16/19 Approved By: MPS Date: 4/25/19

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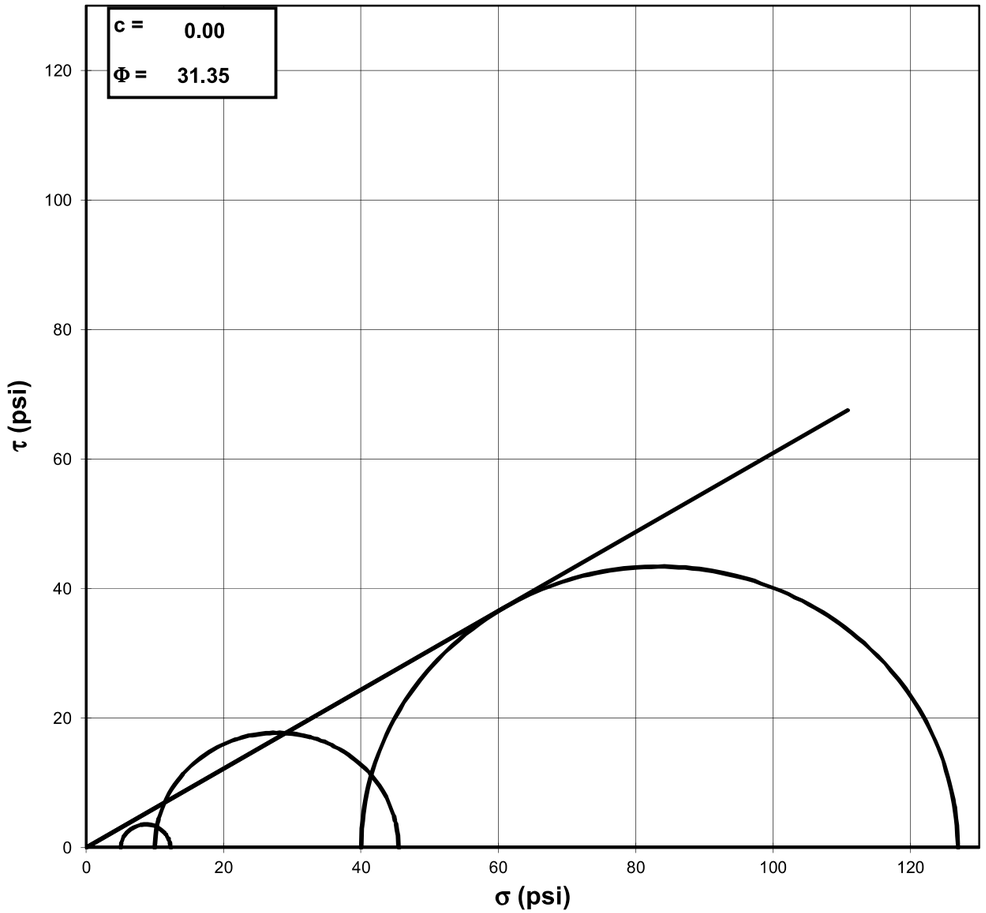
MOHR TOTAL STRENGTH ENVELOPE

AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		
Visual Description:	BROWN SILT (REMOLDED)		



Failure Based on Maximum Effective Principal Stress Ratio

NOTE: GRAPH NOT TO SCALE

Tested By: 129-04-0411 *Date:* 4/16/19 *Approved By:* MPS *Date:* 4/25/19

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

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: BROWN SILT (REMOLDED)

Stage No.	1
Test No.	1

PRESSURES (psi)

Cell Pressure (psi)	55.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	5.0
Pore Pressure Response (%)	100

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	5.34
Q	=	3.61

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.896	Diameter 1:	2.864
Length 2:	5.902	Diameter 2:	2.864
Length 3:	5.891	Diameter 3:	2.864
Length 4:	5.898	Diameter 4:	2.864
Avg. Length:	5.897	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	25.5
Final Change (ml)	22.5
Initial Dial Reading (mil)	314
Dial Reading After Saturation (mil)	415
Dial Reading After Consolidation (mil)	490

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
1.7	0.000	50.0
3.2	0.001	50.0
4.0	0.002	50.0
22.7	0.008	52.2
30.9	0.014	51.6
36.5	0.020	51.8
41.2	0.029	52.1
45.7	0.038	53.3
51.2	0.050	52.4
61.5	0.071	52.5
76.5	0.101	52.4
96.0	0.137	52.0
115.6	0.173	51.4
137.0	0.215	50.6
151.9	0.245	49.8
168.3	0.286	48.5
187.3	0.343	47.2
211.8	0.403	46.0
229.8	0.449	45.2
250.6	0.508	44.3
264.6	0.553	43.9
280.7	0.598	43.3
294.5	0.643	42.8
302.2	0.673	42.5
312.9	0.703	42.2
316.4	0.733	41.9
321.7	0.763	41.7
337.4	0.808	41.2
359.3	0.853	41.0
380.2	0.898	40.5

Tested By: 129-04-0411 Date: 4/16/19 Input Checked By: GEM Date: 4/25/19

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

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: BROWN SILT (REMOLDED)

Effective Confining Pressure (psi)	5.0	*Stage No.*	1
		Test No	1

INITIAL DIMENSIONS

Initial Sample Length (in)	5.90
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	37.99

VOLUME CHANGE

Volume After Consolidation (in^3)	34.66
Length After Consolidation (in)	5.72
Area After Consolidation (in^2)	6.059

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma}_1$	$\overline{\sigma}_3$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.01	0.24	-0.01	5.29	5.1	1.047	-0.03	5.17	0.12
0.04	0.38	0.01	5.42	5.0	1.076	0.03	5.23	0.19
0.14	3.46	2.24	6.27	2.8	2.231	0.65	4.54	1.73
0.24	4.81	1.59	8.27	3.5	2.390	0.33	5.87	2.40
0.34	5.73	1.83	8.94	3.2	2.783	0.32	6.07	2.86
0.50	6.48	2.07	9.45	3.0	3.181	0.32	6.21	3.24
0.67	7.21	3.32	8.94	1.7	5.170	0.46	5.34	3.61
0.87	8.10	2.42	10.72	2.6	4.081	0.30	6.68	4.05
1.24	9.74	2.55	12.23	2.5	4.910	0.26	7.36	4.87
1.77	12.12	2.44	14.72	2.6	5.648	0.20	8.67	6.06
2.40	15.19	2.00	18.23	3.0	5.985	0.13	10.64	7.59
3.03	18.23	1.36	21.91	3.7	5.945	0.07	12.80	9.11
3.75	21.49	0.59	25.94	4.5	5.826	0.03	15.20	10.74
4.28	23.72	-0.21	28.98	5.3	5.511	-0.01	17.12	11.86
5.01	26.12	-1.45	32.62	6.5	5.021	-0.06	19.56	13.06
6.00	28.79	-2.79	36.63	7.8	4.673	-0.10	22.23	14.39
7.05	32.23	-3.97	41.25	9.0	4.573	-0.12	25.14	16.12
7.84	34.69	-4.82	44.56	9.9	4.517	-0.14	27.21	17.35
8.88	37.43	-5.66	48.14	10.7	4.496	-0.15	29.42	18.72
9.67	39.19	-6.08	50.31	11.1	4.523	-0.16	30.72	19.59
10.46	41.23	-6.71	52.99	11.8	4.508	-0.16	32.37	20.62
11.24	42.89	-7.24	55.18	12.3	4.490	-0.17	33.74	21.45
11.77	43.76	-7.52	56.33	12.6	4.481	-0.17	34.45	21.88
12.29	45.04	-7.81	57.90	12.9	4.505	-0.17	35.37	22.52
12.81	45.28	-8.06	58.38	13.1	4.456	-0.18	35.74	22.64
13.34	45.77	-8.32	59.13	13.4	4.425	-0.18	36.25	22.88
14.12	47.58	-8.75	61.37	13.8	4.449	-0.18	37.58	23.79
14.90	50.21	-9.01	64.27	14.1	4.573	-0.18	39.16	25.11
15.69	52.66	-9.48	67.18	14.5	4.626	-0.18	40.85	26.33

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: BROWN SILT (REMOLDED)

Stage No.	1
Test No.	2

PRESSURES (psi)

Cell Pressure (psi)	60.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	10.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	26.64
Q	=	17.75

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Length 4:	5.995	Diameter 4:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	24.0
Final Burette Reading (ml)	9.2
Final Change (ml)	14.8
Initial Dial Reading (mil)	258
Dial Reading After Saturation (mil)	261
Dial Reading After Consolidation (mil)	301

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
9.7	0.000	50.0
12.3	0.002	50.0
12.7	0.003	50.0
15.4	0.009	50.1
23.7	0.015	50.0
32.5	0.021	51.2
57.4	0.029	52.5
72.0	0.038	53.3
87.6	0.050	53.7
111.8	0.071	54.1
148.4	0.100	53.8
194.8	0.136	52.8
240.9	0.171	51.1
286.0	0.212	48.9
313.6	0.242	47.1
346.4	0.284	44.8
381.2	0.341	42.0
410.3	0.400	39.7
429.8	0.446	38.2
453.1	0.505	36.5
468.3	0.551	35.4
482.6	0.596	34.5
494.8	0.640	33.7
503.8	0.670	33.1
511.0	0.700	32.7
518.9	0.730	32.2
526.6	0.760	31.8
538.6	0.805	31.1
550.6	0.850	30.6
558.1	0.880	30.2
566.4	0.910	29.8

Tested By: 129-04-0411 Date: 4/16/19 Input Checked By: GEM Date: 4/25/19

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: BROWN SILT (REMOLDED)

Effective Confining Pressure (psi)	10.0	*Stage No.*	1
		Test No	2

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	37.66
Length After Consolidation (in)	5.95
Area After Consolidation (in^2)	6.327

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.03	0.42	0.00	10.41	10.0	1.042	0.00	10.20	0.21
0.05	0.48	-0.01	10.48	10.0	1.048	-0.03	10.24	0.24
0.15	0.91	0.04	10.85	9.9	1.091	0.04	10.40	0.45
0.25	2.21	-0.01	12.22	10.0	1.221	-0.01	11.11	1.11
0.35	3.60	1.16	12.43	8.8	1.407	0.33	10.63	1.80
0.48	7.51	2.47	15.02	7.5	1.998	0.34	11.27	3.75
0.63	9.79	3.28	16.50	6.7	2.459	0.34	11.60	4.89
0.84	12.21	3.73	18.47	6.3	2.950	0.31	12.36	6.10
1.19	15.96	4.07	21.87	5.9	3.698	0.26	13.90	7.98
1.68	21.56	3.82	27.74	6.2	4.494	0.18	16.95	10.78
2.29	28.60	2.75	35.83	7.2	4.951	0.10	21.54	14.30
2.88	35.50	1.09	44.39	8.9	4.992	0.03	26.64	17.75
3.57	42.11	-1.13	53.23	11.1	4.788	-0.03	32.17	21.06
4.07	46.08	-2.88	58.95	12.9	4.581	-0.06	35.91	23.04
4.77	50.68	-5.26	65.93	15.3	4.323	-0.11	40.59	25.34
5.73	55.35	-7.99	73.33	18.0	4.079	-0.15	45.66	27.68
6.72	59.06	-10.34	79.38	20.3	3.906	-0.18	49.85	29.53
7.49	61.42	-11.86	83.27	21.8	3.812	-0.20	52.56	30.71
8.49	64.13	-13.51	87.62	23.5	3.730	-0.21	55.56	32.06
9.25	65.79	-14.60	90.38	24.6	3.675	-0.23	57.48	32.89
10.01	67.26	-15.49	92.74	25.5	3.640	-0.23	59.11	33.63
10.76	68.43	-16.36	94.78	26.3	3.597	-0.24	60.56	34.21
11.26	69.31	-16.87	96.17	26.9	3.581	-0.25	61.51	34.66
11.76	69.91	-17.35	97.25	27.3	3.557	-0.25	62.30	34.96
12.27	70.61	-17.81	98.41	27.8	3.540	-0.26	63.10	35.31
12.76	71.27	-18.23	99.49	28.2	3.526	-0.26	63.85	35.64
13.52	72.30	-18.88	101.16	28.9	3.505	-0.27	65.01	36.15
14.28	73.28	-19.42	102.69	29.4	3.492	-0.27	66.05	36.64
14.78	73.87	-19.78	103.64	29.8	3.481	-0.27	66.71	36.94
15.28	74.55	-20.19	104.73	30.2	3.470	-0.28	67.45	37.27

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

Visual Description: BROWN SILT (REMOLDED)

Stage No.	1
Test No.	3

PRESSURES (psi)

Cell Pressure (psi)	90.0
Back Pressure (psi)	50.0
Eff. Conf. Pressure (psi)	40.0
Pore Pressure Response (%)	98

MAXIMUM OBLIQUITY POINTS

$\overline{P}$	=	73.10
Q	=	43.42

INITIAL SAMPLE DIMENSIONS (in)

Length 1:	5.995	Diameter 1:	2.864
Length 2:	5.995	Diameter 2:	2.864
Length 3:	5.995	Diameter 3:	2.864
Length 4:	5.995	Diameter 4:	2.864
Avg. Length:	5.995	*Avg. Diam.:*	2.864

VOLUME CHANGE

Initial Burette Reading (ml)	48.0
Final Burette Reading (ml)	16.1
Final Change (ml)	31.9
Initial Dial Reading (mil)	168
Dial Reading After Saturation (mil)	169
Dial Reading After Consolidation (mil)	251

LOAD (LB)	DEFORMATION (IN)	PORE PRESSURE (PSI)
14.8	0.000	50.0
16.9	0.001	50.0
19.0	0.003	50.0
30.8	0.009	50.3
83.0	0.014	52.8
126.9	0.020	55.9
176.3	0.028	59.5
213.1	0.037	61.9
258.5	0.049	64.0
323.0	0.069	65.6
409.9	0.099	65.3
494.5	0.135	63.2
569.1	0.170	60.4
630.2	0.211	56.8
668.5	0.241	54.5
717.5	0.283	51.3
770.2	0.340	47.3
806.9	0.400	43.9
827.5	0.445	41.9
859.4	0.504	39.6
882.7	0.549	38.1
905.4	0.595	36.7
919.9	0.640	35.6
932.5	0.670	34.9
942.2	0.700	34.3
950.3	0.729	33.6
960.7	0.760	33.2
982.6	0.805	32.5
1003.2	0.851	31.9
1016.1	0.882	31.5
1023.0	0.912	31.0

Tested By: 129-04-0411 Date: 4/16/19 Input Checked By: GEM Date: 4/25/19

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

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CONSOLIDATED UNDRAINED TRIAXIAL TEST WITH PORE PRESSURE READINGS

AASHTO T-297

Client: Falcon Engineering | Boring No.: B-3
Client Reference: R-5864 Slide Repair | Depth (ft): 1.0-9.0
Project No.: R-2019-098-001 | Sample No.: BS-1
Lab ID: R-2019-098-001-001

Visual Description: BROWN SILT (REMOLDED)

Effective Confining Pressure (psi)	40.0	*Stage No.*	1
		Test No	3

INITIAL DIMENSIONS

Initial Sample Length (in)	6.00
Initial Sample Diameter (in)	2.86
Initial Sample Area (in^2)	6.44
Initial Sample Volume (in^3)	38.62

VOLUME CHANGE

Volume After Consolidation (in^3)	36.66
Length After Consolidation (in)	5.91
Area After Consolidation (in^2)	6.200

Strain (%)	Deviation Stress	ΔU	$\overline{\sigma_1}$	$\overline{\sigma_3}$	Effective Principle Stress Ratio	$\overline{A}$	$\overline{P}$	Q
0.02	0.34	0.00	40.39	40.0	1.009	-0.01	40.22	0.17
0.05	0.68	0.00	40.73	40.0	1.017	0.00	40.39	0.34
0.16	2.59	0.26	42.37	39.8	1.065	0.10	41.08	1.29
0.24	10.99	2.81	48.22	37.2	1.295	0.26	42.73	5.49
0.34	18.03	5.87	52.20	34.2	1.528	0.33	43.19	9.01
0.48	25.93	9.47	56.51	30.6	1.848	0.37	43.55	12.97
0.63	31.79	11.91	59.92	28.1	2.130	0.38	44.02	15.89
0.82	38.98	14.00	65.03	26.0	2.497	0.37	45.54	19.49
1.17	49.14	15.60	73.58	24.4	3.010	0.32	49.01	24.57
1.67	62.66	15.31	87.40	24.7	3.533	0.25	56.07	31.33
2.28	75.62	13.15	102.51	26.9	3.812	0.18	64.70	37.81
2.88	86.84	10.37	116.52	29.7	3.926	0.12	73.10	43.42
3.57	95.72	6.81	128.95	33.2	3.880	0.07	81.09	47.86
4.08	101.14	4.48	136.70	35.6	3.844	0.05	86.13	50.57
4.78	107.92	1.28	146.69	38.8	3.784	0.01	92.73	53.96
5.74	114.84	-2.73	157.62	42.8	3.685	-0.02	100.20	57.42
6.76	119.12	-6.10	165.26	46.1	3.582	-0.05	105.70	59.56
7.52	121.22	-8.06	169.32	48.1	3.520	-0.07	108.71	60.61
8.52	124.62	-10.41	175.08	50.5	3.470	-0.09	112.77	62.31
9.28	127.00	-11.95	179.00	52.0	3.442	-0.10	115.50	63.50
10.06	129.19	-13.31	182.54	53.4	3.421	-0.11	117.95	64.59
10.82	130.19	-14.36	184.60	54.4	3.393	-0.11	119.51	65.10
11.33	131.25	-15.09	186.39	55.1	3.380	-0.12	120.76	65.63
11.84	131.87	-15.70	187.62	55.7	3.365	-0.12	121.68	65.94
12.34	132.28	-16.36	188.68	56.4	3.345	-0.13	122.54	66.14
12.85	132.96	-16.84	189.85	56.9	3.337	-0.13	123.37	66.48
13.61	134.84	-17.47	192.36	57.5	3.344	-0.13	124.94	67.42
14.40	136.47	-18.13	194.65	58.2	3.346	-0.14	126.41	68.23
14.91	137.42	-18.52	195.99	58.6	3.346	-0.14	127.28	68.71
15.42	137.54	-18.96	196.55	59.0	3.331	-0.14	127.78	68.77

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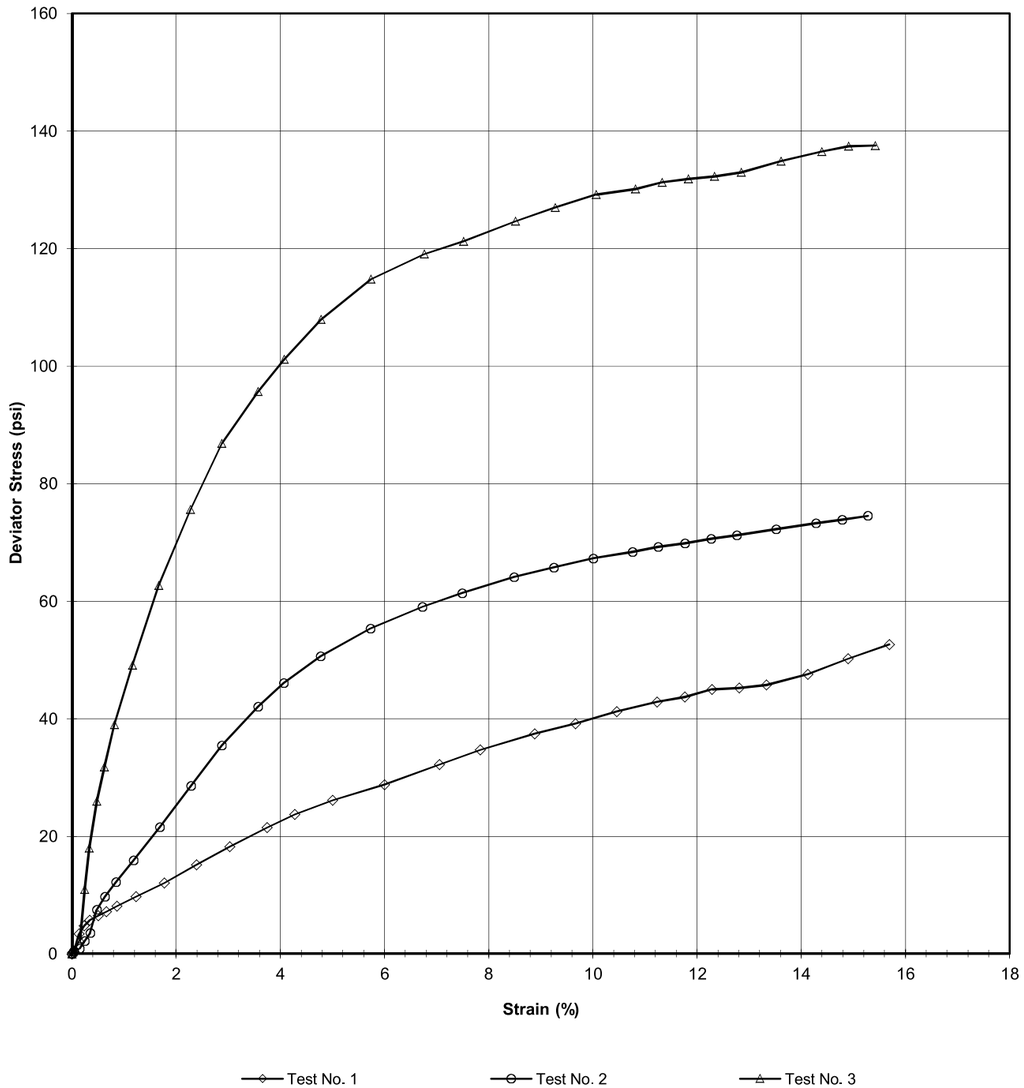
CONSOLIDATED UNDRAINED TRIAXIAL TEST
WITH PORE PRESSURE READINGS
AASHTO T-297

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		
Visual Description:	BROWN SILT (REMOLDED)		



Tested By: 129-04-0411 Date: 4/16/19 Approved By: MPS Date: 4/25/19

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

Client:	Falcon Engineering		
Client Reference:	R-5864 Slide Repair		
Project No.:	R-2019-098-001		
Lab ID:	R-2019-098-001-001	Specific Gravity (Assumed)	2.68
Visual Description:	BROWN SILT (REMOLDED)		

SAMPLE CONDITION SUMMARY

Boring No.:	B-3	B-3	B-3
Depth (ft):	1.0-9.0	1.0-9.0	1.0-9.0
Sample No.:	BS-1	BS-1	BS-1
Test No.	T1	T2	T3
Deformation Rate (in/min)	0.002	0.002	0.002
Back Pressure (psi)	50.0	50.0	50.0
Consolidation Time (days)	1	1	1
Moisture Content (%) (INITIAL)	11.5	11.5	11.5
Total Unit Weight (pcf)	135.2	135.3	136.1
Dry Unit Weight (pcf)	121.2	121.3	122.1
Moisture Content (%) (FINAL)	18.2	16.8	15.8
Initial State Void Ratio,e	0.380	0.379	0.371
Void Ratio at Shear, e	0.259	0.345	0.301

Tested By: 129-04-0411 Date: 4/16/19 Input Checked By: GEM Date: 4/25/19

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

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

Client:	Falcon Engineering	Boring No.:	B-3
Client Reference:	R-5864 Slide Repair	Depth (ft):	1.0-9.0
Project No.:	R-2019-098-001	Sample No.:	BS-1
Lab ID:	R-2019-098-001-001		

TEST 1 INITIAL

N/A

TEST 1 FINAL

TEST 2 INITIAL

N/A

TEST 2 FINAL

TEST 3 INITIAL

N/A

TEST 3 FINAL

Tested By 129-04-0411 *Date* 4/16/19 *Approved By* MPS *Date* 4/25/19

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