SHEET NO.: CONTENTS:

> TITLE SHEET 01 02 LEGEND 03 SITE PLAN 04-05 PROFILES

06-08 CROSS SECTIONS

09-21 BORE LOGS & CORE REPORTS 22 SITE PHOTOGRAPHS

STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO.:	34442.1.5	F.A. PROJ. <u>N/A</u>
COUNTY: Jones		
PROJECT DESCRIPTION:	US 17 from No	orth of NC 58 to the New Bern
Bypass		
SITE DESCRIPTION:Dua	al Bridges on -L-	over Goshen Branch

STATE STATE PROJECT REFERENCE NO. SHEET TOTAL NO. SHEETS N.C. 34442.1.5 (R-2514D) 01 22

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. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE 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 THES USBURFACE INVESTIGATION, SARE 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 THIS 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.

PERSONNEL:

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STEVEN V. HUDSON, P.G., CWD

DATE:

December, 2013



DRAWN BY: STEVEN V. HUDSON, LG, CWD

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT NOTE - BY HAVING REQUESTED THIS INFORMATION THE CONTRACTOR SPECIFICALLY WAIVES ANY CLAIMS OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS. SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

FOR INCREASED COMPENSATION OR EXTENSION OF TIME BASED ON DIFFERENCES BETWEEN THE CONDITIONS INDICATED HEREIN AND THE ACTUAL CONDITIONS AT THE PROJECT SITE.

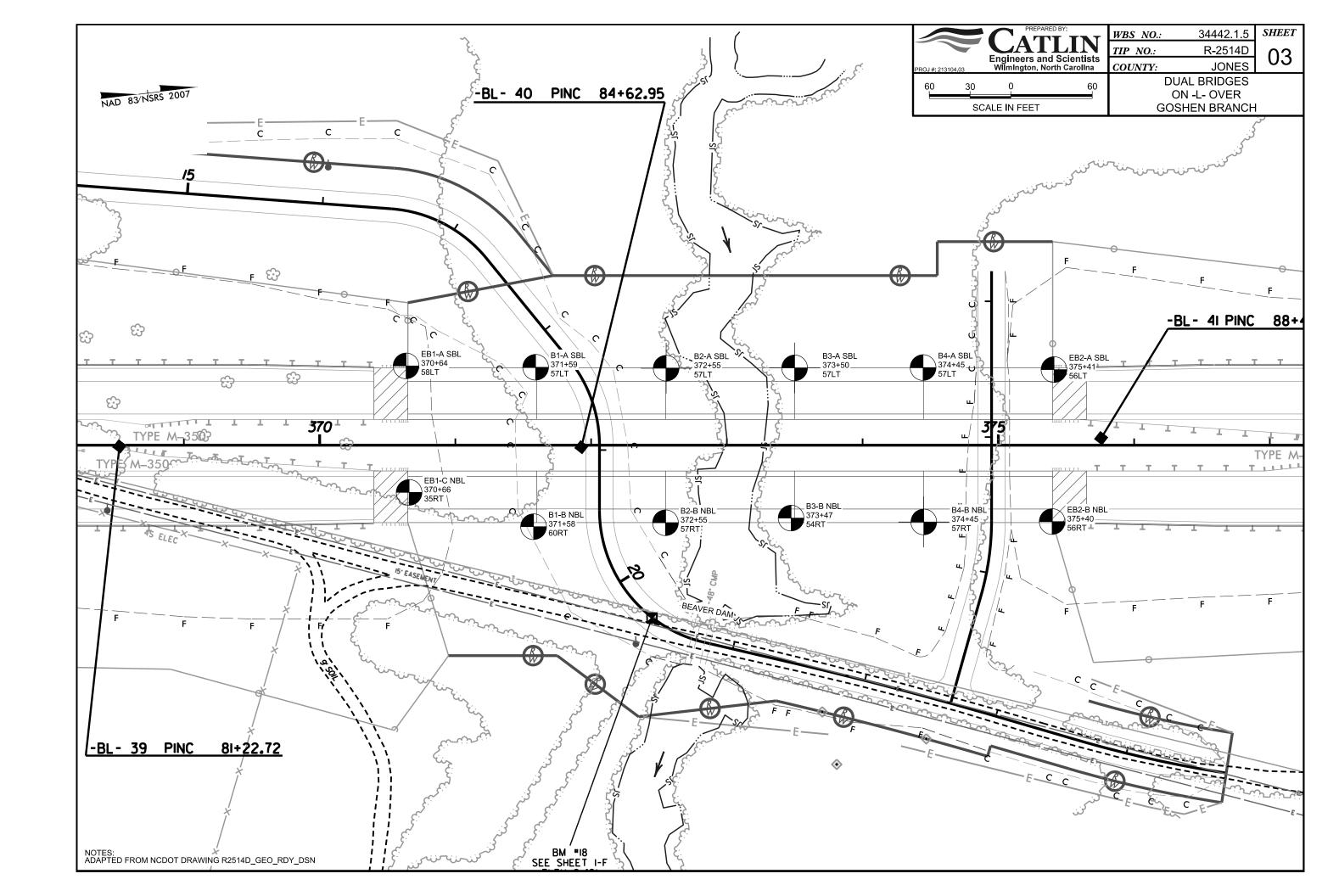


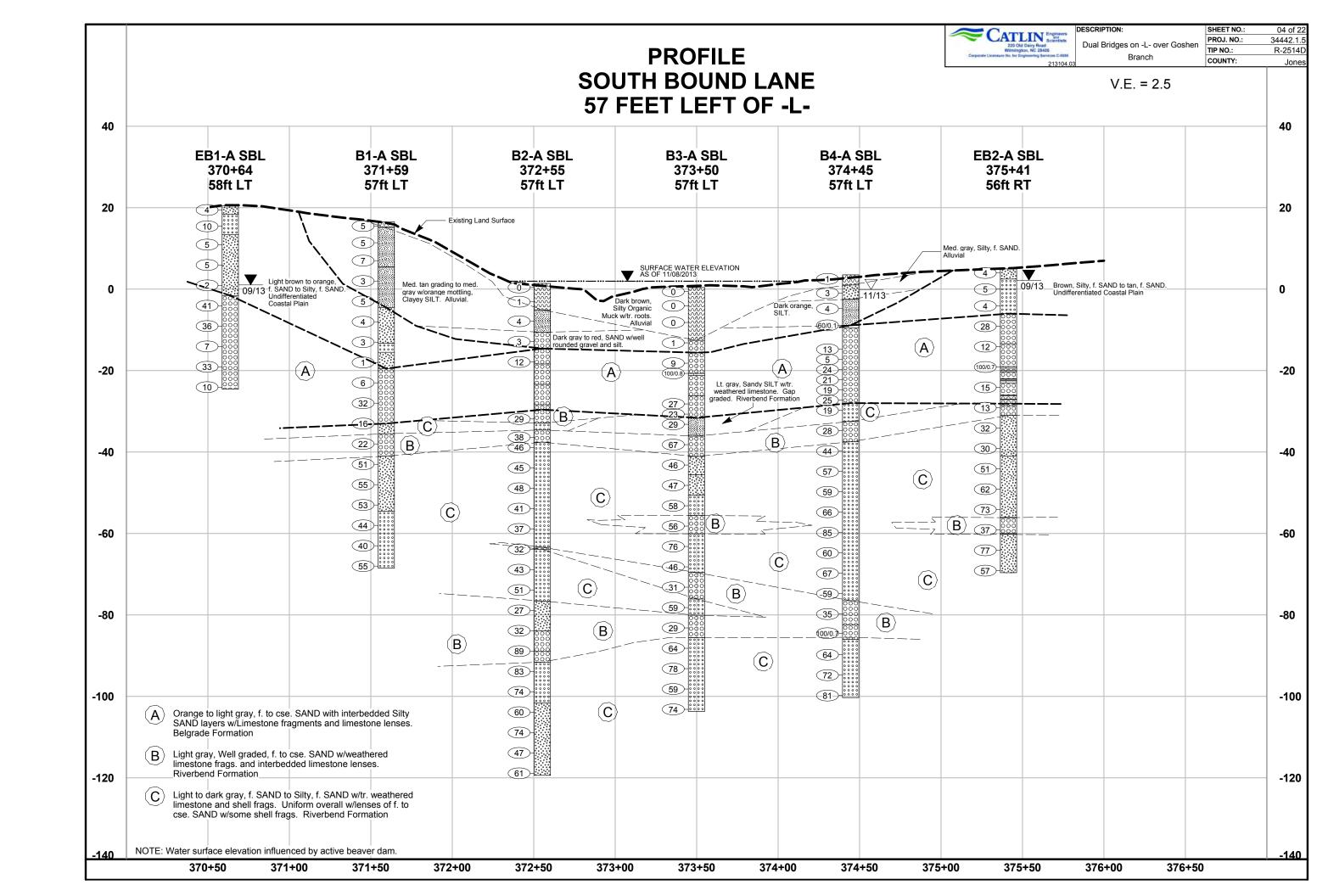
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

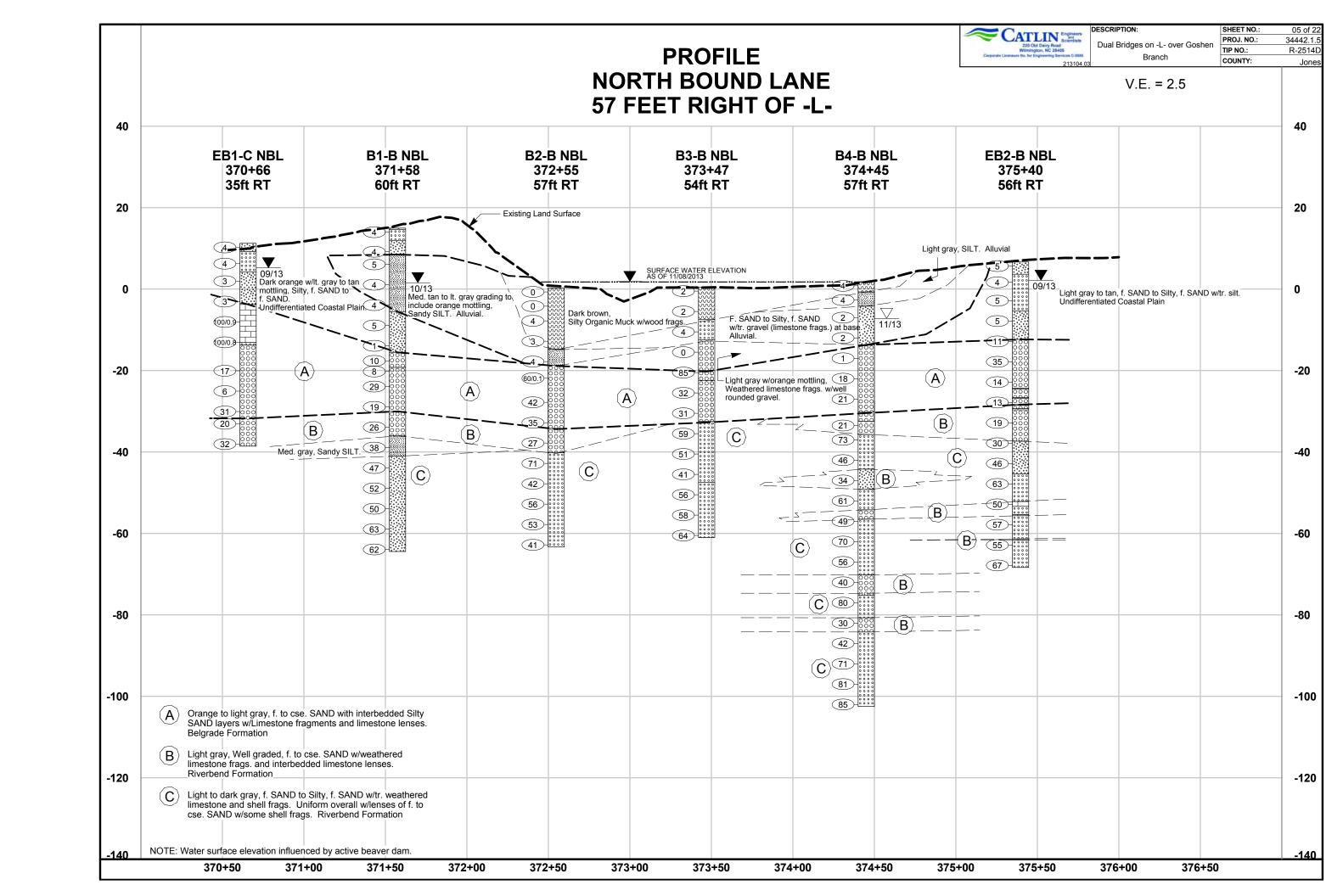
SUBSURFACE INVESTIGATION

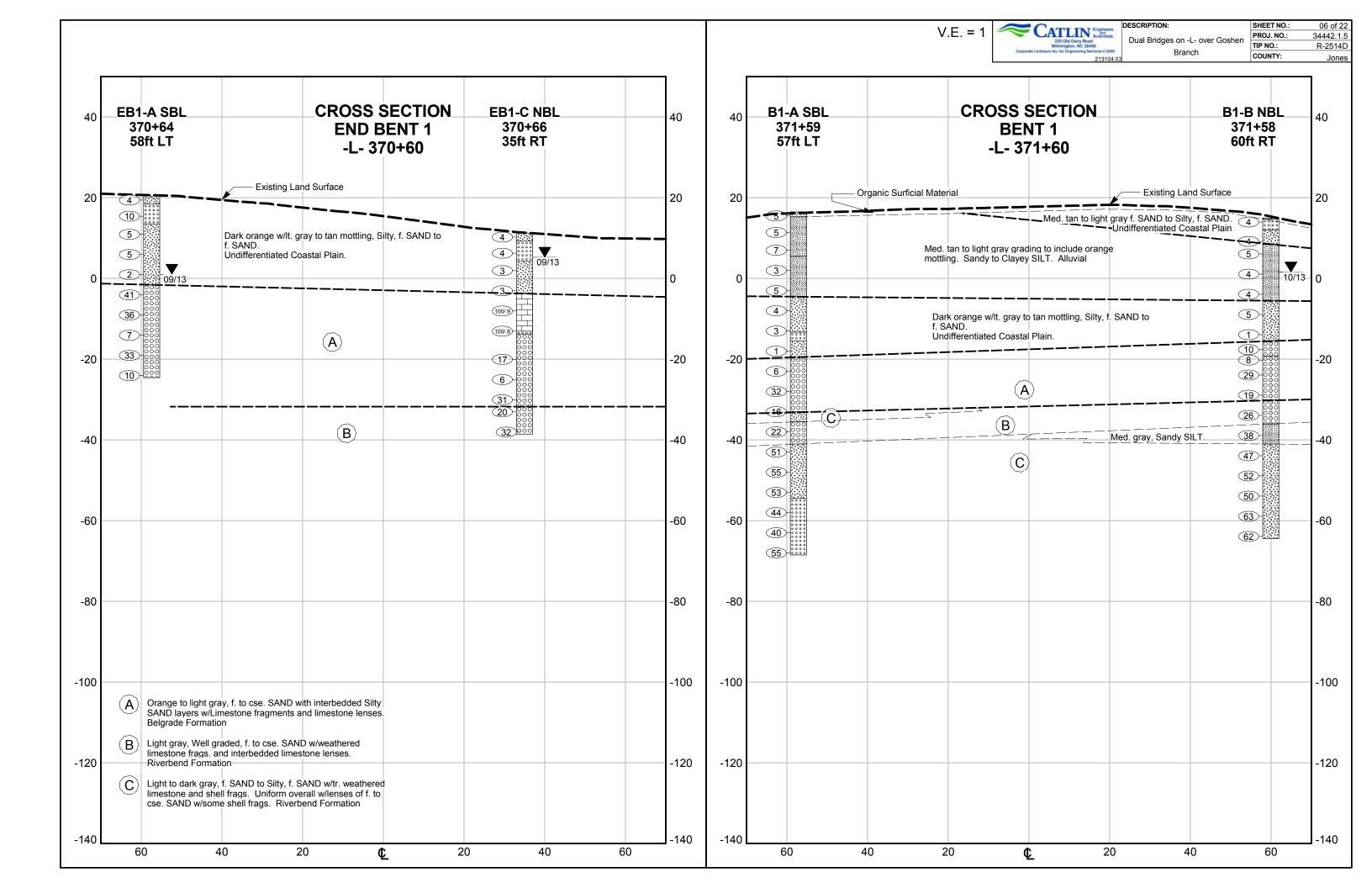
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

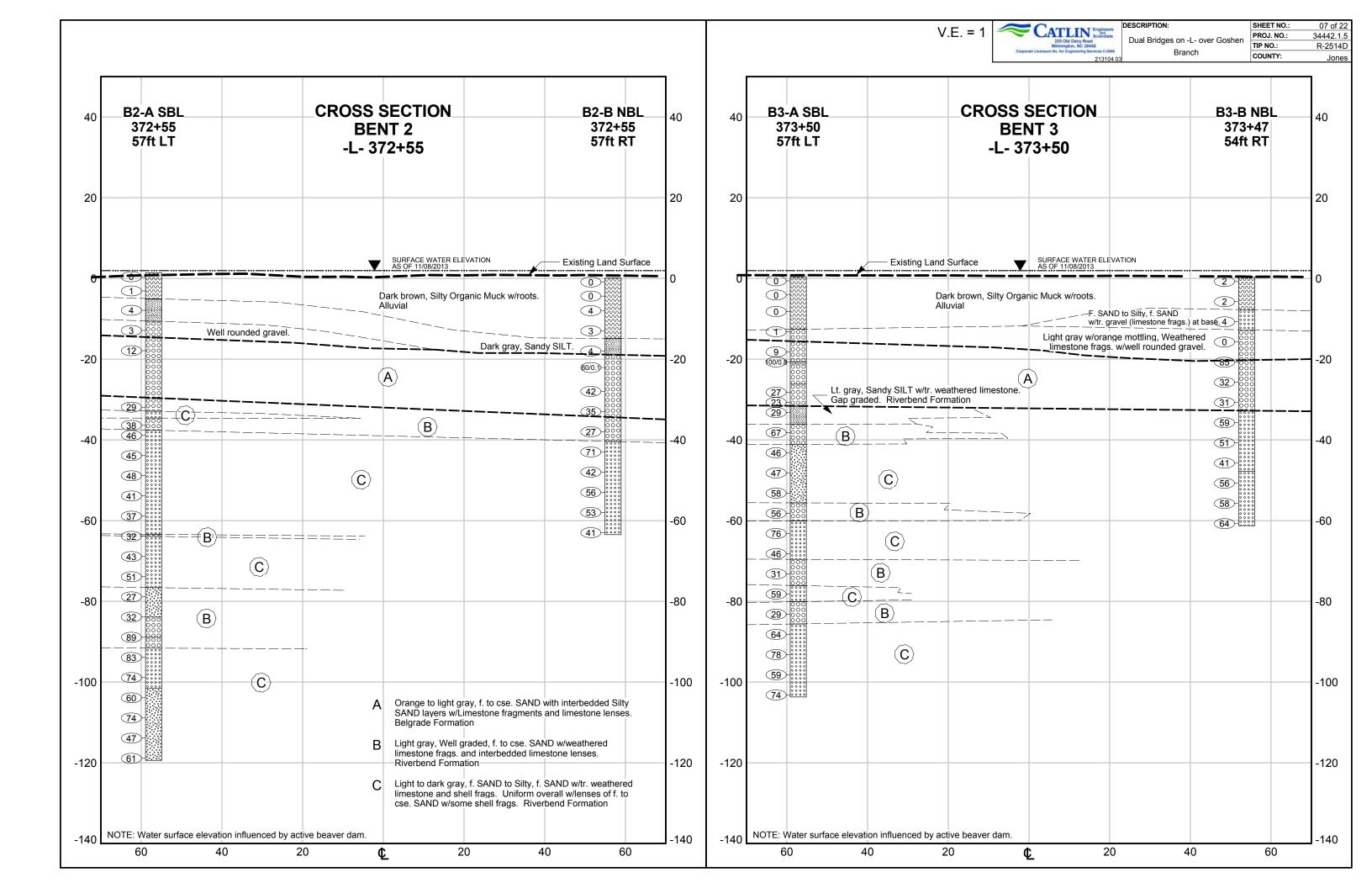
	SOIL AND ROCK LEGEND, TERMS, SY	MBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED OR WEATHERED EARTH MATERIALS WHICH CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND WHICH YIELDS LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, ASTM D-1586), SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM AND BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES. ANGULARITY OF GRAINS	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WHEN TESTED, WOULD YIELD SPT REFUSAL. 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 AS FOLLOWS:	ALLUVIUM (ALLUV.) - SOILS WHICH 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, AS
VERY STIFF, GRAY SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS ARE DESIGNATED BY THE TERMS; ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT YIELDS SPT N VALUES >100 BLOWS PER FOOT	SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL GRANULAR MATERIALS (14.35) (2.35% PASSING #200) (2.35% PASSING #200	MINERALOGICAL COMPOSITION	CRYSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IS IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND SURFACE.
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-a A-1-b A-2-4 A-2-5 A-2-6 A-2-7 A-7-5 A-3 A-6, A-7	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED.	CALCAREOUS (CALC.) - SOILS WHICH CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
SYMBOL	COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 30 MODERATELY COMPRESSIBLE LIQUID LIMIT 31 - 50	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.	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.
= 10	HIGHLY COMPRESSIBLE LIQUID LIMIT GRATER THAN 50 PERCENTAGE OF MATERIAL	WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK.
= 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 36 MX	GRANULAR SILT-CLAY ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
GROUP 0 0 0 4 MX 8 MX 12 MX 16 MX NO MX NO MX NO MX ORANIC ORGANIC ORGANIC SOILS		(V. SLI.) COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GEN. RATING AS A EXCELLENT TO GOOD FAIR TO POOR FAIR TO	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	(SLI.) 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.	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
P.I. OF A-7-5 ≤ L.L 30 : P.I. OF A-7-6 ≥ L.L 30 CONSISTENCY OR DENSENESS	GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	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.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY COMPACTNESS OR COMP	STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE OR WATER BEARING STRATA	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL SEVERE FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK (MOD. SEV.) SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S	FLOOD PLAIN (F.P.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
GENERALLY VERY LOOSE <4 LOOSE 4 TO 10	OW- SPRING OR SEEPAGE	PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. IF TESTED. WOULD YIELD SPT REFUSAL.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. HYDBAULIC DUSH, (HD.), ADVANCEMENT OF SAMPLING TOOLS LITERIZING.
GRANULAR MEDIUM DENSE 10 TO 30 N/A MATERIAL DENSE 30 TO 50 VERY DENSE >50	MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT	SEVERE (SEV.) ALL ROCKS 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	HYDRAULIC PUSH (HP) - ADVANCEMENT OF SAMPLING TOOLS UTILIZING MECHANICAL/HYDRAULIC DOWN-FORCE OF DRILLING MACHINE. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
VERY SOFT <2 <0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.50	WITH SOIL DESCRIPTION SOIL SYMBOL AUGER BORING SPT N-VALUE	ROCK USUALLY REMAIN. IF TESTED. YIELDS SPT N VALUES > 100 BPF VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1 MATERIAL STIFF 8 TO 15 1 TO 2 (COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	ARTIFICIAL FILL OTHER THAN	(V. SEV.) DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC 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 USUALLY INDICATES POOR AERATION AND LACK OF GOOD
TEXTURE OR GRAIN SIZE	MONITORING WELL	IF TESTED, YIELDS SPT N VALUES < 100 BPF COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN	DRAINAGE.
U.S STD. SIEVE SIZE 4 10 40 60 200 270 OPENING (mm) 4.76 2.0 0.42 0.25 0.075 0.053		SMALL AND SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	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.
BOULDER COBBLE GRAVEL SAND SILT CLAY (BLDR.) (COB.) (GR.) (CSE. SD.) (F. SD.) (SL.) (CL.)	ALLUVIAL SOIL BOUNDARY SLOPE INDICATOR INSTALLATION ROCK STRUCTURES	ROCK HARDNESS VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS	ROCK QUALITY DESIGNATION (R.Q.D.) - 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.
GRAIN MM 305 75 2.0 0.25 0.05 0.005 SIZE IN. 12 3	SOUNDING ROD CONE PENETROMETER TEST	REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGISTS PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	SAPROLITE (SAP.) - RESIDUAL SOIL WHICH RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
SOIL MOISTURE - CORRELATION OF TERMS	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP HARD CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGISTS PICK. HAND SPECIMENS CAN	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, WHICH HAS BEEN_EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR (ATTERBERG LIMITS) DESCRIPTION FIELD MOISTURE DESCRIPTION	AR - AUGER REFUSAL MOD - MODERATELY WEA WEATHERED BIS - BELOW LAND SURFACE NA - NOT APPLICABLE BT - BORING TERMINATED NE - NOT ENCOUNTERED	BE DETACHED BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR	ROCKS. <u>SLICKENSIDE</u> - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE	CL CLAY	HARD PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PIECES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGISTS PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPT) 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 OR LESS THAN 0.1 FOOT PER 60
LL PLASTIC RANGE (PI) - WET - SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	DPT - DYNAMIC PENETRATION TEST SAA - SAME AS ABOVE Id - DRT ONT WEIGHT e - VOID RATIO SAP SAPROLITIC F - FINE SD SAND, SANDY SAMPLE ABBREVIATIONS	FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	BLOWS.
PL - PLASTIC LIMIT - MOIST - SOLID; AT OR NEAR OPTIMUM OM - OPTIMUM MOISTURE (M) MOISTURE	DRILLING	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.	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.
SL + SHRINKAGE LIMIT - DRY - REQUIRES ADDITIONAL WATER TO	FRAGS FRAGMENTS COASTAL PLAIN RS - ROCK HI HIGHLY W - MOISTURE CONTENT RT - RECOMPACTED TRIAXIAL MED MEDIUM V - VERY CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	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.
(D) ATTAIN OPTIMUM MOISTURE PLASTICITY	MICAMICACEOUS VST-VANE SHEAR TEST RATIO EQUIPMENT USED ON SUBJECT PROJECT	TERM	TOPSOIL (T.S.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE	
NONPLASTIC 0 - 5 VERY LOW	DIEDRICH D-50 CLAY BITS G* CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	CATLIN#: 213104.03
LOW PLASTICITY	DIEDRICH D-25 8" HOLLOW AUGERS	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT,	BENCH MARK: Survey conducted using RTK with Trimble 5800 GPS and Trimble TSC2 Data Collector. Additional survey conducted using NCDOT BL-40 marker.
COLOR	TUNGCARBIDE INSERTS HAND TOOLS:	PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	BL-40 = 16.7ft. (N:464341 / E:2530426) NOTES: ADAPTED FROM NCDOT FILE "Geotechnical_English.cel" named "Lgd_1" Rev. 9/23/09
	CASING W/ADVANCER PORTABLE HOIST TRICONE 2 7/8" STEEL TEETH HAND AUGER	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BENEVALE ASILY WILLEN LIFE WITH LAWRED	Coordinate System = North Carolina State Plane 1983 Project Datum = North American Datum 1983 (Conus)
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YEL-BRN, BLUE-GRAY) MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE	AMS POWER PROBE TRICONE 2 7/8" TUNGCARBIDE SOUNDING ROD	BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.	Zone = North Carolina 3200 Geoid Model = GEOID 12 (Conus)
APPEARANCE.	OTHEROTHEROTHER	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	All Units = US Feet GPS Elevation = North American Vertical Datum 1988

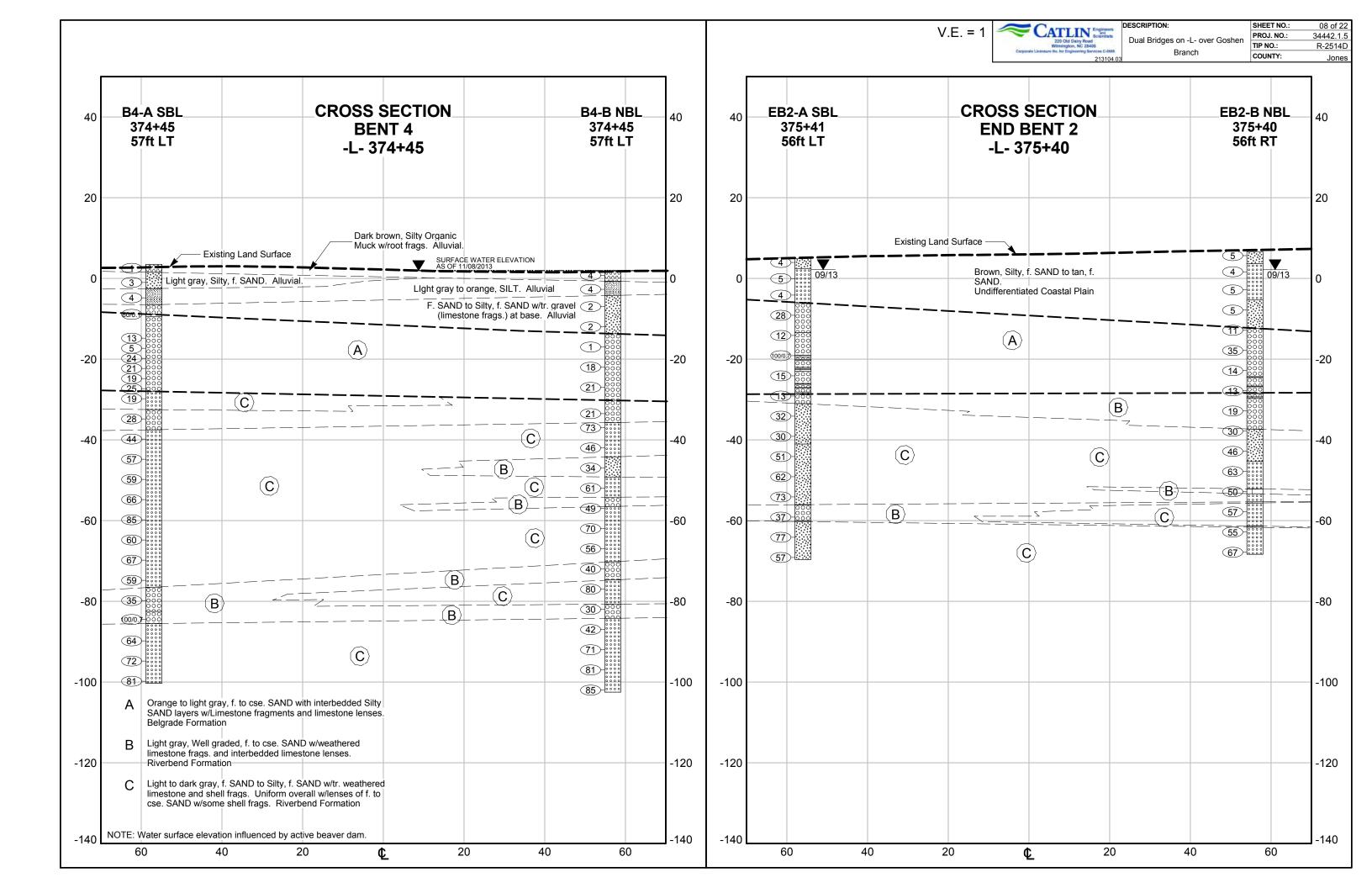








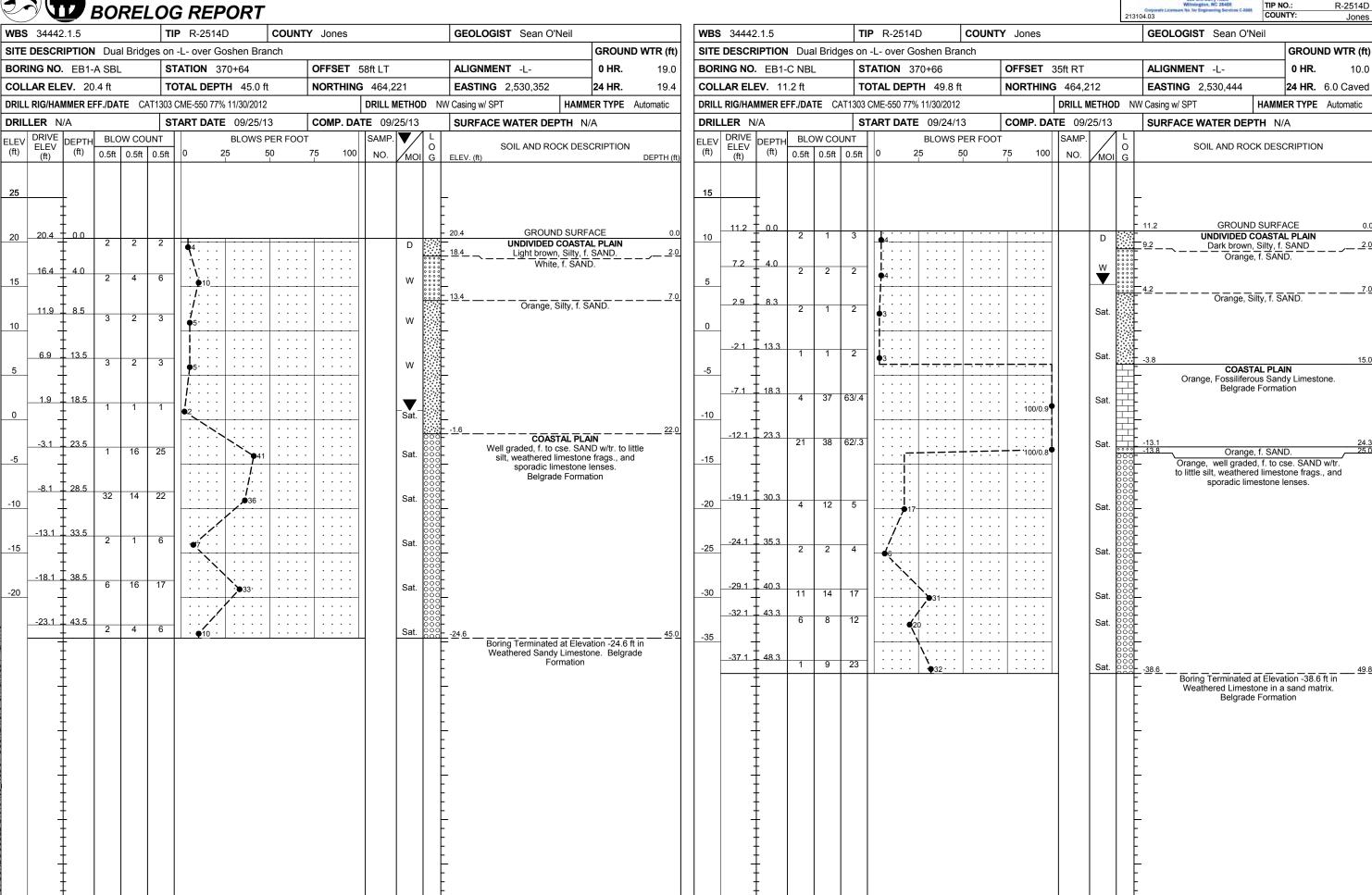








34442.1.5







	34442	2.1.5			TII	P R-2514D	COUNT	Y Jones				GEOLOGIST Chuck Branch	
SITE	DESCR	IPTION	l Dua	l Bridg	ges on	-L- over Goshen Br	anch						GROUND WTR (ft)
3OR	ING NO.	. B1-A	SBL		S1	FATION 371+59		OFFSET	57ft LT			ALIGNMENT -L-	0 HR . N/A
COL	LAR ELE	EV. 16	.5 ft		тс	OTAL DEPTH 85.0	ft	NORTHING	4 64,3	16		EASTING 2,530,364	24 HR . N/A
RILL	RIG/HAI	MMER E	FF./DA	TE CA	AT1303 (CME-550 77% 11/30/201	2	•	DRILL N	IETHOD	NW C	V Casing w/ SPT HAMM	IER TYPE Automatic
PRIL	LER N	/A			SI	TART DATE 10/04/	13	COMP. DA	TE 10/0	7/13		SURFACE WATER DEPTH N	/A
LEV	DRIVE	DEPTH	BLC	W CO	UNT	BLOWS	PER FOO	Г	SAMP.	▼/	L O	SOIL AND ROCK DES	CDIDTION
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МОІ		ELEV. (ft)	DEPTH (ft)
20													
	-	F									F		
	16.5	0.0	2	3	2	1					<u></u>	16.5 GROUND SURF	
15	_	F	-	3		\$ 5				D		15.3 ALLUVIAL Med. brown, SILT. Unit	
	12.4	4.1									F	root/org. conte	
10	-	ļ	3	2	3	♦ 5				D	#	No recovery from sample Logged from cutt	@ 8.5ft BLS.
10		† <u>, </u>				1					-	_ Logged from call	iligs.
	8.0	8.5	3	4	3					Sat.	*		
5	_	_					1					5.5 Med. gray w/orange mottlin	n Clavey SILT
	3.0	13.5						.			#	mod. gray morange mount	g, oldydy oler.
	-	Ł	1	2	1	93				Sat.	E		
0	_	F					1				F	-	
	-2.0	18.5	2	2	3					Sat.	F		
5	-	ļ	_	_		• 5· · · · · · ·				Sat.		-4.5	21.0
		† <u>-</u>				1						UNDIVIDED COASTA Med. gray w/orange mot	
	-7.0	23.5	3	2	2					Sat.		SAND. Unifor	m.
0	-	Ł				<u> F</u>					-	_	
	-12.0 _	[_ 28.5				Ţ					F		
	12.0	- 20.0	1	0	3	♦ 3 · · · · · · ·				Sat.		-13.3	29.8
5	_	ļ.								4		Red, f. SAND. Gap	32.0
	-17.0	33.5	1	0	1							Med. gray w/orange mot SAND. Unifor	tling, Silty, f. m.
	-	<u> </u>	'	U	'	1· · · · · · · · ·				Sat.		-19.5	36.0
20	_	Ė				 <u> </u>	+	 		6		COASTAL PLA Med. gray to light orange, w	NN
	-22.0	38.5	1	0	6	$ \mid I \mid I \mid \dots \mid \dots \mid$				Sat.		cse. SAND w/tr. to little si	It, weathered
25	-	F								Jai.		limestone frags. and spora lenses.	adic limestone
	07.0	43.5					1					Belgrade Forma	ition
	-27.0	43.5	11	17	15	32.				Sat.			
30	-	<u> </u>									~ ~ ~ ~ ~	_	
	-32.0	48.5				::::/ ::::		.					
	-		9	9	7	16				Sat.	000 <u></u>	-33.0 Dark gray, Silty, f. SANI	29.5 Uniform.
5_	_	F										35.5 Riverbend Forma	ation 52.0
	-37.0	53.5	13	12	10	:::\ ::::					000 -	Dark gray, well graded, f. w/tr. to little silt, weathered l	imestone frags.
10	-	‡	13	14	'0	22		.		Sat.		and sporadic limestor	ne lenses.
10	_	<u> </u>					1				000	- <u>-41.0</u>	57.5
	-42.0	58.5	17	23	28		51	.		Sat.		Dark gray, Silty, f. SAND w limestone frag	s.
5	-	F					101			Jul.	:::I	No recovery from sample	@ 58.5ft BLS.
	-47.0 -	63.5					\				::: <u> </u>	-	
	-4 /.U _	03.5	13	27	28		55			Sat.			
0	-	‡					11					-	
	-52.0 -	68.5				: : : : : : - :	<u> </u>	.					
	-		27	29	24		∮ 53· · ·	.		Sat.	::::F	545	
5	_	ļ.					<i>/</i>					-54.5 Med. gray, f. SAND w/tr. lir	71.0 mestone frags.
	-57.0 -	73.5			22	:::: ::::	/ : : : :	: : : : :					-
	07.0		15	22	ו חיים ו					Sat.			

															213		IP NO.: OUNTY:	R-25 ⁻ Jo	14D nes
WBS	34442	2.1.5			TI	P	R-2514D)	cou	TNI	/ Jones	;				GEOLOGIST Chuck Brand	h		
SITE	DESCR	IPTION	I Dua	ıl Brid	ges on	-L-	- over Go	shen Bı	anch								GROL	IND WTR	(ft)
BOR	ING NO.	B1-A	SBL		S	ΓΑΊ	TION 37	1+59			OFFSET	Г 5	7ft LT			ALIGNMENT -L-	0 HR	. 1	N/A
COL	LAR ELE	EV . 16	6.5 ft		TO)TA	AL DEPT	H 85.0	ft		NORTH					EASTING 2,530,364	24 HR	. 1	N/A
			FF./DA	TE C			IE-550 77%						DRILL N		D N	W Casing w/ SPT HA	MMER TYPE	Automat	tic
DRIL	LER N	/A				ΓAF	RT DATE				COMP.	DAT		07/13	1	SURFACE WATER DEPTH	N/A		
ELEV (ft)	ELEV	DEPTH (ft)		W CO	_	0) 25		50 PER F0			00	SAMP.		LO	SOIL AND ROCK D	ESCRIPTIO	N	
(,	(ft)	(1.1)	0.511	0.5ft	0.511	+			<u> </u>		75 1	-	NO.	/MOI	G				
								Ma	tch Line										
-60						-		IVIA		; 	T	-	 		0000	Med. gray, f. SAND w/t	. limestone	rags.	
	-62.0 <u>-</u>	_ 78.5 -	17	21	19			J •4	.	: :		:		Sat.	0000	_ (continu	ed)		
-65	-	_						\			ļ : : :	_			0000	- -			
	-67.0	83.5	20	24	31				. /	: :				Cat	0000	- -			
	-								• ▶55	• •		•	1	Sat.		 - 68.5 Boring Terminated at E uniform f. SAND. Rive 	evation -68	5 ft in	85.0
	-	-														uniform f. SAND. Rive	rbend Form	ation	
	-	-														- -			
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											213		OUNTY:	Jones
WBS	34442	.1.5			TI	P R-2514D	COUNT	Y Jones				GEOLOGIST Corey Futral		
SITE	DESCR	IPTION	Dua	l Bridg	ges on	-L- over Goshen Bra	ınch						GROUN	ID WTR (ft)
BOR	ING NO.	B1-B	NBL		S	TATION 371+58		OFFSET 6	Oft RT			ALIGNMENT -L-	0 HR.	15.6
COLI	LAR ELE	V . 15	.0 ft		TO	OTAL DEPTH 79.4 f	t	NORTHING	464,3	300		EASTING 2,530,480	24 HR.	13.4
DRILL	. RIG/HAN	MER EI	FF./DA	TE CA	AT1303	CME-550 77% 11/30/2012	2		DRILL I	ИЕТНО	D N	W Casing w/ SPT HA	MMER TYPE	Automatic
DRIL	LER N	'A			S	TART DATE 10/02/1	3	COMP. DAT	Γ E 10/	03/13		SURFACE WATER DEPTH	N/A	
ELEV	DRIVE ELEV	DEPTH	BLO	W CO	UNT	BLOWS	PER FOOT	-	SAMP.	V /	L	SOIL AND ROCK [ESCRIPTION	
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МОІ		ELEV. (ft)		DEPTH (ft)
15	15.0	0.0	2	_								15.0 GROUND SU		0.0
	15.0	- 0.0	2	2	2	•				D	0000	14.7 / UNDIVIDED COA Med. brown, f. SAN	D w/org. frags	
10	40.0	-									0000	Med. to lt. tan, f. SA	ND. Uniform	
10	10.2	4.8	2	2	2	4				М	_	Med. tan to lt. gray, Uniforr	n.	6.5
	7.1	7.9	2	_		{ : : : : : : :						Med. tan to It. gray gray orange mottling,	ading to inclu	de
5	_	-	3	3	2	♦ 5				М		orange motting,	Januy OIL1.	
	-	•				; ::: ::::						- -		
	2.1	12.9	2	2	2					M		- -		
0	-	-					 			IVI		<u> </u>		
	-2.9	17.9										• •		
-5	_	-	2	2	2	4				Sat.		- - -5.5		20.5
	-	-										Dark orange w/lt. gray to	tan mottling,	Silty,
	-7.9	22.9	3	3	2	5				Sat.		1. SAND. U	illoitti.	
-10	_	-				 [_	<u>-</u>		
	-12.9	27.9				/: : : : : : : :						-		
-15	-	-	1	0	1	1				Sat.		- - -15.5		30.5
	-16.6	31.6	7	5	5						000	Dark orange, f. SAND		
	- -19.2 -	- - 34.2	,	5)	10				Sat.	000	Well grad Belgrade Fo	rmation	34.2
-20		-	12	4	4	48	+	+		Sat.	000	 Dark orange, well grade w/tr. to little silt, weather 	ed, f. to cse. Sa	AND
	-22.9	37.9									000	and sporadic lime		. ago.
-25	-	-	6	13	16	29				Sat.	000	- -		
	-	-				:::://::::					000	<u>.</u>		
	-27.9	42.9	7	10	9	1				Sat.	0000	• •		
-30	_	-					 	 			000	30.0 Med. to dark gray, well	graded, f. to	se. 45.0
	-32.9	47.9				::::\ ::::					000	SAND w/tr. to little slimestone frags. and s	silt, weathered ooradic limest	one
-35	_	-	8	9	17	26				Sat.	000	lenses Riverbend Fo		
į	-	-				:::: `\:::					000	36.0 Med. gray, Sa		51.0
-40	-37.9	52.9	15	16	22					Sat.		• •		
-40	_	-				 	 	+						56.0
I .	-42.9	57.9	4.0	00		:::: :::\						Med. gray, Silty, f. S	AND. Uniform	1.
-45	_	-	10	20	27	•	47			Sat.	-	- -		
		- 					<u>\</u> : : : :					<u>.</u>		
	-47.9	62.9	15	25	27		52			Sat.	_	• -		
-45 -50	_	-										_ -		
	-52.9	67.9	4-				: : : :					• •		
-55	_	-	15	21	29		50			Sat.	-	- -		
		- 					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \				_	- -		
-60	-57.9	72.9	20	30	33		. \			Sat.	_	• -		
-60	-	-						 				<u>-</u> -		
	-62.9	77.9		00			: : : :					·	-1 ,	
	-	-	17	26	36		- ∳62 -			Sat.		Boring Terminated at I Silty, f. SAND. Rive		





BOREL BOREL	OG REPORT			213104.03 COUNTY: Jones
WBS 34442.1.5	TIP R-2514D COUNTY Jones	GEOLOGIST Corey Futral	WBS 34442.1.5 TIP R-2514D COUNTY	Y Jones GEOLOGIST Corey Futral
SITE DESCRIPTION Dual Bridge	es on -L- over Goshen Branch	GROUND WTR (ft)	SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch	GROUND WTR (ft)
BORING NO. B2-A SBL	STATION 372+55 OFFSET 57ft LT	ALIGNMENT -L- 0 HR. +0.6	BORING NO. B2-A SBL STATION 372+55	OFFSET 57ft LT ALIGNMENT -L- 0 HR. +0.6
COLLAR ELEV. 1.4 ft	TOTAL DEPTH 120.8 ft NORTHING 464,411	EASTING 2,530,376 24 HR. FIAD	COLLAR ELEV. 1.4 ft TOTAL DEPTH 120.8 ft	NORTHING 464,411 EASTING 2,530,376 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE MAI	D5152 D-25 75% 05/25/2012 DRILL METHOD N	W Casing W/SPT & Core HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012	DRILL METHOD NW Casing W/SPT & Core HAMMER TYPE Automatic
DRILLER N/A	START DATE 10/29/13 COMP. DATE 10/30/13	SURFACE WATER DEPTH 0.4ft		COMP. DATE 10/30/13 SURFACE WATER DEPTH 0.4ft
ELEV (ft) DRIVE ELEV (ft) DEPTH BLOW COUL		SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	ELEV FLEV DEL III	75 100 NO. MOI G SOIL AND ROCK DESCRIPTION
ELEV (ff) DEPTH (ff) O.5ft O.5ft	NT BLOWS PER FOOT 0.5ft 0 25 50 75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft) 1.4 WATER BOTTOM 0.0 ALLUVIAL Dark brown, Silty Organic Muck w/root frags. No return in 3.5ft. sample. -5.1 Dark gray, Sandy SILT. -10.6 Dark gray, SAND w/well rounded gravel (0.01 to 0.02ft.) and silt. Limited recovery. -14.6 COASTAL PLAIN Light brown tan w/light gray, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags., and sporadic limestone lenses. Belgrade Formation -23.4 29.8 -29.6 Light gray, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags. and sporadic limestone frags. and sporadic limestone frags. and sporadic limestone frags. 31.0 Light gray, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags. and sporadic limestone lenses. 34.3 Riverbend Formation Light gray, f. SAND. Uniform. Light gray, f. SAND. Uniform. Light gray, f. SAND. Uniform. Light gray, f. SAND. WWeathered	ELEV (ft) DEPTH (ft) DEPTH (ft) 0.5ft 0.5ft	SAMP. L SOIL AND ROCK DESCRIPTION
-52.9 54.3 11 18 2 2 55.5 50.5 50.5 50.5 50.5 50.5 50.5		- - - - - - -		
-62.9 64.3 14 15 15 169.3 13 21 18 18 18 18 18 18 18 18 18 18 18 18 18	32	63.4 64.8 -63.9 Weathered Limestone. 65.3 - Light gray, f. SAND. Uniform.		
72.9 74.3 17 23	28			[

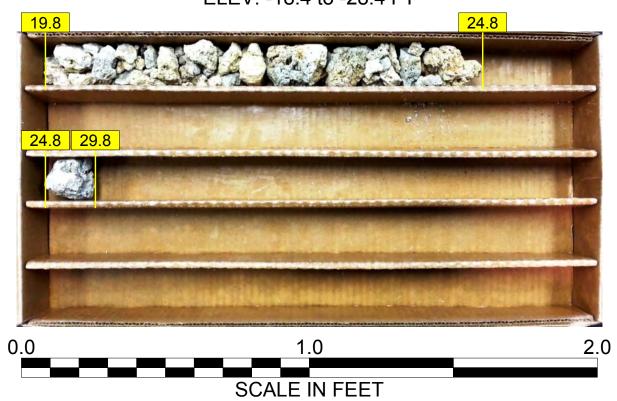


WBS	34442	2.1.5			TIP	R-251	I4D	С	OUNT	Y J	ones				GEOLOG	IST Core	ey Futra	al		
SITE	DESCR	IPTION	I Dua	al Bridges	on -L	over	Goshen E	3rancl	า										GROUN	ID WTR (f
BOR	NG NO.	B2-A	SBL		STA	ΓΙΟΝ	372+55			OFI	SET	57ft LT			ALIGNME	NT -L-			0 HR.	6.
COLI	AR ELE	EV. 1.	4 ft		тот	AL DE	PTH 120).8 ft		NO	RTHING	G 464,4	411		EASTING	2,530,3	76		24 HR.	FIAI
DRILL	RIG/HAI	MER E	FF./DA	TE MAD5	152 D-2	25 75%	05/25/2012					DRILL I	METHOD	NW	Casing W/SF	PT & Core	Н	IAMME	R TYPE	Automatic
DRIL	LER N	/A			STAI	RT DA	TE 10/2	9/13		СО	MP. DA	TE 10/	/30/13		SURFACE	WATER	DEPT	H 0.4	·ft	
COR	E SIZE	NQ			TOTA	AL RU	N 10.0 ft	t						-						
ELEV	RUN ELEV	DEPTH	RUN	DRILL	REC.	JN ROD	SAMP.	STR	RATA	L					CODIDTION	LAND DEA	44 DICC			
(ft)	(ft)	(ft)	(ft)	RATE (Min/ft)	(ft) %	(ft) %	NO.	(ft) %	(ft) %	G	ELEV.	(ft)		DE	SCRIPTION	N AND REI	MARKS			DEPTH
-18.4															Begin Cor	ing @ 19.	.8 ft			
-20	-18.4 _ - - -	-	5.0	00:38/1.0 00:15/1.0 00:26/1.0 00:30/1.0	(1.6) 32%	N/A		(1.6) 32%	N/A	000 000 000 000	-18.4 -	Tan to	o brown gi	ray, S of fri	andy, Weatl able materia	hered Lime ıl. Vuggy a	stone. ⁻ nd sli. fo	Thin (< oss.	0.2ft.) ler	ises 19
-25	-23.4 - -	- 24.8 -	5.0	00:30/1.0 00:11/1.0 01:14/1.0 00:30/1.0 00:25/1.0	I (0 1)	N/A		(0.1) 2%	N/A	000	-23.4 -	L	ight gray,	f. Sar	ndy Limesto	ne lens. Sl	i. foss.	Well in	durated.	24
20	-28.4	29.8		00:25/1.0 00:20/1.0 02:49/1.0						0000	-28.4									29
-30	<u> </u>	- - -								-	-									
-35	- -	-								-	· -									
-40	-	-								-	-									
	- - -	-								-										
-45	_ - -	_ - -								-	-									
-50	- - -	-								-	· · -									
-55	- - -	-																		
	- -	-								-	-									
-60	_ _ _	-								-	• - •									
-65	- -	-								-	-									
-70	- - -	-								-										
-70	-									-	-									
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-85		- - -								=	-									
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NICHOT CODE DOLIDI E 242404 02 NICHOT COCHENI CHI CATI INI CHT. 44/45/42

B2-A SBLBOX 1 of 1 ELEV. -18.4 to -28.4 FT







WIRD 3442.15 TIP R.25140 COUNTY Jones GEOLOGIST Corey Futural STREET COUNTY (Try) CO												213	Corporate Licensure No. for Engineering Services C-888 104.03	COUN		Jones
BORING NO. B2-B NBL STATION 372-55 OFFSET 57ft RT ALIGNMENT -L DATE DATE ALIGNMENT SECONDARY DATE DAT	WBS	34442	2.1.5			TI	P R-2514D	COUNT	Y Jones				GEOLOGIST Corey Fo	utral		
COLLAR ELEV. 0.3 nl	SITE	DESCR	IPTION	I Dua	l Brid	ges on	-L- over Goshen Bra	ınch					•		GROUN	ID WTR (ft)
DRILLE RIGHAMMER EFF_DATE MADE 10/24/13 COMP_DATE 10/25/13 SURFACE WATER DEPTH 1.4R	BOR	ING NO.	B2-B	NBL		S	FATION 372+55		OFFSET	57ft RT			ALIGNMENT -L-		0 HR.	1.6
DRILLER N/A DRIVE	COLI	LAR ELE	EV. 0.	3 ft		TO	OTAL DEPTH 63.61	ť	NORTHING	4 64,3	397		EASTING 2,530,489		24 HR.	FIAD
BLOW Depth BLOW COUNT BLOW COUNT BLOW SPER FOOT SAMP	DRILL	. RIG/HAI	MER E	FF./DA	TE M	AD5152	D-25 75% 05/25/2012			DRILL I	ИЕТНО	D N	W Casing w/ SPT	HAMM	ER TYPE	Automatic
	DRIL	LER N	/A			S	TART DATE 10/24/	3	COMP. DA	TE 10/	25/13		SURFACE WATER DEF	PTH 1.4	4ft	
8	ELEV	DRIVE FI FV		-		UNT				SAMP.	lacksquare		SOIL AND RO	CK DESC	CRIPTION	
0 0.3 0.0 WOH WOH WOH WOH ON THE STATE OF TH	(π)		(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	MOI	Ğ	ELEV. (ft)			DEPTH (ft)
0 0.3 0.0 WOH WOH WOH WOH ON THE STATE OF TH																
3.2 3.5 WOH WOH WOH WOH STATE OF STATE	5		_										_			
3.2 3.5 WOH WOH WOH WOH STATE OF STATE		-	-										-			
32 3.5 WOH WOH WOH WOH OF State of Stat	0	0.3	- 0.0												OM	0.0
32		-	_	WOH	WOH	WOH	0				Cot	*****	Dark brown,	Silty, Ord	g. Muck.	
5		-3.2	- 3.5	WOH	WOH	WOH						\$	No recovery on Logged f	additiona rom cutti	al samples ngs.	i.
Sat. 11.8	-5	-					1 0		+ : : : : :		Sal.	****	<u>-</u> -			
11.8 12.1 3 1 2 4 3 1 2 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		-6.8	7.1	WOH	3	1	4				Sat.	****	- -			
16.8 17.1 2 3 1 2 3 1 2 3 1 3 1 2 3 3 1 3 1 2 3 3 1 3 1	-10	_										****	- - -			
15		-11.8	12.1									****	<u>.</u>			
16.8 17.1 2 3 1 4 2 3 1 4 2 3 4 4 2 4 2 4 3 4 4 2 4 4 5 4 5 5 1 1 6 11 4 2 4 4 5 5 5 1 1 1 1 1 1 2 3 4 5 5 1 1 1 1 1 1 1 1		-	_	3	'	2	•3 · · · · · · · · ·				Sat.	****	- - 147			15.0
22 3 1 4 4 190	-15	40.0	- 47.4				1						Med. gray to med	. brown,	Clayey SII	LT 13.0
20		-16.8	1/.1 -	2	3	1					Sat.		- - ₋ 18 7			19.0
21.8 22 1 60/.1 60	-20	-	_				`	+	7			000	COAS			
25		-21.8	22.1	60/ 1						,	Sat.	0000	SAND w/tr. to	ittle silt, v	weathered	
26.8 27.1 11 12 30 442 Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	25	-	-	007.1					ا نا نا نا نا نا نا			0000	lenses (0.1	1 - 0.2ft tl	hick)	one
-30	-25	26.0	- 27 1					J./.				0000	Beigrad -	e Formai	lion	
-31.8 32.1		-20.6	- 21.1 -	11	12	30					Sat.	000	• •			
Sat. Sat. Sat. Sat. Sat. Sat. Sat. Sat.	-30	-	_									000	- -			
		-31.8	32.1	5	11	24	: : : : : :/: : : :/: :				Sat	000	- -			
-36.8 37.1 11 16 11	-35	-	-								Jat.	000		d f to or		34.5
-40 -41.8		-36.8	37.1				<i>j</i>					000	 to little silt, weather 	ed limest	one frags.	
-41 8		-		11	16	11	•27				Sat.	000				
-45	-40	_	Ī.									000	40.2 Med_gray_f	SAND	Uniform -	40.5
-50		-41.8	42.1	28	34	37			71		Sat.	0000	- -	0, 12.	•	
-50	-45	-	_					/.				0000	- -			
-50	3	-46.8	47.1	16	10	24		/·····				0000	<u>-</u> -			
-51.8	5	-	_	10	10	24	42	2			Sat.	0000	<u>.</u>			
-55	-50	-	- 50.4					<u> </u>				0000	- -			
-60 -56.8 57.1		-31.0	- 32.T -	17	30	26		56			Sat.	0000	<u>-</u>			
-60	-55	-	-					<u> </u>				0000	- -			
-60 -618 -62.1 -618 -62.1 -618 -63.3 -63.3 -63.3 -63.3 -63.3 ft in f.		-56.8	57.1	14	24	29					Sat	0000	- -			
-61.8 62.1 18 11 30 Sat Sat	-60	-	-					P 53			Sal.	0000	- -			
18 11 30		-61 8 ⁻	621				/					0000	- -			
SAND. Riverbend Formation		-		18	11	30	41	: : : :		4	Sat.	0000		ot Elo: := "	ion 62.0.1	63.6
		-	_										- Boring Terminated - SAND. Rive	at ⊑ievat rbend Fo	ormation	LINT.
		-	[- - -			
			<u> </u>										<u>-</u>			
			<u>-</u>										<u>-</u> -			
		-	-										- -			





WBS	34442.1.5			TII	P R-2514D	COUNT	Y Jones				GEOLOGIST Corey Futral		WB	34442	2.1.5			
SITE	DESCRIPTION	ON Du	al Brid	ges on	-L- over Goshen Bra	anch						GROUND WTR (ft)	SITE	DESCF	RIPTION	I Dua	ıl Bridç	jes
BOR	ING NO. B3	-A SBL		ST	ATION 373+50		OFFSET 5	57ft LT			ALIGNMENT -L-	0 HR. +0.5	BOF	RING NO	. B3-A	SBL		
COLI	LAR ELEV.	0.4 ft		TC	TAL DEPTH 104.1	ft	NORTHING	464,50	05		EASTING 2,530,387	24 HR . FIAD	COL	LAR EL	EV. 0.4	4 ft		
DRILL	. RIG/HAMMER	R EFF./D/	ATE M	1AD5152	D-25 75% 05/25/2012			DRILL M	ETHO) N	W Casing W/SPT & Core HA	MMER TYPE Automatic	DRIL	L RIG/HA	MMER E	FF./DA	TE M	AD51
DRIL	LER N/A			ST	ART DATE 10/30/	13	COMP. DA	TE 10/3	31/13		SURFACE WATER DEPTH	4.6ft	DRII	LLER N	I/A			
ELEV (ft)	DRIVE ELEV (ft) (ft	'''ႃ——	OW CO			PER FOOT 50	75 100	SAMP. NO.	MOI	L 0 G	SOIL AND ROCK D	ESCRIPTION DEPTH (f	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	
5										-	_ - -		-75	-77.2	 77.6			
0	0.4 + 0.0	WOF	H WOH	WOH	0				Sat.	***	- - 0.4 WATER BO' - ALLUVI		-80	-	+	14	25	34
	-3.1 3.5	5 WOH	H WOH	WOH					Sat.	*******	Dark brown, Silty Organi No recovery throu			-82.2	82.6	16	12	17
-5	-7.2 7.6	S WOH	1 WOH	WOH					Sat.	*******	- - -		-85	-87.2	87.6	10	28	36
-10	-12.2 + 12.								oat.	} }} }}	- - -		-90	-92.2	92.6			
-15	- 12.2 - 12. - -	WOF	1 1	0	11				Sat.	\$00000 00000	12.6 No recovery. Well rour 03ft.) noted in	cuttings.	-95	-92.2	+ 92.0 - -	17	32	46
-20	-17.2 - 17. -19.7 - 20.	1 2	3	6					Sat.	00000	COASTAL F Light gray, well graded w/tr. to little silt, weath frags., and sporadic lir	, f. to cse. SAND nered limestone	-100	-97.2	97.6	17	27	32
	+	23	17	83/.3		1/1	100/0.8		Sat.		-20.7 Belgrade For Limestone I Light gray, well graded	mation 21. ense. , f. to cse. SAND		-102.2	102.6	19	32	42
-25	<u>+</u> -27.2 + 27.	6 4	7	20					0.1	0000	w/tr. to little silt, weath frags., and sporadic lir			-	-			
-30	-29.7 30. -32.2 32.	1 7	9	14					Sat.	0000	- - - - <u>-31.6</u>	32.1		-	Ī 			
-35		12	14	15	29				Sat.		Light gray, Sandy SILT Ilmeston Riverbend Fo -36.1	e.		-	 - -			
-40	-37.2 - 37.	15	31	36			7		Sat.	0000	Light gray, Weather Inferred from cuttings di shoe during samp	ue to loss of drive lle retrieval.						
-45	-42.2 + 42.	6 14	19	27		46			Sat.		41.1 Med. to dark gray, S - -	Silty, f. SAND.			† 			
	-47.2 47.	6 20	30	17		47			Sat.		- 45.6 Light gray, f. SAND w/tr. limestone frags. (silt and weathered Gap graded.						
-50 -55 -60	-52.2 <u>52.</u>	6 30	28	30		58.			Sat.		<u>-50.6</u> Light gray, f. SAND w/ -	tr. silt. Uniform.	<u>) </u>	-	 			
-55	-57.2 57.	6 11	23	33		1			Sat.	000	- -55.6 Light to med. gray, f. to weathered limestone and Gap grad	d some shell frags.	<u> </u>	-				
-60	-62.2 - 62.	6 13	30	46		2000				000	60.1 Med. gray, f. SAND w frags. Unif	/little to no shell	<u>i</u>	- -	<u>+</u> - - -			
	-67.2 - 67.	6					76		Sat.	000000000000000000000000000000000000000	- - - -			-				
-70 -75	‡ ‡	13	20	26		46			Sat.	000	69.6 Light gray, f. to cse. SA limestone frags. (ND w/weathered		-	<u> </u>			
-75	<u>-72.2 </u>	35	11	20	31				Sat.		-				‡			

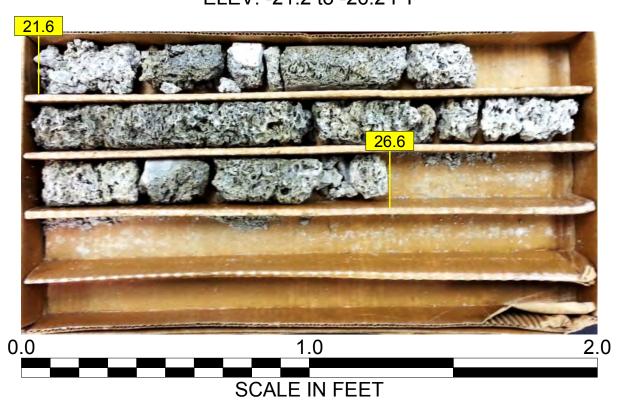
												2131	Corporate Licensure No. for Engineering Services C-088 04.03	COU		Jones
WBS	34442	.1.5			TII	P R-251	4D	COUNT	Y Jones				GEOLOGIST Corey Fo	utral		
SITE	DESCR	IPTION	l Dua	l Bridg	ges on	-L- over (Goshen Bra	anch					•		GROUN	ND WTR (ft)
BOR	ING NO.	В3-А	SBL		ST	ATION	373+50		OFFSET	57ft LT			ALIGNMENT -L-		0 HR.	+0.5
COLI	LAR ELE	EV. 0.4	4 ft		TC	TAL DEF	PTH 104.1	ft	NORTHING	3 464,	505		EASTING 2,530,387		24 HR.	FIAD
DRILL	. RIG/HAN	MER E	FF./DA	TE M	AD5152	D-25 75% 0	5/25/2012		•	DRILL	METHO	D N	V Casing W/SPT & Core	HAMM	ER TYPE	Automatic
DRIL	LER N	/A			ST	ART DAT	TE 10/30/1	13	COMP. DA	TE 10	/31/13		SURFACE WATER DEF	PTH 4.	6ft	
ELEV	DRIVE ELEV	DEPTH	BLO	w co				PER FOO		SAMF	· /	L	SOIL AND RO	CK DES	CRIPTION	J
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI		001271112710			`
-75						-	Mato	h Line		+		000	-76.1			76.5
	-77.2	- 77.6	14	25	34			`			Sat.		Med. gray, f.	SAND.	Uniform.	
-80	-	-						: 59			Sat.	0000	80.1			80.5
	-82.2 -	- - 82.6						1				000	Light gray, well gr w/tr. to little silt, wea	aded, f.	to cse. SA	ND — —
	-02.2 -	- 02.0	16	12	17	: : :	29				Sat.	000	and sporadic	limestor	e lenses.	nago.
-85	_	-						+				000	85.6			86.0
	-87.2 -	- - 87.6	10	28	36			: 1			0-4	0000	Light gray, f.	SAND.	Uniform.	
-90	-	-	10	20				64			Sat.	0000				
	-92.2 -	- - - 92.6										0000	_			
	-92.2 -	- 92.0	17	32	46				78		Sat.	0000				
-95	-	-						· · · · ·				0000	_			
	-97.2 -	- - 97.6	17	27	32			/.				0000				
-100	-	-	17	"	32			59			Sat.	0000				
	400.0	-										0000	-			
	-102.2 -	- 102.6 -	19	32	42				74		Sat.	0000	-103.7			104.1
	-	-											Boring Terminated f. SAND. Riv	at Eleva erbend F	tion -103.7 ormation	7 ft in
	-	-														
	-	- -														
	-	<u>-</u> -											-			
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WBS	3444	2.1.5			TIP	R-25	14D	С	OUNT	Y Jo	ones						GEOLOG	IST	Core	ey Fu	ıtral			
SITE	DESCI	RIPTIO	N Di	ual Bridge	s on -L	- over	Goshen I	Branc	h													GROL	IND W	TR (ft
BOR	ING NO	. B3-	A SBL	-	STA	TION	373+50			OF	SET	57ft	LT				ALIGNME	ENT	-L-			0 HR		5.8
COL	LAR EL	EV.	.4 ft		тот	AL DE	PTH 10	4.1 ft		NO	RTHING	G 4	64,5	05			EASTING	2,	530,3	87		24 HR	i	FIAD
DRILI	RIG/HA	MMER	EFF./D	ATE MAI)5152 D-	25 75%	05/25/2012					DR	RILL N	METHO	D N	W C	Casing W/SF	PT & (Core		HAMN	IER TYPI	Autor	matic
DRIL	LER N	I/A			STA	RT DA	TE 10/3	0/13		CO	MP. DA	ΙΈ	10/3	31/13			SURFAC	E WA	ATER	DEP	TH 4	.6ft		
COR	E SIZE	NQ		_			N 5.0 ft	LOTE	24.74															
ELEV (ft)	RUN ELEV (ft)	DEPT (ft)	H RUI (ft)			UN RQD (ft) %	SAMP. NO.	REC. (ft)	RATA RQD (ft) %	L O G	ELEV. ((ft)			l	DES	SCRIPTION	N AN	D REM	ИARK	S		DE	EPTH (f
-21.2	-21.2	21.6	5.0	1:03/1/) (4.6)	N/A		(4.6)	N/A	000	21.2	Gr	ray br	own E	Foce I	Lim	Begin Cor estone. Vu	ing (@ 21.	.6 ft	rated w	/numorou	e cand	21.
-25	_	26.6		1:03/1.0 5:00/1.0 0:20/1.0 0:23/1.0 1:32/1.0) (4.6) 92%)	IN/A		(4.6) 92%	IN/A	000		Gi	ay Di	Owii, i	055. 1		lenses.	High	poros	sity.	ateu w	mameroc	s saliu	26.
-30	-	† - - -								- - -	· - - ·													
-35	-	† - -								-	• • - •													
-40	-	<u> </u>								- - -	· - - ·													
-45	-									-	· - - ·													
-50	-	 								-	· - - ·													
-55	-	 								-	· - - ·													
-60	-									-	· ·													
-65	-									-	· - ·													
-70	-	 								-	· - ·													
-75	-	I - -								- - -	· - ·													
-75 -80 -85 -90	-	 - -								- - -	· - ·													
-85	-	I - -								-	- - -													
-90	-	<u> </u>								- - -	· - ·													
-95	-	† - -								-	· · - ·													
-100		‡								-	-													



B3-A SBL BOX 1 of 1 ELEV. -21.2 to -26.2 FT

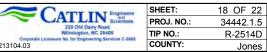




CATT TAT Engineers	SHEET:	17 OF 22
ATT and Scientists	PROJ. NO.:	34442.1.5
Wilmington, NC 28405 Corporate Licensure No. for Engineering Services C-0885	TIP NO.:	R-2514D
213104.03	COUNTY:	Jones

											2131	Corporate Licensure No. for Engineering Services C-888 104.03	COUNTY:	Jones
WBS	34442	2.1.5			TI	P R-2514D	COUNT	Y Jones				GEOLOGIST Corey Fu	ıtral	
SITE	DESCR	RIPTION	I Dua	al Brido	ges on	-L- over Goshen Bra	anch						GROUN	ID WTR (ft)
BOR	ING NO	. B3-B	NBL		S	TATION 373+47		OFFSET	54ft RT			ALIGNMENT -L-	0 HR.	1.7
COL	LAR EL	EV. 0.	5 ft		т	OTAL DEPTH 61.5	ft	NORTHING	4 64,4	89		EASTING 2,530,497	24 HR.	FIAD
DRIL	L RIG/HAI	MMER E	FF./DA	TE M	AD5152	D-25 75% 05/25/2012			DRILL N	ЛЕТНО	D N\	N Casing w/ SPT	HAMMER TYPE	Automatic
DRIL	LER N	I/A			S	TART DATE 10/24/	13	COMP. DA	TE 10/	24/13		SURFACE WATER DEF	PTH 1.9ft	
ELEV	DRIVE	DEPTH	BLC	ow co	UNT	BLOWS	PER FOO	·	SAMP.	V /	LO	SOIL AND BOX	CK DESCRIPTION	1
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50	75 100	NO.	МОІ		ELEV. (ft)	OR DESCRIPTION	DEPTH (ff
5		<u> </u>										_		
		‡												
0	0.5	0.0										· 0.5 WATEF	R BOTTOM	0.
U	-	+	1	1	1	•2				Sat.	****	Dark brown, Silty	LUVIAL Organic Muck w/wo	ood
	:	‡				::::: :::::					****		ery from 5ft. sample	
-5	-4.5	5.0	1	1	1					Sat.	****	-		
	:	‡								Juli	****	·7.5		8.
-10	-9.5 ·	10.0									0000	Light gray, f.	SAND. Uniform.	
10	-	‡	2	1	3	9 .4				Sat.	0000	-		
		‡									000	· -12.5Light gray w/orange	e mottling, well gra	ded, 13.
-15	-14.5	15.0	1	0	0					Sat.	0000	f. to cse. SAND w/tr limestone frags., a	nd sporadic limest	one
	:	‡									000	lenses. Well round	ed gravel (0.1 to 0.	3 ft).
-20	-19.5	20.0				1/2					000	· · -20.0		20.
	1 -	† †	4	7	78			85		Sat.	000	COAST	TAL PLAIN orange mottling, we	
	:	‡									000	22.5 Light gray w/tr. c graded, f. to cse. S weathered limestor	SAND w/tr. to little	silt,
-25	-24.5	25.0	40	20	12	●32				Sat.	000	 limestone lenses. 	Grades to light grades Formation	
	:	Ŧ									000	. Deigradi	e Formation	
-30	-29.5	30.0	7	15	16	:::: ; :::					000	•		
] -	Ŧ	'	15	16					Sat.	000			20.4
		1									000		gray, f. SAND w/tr.	33.
-35	-34.5	35.0	5	22	37		59			Sat.	0000	weathered limestor Riverber	ne trags. Gap grad id Formation	iea.
		ł					17:::				0000			
-40	-39.5	40.0	13	21	30		/			0-1	0000	_		
	:	1	10	-			9 51			Sat.	0000			
	-44.5 ·	45.0				:::: ::::/	'				0000			
-45		+3.0	10	20	21	4:				Sat.	0000	_		
	:	‡				: : : : : : : }					0000	-47.5	SAND. Uniform.	48.0
-50	-49.5	50.0	15	28	28		<u> </u>			Sat.	0000		Orange. Crimonni.	
	:	‡					. 56			Jai.	0000			
	-54.5 ·	55.0					1 .1				0000	·		
-55	-	+	19	26	32		58			Sat.	0000	_		
	:	‡					:/:::				0000			
-60	-59.5	60.0	18	31	33		/.			Sat.	0000	- - _{61.0}		61.1
		‡					●64		1	Jul.		-61.0 Boring Terminated		61.5 t in f.
	:	‡										SAND. Rive	rbend Formation	
-45 -50 -55 -60	-	‡										_		
	:	‡												
	-	‡										-		
		‡												
	:	‡												





W BORELO	OG REPORT					Corporale Licensure to for Engineering Services C-3888 213104.03 Fig. 10 COUNTY: Jones
WBS 34442.1.5	TIP R-2514D COUN	TY Jones	GEOLOGIST Corey Futral	WBS 34442.1.5 TIP R-2514D COU	JNTY Jones	GEOLOGIST Corey Futral
SITE DESCRIPTION Dual Bridges	s on -L- over Goshen Branch		GROUND WTR (ft)	SITE DESCRIPTION Dual Bridges on -L- over Goshen Branch		GROUND WTR (ft)
BORING NO. B4-A SBL	STATION 374+45	OFFSET 57ft LT	ALIGNMENT -L- 0 HR. 3.6	BORING NO. B4-A SBL STATION 374+45	OFFSET 57ft LT	ALIGNMENT -L- 0 HR. 3.6
COLLAR ELEV. 3.5 ft	TOTAL DEPTH 103.8 ft	NORTHING 464,599	EASTING 2,530,398 24 HR. FIAD	COLLAR ELEV. 3.5 ft TOTAL DEPTH 103.8 ft	NORTHING 464,599	EASTING 2,530,398 24 HR. FIAD
DRILL RIG/HAMMER EFF./DATE MAD	5152 D-25 75% 05/25/2012	DRILL METHOD N	N Casing w/ SPT HAMMER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE MAD5152 D-25 75% 05/25/2012	DRILL METHOD	NW Casing w/ SPT HAMMER TYPE Automatic
DRILLER N/A	START DATE 10/31/13	COMP. DATE 11/01/13	SURFACE WATER DEPTH N/A	DRILLER N/A START DATE 10/31/13	COMP. DATE 11/01/13	SURFACE WATER DEPTH N/A
ELEV CHIP CHIP CHIP CHIP CHIP CHIP CHIP CHIP		75 100 110 / 0	SOIL AND ROCK DESCRIPTION ELEV. (ft) DEPTH (ft)	DRIVE DEPTH BLOW COUNT BLOWS PER F	OOT SAMP. 75 100 NO. MOI	C SOIL AND ROCK DESCRIPTION G
5			- 3.5 GROUND SURFACE 0.0	-75 Match Line		000
3.5 + 0.0 WOH WOH	1 1::::::::::::::::::::::::::::::::::::		ALLUVIAL 1 1 Dark brown to dark gray, Silty Organic 2 5	78.8 82.3		Light gray, well graded, f. to cse. SAND w/tr. to little silt, weathered limestone frags.
0 0.0 3.5 1 2	1		Med. gray, Shry, f. SAND.	8 17 18	Sat. 0	and sporadic limestone lenses.
-3.8 7.3 WOH WOH	4		Dark orange, SILT.	-83.8 + 87.3	100/0.7• Sat.	100 00 00 00 00
						89. Med. gray, f. SAND. Uniform.
-10 -8.8 12.3 60/.1		Sat.	-8.9	90	64 Sat.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
-13.8 17.3 2 6	7		limestone lenses. Limited recovery on samples from upper portion of stratum. Assumed indurated limestone lense.	-93.8 97.3 16 30 42	Sat.	000 000 000 000 000 000
-16.3 + 19.8	3 6		Belgrade Formation		\	000 - 000 -
-20 -18.8 T 22.3 8 10 -21.3 + 24.8	14	Sat. 0000	-	-100 -98.8 102.3 - 18 36 45 · · · · · · · · · · · · · · · · · ·	81 Sat.	-100.3 103. Boring Terminated at Elevation -100.3 ft in
-23.8 + 27.3 9 10 7	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sat. 0000				f. SAND. Riverbend Formation
-26.3 + 29.8	8	Sat. 0000 	-			<u>-</u> -
-30 -28.8 32.3 7 9	10 19 19	Sat.				-
-35 -33.8 37.3 12 10	18		Gray, f. SAND w/weathered limestone frags. Gap graded.			<u> </u>
-38.8 42.3	22		Gray, f. SAND w/tr. weathered limestone			- - -
17 21 2			frags.			<u>-</u> - -
-43.8	31	Sat. Sat.	<u>. </u>			-
-48.8 52.3 17 27 3	32		: -			
-53.8 57.3	34					
7 19 32 3 7 19 32 3	34	66 Sat. 888.	- :			-
-58.8 T 62.3 16 35 §	50	85 Sat. Sat. Soc.	<u>. </u>			<u>-</u>
-63.8 67.3 18 26 3	34	Sat.	: - -			<u>-</u>
-68.8	32		· ·			
73.8	<u> </u>		- - -			



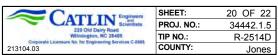


R-2514D Jones

	y Ų		BU	KE	LOC	REPUR	<u> </u>																		213104.03	to, for engineering services c-us	COUNT	Y :	Jones
WBS	3444	2.1.5			TI	P R-2514D	COUN	TY Jones			GE	OLOGIST Corey Futral		WB	S 34	4442.1.	5		-	FIP R-2514D	COUNT	Y Jones			GEOLO	GIST Corey F	utral		
SITE	DESC	RIPTIO	N Dua	al Brid	dges on	-L- over Goshen E	Branch						GROUND WTR	ft) SIT	E DE	SCRIP1	TION	Dual E	Bridges o	n -L- over Goshen I	Branch							GROUND	WTR (ft)
). B4-E				ATION 374+45		OFFSET	57ft RT		ALI	GNMENT -L-	 	`` ├──		NO. E				STATION 374+45		OFFSET :	57ft RT		ALIGNM	IENT -L-		0 HR.	9.0
-		. EV . 1.				TAL DEPTH 104	1.3 ft	_	NG 464.5	586		STING 2,530,511	24 HR. FIA	 		R ELEV.				TOTAL DEPTH 104	4 3 ft	NORTHING		 6		G 2,530,511		4 HR.	FIAD
-				TF N		D-25 75% 05/25/2012		110111111					MMER TYPE Automation							52 D-25 75% 05/25/2012					NW Casing W/S			R TYPE A	
-	LER N		-11./07			ART DATE 11/04	1/12	COMP	DATE 11/			RFACE WATER DEPTH		_		R N/A		JUNIE		START DATE 11/0		COMP. DA				E WATER DE		(III	utornatio
		DEPTH	.l BLC		DUNT	_	S PER FOC		SAMP.		L	RFACE WATER DEPTH	IN/A			RIVE DE		BI OW	/ COUNT	11	/S PER FOO		SAMP.	// I	L	E WAIER DE	PIN N/A		
(ft)	ELEV (ft)	(ft)			0.5ft	0 25	50	75 10			0 5157	SOIL AND ROCK DE		(ft)					0.5ft 0.5ft		50	75 100		MOI		SOIL AND RO	OCK DESC	RIPTION	
	(IL)		0.0.0	0.0.0	. 0.0				110.	MOI	G ELEV.	. (π)	DEPTH	Ι (π)	1 (11)		0.011	0.0.0	1			110.	MOI C	G				
																					-4-b 1 !								
5		\pm									F			-75		6.0 7		+-		† 	atch Line		++		000	Med. gray, f.	f SAND U		
	1.8	\prod_{α}									1.8	GROUND SUF	RFACE	0.0		1		25	40 40			. 80		Sat.	000	oa. g.ay,	0, 12. 0.		
0	1.0	+ 0.0	WOH	WOF	1 4	4			-	Sat.	*** -	ALLUVIA	L	-80	,	Ŧ								000	000				
	-1 7	3.5				i			.	├ ※	-0.7_	Dark brown to dark gra	SILT.	2.5	-8	1.0 + 8	2.8	60	13 17		-: · · · ·			0.1	-80.7 -80.7	ight to med. gray	v. well grade	ed. f. to cse	82. <u>5</u>
	•••	‡	1	3	1	4			:	Sat.	.	3 13 177 1				‡			" "	30 -				Sat.		SAND w/tr. to imestone frags. a	little silt, we	eathered	
-5		‡				ļ: : : : : : : : : : : : : : : : : : :					-4.2	UNDIVIDED COAS	TAL PLAIN	6.0 -85		‡ .								00	-84.2	Light gray,	essand. Ui	niform.	86.0
	-6.0	7.8	1	0	2	1			· .	Sat.		Light gray, Silty, f. SA	ND. Uniform.		-80	6.0 8	7.8	12	17 25	┤		.		Sat.	000				
		<u> </u>							·							1						· · · · ·		0 0 0 0 0 0	000				
-10	-11.0	12.8				 								-90		1.0 + 9	2.8			<u> </u>				0 0	000				
		+	1	1	1	• 2 · · · · · · ·			.	Sat.				_		+		21	31 40			71		Sat. 👯	000				
-15		Ŧ							-	1 00	- <u>13.7</u>	COASTAL P		<u>5.5</u> 95	.	Ŧ						. \		000	000				
	-16.0	17.8	2	1	+				.	000	000-	Dark brown, well graded w/tr. to little silt, weath	, f. to cse. SAND ered limestone		-9	6.0 + 9	7.8	22	34 47			. ,		0 0	000				
		‡	-	'		1			:	Sat.	 	frags., and sporadic lim Belgrade Forn	nestone lenses			‡			° ''			. 81		Sat.	000				
-20		‡							·	000	000 <u>-</u>	beigiade i oili	nation.	-100)	‡								0 0	000				
	-21.0	22.8	6	8	10				·	Sat.	000				-10	01.0 10)2.8	22	34 51	$\exists 1 : : : : 1 : : :$		· · · • ·		Sat.	-102.5				104.3
		+				· · · • • • • • • • • • • • • • • • •				000	000					+						<u> </u>	1			oring Terminated	d at Elevatio	n -102.5 ft	
-25	-26.0	I 27.8								0000	<u> </u>					Ŧ									F	f. SAND. Riv	verbena Foi	mation	
		+	14	14	7				.	Sat.	-27.5			9.3		Ŧ									-				
-30		‡							:	000	800-	Driller noted potential li Attempted C	`ore			‡									ļ				
-30	-	‡								000	30. <u>2</u>	Light gray, well graded,	f. to cse. SAND	<u>12.0</u>		‡									-				
	-32.5	34.3	3	9	12				:	Sat.	-32.5	w/tr. to little silt, weathere and sporadic limest		4.3		‡									_				
-35	_	<u> </u>			'-	•21			-	1 8		Riverbend For	mation.	_		1									Ŀ				
	-36.0	37.8	15	27	46		`.`\ 	<u>-</u>	-	Sat.	-35.7	Med. gray, f. SANE	<u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u>	57.5		+									-				
		Ŧ								Out.						Ŧ									F				
-40	41.0	42.8								0						7									F				
	-41.0	+ 42.8	12	22	24		46		.	Sat.						‡									-				
45		‡				: : : : : : : ;	/: :::		· •	0	-44.2			6.0		‡									-				
-45	-46.0	47.8	<u> </u>			/.			.			Med. gray, f. to cse. SAN	ND. Gap graded.			+									<u> </u>				
GDT		‡	12	16	18	34			:	Sat.						‡									E				
9 Z -50		Ŧ							·]]		-49.2	Med. gray, f. SANE		11.0		<u></u>									Ł				
CAT	-51.0	52.8	18	25	36		. \		-]	Sat.		.noa. gray, i. O/ANL				Ŧ									F				
GPJ		Ŧ	-						.	Jai.						‡									F				
-55	FC 0	† 57.8							-	000	000 - 34.2	Light gray, f. to cse. SAI	ND w/weathered	0.0		#									<u> </u>				
SOSI	-56.0	+ 57.8	17	25	24		. 49		:	Sat.	-56.5	limestone frags. W Med. gray, f. SANE	/ell graded	8.3		‡									-				
69 -60		‡							:	0	000	3 3 7,7				‡													
GO -60	-61.0	62.8						- 								+									F				
4.03		İ	17	30	40			70	:	Sat.						1									E				
65_		Ŧ					. , /		.	0	000					Ŧ									F				
П 2	-66.0	67.8	23	26	30		/		-							‡									F				
IBUC		‡	23	20			· / 56 ·		:	Sat.						‡									ļ.				
-70		‡					/			000	-70.2			2.0		‡									<u> </u>				
BOF	-71.0	72.8	24	24	16		/· · · · · · · · · · · · · · · · · · ·		:	Sat.		Light to med. gray, f. w/weathered limestone fra				‡									ţ				
1000		<u> </u>					* :::		:							1									E				



WBS	34442	2.1.5			TIP	R-251	4D	C	OUNT	Y Jo	nes					GEOLOG	SIST					
SITE	DESCR	RIPTION	I Dua	l Bridges	on -L-	over	Goshen E	3ranch	1									GROUND WTR (
BOR	ING NO.	. B4-B	NBL		STAT	ION	374+45			OFFSET 57ft RT						ALIGNM	ENT	0 HR.	9.0			
COL	LAR ELI	EV. 1.	8 ft		TOTA	AL DE	PTH 104	1.3 ft		NORTHING 464,586						EASTING	3 2.	24 HR.	FIAD			
				TE MAD5						DRILL METHOD NW								НАММ		Automatic		
	LER N						TE 11/0	4/13		COL	/IP DA		11/05/			SURFAC			R DEF			
	E SIZE						N 5.0 ft	17 10		00.		-	117007			JOIN AO		A1E1	· DLI	111 14		
			I	DRILL				STR	ATA	-												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	REC. (ft) %	ATA RQD (ft) %	ÖG					DES	CRIPTIO	N AN	ID RE	MARK	S		
	(11)	` '	<u> </u>	(IVIIII/IL)	%	%		%	%		ELEV. (ft)										DEPTH (
27.5	-27.5 -	29.3	5.0	0:30/1.0	(0.0)	N/A		(0.0)	N/A	000					<u>L</u>	Begin Co OASTAL	ring PLAI	@ 29 N (cor	9.3 ft ntinue	d)		
-30	_	‡		0:30/1.0 0:18/1.0 1:10/1.0	`0%´			`0%´			-30.2					NO F	RECO	OVÈR'	Y 	´ -		32
	-32.5 -	34.3		0:27/1.0 0:33/1.0						000	-32.5											34
				0.0071.0																		
-35	-	+								-	-											
	-	Ŧ								-												
-40	-	‡								=												
-+0	-	‡								=	=											
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B4-B NBLBOX 1 of 1 ELEV. -27.5 to -32.5 FT

NO RECOVERY







() ()	ا بر	BOF	(EL	OG	REP	ORI																				213104.03	rale Licensure No. for Engineering Servicee C-088	COUNTY:	Jones	
WBS 34442	1.1.5			TIP	R-2514[)	COUNT	Y Jones			GEOLOGIST	Sean O'Ne	eil		WBS	3 34442.	1.5		TIF	P R-2514	D	COUNT	Y Jones			GE	GEOLOGIST Sean O'Neil			
SITE DESCRI	IPTION	I Dual	Bridge	s on -	L- over Go	shen Bra	nch				•		GROUND W	TR (ft)	SITE	SITE DESCRIPTION Dual Bridges on -L- over						- over Goshen Branch						GROUND WTR (ft		
BORING NO.	EB2-	A SBL		STA	ATION 37	75+41		OFFSET	56ft LT		ALIGNMENT -	L-	0 HR. 2.8 (Caved	BOF	RING NO.	EB2-B NE	3L	ST	ATION 3	75+40		OFFSET :	56ft RT		AL	LIGNMENT -L-	01	HR. 4.5 Caved	
COLLAR ELE	EV. 5.0) ft		то	TAL DEPT	H 74.6 ft	t	NORTHIN	IG 464,695		EASTING 2,53	30,411	24 HR. 2.8 (Caved	COL	COLLAR ELEV. 6.7 ft			то	TOTAL DEPTH 75.0 ft			NORTHING 464,680			E/	ASTING 2,530,522	24 I	HR. 4.5 Caved	
DRILL RIG/HAM	/MER E	FF./DAT	E CAT	1303 C	03 CME-550 77% 11/30/2012			DRILL METHOD NW						DRILL RIG/HAMMER EFF./DATE CAT				T1303 CME-550 77% 11/30/2012			2	DRILL METHOD			NW Cas	sing w/ SPT	HAMMER T	YPE Automatic		
DRILLER N/				_	ART DATE			COMP. D	ATE 09/27/1:		SURFACE WAT				—	LLER N/A				ART DATE			COMP. DA				JRFACE WATER DEF			
ELEV DRIVE		BLO\	V COUN				PER FOOT		SAMP.	<u> </u>						DDI) /E		.ow co				PER FOOT		SAMP.		L				
(ft) ELEV	(ft)		0.5ft C		0 2	5 5	50	75 100	. 17	O O G		AND ROC	K DESCRIPTION	EPTH (ft)	(ft)	ELEV (ft)		t 0.5ft		0 2			75 100	NO.	MOI	O G	SOIL AND RO	CK DESCRIP	PTION	
								'			(3)										'	'	1							
5											5.0	GROUND	SURFACE	0.0	10															
5.0	0.0	2	2	2	4				D		UN	DIVIDED CO	DASTAL PLAIN			 										-				
	-									0000	<u>- 2.5</u>	Tan, f.	y, f. SAND. SAND.			6.7	0.0			<u> </u>						- 6.7		D SURFACE		
0 1.0	<u>- 4.0</u> -	2	2	3	1 · · · ·					0000	<u>-</u>	,			5	‡	2	2	3	5					D	::: <u>-</u>		COASTAL PL Silty, f. SAND.		
	-				i : : : i					0000	-					2.7	4.0			t : : :						<u>:::-</u> 3.7 _		AND w/tr. silt.	3.01	
-3.1	- 8.1 -	2	2	2	I 				Sat	0000	_						1	1	3	4					W	000				
-5	_							 	-	0000				11.0	0	1 ‡				 	 	 	 		0					
-8.1	- - 13.1									000	_ Orange	COASTA e. f. SAND v	AL PLAIN w/some weathered			-1.9 I	8.5	3	2	5					w					
-10		3	7	21		▶ 28· · ·	<u> </u>	<u> </u>	Sat	. 000 . 000		limeston	ne frags. Formation		-5] <u> </u>					<u> </u>				0	-5.4			12.0	
7					/					000	_	20.9.440				-6.9 T	13.5			1						· · · · ·	Silty, f. SAND w/tr. o	TAL PLAIN		
-13.1	18.1	4	5	7	/.				Sat	000	13.4	Mallana da d	L C La casa CANID. //c	18.4			1	3	2	• 5		: : : :			Sat.			graver (illinesid	one rrags.)	
-15				.	12.			+		. 000	 to little silt 	weathered	I, f. to cse. SAND w/tr. I limestone frags., and		-10	∤ ‡				1,										
1 1 1	- 00.4				: : :/					000	- st	oradic lime	estone lenses.			-11.9	18.5	2	9						Sat.	-12.4	4		19.0	
-18.1 <u>-</u>	- 23.1 -	4	19 8	1/.2	/:::: <i>`</i>				Sat	. 000	_ 19.0 19.4			24.0	-15	‡									Sat. 0	000 -	Orange, well grade to little silt, weather	ed limestone t	frags., and	
1	-					/	1	100/0.7]	000	-20.0 20.3			25.0 25.3	10	-16.9	22.5								000	- -	sporadic lin	nestone lense	es.	
-23.1	- - 28.1				· · · · ,	//:::					22.0 22.3			24.0 24.4 25.0 25.3 27.0 27.3 27.5 28.0 31.0		-10.9	13	17	18		35 .				Sat.	00-				
-25		11	8	7	· · •15				Sat	. 000 000	22.5 			27.5 28.0	-20	<u> </u>					/				000	00-				
1 ±	_				. .					000	26.0 26.2			31.0 31.2		-21.9	28.5			/.	'				000	00-				
-28.1	_ 33.1	5	6	7	j				Sat	000 000	27.0 27.1	II graded, f.	to cse. SAND w/tr. to	32.0 32.1		1 ±	4	6	8	14					Sat.	00 00 00 24.4	4		31.0	
-30					13		1	+		0.00	1 little silt,	weathered li	limestone frags., and	33.1	-25	 				· · · · ·	1	1	+		000	<u> </u>	6		31.0 31.2	
-33.1	38.1				: : : ;/							Riverbend	Formation	~_36.0		-26.9 T	33.5	6	7			: : : :			Sat.	-26.9 26.9 28.4	9		33.3 33.5 35.0 35.2	
-35	- 50.1	7	7	25		32 · ·			Sat		- 1 "	Fra	eathered Limestone ags.	 	-30					: : \						0028.6 0029.4	6	hana Madia	35.2	
T 7	-					1			7		Gray,	Silty, f. SAN limes	ID w/tr. weathered			-31.9	38.5			/.					000	-29.7		and. Indurate	durated to 36.0/ ed lenses 36.3	
-38.1	43.1	5	11	19							-					Ī	6	9	10		9				Sat.	00-	sporadica Riverber	illy throughout nd Formation	t.	
-40	_		''	'		4 30 · ·			Sat		- -41.0			46.0	-35	↓ ‡									000	80 <mark>-</mark>				
	- - 40 .					: :`\;;:	: : : :					S.A.A. w/	/no frags.	7 0.0		-36.9	43.5	15	15						Sat.	00- 37.4	4		44.0	
≌ ∣ ∣	- 48.1 -	28	21	30		: : : :`	51		Sat		_				-40	‡					30				Jai.		Gray, Silty, f. SAND) w/weathered frags.	1 limestone	
-45	- -						<u> </u>	1			 -				-40	1,, ‡	19.5				1									
-48.1	- - 53.1						.\				-					-41.9	48.5	20	26		: : : `\$	· · · · ·			Sat.					
-50	<u>-</u>	18	26	36			62		Sat		<u> </u>				-45	↓ ‡					<u> </u>	\				-45.4	4		52.0	
₫ ‡	-						/ .				_ _					-46.9	53.5	29	24			\\ : : :			0	-	Gray, f. SAND cemen	w/tr. silt. Lens	ses of	
급 <u>-53.1</u>	- 58.1 -	23	37	36			:::'		Sat		_					‡	16	29	34		: : : :	63.			Sat.	-	551611			
-55	-				<u> </u>		<u> </u>	T/~ 	- Jan		-56.0			61.0	-50	 				<u> </u>	+	1/	+		0					
S O O -58.1	L 63 1						T			000 000 000			mestone Lens /some Weathered	61.1		-51.9 T	58.5	22	28			/			ـما	-52.2 -53.4			58.8 60.0	
-50.1 -	-	20	19	18		• • 37 ·			Sat	000	60.0	Limeston		65.0 /\65.2	-55	Ţ						<u> </u>				-55.4				
Ĭ	_						 	1				durated Lim Gray, Silty	nestone Lens	65.2		-56.9	63.5					7				-55.7			62.0 62.3	
63.1 -63.1 -	68.1	12	35	42								Giay, Silly	, i. SAND.				15	23	34			57			Sat.	0000				
₹ <u>65</u> -65	<u>-</u>	'-	"	"			ļ · · · ·	777	_ Sat		<u>-</u>				-60	↓ ‡									0					
	- 					: : : :	: : //.	: : : :			<u>-</u> -					-61.9	68.5	23	32			1::::			904	-61.4 -61.7			68.0 68.3	
-68.1 <u>-</u>	- /3.1 -	15	25	32			57		Sat		- 69.6			74.6	-65	‡	''	-	-			55			Sat.	000				
	-					•		•			Boring Te		t Elevation -69.6 ft in verbend Formation		-03		72.5					· \	1		0					
	-										- Oiity, 1.	J 10.	. c. bong i omiation			-66.9	20	28	39	<u> </u>	<u> : : : : : </u>	\ .	7		Sat.	-68.4	Boring Terminated	at Elevation -	-68.4 ft in f. 75.0	
g 	-										+					+										-	SAND w/tr. silt.	kiverbend Fo	orrnation	

SITE PHOTOGRAPHS



NORTH ALONG -L-END BENT 1 IN FOREGROUND



BENT 1 FACING NORTH ALONG -L-



FACING SOUTH ALONG -L-END BENT 2 IN FOREGROUND



EAST OF -L- FACING WEST BENT 2 AND BENT 3