# This electronic collection of documents is provided for the convenience of the user and is Not a Certified Document –

The documents contained herein were originally issued and sealed by the individuals whose names and license numbers appear on each page, on the dates appearing with their signature on that page.

This file or an individual page shall not be considered a certified document.

3 3 S B REFERENCE

604 4

### STATE OF NORTH CAROLINA

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

# **CONTENTS**

HEET NO.	<b>DESCRIPTIO</b>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-10	BORE LOG(S)
II	SITE PHOTOGRAPH(S)

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY ROBESON

PROJECT DESCRIPTION BRIDGE NOs. 173 & 174 ON SR 1550 (LOWE RD.) OVER THE LUMBER RIVER AND LUMBER RIVER OVERFLOW SITE DESCRIPTION BRIDGE NO. 173 OVER LUMBER RIVER AT STATION 21+66.08 -L-

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5333	1	11

### **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.

CENERAL 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 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 SATISTY 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:

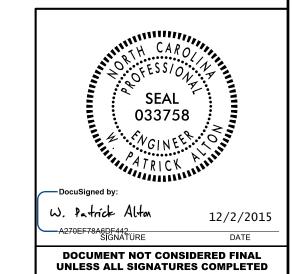
  1. THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N.C. DEPARTMENT OF TRANSPORTATION AS ACCURATE NOR IS IT CONSIDERED PART OF THE PLANS, SPECIFICATIONS OR CONTRACT FOR THE PROJECT.

  2. BY HAVIOR PEQUESTED 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.

S. DAVIS W. SHENBERGER INVESTIGATED BY F&R, Inc.DRAWN BY \_\_T.T. WALKER CHECKED BY \_P. ALTON SUBMITTED BY P. ALTON DATE NOVEMBER 2015

C. WANG

PERSONNEL



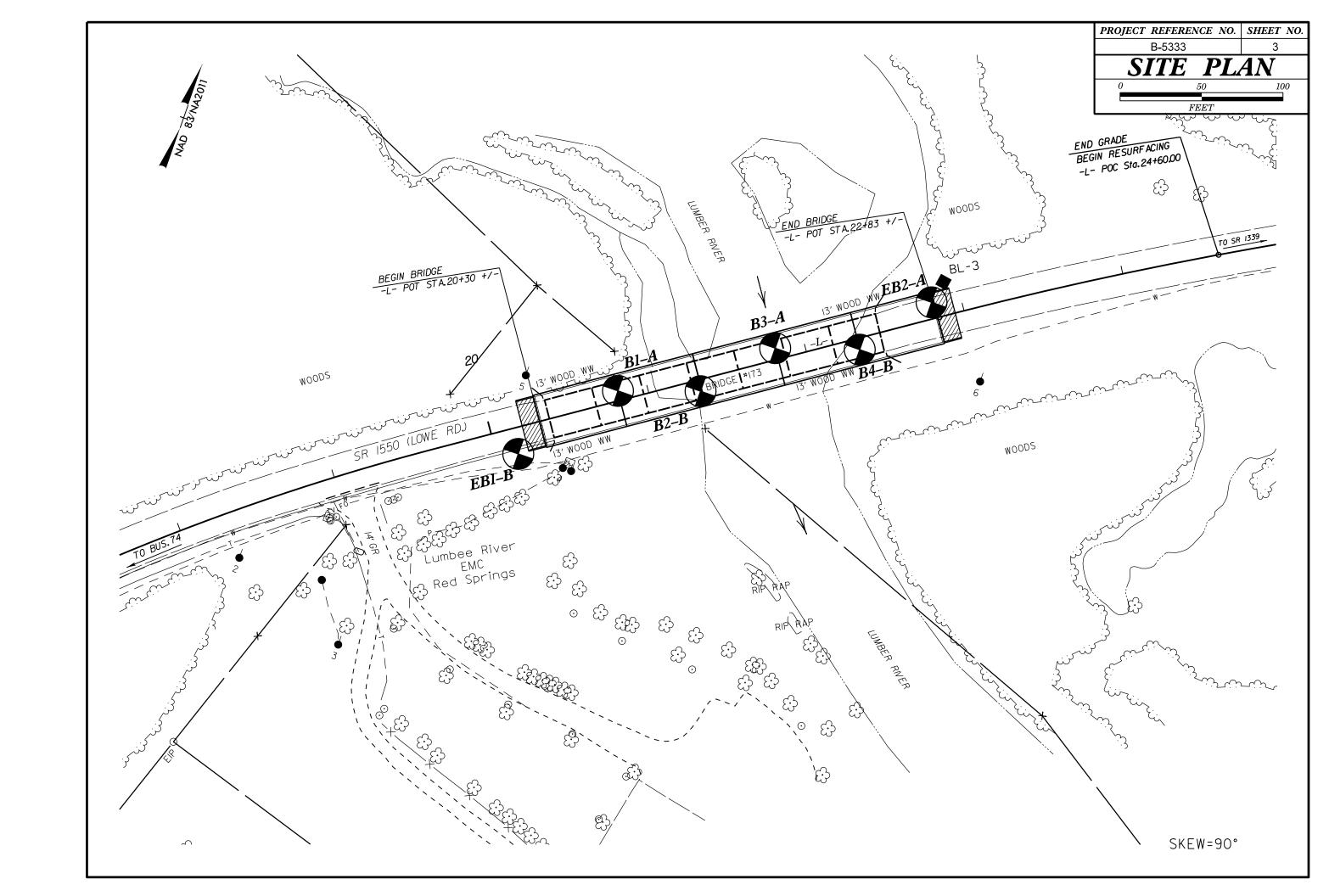
PROJECT REFERENCE NO.	SHEET NO.
B-5333	2

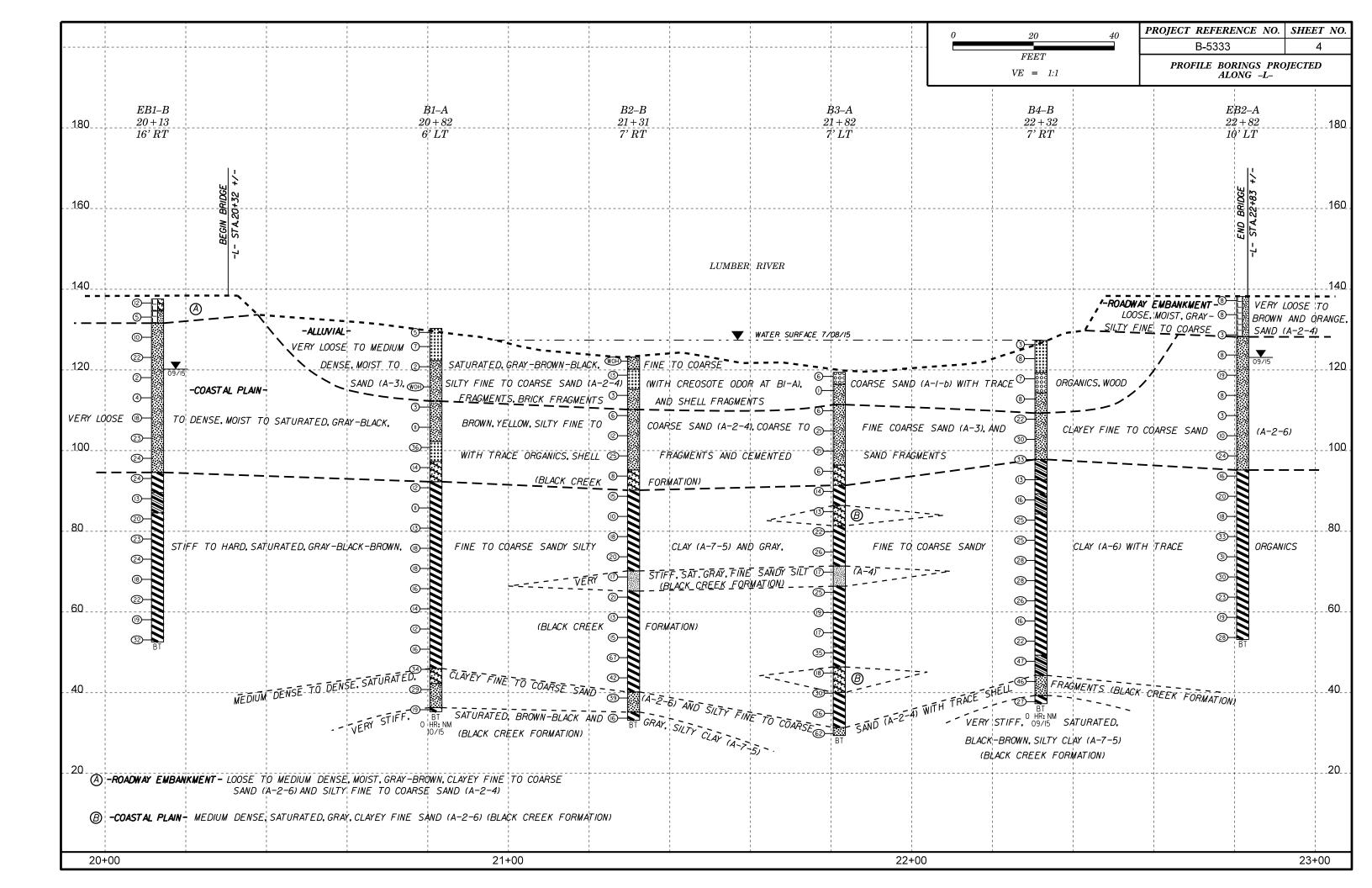
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

# SUBSURFACE INVESTIGATION

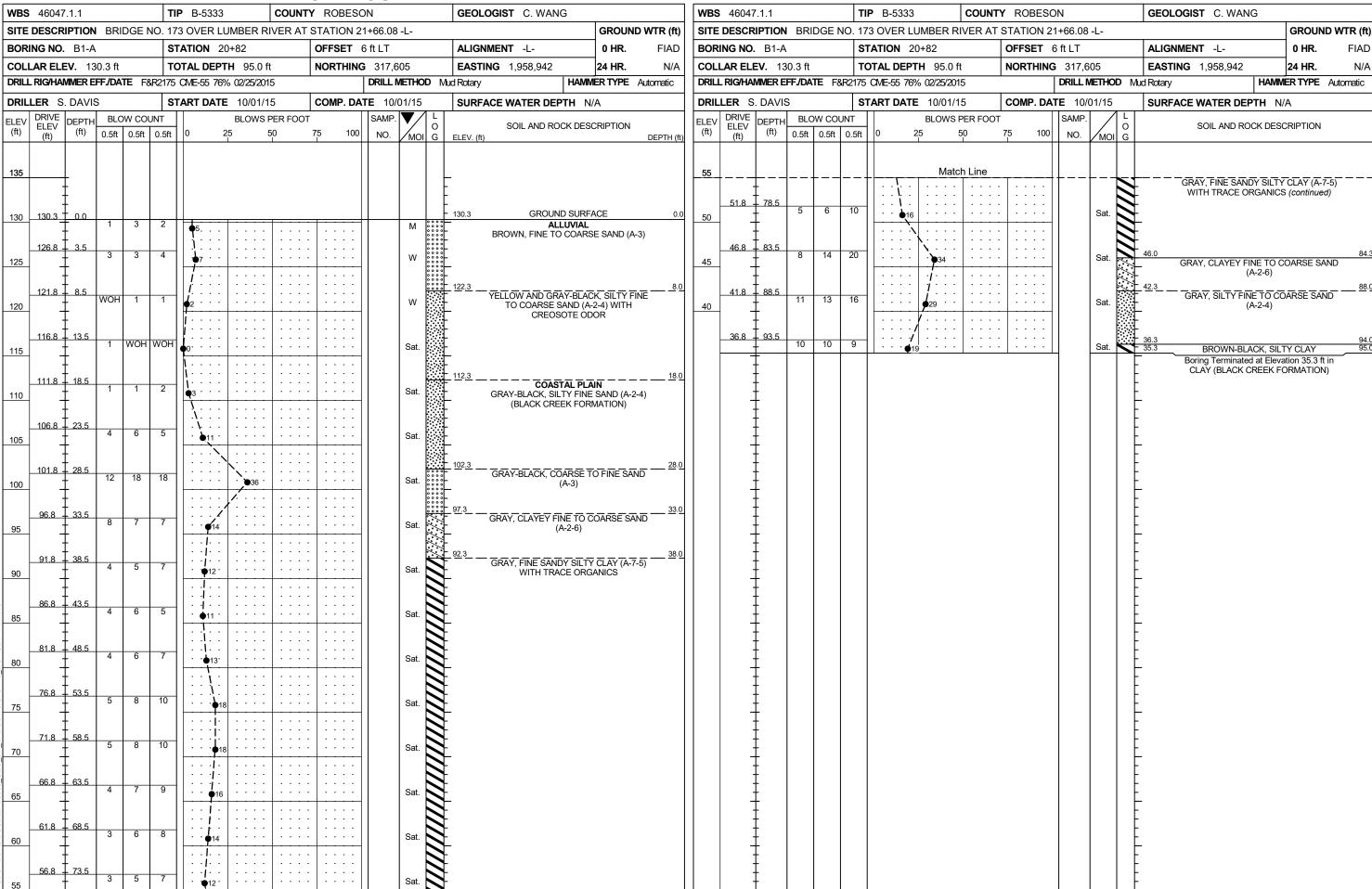
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

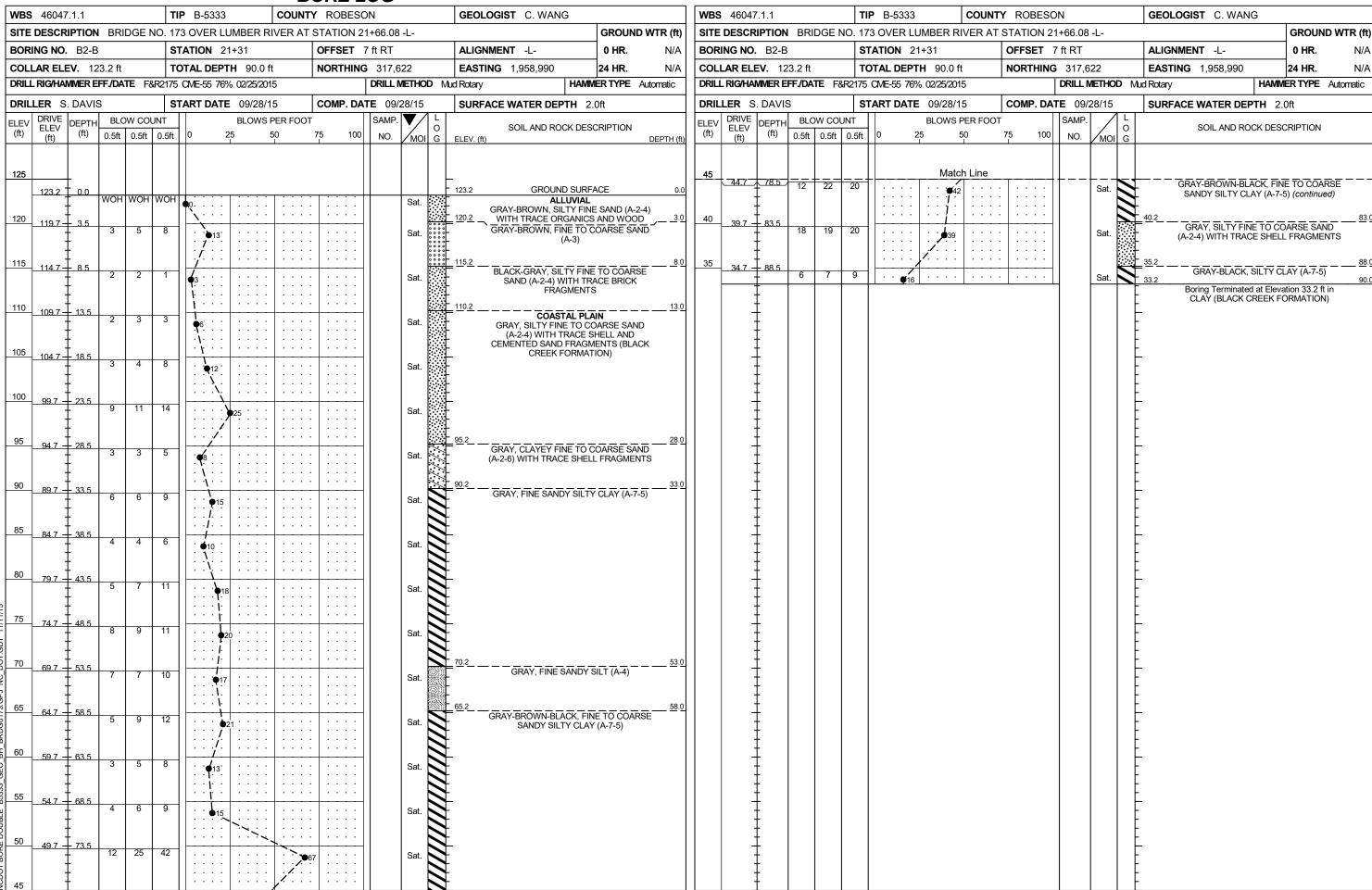
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	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	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - 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	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 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	CONSTALLINE FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (≤ 35% PASSING "200) (> 35% PASSING "200)	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.	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-2-6 A-2-7 A-3-4-6 A-7 A-1, A-2 A-4, A-5 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.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  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.
0000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SEDIMENTARY ROC	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING	PERCENTAGE OF MATERIAL	CP) SHELL BEDS, ETC. WEATHERING	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
*40 30 MX 50 MX 51 MN PEAT SOILS	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.	<u>DIP</u> - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL.
PASSING *40 48 MX 41 MN 50ILS WITH	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 UK 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 SOILS	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.  OF MAJOR GRAVEL, AND SILTY OR CLAYEY SILTY CLAYEY MATTER  OF MAJOR GRAVEL, AND CAND CAND CAND CAND CAND CAND CAND		(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.
MATERIALS SAND SAND GRAVEL AND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24 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 FAIR TO POOR UNSUITABLE		(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 SUBGRADE   PLOF A-7-5 SUBGROUP IS ≤ LL - 30 ; PLOF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	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
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OF RANGE OF STANDARD RANGE OF UNCONFINED	III 25 (025	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK, ROCK GIVES 'CLUNK' SOUND WHEN STRUCK,  IF TESTED, WOULD YIELD SPT REFUSAL	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
PRIMARY SOIL TYPE CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  POP & DIP & DIP DIRECTION  OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4	SOIL SYMBOL SPT DOT TEST BORING SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GRANULAR LUUSE 4 10 10 M	M)	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.  IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
MATERIAL DENSE 30 TO 50 (NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETHOMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	INFERRED SOIL BOUNDARY CORE BORING SOUNDING ROD	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK (V SEV.) REMAINING. SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	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	MONITORING WELL  TEST BORING MITH CORE	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> 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.
MATERIAL STIFF 8 TO 15 1 TO 2	A PIEZOMETER	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS	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
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS  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 - 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		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	SHALLOW UNCLASSIFIED EXCAVATION - USED IN THE TUP 3 FEET OF UNDERCUT SHALLOW EMBANKMENT OR BACKFILL	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  AD AUGSD DESUGAL MED MEDIUM.	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.	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	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 $\gamma$ - UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma$ - DRY UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE CHIDE FOR FIELD MOISTURE DESCRIPTION	CSE COARSE ORG ORGANIC	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 GOIDE TOWN TEED HOLDSTONE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIOUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - YOID RATIO   SD SAND, SANDY   SS - SPLIT SPOON   F - FINE   SL SILT, SILTY   ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES I INCH	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY
LL LIOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS,) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID: REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES  TCR - TRICONE REFUSAL  RT - RECOMPACTED TRIAXIAL  ## - MOISTURE CONTENT  CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-3. N: 317734 E: 1959109. STATION 16+22.38. 0.2' RT
(PI) PL PLASTIC LIMIT	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MHRK: DE-3, N: 311134 E: 1933109, 314110N 10+22.30, 0.2 KT
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 137.47 FEET
SL SHRINKAGE LIMIT	DRILL UNITS:  ADVANCING TOOLS:  HAMMER TYPE:  CME-45C  CLAY BITS  X AUTOMATIC  MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	S' CONTINUOUS ELIGHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	
	X CME-55   X 8" HOLLOW AUGERS   CORE SIZE:   -H	THINLY LAMINATED < 0.008 FEET  INDURATION	
PLASTICITY  DIAGNISTY INDEX (ID)  ODV CTDENCTH		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
PLASTICITY INDEX (PI) DRY STRENGTH NON PLASTIC 0-5 VERY LOW	TUNGCARBIDE INSERTS	RUBBING WITH FINGER FREES NUMEROUS GRAINS;	
SLIGHTLY PLASTIC 6-15 SLIGHT MODERATELY PLASTIC 16-25 MEDIUM	VANE SHEAR TEST CASING WAY ADVANCED HAND TOOLS:	GENILE BLUW BY HAMMER DISINTEGRATES SAMPLE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED  GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOCIAL HOD VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	DRAG BIT	EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
	•		





14/D	100	17.4.4				D 5000			UKE I			0501	00107 0 1	14/41/0			] [wpc	100.4	7 4 4			TID I	D 5000	COLINITA	, DODEO(			0501.04	NOT O MANAGE		
		)47.1.1				B-5333			Y ROBES			GEOL	OGIST C. \	WANG			<b>↓</b>	46047				l			ROBES			GEOLOG	GIST C. WANG		
-				GE N				IVERAI	STATION		L-	T			GROUND \		l —						OVER LUMBER RIV				-L-	T			ROUND WTR (ft
		IO. EB1-			_	ATION 20			OFFSET				MENT -L-		0 HR.	NM	l <del></del>	ING NO.					TION 20+13		OFFSET			+	ENT -L-		HR. NM
		<b>LEV</b> . 13				TAL DEPT			NORTHIN				<b>NG</b> 1,958,8		24 HR.	17.4	┦	LAR ELI					AL DEPTH 85.0 ft		NORTHING				<b>3</b> 1,958,897		<b>4 HR.</b> 17.4
DRIL	L RIG/F	HAMMER E	FF./DATI	E F&I	R2175	CME-55 76%	% 02/25/201 	15		DRILL ME	ETHOD	Mud Rotary		HAMI	MERTYPE AL	tomatic	DRIL	L RIG/HA	MMER E	FF./DAT	TE F&R21	175 CM	/IE-55 76% 02/25/2015			DRILL N	METHOD M.	ud Rotary		HAMMER	TYPE Automatic
DRI	LER	S. DAVIS	S		ST	ART DATE	09/15/1	5	COMP. D	ATE 09/1	5/15	SURFA	ACE WATER	R DEPTH N	N/A		DRIL	LER S	. DAVIS	3		STAR	<b>RT DATE</b> 09/15/15		COMP. DA	<b>TE</b> 09/	15/15	SURFAC	E WATER DEP	TH N/A	
ELE\ (ft)	DRIV ELE\ (ft)		BLOV 0.5ft			0 2		PER FOOT 50	75 100	SAMP.	/ 10	ELEV. (ft)		ND ROCK DES		DEPTH (ft)	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)		W COUNT	<b>—</b> □	BLOWS PE		75 100	SAMP.	MOI G		SOIL AND RO	CK DESCR	PTION
	(11)										IVIOI O	LLEV. (II)				DEF III (II.		(11)									/ WOI G				
140																	60	59.5	78.5		8 1		Match	Line	T		Sat.		GRAY, SILTY CLA	Y (A-7-5) (	continued)
	138.0	0.0	2	5	7	· •12 ·		T	I		м	138.0	ROAD	ROUND SURF DWAY EMBAN ROWN, CLAY	NKMENT	0.0	1	-	-			·    :	• • • • • • • • • • • • • • • • •				Sal.				
135	134.5	5 + 3.5	4	2	2	/						135.0	CO	ARSE SAND (	(A-2-6) NE TO COARSE		55	54.5	83.5	7	14 18							<del>-</del>			
		Ī	4	_	3	<b>4</b> 5					М	∵L		SAND (A-2-4	4)					,	14 10	°     .	32			-	Sat.	53.0	Boring Terminated	at Elevatio	85. n 53.0 ft in
130	129 !	+ 5 + 8.5				-/				<u> </u>		** <u>-</u>	GRAY-BLAC	COASTAL PL CK, SILTY FIN	<b>.AIN</b> IE TO COARSE			-	_									<del>-</del>	CLAY (BLACK C	REEK FOR	MATION)
		+	2	3	7	. <b>Q</b> 10 .					W		SAND (A-2-4 (BLAC	4) WITH TRAC K CREEK FOR	CE ORGANICS RMATION)			-													
125	404	_				, , .													†												
	124.	5 <del>†</del> 13.5	10	12	10		22			]	Sat.							-													
120		‡				1://:					lacktriangle	<u></u>						-													
120	119.5	5 <del>+</del> 18.5	1	1	1	<u>/</u>				1	Sat.	<u>-</u> -						-	†									-			
		Ī																	<u> </u>												
115	114.5	5 + 23.5	1	2	2	1				<del> </del>	Sat.	:- :-						-										<del>-</del>			
		‡				.\					oat.							-													
110	109.5	+ 5 + 28.5				· · · · ·												_	†									<del>-</del>			
		Ī	1	8	10	•18					Sat.								<u> </u>												
105	104 !	+ 5 + 33.5				/				<u> </u>		<u></u>						-	_									<del>-</del>			
	10.11	+	8	9	14	: : : :	  23 <sub></sub>				Sat.	:- :-						-													
100		. † <u></u>				: : : :			1			-						-	†												
	99.5	5 <del>+</del> 38.5	7	12	12		24			]	Sat.							-										<del>-</del>			
95		‡							<b>I</b>			05.0				42.0		-													
93	94.5	5 <del>+</del> 43.5 +	6	10	14					1	Sat.	95.0	GRAY	Y, SILTY CLA	Y (A-7-5)	43.0	-	-	<u> </u>									<del>-</del>			
/15		<u> </u>										<b>.</b>							[												
5 90	89.5	$\frac{1}{5} + \frac{1}{48.5}$	6	5	8	<u>I</u>				$\parallel \parallel \parallel$	Sat.	90.0	GRAY, FINE		SANDY CLAY	48.0		-	<u> </u>								[	<del>-</del>			
.GDT		‡				<b>●</b> 13.					Sal.	<b>\$</b>		(A-6)					‡												
85	84.5	5 + 53.5				· · · · · · · ·			·   · · · ·			85.0	<u></u>	Y, SILTY CLA	Y (A-7-5)	53.0		-	‡									<del>-</del>			
N		<u>†</u>	6	9	11	2	   				Sat.	3	Sival	., OLLI I OLA	. (1.10)			-	[												
73. 80 80	70.5	5 + 58.5								]		$\mathbf{\xi}$							[									- -			
DG01	79.5	- 30.3	6	10	13	: : : :	  23 				Sat.	<b>\</b>						-													
딺 표 75		‡										*						-													
	74.5	63.5	8	10	14		24			1	Sat.	<b>*</b>						-	†									<del>-</del>			
333		Ī										₹							<u> </u>												
<u>г</u> 70 ш	69.5	68.5	4	9	9	1				$\parallel \parallel \parallel$	Sat.	*						-	<u> </u>								[	_			
OUBL		‡				¶18		1	1		Jai.	*							‡												
65 E	64.5	+ 5 <del>+</del> 73.5				· · · · j			<u> </u>			\$						-	‡									<del>-</del>			
OT BC		<u> </u>	2	9	13	· · · · ·	22 				Sat.	$\Xi$							[												
00 60		Ŧ				: : :						}																			





NA/D	10	20.47.4					D 500				JKE				056	21 0010	OT 0 14	VANO				WDO	4004	7.4.4				<b>D</b> D C	-000		00111	TV DO	DE00	N 1		05	.01.001	<b>T</b> 0 14/	ANO.		
		6047.1		BBIBG	) = N/		B-5333				ROBE		2.00.1		GEC	DLOGIS	ST C. W	VANG	000		- CO		4604			DOE 1		P B-5				ITY RO				GE	OLOGI	ST C.W	ANG	0001111011	
-				BRIDG	3E NC	_	3 OVER L		RIVI											UND WT	` '					DGE N					VER A	T STATI			-L-	1				GROUND W	
		NO.					ATION 2				OFFSET						NT -L-		0 HF		N/A		ING NO						N 21+				<b>SET</b> 7				IGNMEN			0 HR.	N/A
		ELEV.					TAL DEP				NORTHI						1,959,0		24 HF		N/A		LAR EL							90.0 ft		NOR'		317,6				1,959,02		24 HR.	N/A
DRIL	L RIG	3/HAMM	ER EF	F./DATE	F&R	2175 (	CME-55 76	5% 02/25/	2015			DR	ILL METH	HOD	Mud Rota	ry		HA	MMER TYP	PE Autom	natic	DRILL	_ RIG/HA	MMER E	FF./DA	TE F8	R2175	CME-5	5 76% (	02/25/201	5	_		DRILL N	METHOD	Mud Rota	ary		HAMN	MER TYPE Aut	omatic
DRI	LER	S.D	AVIS			ST	ART DAT	<b>E</b> 09/3	0/15		COMP. [	DATE	09/30/1	5	SUR	RFACE	WATER	DEPTH	7.0ft			DRIL	LER S		S		ST	TART [	DATE	09/30/1	5	СОМ	P. DAT	<b>E</b> 09/3	30/15	SU	RFACE	WATER I	DEPTH 7	.Oft	
ELE\ (ft)	DRI ELI (f	EV  DE	-, ,,,,⊢	0.5ft 0.			0	BLOW 25	VS PEI	R FOOT			MP. M	′   0	ELEV.		SOIL AND	D ROCK D	ESCRIPTION		PTH (ft)	ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)		0.5ft		0	25	BLOWS F	PER FOO	OT 75	100	SAMP.	MOI G			SOIL AND	ROCK DES	CRIPTION	
400																						10								Mata	h Line										
120	119	9.4	0.0	1	3	3	6					-	Sa	t. 00	— 119.4 0 –	GR		OUND SU ALLUVIA VN. COAR		(A-1-b)	0.0	40		<del> </del> -			+		::	30		: : :	· ·		Sat.	<del></del>	В		WN, SILTY (continued)	CLAY (A-7-5)	. — — —
115	11	5.9 + :	3.5	1 W	ОН	1	/: : : : 		:	· · · · ·			Sa	ıt.	116.4	_ WI	TH TRACE	E SHELLS	AND ORG	ANICS	3.0	35	35.9	83.5	6	8	18	: :		· · · · · · · · · · · · · · · · · · ·		- 1			Sat.						
	110	0.9	8.5				/					· :						,	,				30.9	]     <sub>88.5</sub>											Sat.	31.4				DARSE SAND	88.0
110		+		3	3	3	6		-				Sa	t.								30	_	<u>+</u> +	15	24	38	<u> </u>		· · · · ·	•6	2			Sat.	29.4	Bo	ring Termin	(A-2-4) ated at Elev	ation 29.4 ft in ORMATION)	90.0
105	10	5.9 <sup>†</sup> 1	3.5	6	9	12	, , .	21	:				Sa	ıt.	<u>106.4</u>		GRAY AND		SILTY FINE	E TO	13.0		_	‡ ‡												-	5	AIND (BLAC	N CREEN F	ORIVIATION)	
	100	0.9 1	8.5									:				СО	ARSE SAI	ND (A-2-4) FORMATI	) (BLACK C ION)	CREEK				Ī												E					
100		‡		5	8	13	/	21					Sa	t.									-	<del> </del> 												-					
95	95	5.9 ± 2	3.5	3	2	4	6		:				Sa	t. 🔆	96.4_	— GRA	AY, CLAYE	EY FINE TO (A-2-6)	O COARSE	E SAND	23.0		-	‡												Ė					
	90	2.9 2	28.5									·		/////// <b>//////////////////////////////</b>	91.4	— <u></u>	AV EINE	SANDY SII	TTY CLAY	<u> </u>	28.0			Ī												E					
90		+		3	6	8	14						Sa	t.	-	GIV	AI, I INC	SANDT SI	LIT CLAT	(A-1-5)			-	<del> </del> 												-					
85	85	5.9 ‡ 3	33.5	3	4	9	13-		:	· · · · ·			Sa	t. //	86.4	———	GRAY, CLA	AYEY FINE	E SAND (A-	-2-6)	33.0		-	‡												Ė.					
00	80	D.9 3	38.5				\							//////////////////////////////////////	81.4	— <u>G</u>	AV FINE	SANDY SII	TTY CLAY	<u></u>	38.0			Ī												E					
80_		+		8	9	13		1	.			-	Sa		}	0.0		O7 11 415 1 OII	211 021	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			-	‡ ‡												-					
75	75	5.9 1 4	3.5	8 1	11	15		26					Sa	t. 📘	-								-	<u> </u>												E					
11/15	70	0.9 + 4	18.5	7	7	10		/   				·			71.4		GRAY, F	INE SAND	OY SILT (A-	<del></del>	48.0			‡												-					
GDT 11/		‡				.	· · · · · ·	7	-			·	Sa	ι.	F 66.4						53.0		_	Ī												E					
65 65	65	5.9 + 5	3.5	7	11	14		25				·	Sa	t.	<b>*</b> * * * * * * * * * * * * * * * * * *	— — BI	LACK-BRO	OWN, SILT	TY CLAY (A	A-7-5)	_ 50.0		_	‡ ‡												-					
73.GPJ 7	60	).9 ± 5	58.5	6	9	10		/ : : :	:				Sa	, E	<u> </u>								_	‡												E					
BRDG01		_					T.    .    .					:			}									‡												ļ.					
Hg 55	55	5.9 + 6	33.5	4	7	10	1	7	:				Sa	t. 📙	}								_	‡												Ė					
5050	50	0.9	8.5	8 1	13	22		35	:		: : :		Sa	ı.	<u>- 51.4</u>	— <u>-</u> GR		TO COAR CLAY (A-	SE SANDY 7-5)	SILTY	68.0		_	‡												<u> </u>					
DOUBLE	15	59   7	3.5												46.4					=. <del></del> ===	<u>73.0</u>			‡												Ė					
45 45		**************************************	J.J	10	8	10		18	-				Sa	t. 📈	<del>,,,,,,,</del>	GR/	ay, Claye	EY FINE TO (A-2-6)	O COARSE )	E SAND			-	Ī												F					
1000 40	40	0.9 + 7	8.5	12 1	18	12		\: : :						*//-//-/	40.1						79.3			‡												-					

14/2		20.47.4.4			T	D 5000		1	UKE			0501	00107				1	1004	7.4.4			T =:=	D 5000		0011117	. DODEO	<u> </u>		0501	00107 0 14	· · · · · · · · · · · · · · · · · · ·	
-		6047.1.1				P B-5333			Y ROBES			GEOL	OGIST C	. WANG	T		<b>↓ ├</b> ──	<b>3</b> 4604					B-5333			Y ROBES			GEOL	LOGIST C. W	ANG	T
-				DGE N				RIVER AT	1	21+66.08 -L	-	-			GROUNE		l ——				DGE NO				VER AT	STATION 2		i -L-				GROUND WTR (ft
BOF	RING	<b>NO</b> . B4-B	3		_	ATION 22			OFFSET	7 ft RT		ALIGN	NMENT -L	-	0 HR.	FIAD	BOF	RING NO	). B4-B	3		STA	ATION 2	2+32		OFFSET	7 ft RT		ALIGI	NMENT -L-		0 HR. FIAD
COL	LAR	ELEV. 12	27.3 ft		TC	TAL DEPT	<b>TH</b> 90.01	ft	NORTHIN	<b>IG</b> 317,678			<b>ING</b> 1,95	9,074	24 HR.	N/A	<u> </u>	LAR EL						<b>TH</b> 90.0 ft		NORTHIN	<b>G</b> 317,6	678	EAST	<b>ING</b> 1,959,0	74	<b>24 HR.</b> N/A
DRIL	L RIG	HAMMER E	FF./DAT	TE F8	R2175	CME-55 76%	% 02/25/20	15		DRILL MET	THOD I	Mud Rotary		HA	AMMER TYPE	Automatic	DRIL	L RIG/HA	AMMER E	FF./DA	TE F&R	R2175 (	CME-55 76	% 02/25/201	5		DRILL	METHOD	Mud Rotary		HAMIN	IER TYPE Automatic
DRI	LER	S. DAVI	S		ST	ART DATE	09/29/	15	COMP. D.	ATE 09/29/	15	SURF	ACE WAT	ER DEPTH	N/A		DRII	LLER S	S. DAVIS	S		STA	ART DAT	<b>E</b> 09/29/1	5	COMP. DA	ATE 09/	29/15	SURF	ACE WATER	DEPTH N	/A
ELE\	DRI'	IVE DEPTH	BLO'	w cou	JNT		BLOWS	PER FOO	Γ	SAMP.	L		9011	VVID BUCK D	DESCRIPTION		ELEV	DRIVE ELEV	DEPTH	BLO	W COUN	NT		BLOWS F	PER FOOT		SAMP.	L	•	SOIL AND	ROCK DES	~PIDTION
(ft)	(ft		0.5ft	0.5ft	0.5ft	0 2	25 I	50	75 100	0 NO. /1		ELEV. (ft)		AND NOCK D	DESCRIPTION	DEPTH (ft	(ft)	(ft)	(ft)	0.5ft	0.5ft (	0.5ft	0	25 5	50	75 100	NO.	MOI G		SOIL AND	TOOK DES	SIMP HON
130																	50							Matc	h Line							
		7										F						48.8	78.5	14	22	25					1		49.3	GRAY, FINE	TO COARSE	SANDY CLAY
	127	7.3 † 0.0	1	1	2	1:		1		<del>                                     </del>	W 0000	- 127.3 -		GROUND SU ALLUVI		0.0	4		‡	'*	22	23		: : : :	47 · · · · ·			Sat.	<b>‡</b>		(A-6)	
125		‡				<b>\q</b> 3 \cdot \cdot \cdot				_	0000	_		OWN, FINE TO	O COARSE SAN E ORGANICS	ND	45	╡.	‡								11		44.3			83
	123	3.8 + 3.5	2	3	5	., s			:   : : : :		W		(A-3)	WIIII IIVACL	LONGANICS			43.8	83.5	10	22	24		: : : 🛓				Sat.	Ţ	GRAY, SILT	FINE TO CO (A-2-4)	DARSE SAND
		‡				· <b>T</b> ° · ·					0000								<u> </u>						Ĭ : : : :				ŧ		(A-2-4)	
120	_	8.8 + 8.5				<del>                                      </del>	<u> </u>	+		$\dashv$	000	119.3			5.E.T. 5. 7. 7.		40	38.8	88.5				<u> </u>	<del>  //</del>		<del> </del>	1		39.3			88
		+	3	3	4	<b>∳</b> 7 · ·				s	at.	-	WITH T	RACE WOOL	RSE SAND (A-1- D FRAGMENTS	D)			+	6	11	16		<b>4</b> 27 · · ·			Ц	Sat.	37.3	BLACK-BRO		` ´ 90
115		Ŧ							.		000	}-							+										F	Boring Termi CLAY (BLA	nated at Eleva CK CREEK F	ation 37.3 ft in ORMATION)
	7	3.8 + 13.5	4	4	4			1		$\exists     _{\underline{\ }}$	000	114.3			COARSE SAN		1	_	Ŧ										F			
		‡	"	*	"	. 68			.		at.	<u>;</u>	(A-2-4) WIT	H TRACE WO	OOD FRAGMEN	NTS			‡										F			
110	7	‡				· ., <u>, , , , , , , , , , , , , , , , , ,</u>				<b>.</b>		109.3				18.0			‡										L			
	108	8.8 + 18.5	9	10	12	: : : /	99				at.		TAN RPOL	COASTAL F	PLAIN AY, SILTY FINE		1		‡										<u> </u>			
		‡										‡	COARSE	SAND (A-2-4)	) (BLACK CREE	K			<u> </u>										E			
105	_	3.8 + 23.5				<del></del>	<u> </u>	+		$\dashv$		Ė		FORMATI	ION)			-	t										F			
	100	<del>7</del> <del>7</del> 20.0	7	14	16		<b>♦</b> 30 · ·		.	s	at.	-							Ŧ										F			
100		Ŧ					} : : :		.			<b>.</b>							Ŧ										F			
	7	3.8 28.5	10	20	12		1	1				97.8				20.1		-	Ŧ										F			
		‡	12	20	13		33				at.		GRAY, HIG		O COARSE SAN	29.5 DY	11		‡										Ė			
95		‡					/					<u></u>		CLAY (A	A-6)				‡										<u> </u>			
	93.	33.5	6	6	7	/.			:   : : : :		at.	92.8				34.5			‡										Ė			
		‡				7						}	GR	AY, SILTY CL	LAY (A-7-5)				<u> </u>										E			
90	88	38.5				<del>                                     </del>		1		$\dashv$		89.3		=======================================	5-5-T-15-7-5-T-	38.0	]	-	t										F			
		1	7	7	9	16			.		at.	}	GRAY, FII	NE TO COAR (A-6)	RSE SANDY CLA	ΛY			ł										-			
85		+				\						<u> </u>							+										-			
	83.	3.8 43.5	7	11	14		25				at.	= <u>84.3</u>		ROWN-BLAC	CK, SILTY CLAY	,43.0	11		Ŧ										F			
15		Ŧ	'			`	T-3 · · ·		.		al.	}		(A-7-5)	5)				Ŧ										F			
<u>5</u> 80		, ‡ <u>, , , , , , , , , , , , , , , , , ,</u>						ļ · · ·				}_							Ŧ										F			
GDT 1	/8.	3.8 + 48.5	8	11	14	: : : : (	25 · · ·			s	at.	}							‡										-			
0 75		‡							<b>I</b>			Ţ							‡										‡			
NC 75	73.	3.8 <del>+</del> 53.5					<u> </u>	1	:   : : : :			<b>├</b>						-	‡										F			
GPJ N		‡	8	11	17		28			11 1	at.	‡							‡										ļ.			
හු 70		<u> </u>					1 1	1	<b>I</b>	_		<b>t</b>							‡										L			
BRDG01	68.	3.8 + 58.5	6	11	17		28				at.	ŧ							<u></u>										E			
		±					728		.			t							İ										E			
품 65	62	3.8 + 63.5				<u> </u>	<del>  </del>	+	+			<u> </u>							Ŧ										F			
<u> </u>	03.	+ 03.3	7	11	15		26			s	at.	F							Ŧ										F			
60		Ŧ				::::/			<b>I</b>			<del>-</del>							Ŧ										F			
m H	58.	8.8 + 68.5	$\downarrow \downarrow \downarrow$			/.		1		7		<b>F</b>							Ţ										F			
OUBI		‡	4	6	10	· · •16			.	11 1	at.	<b>}</b>							‡										-			
当 第 <u>55</u>	1	‡				,				_		<u>t</u>							‡										L			
BOI	53.	3.8 + 73.5	5	9	13	: : · <i>7</i>	22	1	:		at.	‡							‡										-			
000		‡					<b>.</b>					ŧ							<u></u>										-			
S 50																	J L												L			

14/20	400.47				T	D 5000			UKE			050	LOCIOT				14/20	400.47	4.4				5000	NEW BORE	2011		05010	207 0 14/41/0		
_	46047					B-5333		1	Y ROBES			GEO	LOGIST C. V		T			46047.				ΓIP B-		NTY ROBES			GEOLOG	GIST C. WANG	T	
				GE NO	_			IVER AT	STATION		L-				GROUND W	` '							ER LUMBER RIVER						GROUND	
BOR	ING NO.	EB2-A	4		ST	ATION 22	2+82		OFFSET	10 ft LT		ALIG	NMENT -L-		0 HR.	NM	BORI	NG NO.	EB2-A	4	s	STATIO	ON 22+82	OFFSET	10 ft LT		ALIGNM	ENT -L-	0 HR.	NM
COLI	LAR ELE	<b>EV.</b> 137	7.9 ft		TO	TAL DEPT	<b>H</b> 85.0 f	t	NORTHIN	<b>IG</b> 317,72			<b>TING</b> 1,959,1	106	24 HR.	15.1		AR ELE					<b>DEPTH</b> 85.0 ft	NORTHIN				<b>3</b> 1,959,106	24 HR.	15.1
DRILL	_ RIG/HAN	MMER EF	F/DATE	F&R	22175 (	CME-55 76%	% 02/25/201	15		DRILL ME	THOD	Mud Rotary	У	HAMM	IER TYPE Auto	matic	DRILL	RIG/HAM	MER EF	F./DATE	F&R2175	5 CME-	55 76% 02/25/2015		DRILL	<b>METHOD</b> N	/lud Rotary	Н	AMMER TYPE AL	tomatic
DRIL	LER S.	. DAVIS	;		ST	ART DATE	09/16/1	5	COMP. D	ATE 09/16	6/15	SURI	FACE WATER	R DEPTH N/	/A		DRILL	LER S.	DAVIS		s	START	<b>DATE</b> 09/16/15	COMP. D	<b>ATE</b> 09	/16/15	SURFAC	E WATER DEPTH	N/A	
ELEV	DRIVE ELEV	DEPTH	BLOW	COUN	NT		BLOWS I	PER FOO	T	SAMP.	L	: [	SOIL AN	ID ROCK DESC	∩RIPTION		ELEV	DRIVE ELEV	DEPTH	BLOW	COUNT		BLOWS PER FO	ООТ	SAMP	L	•	SOIL AND ROCK	DESCRIPTION	
(ft)	(ft)	(ft)	0.5ft 0	).5ft (	0.5ft	0 2	25	50 	75 100	NO.		ELEV. (1		ID TROOM BLOC		EPTH (ft)	(ft)	(ft)	(ft)	0.5ft 0	.5ft 0.5ft	0	25 50	75 10	0 NO.	MOI G		30127442713011	32001tii 11011	
140												L					60			L			Match Line		<u> </u>	$L \perp L \perp$				
	137.9	[ 00 ]										137.9	GF	ROUND SURFA	ACE	0.0		59.4	78.5	6	8 11	┨				Sat.		GRAY, FINE SANDY S (continu		
	107.0	- "	2	4	4	. •8					м		ROAD	WAY EMBANI	KMENT GE, SILTY FINE			Ŧ					$\vdots : \widetilde{j}   \vdots : \vdots   \vdots : \vdots$					(		
135	134.4	3.5				<del>-  </del>		<u> </u>		41 1	- -		TO CO	OARSE SAND	(A-2-4)		55	54.4	83.5			<u> </u>			$\dashv 1$		<u> </u>			
		-	5	3	5	. 8					М	<u></u>					_			7	14 14	Ш::	28	· ·   · · · · ·	Щ	Sat.	52.9	Boring Terminated at	Floyation 52.0 ft in	85.0
130	‡					/ : : : :						*						‡									-	CLAY (BLACK CREE	EK FORMATION)	
100	129.4	8.5	2	2	1	1		1		<b>                                     </b>	м	127.9				10.0		‡									<del>-</del>			
						<b>T</b> ° · · ·	: : : :	: : :	:   : : : :			121.9	<u>_</u>	OASTAL PLA	NN	10.0		‡									<u> </u>			
125	124.4	135				<u> </u>				<b>.</b>		**	SAND (A-2	2-4) WITH TRA				1									<u> </u>			
	124.4	13.3	3	2	6	.\ . <b>Q</b> 8					▼	<u>#</u>	FRAGM	MEŃTS (BLACK FORMATION)	CREEK			İ									-			
	1					\									,			İ									_			
120	119.4	18.5			10	<del>\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ </del>		+										$\pm$									_			
	l Ŧ		8	9	10	19		: : :			Sat.							Ŧ									Ē			
115						: : / : :												Ŧ									F			
	114.4	23.5	1	3	5					1	Sat.							‡									<del>-</del> -			
	‡					: <b> </b> : : :						<u>:</u>						‡									-			
110	109.4	28 5				1				41 1		-															_			
	103.4	20.5	1	2	1	<b>4</b> 3					Sat.							1									_			
						] ] : : : :												1									_			
105	104.4	33.5		_	_	<del>-\</del>		+										$\pm$									L			
	<del> </del>		4	5	5	. 10					Sat.							Ŧ									<u> </u>			
100						/.												Ŧ									F			
	99.4	38.5	7	14	10		24			7	Sat.	<u></u>						Ŧ									-			
						::::/												‡									<u>-</u>			
95	94.4	43.5				· · · · /				41 1		94.9				43.0											<b>-</b>			
	<u> </u>	- 10.0	8	7	9						Sat.	*	GRAY, FINE	SANDY SILTY	CLAY (A-7-5)			‡									<u>-</u>			
1/12						::: <u>;</u> ::			1			<b>*</b>						‡									_			
90	89.4	48.5	6	10	10	1		<del> </del>			<sub>Cat</sub> [	<b>*</b>						+									_			
GDT			Ĭ	.	.	•20	0				Sat.	<b>*</b>						1									-			
85 85	<u>                                     </u>					· · · · i·				]		1						<u> </u>									L			
ON ON ON	84.4	53.5	6	10	8						Sat.	<u>}</u>						7									_			
GPJ		-										${f x}$						Ŧ												
08 33	79.4	58.5						+		-		<b>X</b>						Ŧ									Ē			
3DGC			9	14	19		.●33.				Sat.	\$						Ŧ									-			
描 표 <u>75</u>							: : : :					*						‡									F			
	74.4	63.5	10	14	17		31			<b>                                     </b>	Sat.	*						‡									<del>-</del> -			
							<b>∮</b> 31		.			*						‡									<u> </u>			
70	69.4	685					1			<b>↓</b>		*															<u> </u>			
BLE			10	12	18		30				Sat.	*						‡									<u>-</u>			
000							/: : : :					<b>±</b>						1									-			
ш <u>65</u>	64.4	73.5	7	10	12		<del>/</del>	<del> </del>				<b>±</b>						+									_			
OT B		<u> </u>	′	10	13	: : : : : •	23				Sat.	<u>}</u>						Ŧ									E			
60		F				: : : ; ;	: : : :					<b>Ş</b>						Ŧ									F			
NCDOT BORE DOUBLE B533  0	69.4	- - -			18	· · · · · · · · · · · · · · · · · · ·	30				Sat.							+ + + + + + + + + + + + + + + + + + + +									- - - - - - - - -			



# Bridge No. 173 over Lumber River at -L- Station 21+66.08 SITE PHOTOGRAPHS



**Photograph No. 1:** View from End Bent 1 looking northeast



Photograph No. 2: View under the bridge looking northeast



Photograph No. 3: View under the bridge looking downstream



Photograph No. 4: View under the bridge looking northeast

3 Ŕ REFERENCE

**CONTENTS** 

**DESCRIPTION** 

TITLE SHEET

BORE LOG(S)

SITE PHOTOGRAPH

LEGEND SITE PLAN

PROFILE

SHEET NO.

5-8

STATE OF NORTH CAROLINA

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

# **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY ROBESON

PROJECT DESCRIPTION BRIDGE NOs. 173 & 174 ON SR 1550 (LOWE RD.) OVER THE LUMBER RIVER AND LUMBER RIVER OVERFLOW SITE DESCRIPTION BRIDGE NO. 174 OVER LUMBER RIVER OVERFLOW AT STATION 37+28.65 -L-

STATE PROJECT REFERENCE NO. B-5333 0

### **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 (199) 707-6805. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

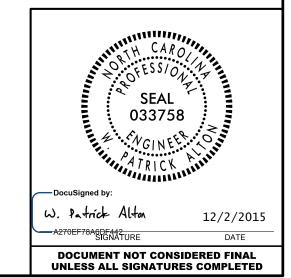
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IMP-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 MICHAELD REAL PROPERTY OF THE PROP 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 DIES 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 SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OF FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS FOR THE TOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

- TES:
  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.
  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.

	C. WANG
	S. DAVIS
	W. SHENBERGER
UVESTICATED	BY F&R, Inc.
INVESTIGATED	J
,	T.T. WALKER
DRAWN BY _	T.T. WALKER
DRAWN BY	T.T. WALKER

PERSONNEL



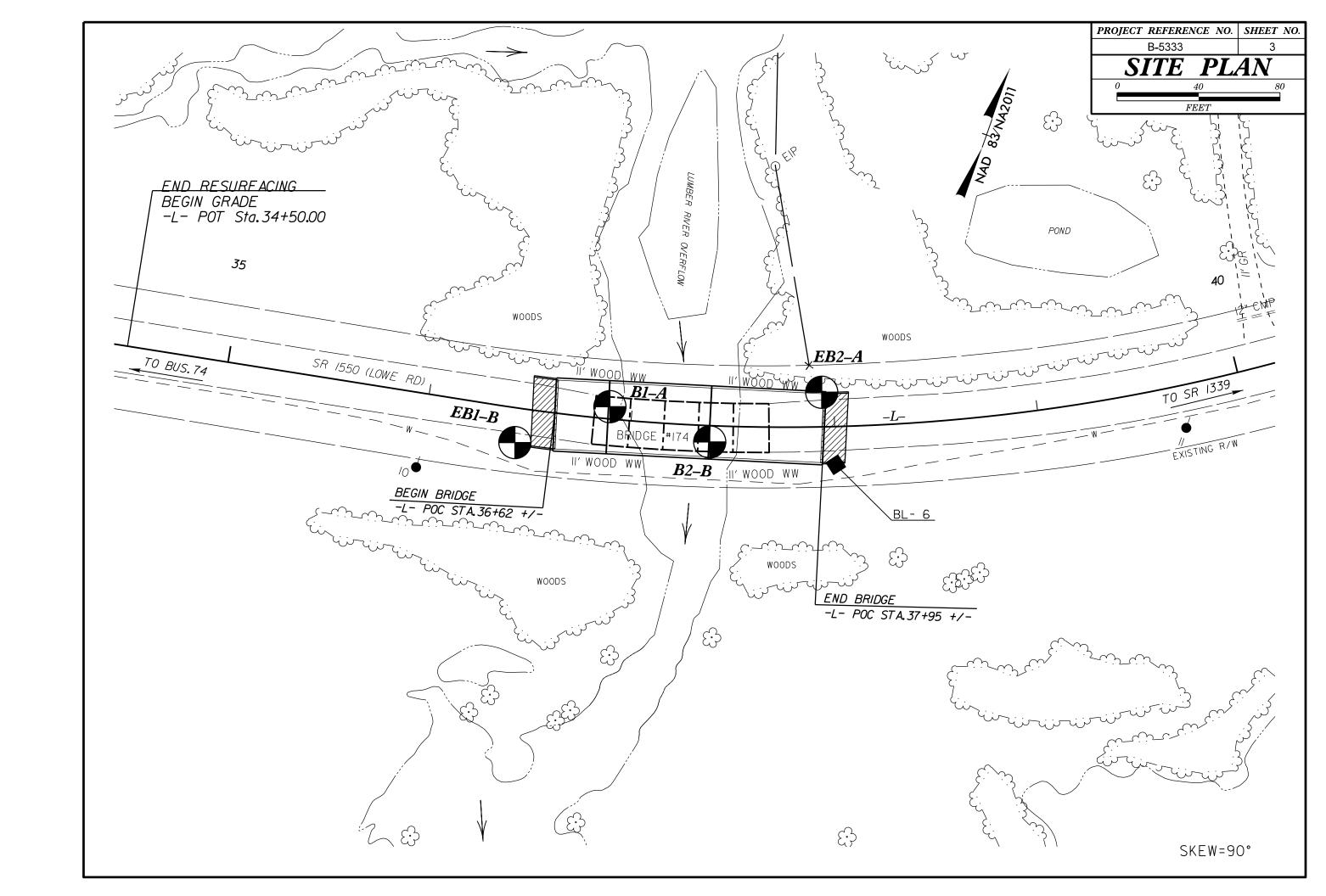
PROJECT REFERENCE NO.	SHEET NO.
B-5333	2

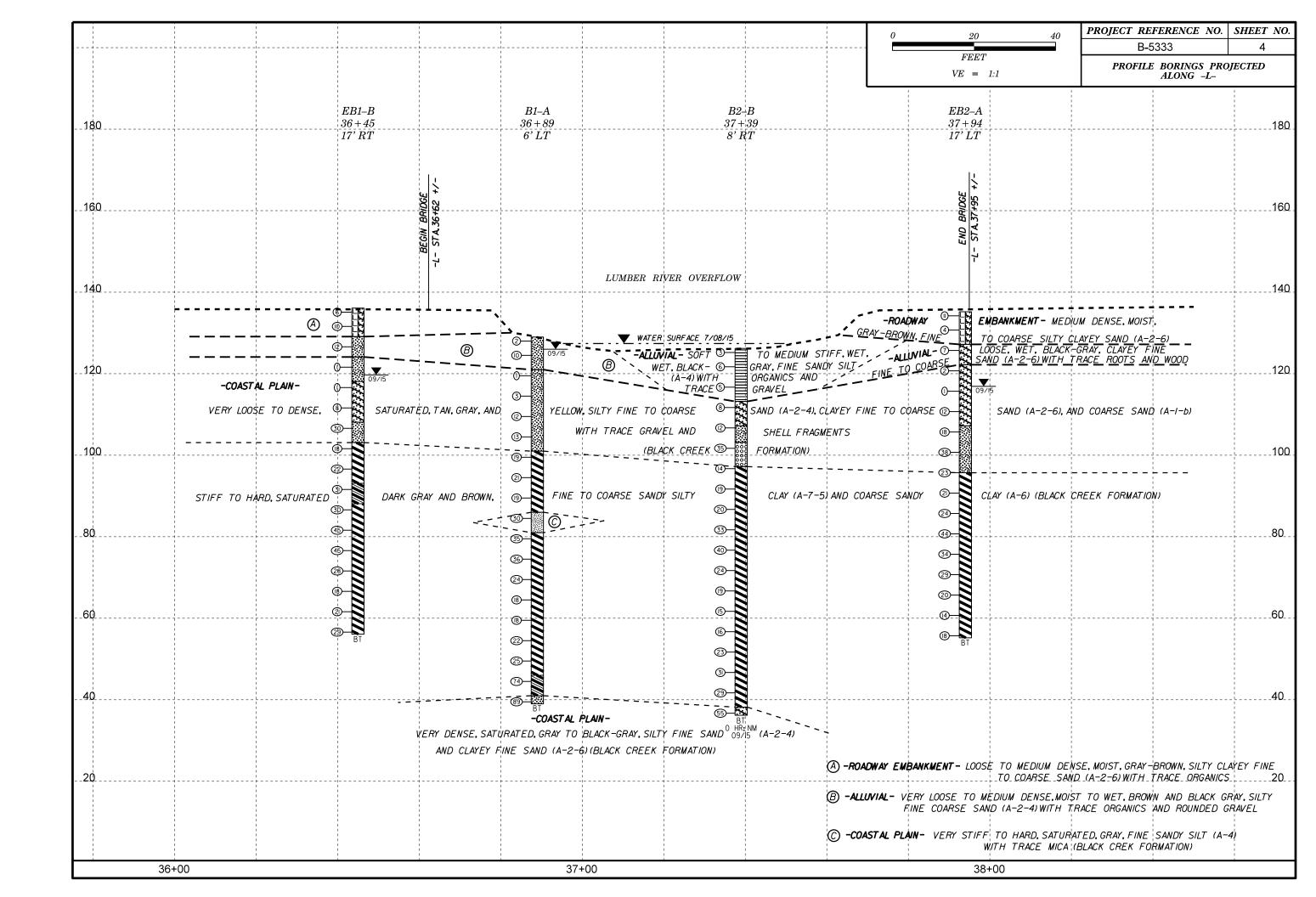
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

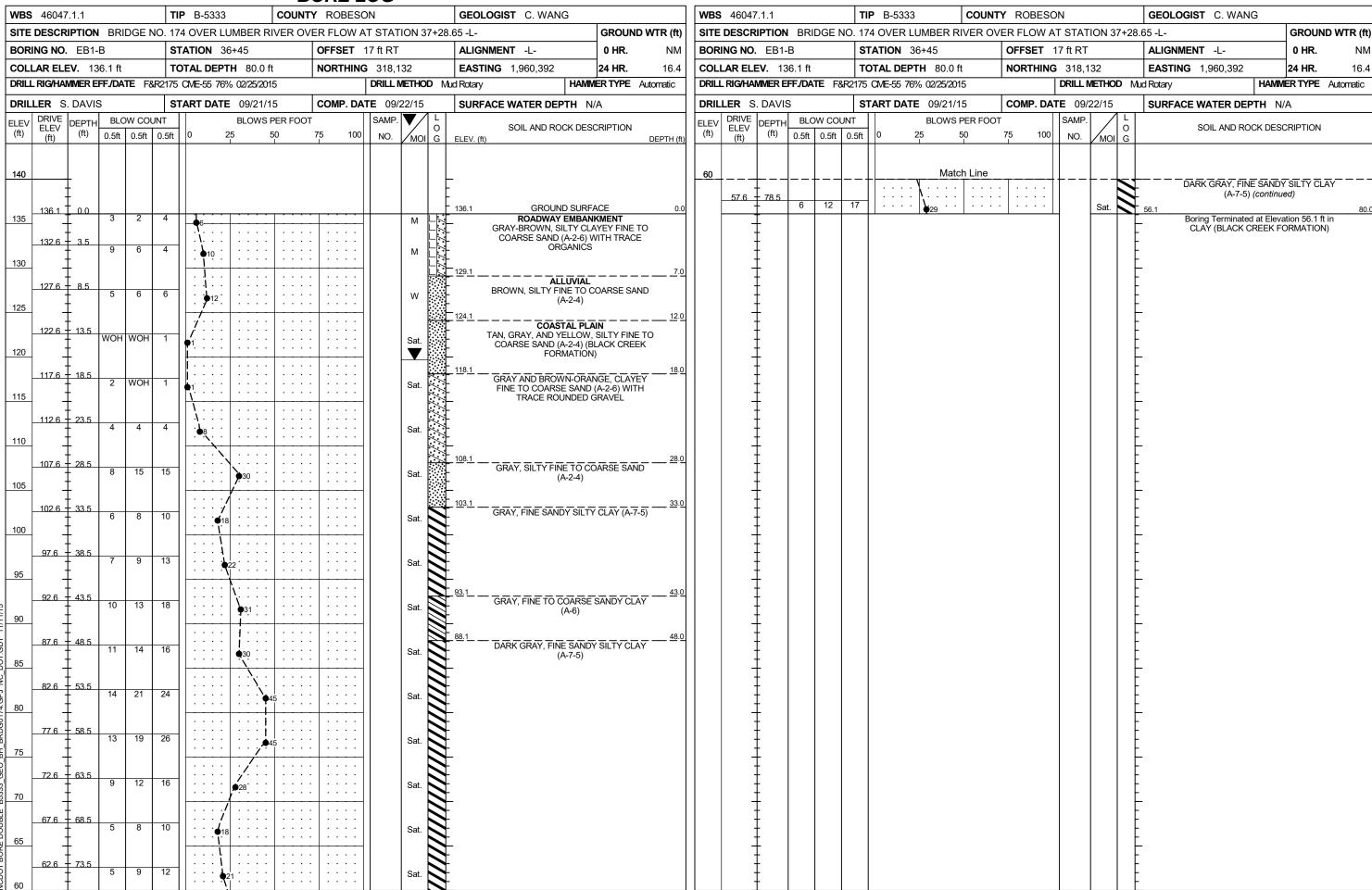
# SUBSURFACE INVESTIGATION

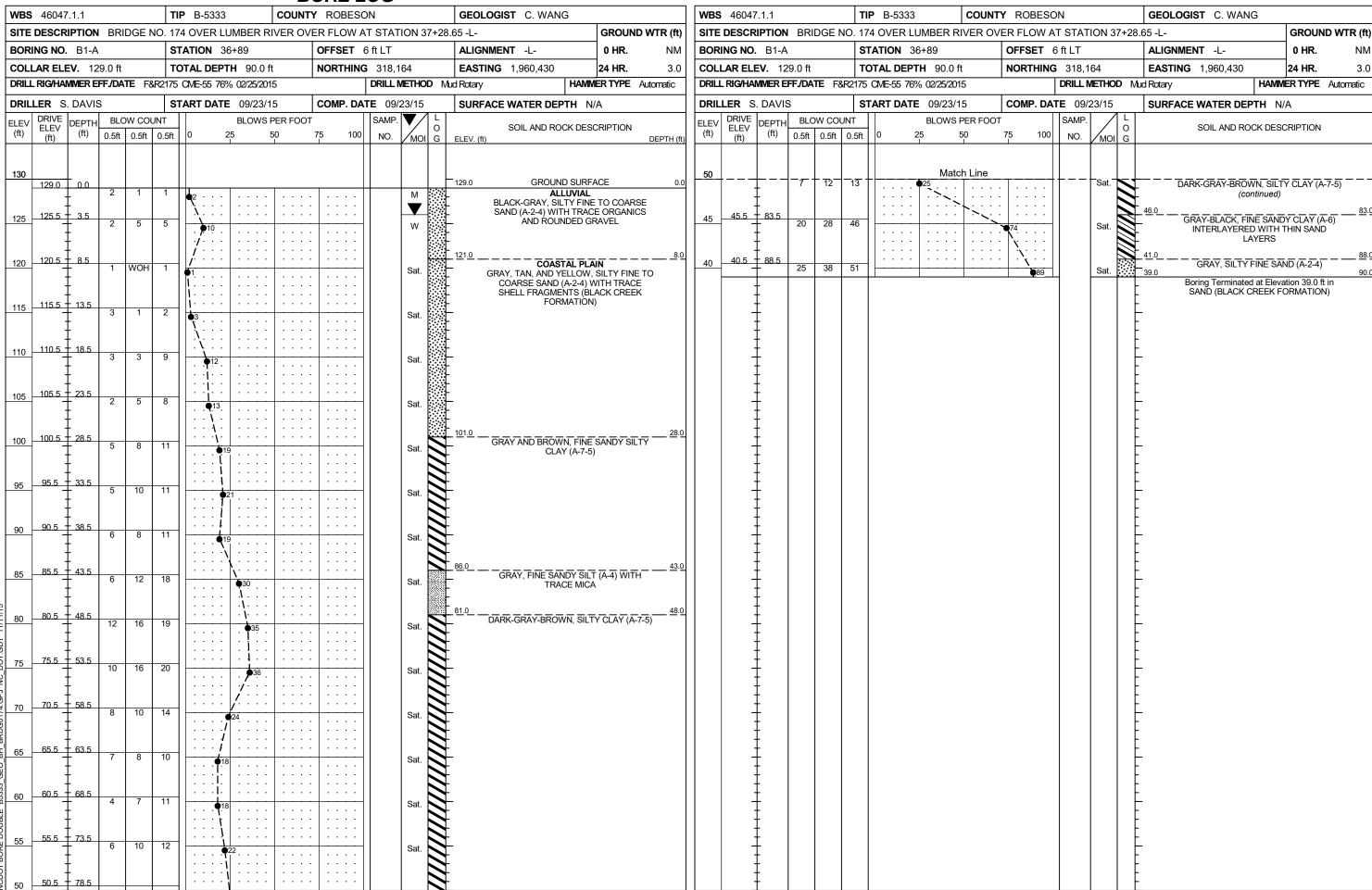
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

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.	ALLUYIUM (ALLUY.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	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.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
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	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS:	ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	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.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 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 TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT	WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE GROUND
LLASS. (\$30, PASSING "200) (>30, PASSING "200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, 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.	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-1- A-1- A-2-4 A-2-5 A-2-6 A-2-7 A-1- A-3 A-6, A-7	COMPRESSIBILITY	FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.  COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
CLASS.   A-1-b   A-2-4   A-2-5   A-2-6   A-2-7     2-6   A-2-7     A-2-7     A-2-7     A-2-7     A-2-7     A-2-7     A-2-7     A-2-7	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR) SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
888888888888888888888888888888888888888	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SEDIMENTARY ROC	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED
7. PASSING SILT- SILT- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	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
*40 38 MX 59 MX 51 MN	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	WEATHERING	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL   MATERIAL	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL  TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOUS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.
LL   -   -   40 MX   41 MN   40 MX   41 MN   40 MX   41 MN   40 MX   41 MN   LITTLE OR   HICHLY	MODERATELY ORGANIC         5 - 10%         12 - 20%         SOME         20 - 35%           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.	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CODITION OF A A A A MY SAMY 12 MY IS MY NO MY AMOUNTS OF ORGANIC	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
USUAL TYPES STORE EDAGS ORGANIC SULLS	✓ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND GADE AND SAND SOULS SOULS	STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SHIP SHIP SHIP SOLES SOLES	VPW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING AS SUBGRADE EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE		DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED 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	SPRING OR SEEP	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
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.  IF TESTED, WOULD YIELD SPT REFUSAL	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
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	WITH SOIL DESCRIPTION OF ROCK STRUCTURES	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT	ITS LATERAL EXTENT.
GENERALLY VERY LOOSE < 4  CONTRACT  LOOSE 4 TO 10	SOIL SYMBOL  SOIL SYMBOL  STOPT DAT TEST BORING  SLOPE INDICATOR INSTALLATION	(SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED 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.
GRANULAR MEDIUM DENSE 10 TO 30 N/A	M	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS
(NON-COHESIVE) DENSE 30 TO 50  (NON-COHESIVE) VERY DENSE > 50	ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER TEST	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.  PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	— INFERRED SOIL BOUNDARY → CORE BORING • SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY SOFT 2 TO 4 0.25 TO 0.5	MMC MONTEONIC DESIGNATION TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u>	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0   MATERIAL   STIFF   8 TO 15   1 TO 2	INFERRED ROCK LINE "MONITORING WELL WITH CORE	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	→ PIEZOMETER INSTALLATION SPT N-VALUE	ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK.  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	UNDERCUT UNDERCUT UNSUITABLE WASTE  UNSUITABLE WASTE  USED IN THE TOP 3 FEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - SEED IN THE TOP 3 FEET OF ACCEPTABLE DEGRADABLE ROCK EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (SE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	BY MODERATE BLOWS.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SIZE IN. 12 3	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	MEDIUM  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 I INCH MAXIMUM SIZE BY HARD BLOWS OF THE	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
SOIL MOISTURE - CORRELATION OF TERMS	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_{ m d}$ - DRY UNIT WEIGHT	POINT OF A GEOLOGIST'S PICK.	TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION  (ATTERBERG LIMITS) DESCRIPTION	CSE COARSE ORG ORGANIC  DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	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 TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	STRATA ROCK QUALITY DESIGNATION (SROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY (SAT.) FROM BELOW THE GROUND WATER TABLE	e - VOID RATIO   SD SAND, SANDY   SS - SPLIT SPOON   F - FINE   SL SILT, SILTY   ST - SHELBY TUBE	VERY CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH	TENGTH 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.
LL _ LIOUID LIMIT	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
PLASTIC   SEMISOLID: REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: BL-6, N: 318173 E: 1960544, STATION 31+40.20, 0.4' RT
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS	BENCH MHRK: BL-6, N: 310113 E: 1360344, 314110N 31+40.20, 0.4 KT
- MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 135.3 FEET
OM OPTIMUM MOISTURE SUBSTITUTE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	10.25
- DRT - (U) ATTAIN OPTIMUM MOISTURE	X CME-55 CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	X 8' HOLLOW AUGERS   L-B L-H	INDURATION	
PLASTICITY INDEX (PI) DRY STRENGTH	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 SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UNGCARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	CASING W/ ADVANCER POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE;	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST   TRICONE STEEL TEETH   HAND AUGER	BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;  DIFFICULT TO BREAK WITH HAMMER.	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT VANE SHEAR TEST	SHARP HAMMER BLOWS REQUIRED TO RREAK SAMPLE.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.	X DRAG BIT	EXTREMELY INDURATED SHARP HAMMER BLOWS REDUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-14
	• '	•	•

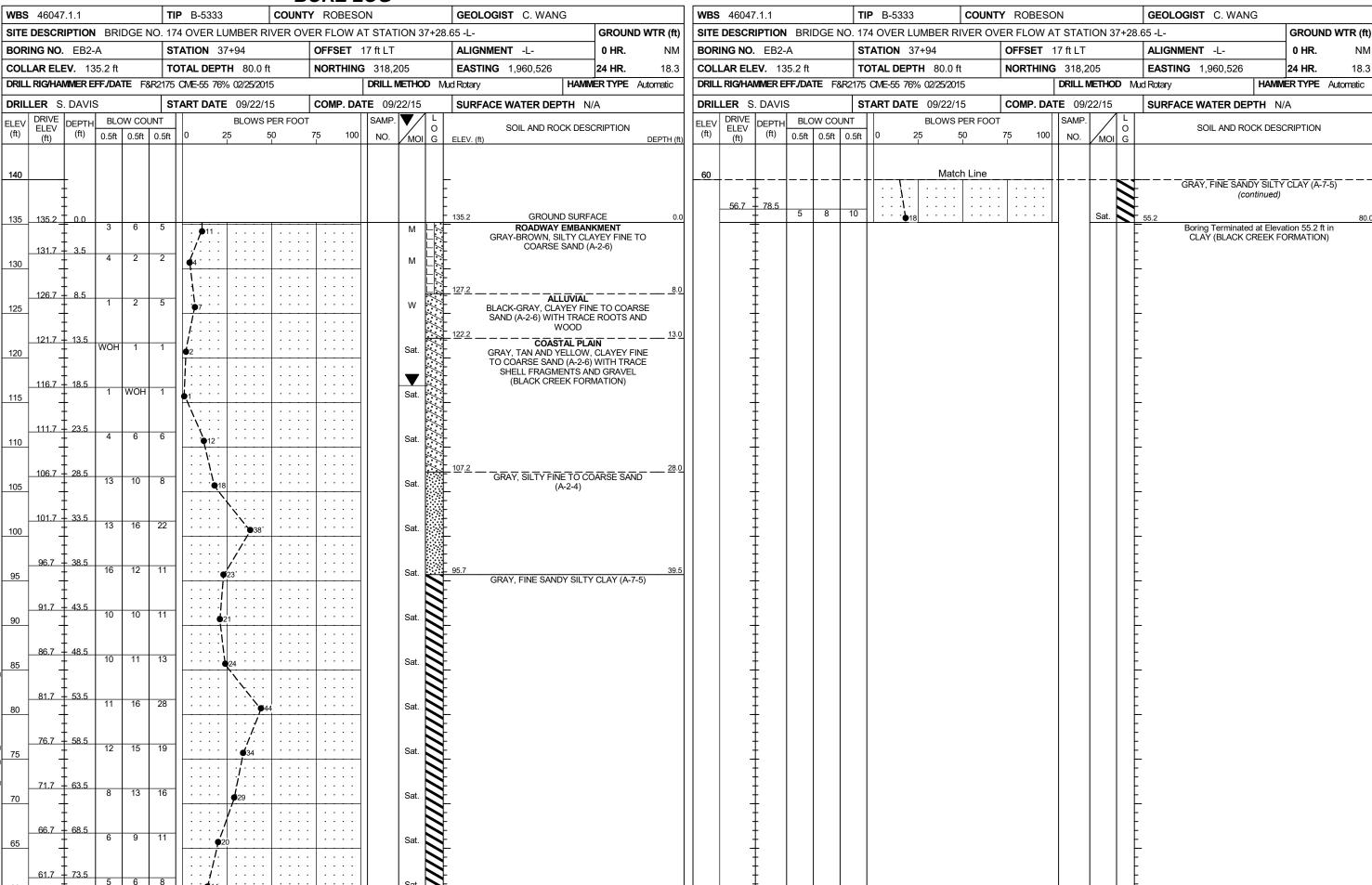








14/00 400 47 4 4		BURE LUG	OFFICE OF WAVE	WD2 40047.4.4	COOL DODGOOM	AFOLOGIST O WALLO
WBS 46047.1.1		JNTY ROBESON	GEOLOGIST C. WANG	WBS 46047.1.1 TIP B-53		GEOLOGIST C. WANG
	SE NO. 174 OVER LUMBER RIVER			SITE DESCRIPTION BRIDGE NO. 174 OVE		
BORING NO. B2-B	<b>STATION</b> 37+39	OFFSET 8 ft RT	ALIGNMENT -L- 0 HR. FIAD	BORING NO. B2-B STATION		ALIGNMENT -L- 0 HR. FIAD
COLLAR ELEV. 126.7 ft	TOTAL DEPTH 90.0 ft	NORTHING 318,164	EASTING 1,960,482 24 HR. N/A		DEPTH 90.0 ft   NORTHING 318,1	
	F&R2175 CME-55 76% 02/25/2015	DRILL METHOD		DRILL RIG/HAMMER EFF/DATE F&R2175 CME-55		/IETHOD Mud Rotary HAMMER TYPE Automatic
DRILLER S. DAVIS	START DATE 09/24/15	COMP. DATE	SURFACE WATER DEPTH N/A	DDIVE	DATE 09/24/15   COMP. DATE 09/2	24/15 SURFACE WATER DEPTH N/A
ELEV   FLEV   DEPTH   BLOT	COUNT         BLOWS PER F           5ft         0.5ft         0         25         50	75 100 NO. MOI G	SOIL AND ROCK DESCRIPTION	Company	BLOWS PER FOOT SAMP.  25 50 75 100 NO.	O SOIL AND ROCK DESCRIPTION
130				48.2 78.5 8 12 19 · · ·	Match Line	DARK BROWN-GRAY, FINE TO COARSE SANDY SILTY CLAY (A-7-5) (continued)
†	3 3		BLACK-GRAY, FINE SANDY SILT (A-4) WITH LITTLE ORGANICS AND TRACE GRAVEL	43.2 83.5 8 12 17	29	Sat.
†	3 2 \$\bigsim_{5} \\ \dots \dots \\ \dots \dots \\ \dots			38.2 88.5 9 18 37	• • • • • • • • • • • • • • • • • • •	38.7 BLACK-GRAY, CLAYEY FINE SAND (A-2-6) 90.0  Boring Terminated at Elevation 36.7 ft in
113.2 13.5	3 5	W	113.7 COASTAL PLAIN GRAY, CLAYEY FINE TO COARSE SAND (A-2-6) WITH TRACE GRAVEL (BLACK			SANĎ (BLACK CREEK FORMATION)
108.2 + 18.5	4 8	Sat.	107.7 19.0 TAN-GRAY, SILTY FINE SAND (A-2-4)			
103 2 7 23 5	6 19 35		103.7 23.0 23.0 TRACE GRAVEL AND SHELL FRAGMENTS			
98.2 28.5 4	6 8		29.0 DARK BROWN-GRAY, FINE TO COARSE SANDY SILTY CLAY (A-7-5)			
90 93.2 7 33.5 4	7 12	Sat.				
85	9 11 20	Sat.				
08 11/1/12	5 18					
75 75 13	20 20	Sat.				
7 70 7		Sat.				
68.2 T 58.5 7 HB 65	9 10   • 19					
60						
55						
53.2 7 73.5	0 13	Sat.				





# Bridge No. 174 over Lumber River Overflow at -L- Station 37+24.46 SITE PHOTOGRAPHS



**Photograph No. 1:** View from End Bent 1 looking east



Photograph No. 2: View from the bridge looking downstream/south



**Photograph No. 3:** View from End Bent 2 looking west