587. REFERENCE

CONTENTS

DESCRIPTION

LEGEND (SOIL & ROCK)

TITLE SHEET

SITE PLAN

PROFILE BORE LOGS

SHEET NO.

5-7

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION **DIVISION OF HIGHWAYS** GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

COUNTY MECKLENBURG

PROJECT DESCRIPTION NORTH MAIN STREET / POTTS STREET INTERSECTION IMPROVEMENTS

SITE DESCRIPTION RETAINING WALL ON -Y2-BETWEEN STATIONS 15 + 96.54 AND 17 + 92.80 -RW1-STA.10+00 TO 12+20

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
V.C.	U-5873	1	7

CAUTION NOTICE

THE SUBSURFACE INFORMATION AND THE SUBSURFACE INVESTIGATION ON WHICH IT IS BASED WERE MADE FOR THE PURPOSE OF PREPARING THE SCOPE OF WORK TO BE INCLUDED IN THE REQUEST FOR PROPOSAL. 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 (1991) 707-805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

SOIL AND ROCK BOUNDARIES WITHIN A BOREHOLE ARE BASED ON GEOTECHNICAL INTERPRETATION UNLESS ENCOUNTERED IN A SAMPLE, INTERPRETED BOUNDARIES MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN SAMPLED STRATA AND BOREHOLE INFORMATION MAY NOT NECESSARILY REFLECT ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS, 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 INTERRETATIONS 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.

P.M. WEAVER C.R. PASTRANA **AMERIDRILL** INVESTIGATED BY ESP Associates, Inc. DRAWN BY __C.R. PASTRANA CHECKED BY P.M. WEAVER

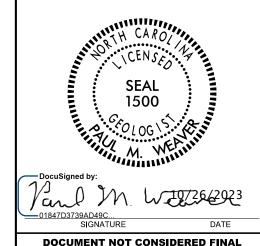
SUBMITTED BY ESP Associates, Inc.

PERSONNEL

DATE October 2018



ESP ASSOCIATES, INC. 7011 ALBERT PICK RD SUITE F GREENSBORO, NC 27409 FIRM # C-0587 WWW.ESPASSOCIATES.COM



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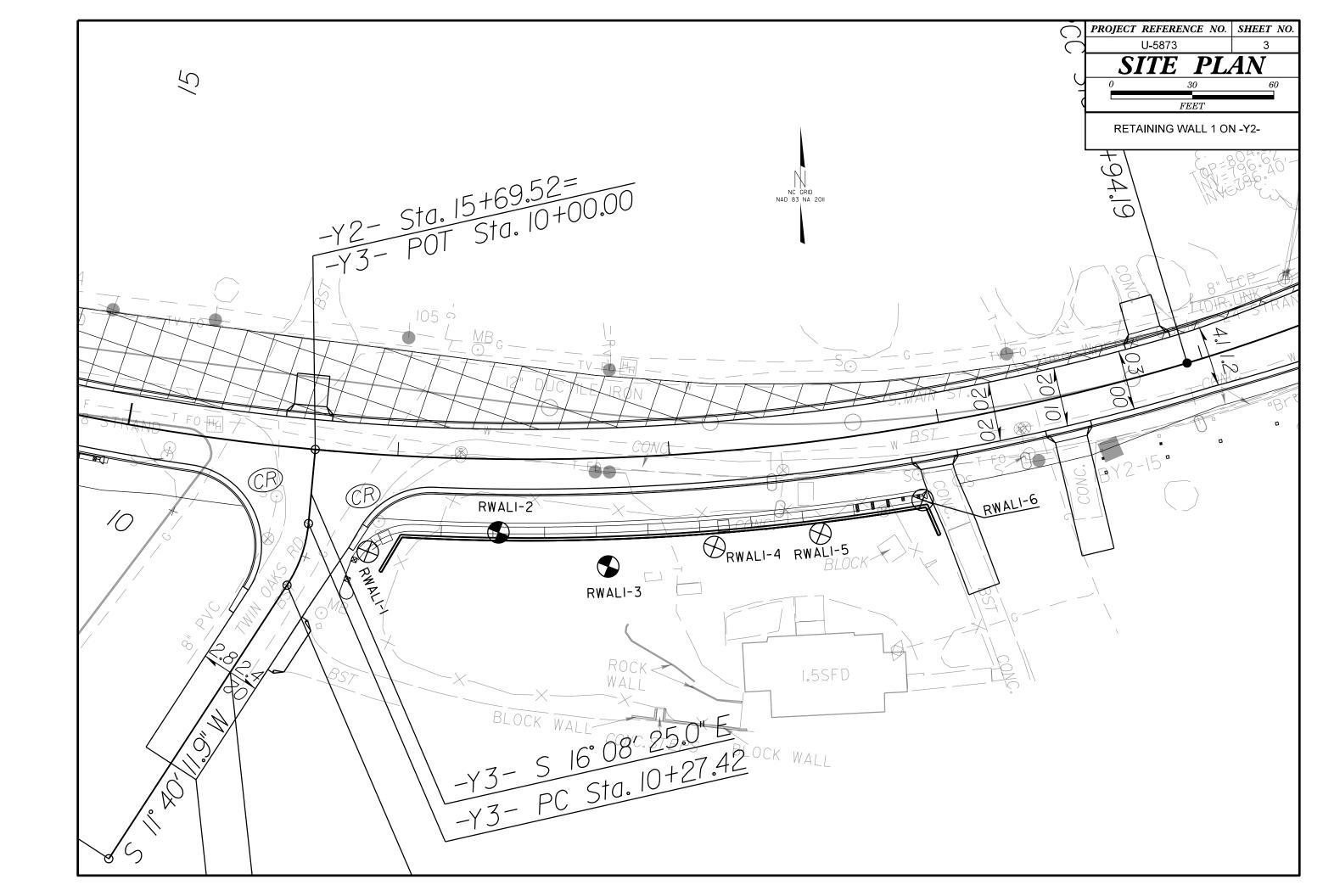
U-5873 SHEET NO.

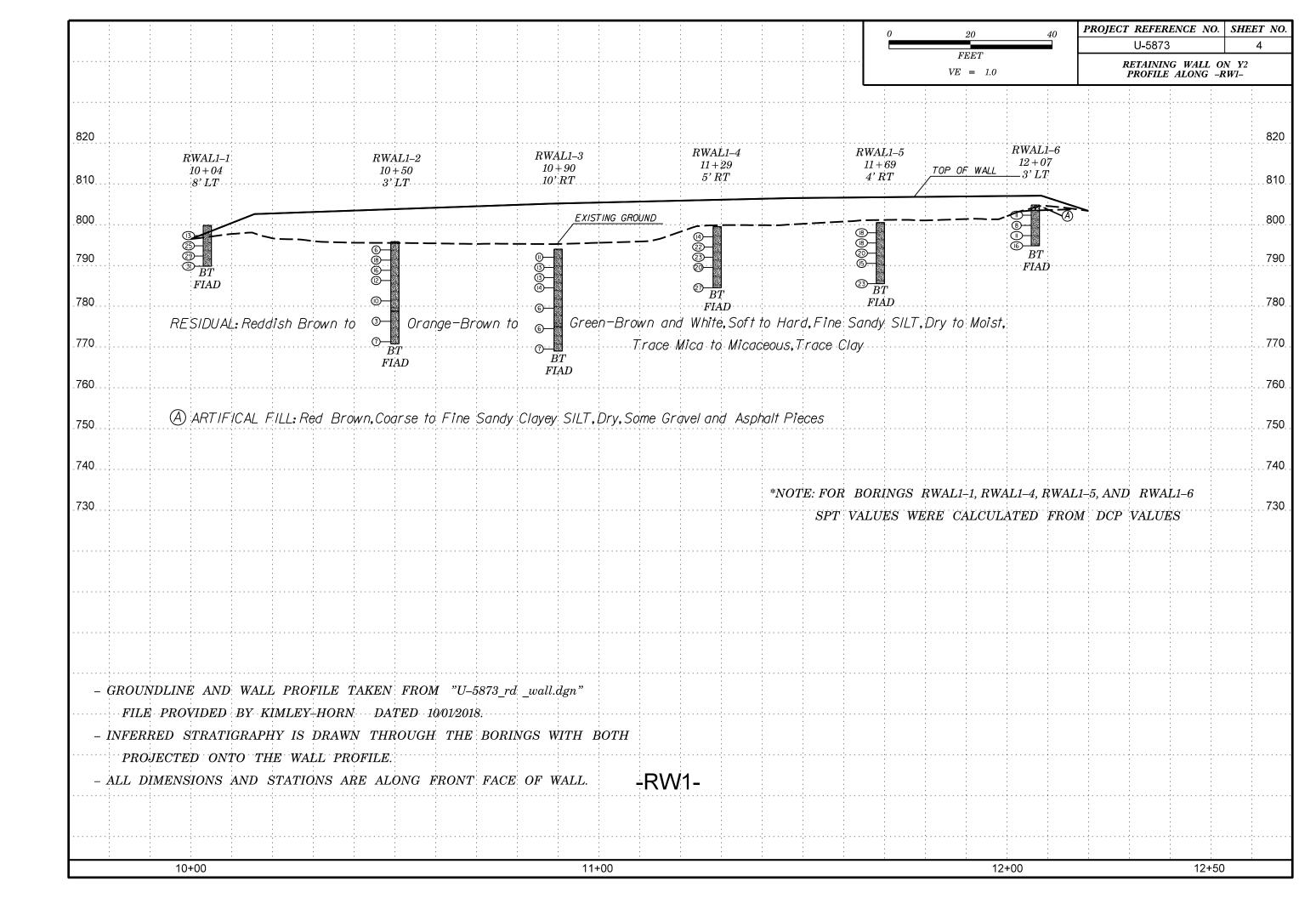
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
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	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.	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.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
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:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	WEATHERED WON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	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.
SOIL LEGEND AND AASHTO CLASSIFICATION	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) CNOWNELL PRITECTIFIES GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAQLIN, ETC. ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5 CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
% PASSING	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	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.
■10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
*40 30 MX 50 MX 51 MN PEAT 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MN 36 MN 36 MN 36 MN 36 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
PI 6 MX NP 10 MX 10 MX 11 MN 11 MN 10 MX 10 MX 11 MN 11 MN LITTLE UR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH,
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX AMOUNTS OF SOLIS	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
USUAL TYPES STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
OF MAJOR GRAVEL, AND MATERIALS SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER <u>24</u> HOURS	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM
GEN.RATING EXCELLENT TO GOOD FAIR TO POOR POOR POOR UNSUITABLE	√Pw PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA PERCHED WATER, SATURATED WATER BEARING PERCHED WATER WATER WATER WATER WATER BEARING PERCHED WATER WAT	(MOD.) 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	PARENT MATERIAL.
AS SUBURANE PUUR	SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30		MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.
CONSISTENCY OR DENSENESS RANGE OF STANDARD RANGE OF UNCONFINED	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES "CLUNK" SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE COMPACTINESS UP PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION WITH SOIL DESCRIPTION OF ROCK STRUCTURES	<u>IF TESTED, WOULD YIELD SPT REFUSAL</u>	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
CENTEDALLY VERY LOOSE < 4	SPT CLORE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL OPT DAT TEST BORING INSTALLATION SLOPE INDICATOR INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	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
MATERIAL NENSE 10 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER THAN ROADWAY EMBANKMENT AUGER BORING TEST	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN RUADWAY EMBANKMENT C	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.5	- INFERRED SOIL BOUNDARY - CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES < 100 BPF</u>	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5 SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0	INFERRED ROCK LINE MONITORING WELL TEST BORING WITH CORE	COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4	A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
HARD > 30 > 4	INSTALLATION SPT N-VALUE	ROCK HARDNESS	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNCLASSIFIED EXCAVATION - UNCLASSIFIED EXCAVATION - ACCEPTABLE, BUT NOT TO BE	SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	UNDERCOT LCCF THBLE DEGRAPHBEE NOCK	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT
(USE, SU.) (F SU.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	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
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
COLL MOISTINE SCALE FIELD MOISTINE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK, CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS) DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH	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
(SAT.) FROM BELOW THE GROUND WATER TABLE	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC SEMISOLIDA PEDILIPES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
RANGE < - WET - (W) ATTAIN OPTIMUM MOISTURE (PI) PL PLASTIC LIMIT	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING	BENCH MARK: FILE "U5873_U5907_Is_tin.tin" WAS USED TO DETERMINE
	EQUIPMENT USED ON SUBJECT PROJECT	TERM SPACING TERM THICKNESS VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	GROUND ELEVATION AT BORINGS ELEVATION: FEET
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	
SL _ SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	CME-55 G' CONTINUOUS FLIGHT AUGER CORE SIZE:	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	F.I.A.D. = FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY	X 8*HOLLOW AUGERS	INDURATION]
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS; FRIABLE GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING W/ ADVANCER HAND TOOLS: POST HOLE DIGGER	CDAING CAN BE CERARATED FROM CAMPLE WITH CIFEL BRORE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH X HAND AUGER	MODERATELY INDURATED MODERATELY INDURATED MODERATELY INDURATED BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1
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							DCP I ESP A					
Project ID:	J-5873- Reta	ining W	all							klenburg		Boring No: RWAL1-1
Site Description				Betwee	n Statio	ns 15+9				<u> </u>		Route:
	astrana, C.F					-	Boring S)4	Offset: 8' LT	Alignment: -RW1-
Elev.: 799.8		Nor	thing:	639,449	9	E	Easting:	1,44	7,889			Date Started: 8/26/2018
Total Depth:	10.0'	_	Depth:	N/A			Total Ar		Cored:	N/A		Date Completed: 8/26/2018
Bore Hole Dia			•		Cor	e Size:						· ·
Drill Machine:						Metho		CP & Ha	nd Aud	ger Ham ı	mer Type: N/A	Energy Ratio: N/A
Driller: N/						Gro	undwat			DRY	-	oundwater @ 24 hrs: FIAD
Top of Strata	Sample No.	Test	Depth	Test I	ncrement	s (bpi)	Average	*N	MOI			
(feet) FROM TO	NUMBER	Depth (ft)	Drive Elev. (ft)	1st 1 3/4"	2nd 1 3/4"	3rd 1 3/4"	bpi	VALUE (bpf)	D/M/S	ORIGIN	SOIL &	ROCK DESCRIPTION
799.8		2.5	797.3	14	14	12	13	9.5	D	Residual	Red Brown to Orange Brow Micaceous, Trace Clay	n, Fine Sandy SILT, Dry,
		5.0	794.8	21	22	31	25	13.8	D			
		7.5	792.3	26	29	33	29	15.3	D			
789.8		10.0	789.8	30	34	28	31		D			
			1				i I				Boring Terminated at Eleva Micaceous SILT	tion 789.8' in Residual Soil:
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* N-\/alues a	ra actimated	hased	on curve	Δ - \/ir	nin Pied	mont S	oile (Rat	oronco.	Sower	c GE and	d Hadanas C S (1966)	Dynamic Cone for Shallow In-Situ

Penetration Testing, Figure 3)

SHEET 5
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GEOTECHNICAL BORING REPORT BORE LOG

													<u>UG</u>							
	47085					P U-58							NBURG			GEOLOGI	ST Pastran	a, C.R.		
SITE	DESCR	IPTION	U-5	873: R	etainir	ng Wall	on -Y	'2- Betw	een St	tation	ns 15-	+96.5 ₄	4 and 17	7+92.8	0				GROUN	D WTR (ft)
BOR	ING NO.	RWA	L1-2		S	TATION	10+	-50			OFFS	ET 3	3 ft LT			ALIGNME	NT -RW1-		0 HR.	DRY
COLI	AR ELE	EV . 79	5.8 ft		TO	OTAL D	EPTH	25.0	ft		NORT	HING	639,4	73		EASTING	1,447,931		24 HR.	FIAD
DRILL	. RIG/HAI	MMER E	FF./DA	TE AN	ЛE9553	CME-55	0X 80	% 12/15/	2017				DRILL N	ЛЕТНО	D H.S	S. Augers		HAMM	ER TYPE	Automatic
DRIL	LER M	leatyard	d, C.		S	TART D	ATE	08/13/	18		COME	P. DA	TE 08/	13/18		SURFACE	WATER DE	PTH N	/A	
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	0.5ft		0	25	BLOWS	PER FC		75	100	SAMP.	MOI	L O G	ELEV. (ft)	SOIL AND RO	OCK DESC	CRIPTION	DEDTIL (%)
	(11)		0.010	0.010	0.010						1		110.	/ IVIOI	G	ELEV. (π)				DEPTH (ft)
800	-	-													-	•				
795	-	10													-	795.8		ID SURFA	ACE	0.0
700	794.8 –	1.0	3	3	3	6								D	F	Red	Brown, Fine S	andy SIL	T, Dry to M	oist,
	792.3	3.5	6	8	10	:`.\				: :		: :		D			Trace (Clay and N	/lica	
790	789.8	6.0	4	7	0		.•18		ļ · ·		· ·									
	787.3	8.5	4	′	9	::;	16			::	: :	: :		D	 					
705	-707.5		3	5	7	::∳	12.			: :				D						
785	-	-				 : 			 		 				-	•				
	782.3	13.5	4	5	5	11 :				: :		: :		١						
780	_	_				. 91	0 .				ļ : :	: :		M	E					
	-	10.5				// :										778.8 Gre	en Brown and	White, Fir	ne Sandy S	17.0 ILT,
	777.3	18.5	2	1	2	 ∮3 .						: :		М	æŁ		Dry,	Micaceou	s	,
775	-	-				-					<u> </u>				_	-				
	772.3	23.5													E					
			2	3	4	7			1		1		-	M		770.8	ring Terminated	d at Fleva	tion 770 8 t	25.0
	-	F													l F		Residual So	il: Micace	ous SILT	
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GEOTECHNICAL BORING REPORT BORE LOG

BORING REPORT

						D	ORE L	UG			
WBS 470	085.1.1			TI	I P U-5873	COUNT	Y MECKLE	NBURG	i		GEOLOGIST Pastrana, C.R.
SITE DES	CRIPTION	I U-5	873:	Retaini	ng Wall on -Y2- B	Setween Station	ons 15+96.54	and 17	' +92.8	0	GROUND WTR (ft)
BORING N	NO. RWA	\L1-3		S.	TATION 10+90		OFFSET 1	0 ft RT			ALIGNMENT -RW1- 0 HR. DRY
COLLAR	ELEV . 79	94.0 ft		T	OTAL DEPTH 25	5.0 ft	NORTHING	639,4	76		EASTING 1,447,973 24 HR. FIAD
DRILL RIG/	HAMMER E	FF./DA	TE A	ME9553	3 CME-550X 80% 12	2/15/2017		DRILL N	IETHO	D H.S	S. Augers HAMMER TYPE Automatic
DRILLER	Meatyard	d, C.		S	TART DATE 08/	13/18	COMP. DAT	TE 08/	13/18		SURFACE WATER DEPTH N/A
ELEV ELE (ft)	EV Cft)	0.5ft	O.5ft		BLO ¹	WS PER FOOT	75 100	SAMP. NO.	MOI	L O G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft
795										_	794.0 GROUND SURFACE 0.0
793 790 790 788	0.5 = 3.5	3 4	5 6 5	6 7 8	1 1 1				D M M		RESIDUAL Red Brown, Fine Sandy SILT, Dry to Moist, Trace Clay and Mica
785 785	5.5 + 8.5 - - - - - - - - - - - - - - - - - - -	5	6	8	14				М		-
700	5.5 + 18.5	3	3	3	•6				М		
770 770	0.5 - 23.5	3	3	4	66				M M		Green Brown and White, Fine Sandy SILT, Moist, Micaceous 769.0 25.0
	+										

SHEET 6

Retaining Wall on -Y2- Between Stations 15+96.54 and 17+92.80 Route: ng./Geo: Pastrana, C.R. Boring Station: 11+29 Offset: 5' RT Alignment: -RW1- lev.: 799.8' Northing: 639,497 Easting: 1,448,007 Date Started: 8/26/2018 otal Depth: 15.0' Soil Depth: N/A Total Amount Cored: N/A Date Completed: 8/26/2018 ore Hole Diameter (in). N/A Core Size: N/A rill Machine: N/A Drill Method: DCP & Hand Auger Hammer Type: N/A Energy Ratio: N/A riller: N/A Groundwater @ TOB: DRY Groundwater @ 24 hrs: FIAD Top of Strata (feet) Sample No. (feet) Depth Dirive 1st 2nd 3rd 1 3/4' 1	roject ID:	I-5873- Pata	ining \//	'all				ESP A					Boring No: RWAL1-4
Northing Sol Sol Depth Northing Sol Sol Depth Northing Sol Sol Depth Northing Sol Depth					Potwoo	n Static	nc 15 i				Neriburg		
Northing: 639,497 Easting: 1,448,007 Date Started: 8/26/2018 Soil Depth: N/A Date Completed: 8/26/2018 Soil Depth: N/A Date Completed: 8/26/2018 Soil Depth: N/A Drill Machine: N/A				011-12-	Detwee	ii Static					20	Offset: 5' DT	
Total Amount Cored: N/A Date Completed: 8/26/2018 Soil Depth: N/A Drill Mechine: N/A				thing	630 10	7	_	_			19	Oliset. 5 KT	
Core Hole Diameter (in) N/A Drill Method: DCP & Hand Auger Hammer Type: N/A Energy Ratio: N/A											NI/A		
				рерии.	IN/A		o Cino		nount C	oreu.	IN/A		Date Completed. 6/20/2016
Sample No. Test Depth Drive 1 3/4" 1			IN/A						ח פ וופ	امما ۸۰۰	uar Hami	mor Type. N/A	Energy Potics N/A
Top of Strata (feet Sample No. Test Depth (feet Depth (feet 1 3/4") 1 3/4" 1						וווט	_						·
Clear Depth Drive Elev. (t) To NUMBER No. Depth Clebr. (t) To NUMBER No.			Test	Depth	Test I	ncrement		1			DKT	Git	Juliuwater @ 24 III's. FIAD
799.5 2.5	(feet)	·			1st	2nd	3rd		VALUE		ORIGIN	SOIL &	ROCK DESCRIPTION
	799.5	NUMBER						14		М	Residual	Pod Prown to Orango Prow	un Fino Sandy SILT Maiet to Dry
7.5 792.0 23 28 19 23 13.1 M 10.0 789.5 18 12 29 20 12.1 D 784.5 15.0 784.5 29 28 23 27 14.5 D Boring Terminated at Elevation 784.5' in Residual Soil:	I			l				!				Micaceous, Trace Clay	III, Fille Sandy SILT, Moist to Dry,
10.0 789.5 18 12 29 20 12.1 D 784.5 15.0 784.5 29 28 23 27 14.5 D Boring Terminated at Elevation 784.5' in Residual Soil:			5.0	794.5	27	21	18	22	12.8	М			
784.5 15.0 784.5 29 28 23 27 14.5 D Boring Terminated at Elevation 784.5' in Residual Soil:			7.5	792.0	23	28	19	23	13.1	М			
Boring Terminated at Elevation 784.5' in Residual Soil:			10.0	789.5	18	12	29	20	12.1	D			
	784.5		15.0	784.5	29	28	23	27	14.5	D			
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Microcous SILT Microcous SILT													ation 784.5' in Residual Soil:
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DCP BORE LOGS ESP Associates, Inc. County: Mecklenburg Boring No: RWAL1-5 Project ID: U-5873- Retaining Wall Site Description: Retaining Wall on -Y2- Between Stations 15+96.54 and 17+92.80 Route: Boring Station: 11+69 Offset: 4' RT Alignment: -RW1-Eng./Geo: Pastrana, C.R. Elev.: 799.8' Northing: 639,516 **Easting:** 1,448,042 **Date Started:** 8/26/2018 Total Amount Cored: N/A Total Depth: 15.0' Soil Depth: N/A Date Completed: 8/26/2018 Bore Hole Diameter (in). N/A Core Size: N/A Drill Machine: N/A Drill Method: DCP & Hand Auger Hammer Type: N/A Energy Ratio: N/A Driller: Groundwater @ TOB: Groundwater @ 24 hrs: FIAD DRY Top of Strata *N VALUE MOI Sample No. Average bpi Drive 1st 2nd 3rd ORIGIN SOIL & ROCK DESCRIPTION D/M/S 1 3/4" 1 3/4" 1 3/4" (bpf) 800.5 11.4 Residual Red Brown to Orange Brown, Fine Sandy SILT, Moist to Dry, Micaceous, Trace Clay 5.0 795.5 15 24 18 11.4 14 7.5 793.0 21 18 **20** 12.1 20 10.0 790.5 17 14 15 10.3 13 785.5 15.0 785.5 21 27 22 **23** 13.1 Boring Terminated at Elevation 785.5' in Residual Soil: Micaceous SILT

SHEET 7

]	ESP A	ssocia	tes, I	nc.		
Project ID:	J-5873- Reta	ining W	all				(County:	Mec	klenburg		Boring No: RWAL1-6
Site Descriptio				Betwee	en Static	ns 15+	96.54 ar	nd 17+92	2.80	-		Route:
Eng./Geo: F	astrana, C.F	₹.				E	Boring S	Station:	12+0)7	Offset: 3' LT	Alignment: -RW1-
Elev.: 799.8	ı	Nor	thing:	639,44	9	1	Easting:	1,44	7,889		•	Date Started: 8/26/2018
Total Depth:	10.0'	Soil	Depth:	N/A		T.	Total Ar	nount C	ored:	N/A		Date Completed: 8/26/2018
Bore Hole Dian	neter (in).	N/A			Cor	e Size:	N/A					
Drill Machine:	N/A				Dril	Metho	d: DO	CP & Ha	ınd Aug	ger Ham	mer Type: N/A	Energy Ratio: N/A
Oriller: N/	A					Gro	undwat	er @ To	OB:	DRY	G	roundwater @ 24 hrs: FIAD
Top of Strata	Sample No.		Depth		ncrement		Average	*N VALUE	MOI	ORIGIN	2011	& ROCK DESCRIPTION
(feet) FROM TO	NUMBER	Depth (ft)	Drive Elev. (ft)	1st 1 3/4"	2nd 1 3/4"	3rd 1 3/4"	bpi	(bpf)	D/M/S	ORIGIN	SOIL	& ROCK DESCRIPTION
805.0		2.5	802.5 I	12	12	8	11	8.6	D	Artificial Fill	Red Brown, Coarse to Fin and Asphalt Pieces	e Sandy Clayey SILT, Dry, Some Grav
803.7		5.0	800.0	10	8	6	8	7	D	Residual	Red Brown to Orange Bro	wn, Fine Sandy SILT, Dry,
		7.5	797.5	8	13	13	11	8.6	D		Micaceous, Trace Clay	,,,,
795.0		10.0	795.0	18	14	16	16	10.7	D			
İ							<u> </u> 				Boring Terminated at Elev Micaceous SILT	vation 795.0' in Residual Soil:
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Penetration Testing, Figure 3)

^{*} N-Values are estimated based on curve A - Virgin Piedmont Soils (Reference: Sowers, G.F. and Hedeges, C.S. (1966), Dynamic Cone for Shallow In-Situ Penetration Testing, Figure 3)