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### STATE OF NORTH CAROLINA

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

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### **STRUCTURE** SUBSURFACE INVESTIGATION

COUNTY MONTGOMERY

PROJECT DESCRIPTION REPLACE BRIDGE NO. 53 ON NC 73 OVER DROWNING CREEK

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5362	1	12

### **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 NCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

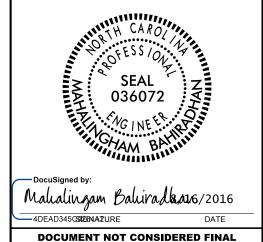
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT, FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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 THE DEPARTMENT AS TO THE TYPE THE SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISTY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR IS ALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE ENCOUNTERED ON THE PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONS TO BE 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.

R. TOOTHMAN W. ALLEN M. BAHIRADHAN INVESTIGATED BY A. PRUITT DRAWN BY \_\_T. WELLS /C. BUTLER CHECKED BY R. RIVENBARK SUBMITTED BY SCHNABEL 

**PERSONNEL** 

T. WELLS



**UNLESS ALL SIGNATURES COMPLETED** 

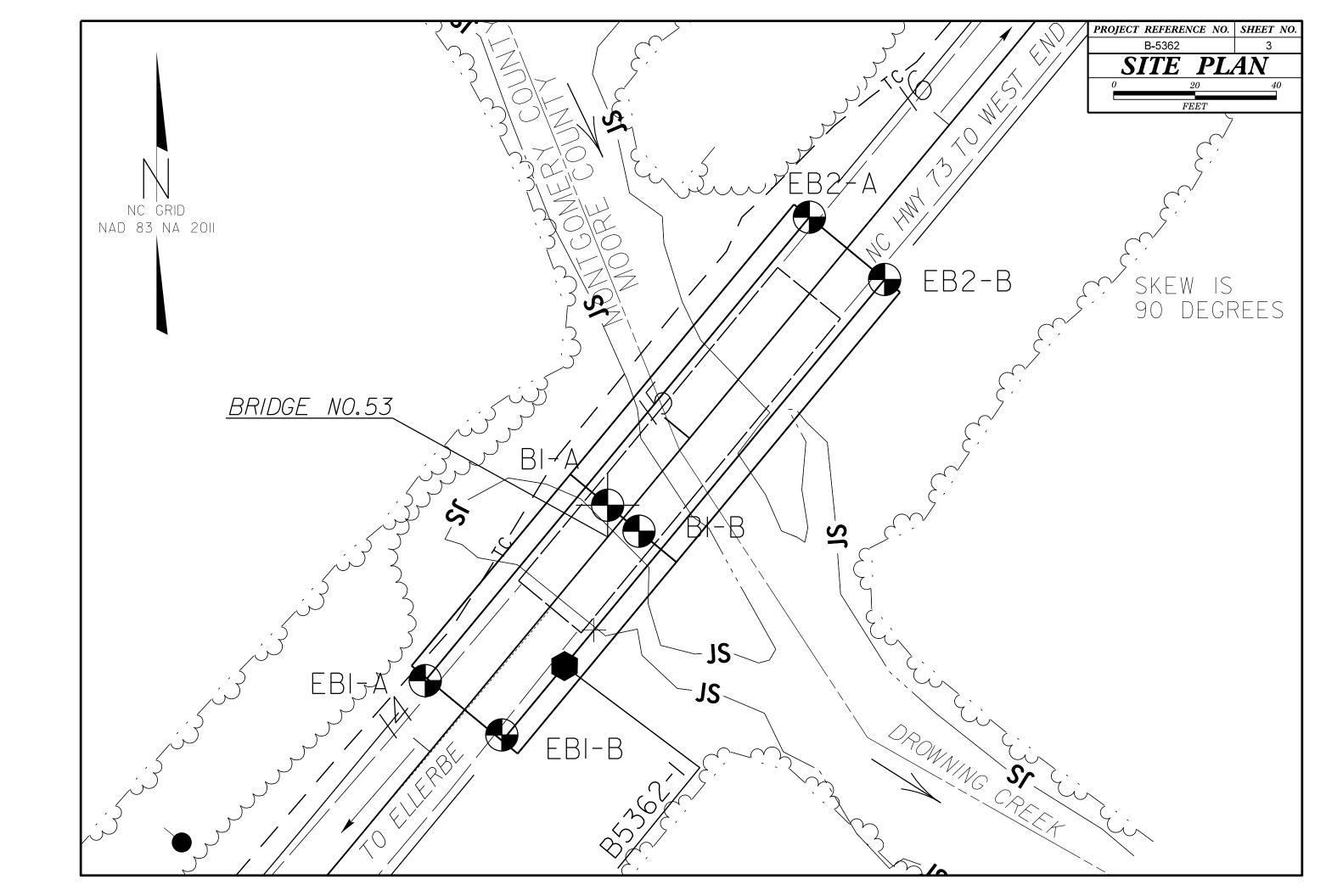
PROJECT REPERENCE NO. SHEET NO. 2

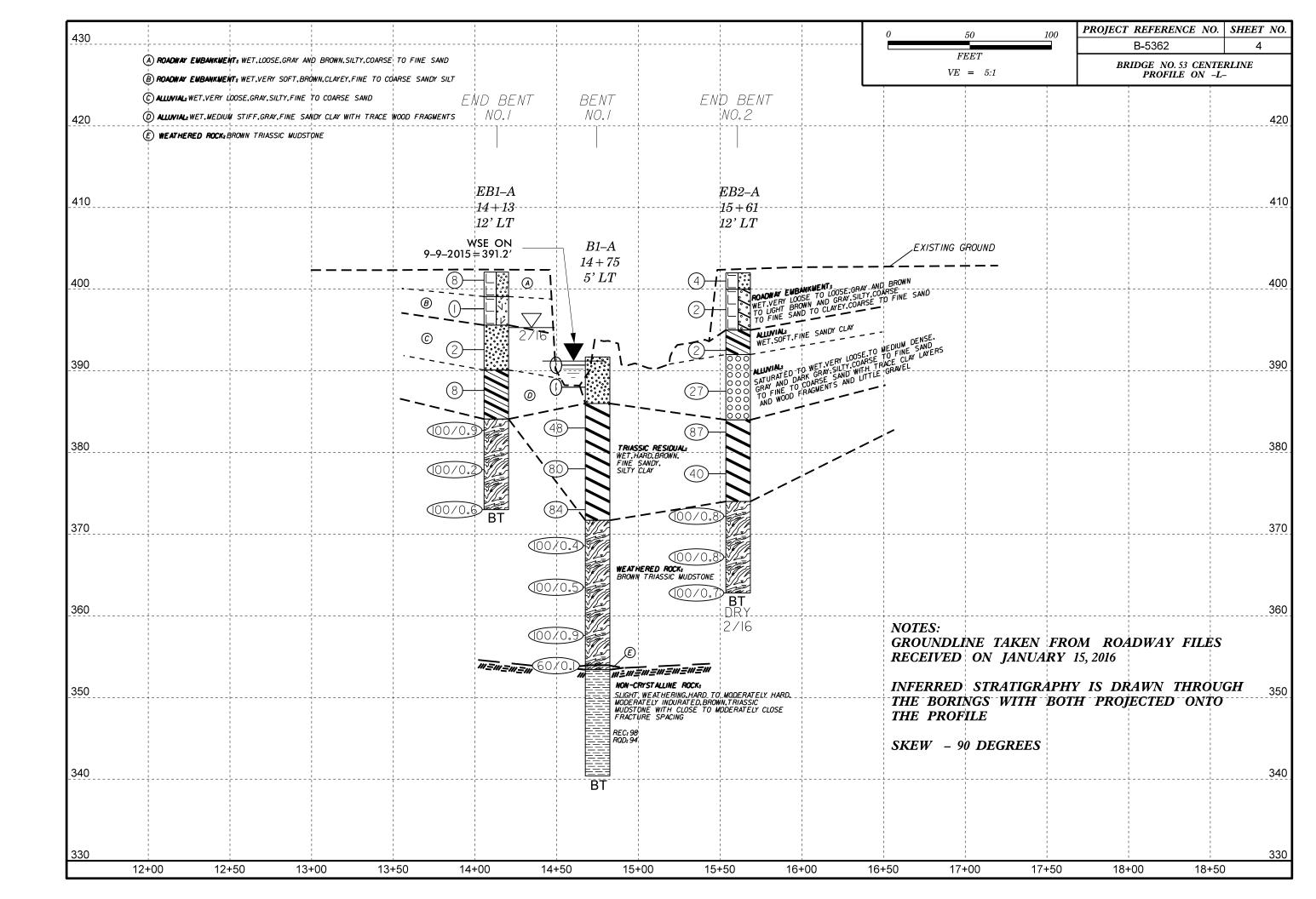
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

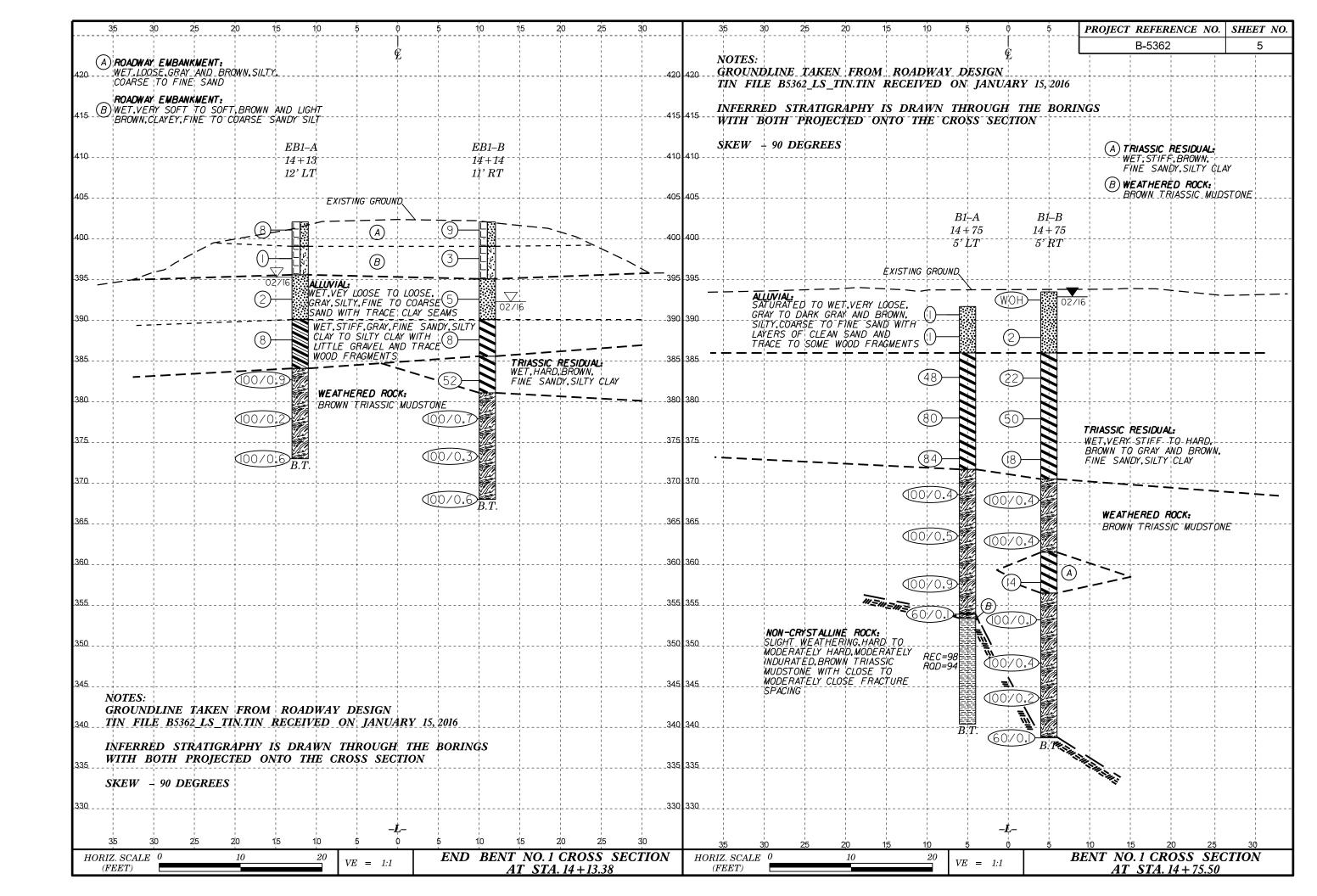
## SUBSURFACE INVESTIGATION

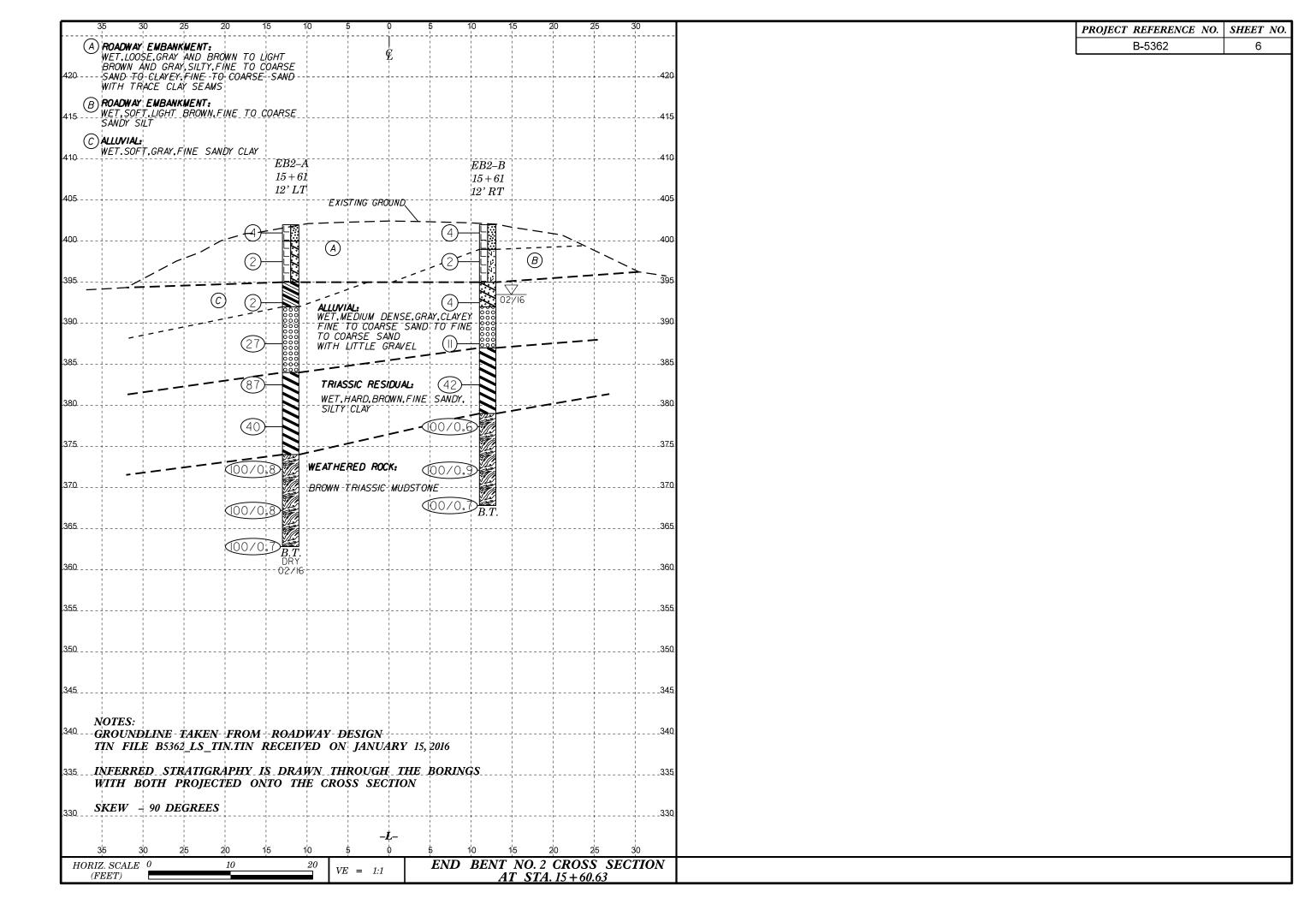
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

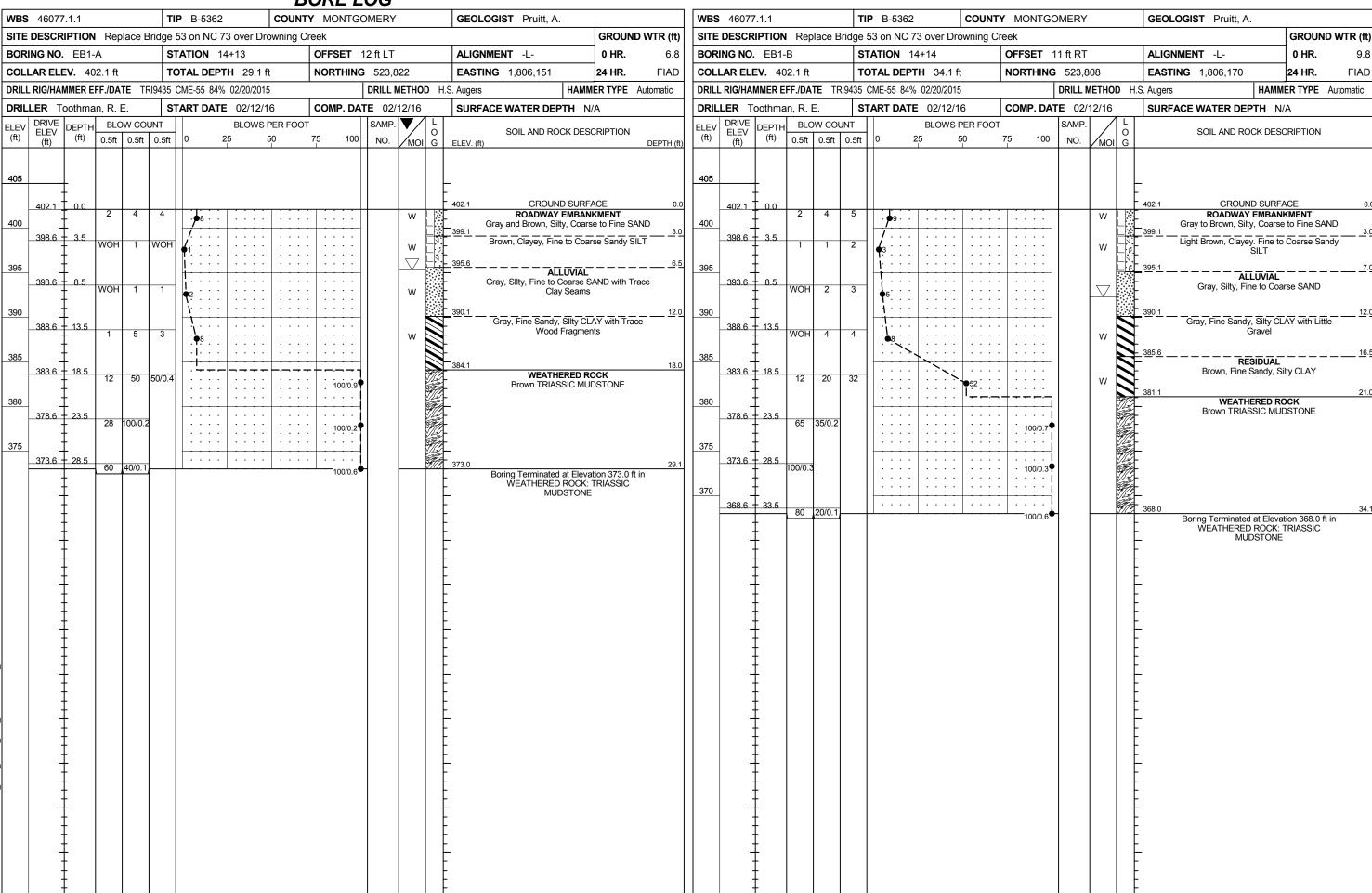
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION  HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED	TERMS AND DEFINITIONS			
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER 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.	ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.			
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM D1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING:	GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN	AQUIFER - A WATER BEARING FORMATION OR STRATA.			
CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	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. (5.30% PASSING "2000) (>.30% PASSING "2000)	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 A-1-b A-2-4 A-2-5 A-2-6 A-2-7 S-2-5 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.			
000000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31	ROCK (NCR)  SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	COLLUYIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE.			
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LL = 31 - 50 HIGHLY COMPRESSIBLE LL > 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED			
7. PASSING   GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC.	BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
■ 40 30 MX 50 MX 51 MN SOILS COLIS		WEATHERING	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   35 MX   36 MN   36 MN   36 MN   36 MN	ORGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING. ROCK RINGS UNDER	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE			
MATERIAL PASSING *40	TRACE OF ORGANIC MATTER 2 - 3%, 3 - 5%, TRACE 1 - 10%, LITTLE ORGANIC MATTER 3 - 5%, 5 - 12%, LITTLE 10 - 20%	HAMMER IF CRYSTALLINE.	HORIZONTAL.			
LL - 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 5011.5 WITH	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, (V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF	DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE			
PI 6 MX NP IN MX II MN II MN II MN II MN II MN II MN MODERATE DECANIC	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	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  SLI,) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	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 STUNE FRAUS. FINE SILTY OR CLAYEY SILTY CLAYEY MATTER		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 POOR UNSUITABLE	<u> </u>	(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 SUBURALE PUR	O-∭⊶ SPRING OR SEEP	WITH FRESH ROCK.	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.			
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	<u> </u>	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD.			
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH (MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK.	JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.			
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) 25/025 DIP & DIP DIRECTION	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO			
CONSISTENCY (N-VALUE) (TONS/FT <sup>2</sup> )	₩ITH 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  CONTROL CONT	SOIL SYMBOL  SOIL SYMBOL  SPT DPT DPT TEST BORING INSTALLATION  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	I M	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) MEDIA DENSE 30 TO 50	THAN ROADWAY EMBANKMENT AUGER BORING CONE PENETROMETER	VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.			
VERY DENSE         > 50           VERY SOFT         < 2	- 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	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM.			
VERY SOFT         < 2         < 0.25           GENERALLY         SOFT         2 TO 4         0.25 TO 0.5	MW - TECT BODING	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	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF			
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4	TTTTT ALLUVIAL SOIL BOUNDARY A PIEZOMETER INSTALLATION - SPT N-VALUE	SCATTERED CONCENTRATIONS. QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS. SAPROLITE IS ALSO AN EXAMPLE.	ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.			
HARD > 30 > 4	INSTRUCTION	ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT			
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES	ROCK.			
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	UNDERCUT 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	HEED IN THE TOP 2 EEET OF	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.			
BOULDER COBBLE GRAVEL SAND SAND SILT CLAY	SHALLOW UNCLASSIFIED EXCAVATION - UNDERCUT STEEL OF ACCEPTABLE DEGRADABLE ROCK 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			
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED	OR SLIP PLANE.			
GRAIN MM 305 75 2.0 0.25 0.05 0.005	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.  HARD 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	Let $\gamma_{ m d}$ 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 (SRQD) - 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	LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY			
LL _ LIOUID LIMIT	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY FINGERNAIL.	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.  TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.			
PLASTIC   SEMISOLID; REQUIRES DRYING TO	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	7.72				
(PI) PL PLASTIC LIMIT ATTAIN OPTIMUM MOISTURE	FRAGS FRAGMENTS	FRACTURE SPACING BEDDING  TERM SPACING TERM THICKNESS	BENCH MARK: B5362-I- STA 14+37, 12' RT (523,825' N, 1,806,186' E)			
	EQUIPMENT USED ON SUBJECT PROJECT	VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	ELEVATION: 401.9 FEET			
OM _ OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET MODERATELY CLOSE 1 TO 3 FEET THINLY BEDDED 0.16 - 1.5 FEET				
SL SHRINKAGE LIMIT	CME-45C CLAY BITS X AUTOMATIC MANUAL	CLOSE 0.16 TO 1 FOOT VERY THINLY BEDDED 0.03 - 0.16 FEET	NOTES:			
- DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE	6' CONTINUOUS ELICHT AUGER	VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IMMEDIATELY AFTER DRILLING			
	X CME-55   ☐	INDURATION	1			
PLASTICITY		FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1			
PLASTICITY INDEX (PI)         DRY STRENGTH           NON PLASTIC         0-5         VERY LOW		DURRING WITH FINGED EDEES NUMEROUS COAINS.				
SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST VAN TEST VA	FRIABLE 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 OP MODE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HOUSE	BREAKS EASILY WHEN HIT WITH HAMMER.	l			
HIGHLY PLASTIC 26 OR MORE HIGH	- I HAND AUGER					
HIGHLY PLASTIC 26 OR MORE HIGH  COLOR	X TRICONE 2-15/6 TUNG,-CARB. SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;				
COLOR  DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	TOUGHT 2 15/1 TIME CARD	DIFFICULT TO BREAK WITH HAMMER.				
COLOR	X TRICONE 2-15/6 TUNGCARB. SOUNDING ROD		DATE: 8-15-14			











							BORI	= <u>L</u>	<u>UG</u>						
	46077					IP B-5362	COUNTY MO	NTGO	MERY			GEOLOGIST Wells, T. R			
				lace l		53 on NC 73 over Dro							G	ROUNI	O WTR (f
BORI	NG NO.	B1-A	١		_	TATION 14+75	OFFS	<b>ET</b> 5	ft LT			ALIGNMENT -L-	0	HR.	N/
COLL	AR ELE	<b>V</b> . 39	91.7 ft		T	OTAL DEPTH 51.3 ft	NORT	HING	523,86	35		<b>EASTING</b> 1,806,196	24	HR.	N/
DRILL	RIG/HAN	MER E	FF./DA	TE T	RI9435	CME-55 84% 02/20/2015			DRILL ME		D Mu	ıd Rotary/NQ Core H	IAMMER	TYPE	Automatic
DRIL	LER To	oothma	_			TART DATE 02/10/1		. DAT	E 02/1	1/16		SURFACE WATER DEPTH	1.2ft		
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	0.5ft	0.5ft	_	- 1	PER FOOT 0 75	100	SAMP.	MOI	O G	SOIL AND ROCK ELEV, (ft)	DESCRIF	PTION	DEPTH
395	391.7	- 0.0		1	WOH	<b>L</b>				<b>V</b>		- — WATER SURFA 391.7 GROUND S	SURFACE		2 F
390	389.0	2.7		WOH		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				Sat.		Gray and Dark Gray, S SAND with Trace Layer Wood Fra	Silty, Coar	rse to Fi n Sand a	ne and
385	384.0	- - 7.7		- Alla								386.0 TRIASSIC R Brown, Fine San	RESIDUAL		
380			10	22	26		48			W					
	379.0	12.7	14	34	46		80			w					
375	374.0	- - 17.7	9	16	68	*****		4		w		k <del>1</del> 3 k			
370	369.0	22.7	100/0.4				* * * *	0/0.4		700000000000000000000000000000000000000		371.7 WEATHERI Brown TRIASSIC			2
365	364.0	- - 27.7	100/0.5					0/0.5							
360	359.0	32.7	9	11	88/0.4		A \$1000000 1 4 4					8 5 <del></del> 0 ₽			
355	354.0	37.7	3	''	66/0.4		내 # # # # # # # # # # # # # # # # # # #	9/0.9							3
350		-	60/0.1			* * * * * * * * * * * * * * * * * * *	* * * * * * * * * * * * * * * * * * *	60/0.1 <b>P</b>			<b>*</b>	353.9 NON-CRYSTAI Brown TRIASSIC WEATHERI Brown TRIASSIC	C MUDST	ONE	<u>_</u>  =
345	1											NON-CRYSTAL Brown TRIASSIC	LLINE RO	CK	
	1					8000 800					and office of the control of the con	340.4			
								I.			-	Boring Terminated at NON-CRYSTALLINE MUDST	ROCK: T	340.4 ft RIASSI	in C
		W-19-704													
											-	<del>-</del>			
	1											-			
	-											- - -			
	-					y									

### GEOTECHNICAL BORING REPORT CORE LOG

SHEET 8

MIDC	46077	1 1			TID	B-536	2	C		_	IONITGO	DMERY	GEOLOGIST Wells, T.	D		
_			I Por	logo Drid				_		_	IONTG	JIVIERT	GEOLOGIST Wells, 1.		POUR	D WTR (ft)
SITE DESCRIPTION Replace Brid BORING NO. B1-A								Drowr	iirig C	_	FSET 5	AIT	ALIGNMENT -L-		0 HR.	N/A
-					_		14+75	0.6		-						
	LAR ELE					PTH 51			NO	RIHING	523,865	EASTING 1,806,196		4 HR.	N/A	
$\vdash$				TE TRI94								DRILL METHOD Muc				Automatic
_	LER T		an, R. I				TE 02/1			CO	MP. DA	TE 02/11/16	SURFACE WATER DEP	TH 1.2ft		
	E SIZE RUN		1	DRILL	IOIA	IN RU	N 13.5 f		ATA	L				_		
ELEV (ft)	ELEV	DEPTH (ft)	RUN (ft)	RATE (Min/ft)	REC.	RQD (ft) %	SAMP. NO.	STR REC. (ft)	RQD (ft)	o G	=. =		ESCRIPTION AND REMARKS	s		05071.40
	(ft)			(IVIII/IL)	<u>%</u>	<u>%</u>		%	<u>%</u>		ELEV. (f	τ)	Pagin Coring @ 27.9.ft			DEPTH (ft)
353.9	353.9	37.8	3.5	0:15/0.5	(2.9)	(2.8)		(0.0)	(0.0)	360	353.9 353.4	1	Begin Coring @ 37.8 ft WEATHERED ROCK	TDIAGGIG	MUDOT	ONE 137.8
350	350.4 -	41.3		0:15/0.5 6:40/1.0 4:30/1.0 5:05/1.0	83%	80%		0% (12.8)	0% (12.2)		-	,	ing, Very Soft, Friable, Brown NON-CRYSTALLINE ROCK	(		
330	1		5.0	11:18/1.0 7:03/1.0	(4.9) 98%	(4.4) 88%		98%	94%		-	Slight Weathering, Ha TRIASSIC MUDSTO	ard to Moderately Hard, Mode NE with Close to Moderately 0	rately Indur Close Fracti	ated, Brure Spac	own sing
				5:11/1.0 4:27/1.0	55,0	00,0							ractures at 0 Degrees to 5 Deg			
345	345.4	46.3	5.0	5:07/1.0 7:10/1.0	(5.0)	(5.0)	260				-	1 Fractu	re Spacing at 40 Degrees to 5	0 Degrees		
	:			6:58/1.0 5:39/1.0		100%										
	340.4	51.3		3:00/1.0 4:48/1.0							340.4					51.3
												Boring Terminated	at Elevation 340.4 ft in NON-C TRIASSIC MUDSTONE	RYSTALLI	NE ROC	K:
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# CORE PHOTOGRAPH REPLACE BRIDGE 53 ON NC 73 OVER DROWNING CREEK

**B1-A**BOXES 1 & 2: 37.8 - 51.3 FEET

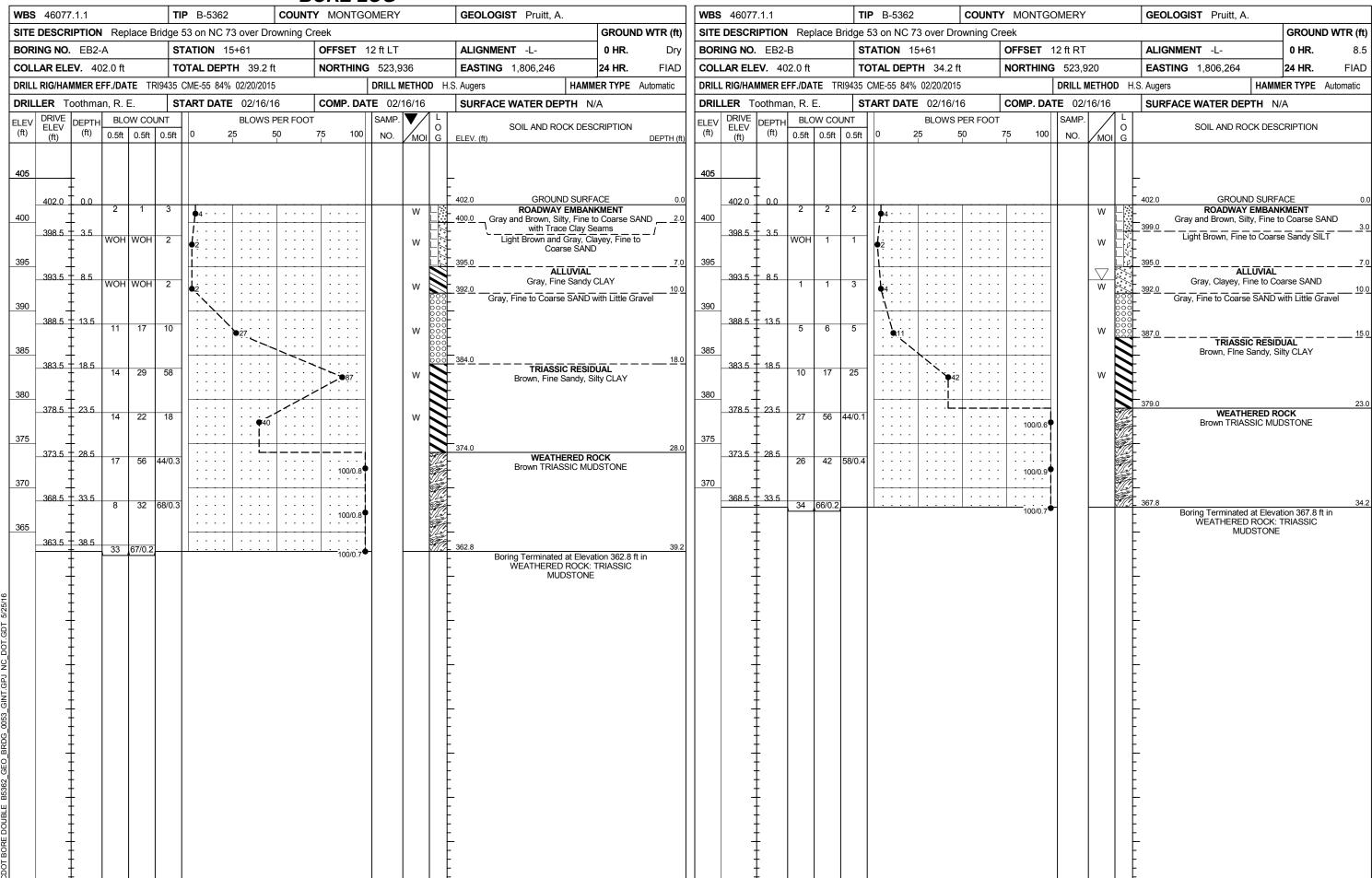


APPROXIMATE SCALE IN FEET

SHEET NO. 9 46077.1.1 (B-5362) MONTGOMERY COUNTY

									UKE L				1	
WBS	46077	'.1.1			T	<b>IP</b> B-5362		COUNT	Y MONTG	OMERY			GEOLOGIST Wells, T. R.	
SITE	DESCR	IPTION	I Rep	olace E	Bridge	53 on NC 7	3 over Dro	owning C	reek					GROUND WTR (ft)
BOR	NG NO.	B1-B	}		S	TATION 1	4+75		OFFSET	5 ft RT			ALIGNMENT -L-	<b>0 HR.</b> N/A
COLI	AR ELE	<b>EV.</b> 39	3.5 ft		T	OTAL DEPT	<b>H</b> 54.8 ft	t	NORTHING	523,8	58		<b>EASTING</b> 1,806,204	<b>24 HR.</b> 0.6
DRILL	RIG/HAI	MMER E	FF./DA	TE TE	 RI9435	CME-55 84%	02/20/2015	<u> </u>	l	DRILL N	/ETHO	<b>D</b> Mu	d Rotary HAMM	ER TYPE Automatic
DRII	LER T	oothms	n R	F	S	TART DATE	- 02/09/1	6	COMP. DA				SURFACE WATER DEPTH NA	/Δ
	DDI\/E			DW CO				PER FOOT		SAMP.	10/10	1 L T	SORI ACE WATER BEF III 10/	'A
ELEV (ft)	ELEV (ft)	DEPTH (ft)		0.5ft	_	0 2		50 	75 100	NO.	МОІ	0	SOIL AND ROCK DESC ELEV. (ft)	CRIPTION DEPTH (ft)
395	393.5	0.0											393.5 GROUND SURFA	ACE 0.0
390	-		WOH	WOH	WOH	0							ALLUVIAL Brown, Silty, Coarse to Fir Some Wood Fragr	
	388.9	4.6	2	1	1	2					w		•	
385	-	-				.\							.386.0 TRIASSIC RESID	UAL
	383.9	9.6	7	9	13		22	: : : :			w		Brown to Gray and Brown, F CLAY	
380	378.9 -	14.6					`.\							
	- 376.9 -	14.0	18	22	28			50			w			
375	373.9	19.6			40		1							
070	-	_	4	5	13	. · · • • 18					W		370.5	23.0
370	368.8 -	24.7	30	100/0.4	4								WEATHERED RO Brown TRIASSIC MUI	OCK
365	-	_							100/0.4					
303	363.8	29.7	25	100/0.4	4									
360	-					: : F ÷		+	100/0.4				361.5 TRIASSIC RESID	
000	358.8 -	34.7	25	9	5						l w		Brown, Fine Sandy, Si	Ilty CLAY
355	-	_				· · · • · · ·		-:-:-:			''	-	356.5 WEATHERED RO	37.0 <b>DCK</b>
333	353.8 -	39.7	07	100/0.4									Brown TRIASSIC MUI	
	-	<u> </u>	21	100/0.1	1				100/0.1	<b>'</b>				
350	348.8 -	44.7												
	-	_	24	100/0.4	4				100/0.4	•				
345		‡ <u>-</u>											•	
	343.8 -	49.7	100/0.2	2					100/0.2	•				
240	-	‡												
340	338.8 -	54.7											338.8	54.7
	-	-	60/0.1				•		60/0.1	7		-	NON-CRYSTALLINE TRIASSIC MUDST	
	- - - - -	- - - -										-	Boring Terminated with Penetration Test Refusal at I ft in NON-CRYSTALLINE RO MUDSTONE	Standard Elevation 338.7 DCK: TRIASSIC
	- - -													
ļ	- - -												•	
	-													
	-	‡												





# SITE PHOTOGRAPHS REPLACE BRIDGE NO. 53 ON NC 73 OVER DROWNING CREEK



View looking upstation along NC 73



View of Drowning Creek from northeast of End Bent No. 2