STATE OF NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

CONTENTS

Ö

2180.1

SHEET	DESCRIPTION
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-8	CROSS SECTION
9-19	BORE LOG & CORE REPORTS & CORE PHOTOGRAPHS
20	ROCK CORE TEST RESULTS
21	SITE PHOTOGRAPHS

STRUCTURE SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 42180.1.1 (B-5105) F.A. PROJ.BRSTP-4982 (7)

COUNTY MECKLENBURG

PROJECT DESCRIPTION BRIDGE NO. 49 OVER LITTLE SUGAR

CREEK ON SR 4982 (LANCASTER HIGHWAY)

| STATE | STATE PROJECT REFERENCE NO. | SHEET | SHEETS | N.C. | 42180.1.1 (B-5105) | 1 | 21

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 HOT FOR CONSTRUCTION OR PAY PURPOSES. THE MARRING FILED BORNOL GLOSE, ROCK CORES, AND SOUL TEST DATA AVAILABLE MAY BE REVENED OR INSPECTED IN RALEIGH BY CONTACTING THE N. C. DEPARTMENT OF TRANSPORTATION, GEOTECHNICAL ENGINEERING UNIT AT 1919) TOT-BBSD. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORNOL GOS. ROCK CORES, OR SOUL TEST DATA ARE PART OF THE CONTRACT,

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A CEDITECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORNOS OR BETWEEN SAMPLED STRATA WITHIN THE BORFHOLE, THE LABORATION YEARNELD STRATA DATE IN SITUIL IN-PLACED TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INNERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOSTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTICATIONS ARE AS RECORDED AT THE TIME OF THE INVESTICATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS MY ANY CONSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS MY ANY ORNSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS MY ANY ORNSIDERABLY WITH THE ACCORDING TO CLIMATIC CONDITIONS MY CANDITIONS AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BODER 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 BODING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN REFORMATION ON THIS PROJECT. THE OFFRETWENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INVESTIGATION MADE, NOR THE INTERPRETATIONS MADE, OR OFFINAND OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH HOBERDEND SUBJECTACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY MINSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL MAYE NO CLAM 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.

J. W	HITE	
R. A	IONTGOM	ERY

PERSONNEL

INVESTIGATED BY_	D. GOODNIGHT
CHECKED BA	X. BARRETT

CHECKED BY

TED BY KLEINFELDER

DATE JANUARY 2014

SEAL 37998

WILLIAM OMAS R. WELLING

DRAWN BY: W. FELDER

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR CLIARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IT IS CONSIDERED TO BE PART OF THE PLANS, SPECIFICATIONS, OR CONTRACT FOR THE PROJECT.

NOTE - 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.

PROJECT REFERENCE NO. SHEET NO. 42180.1.1 (B-5105) 2

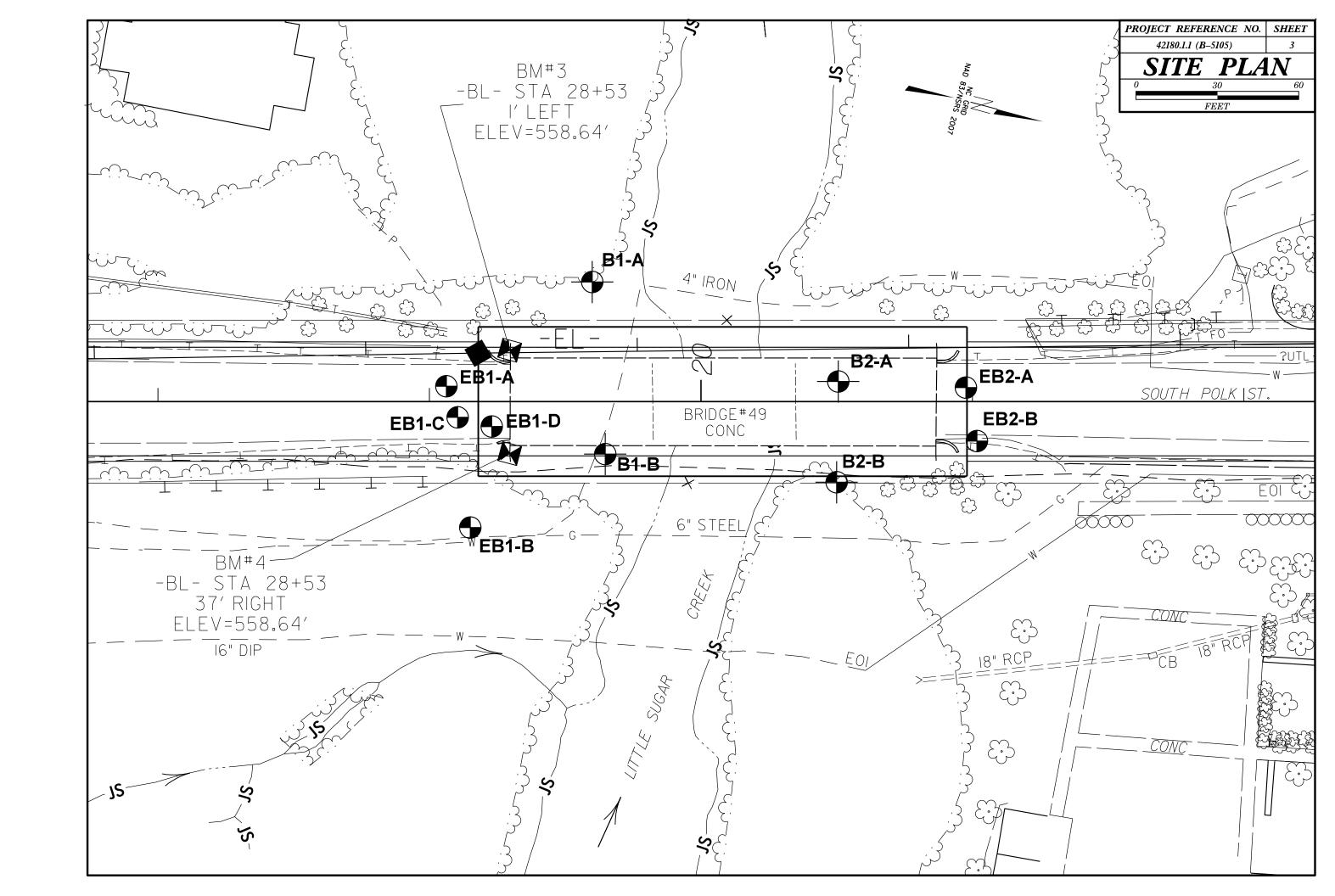
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

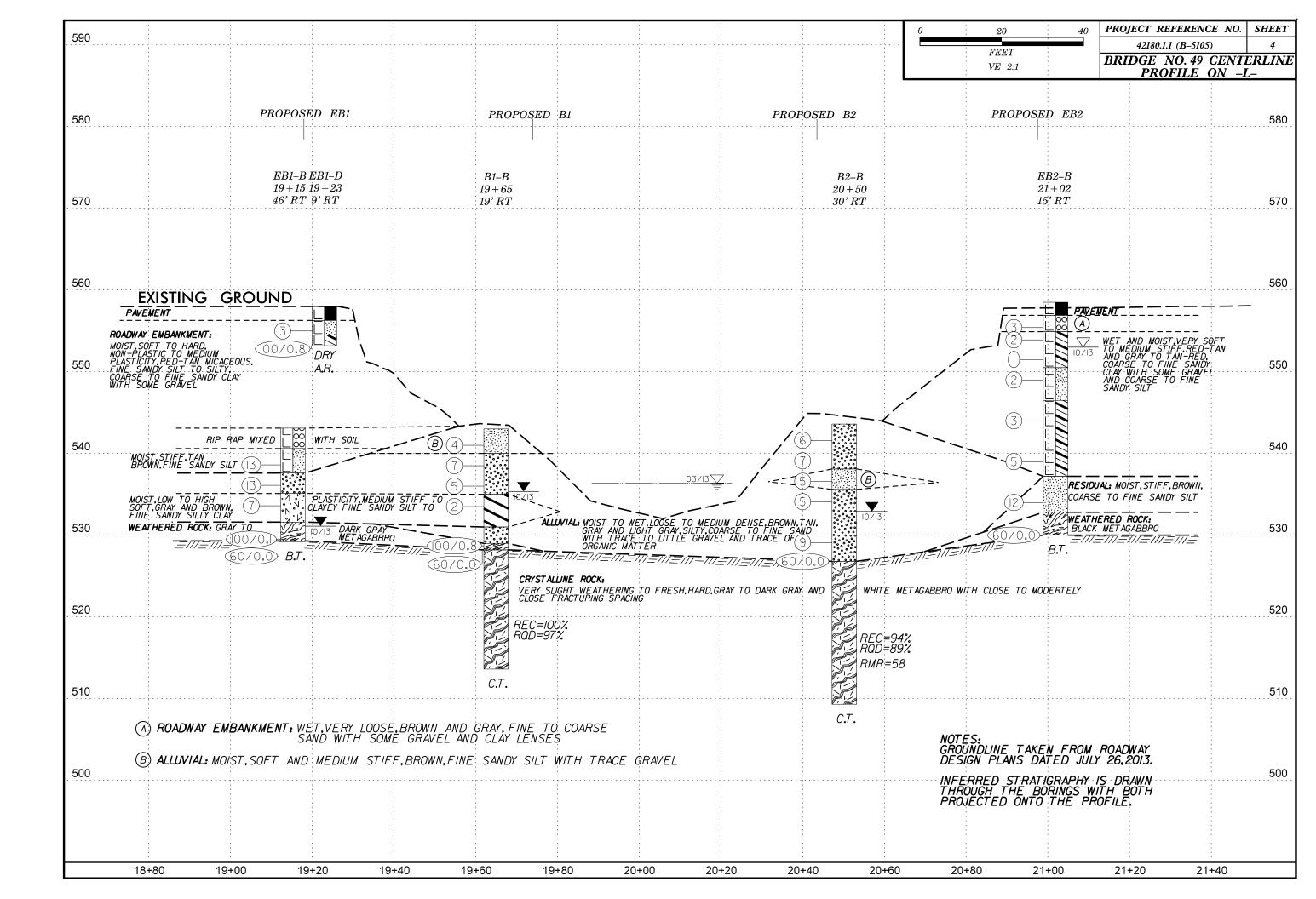
DIVISION OF HIGHWAYS

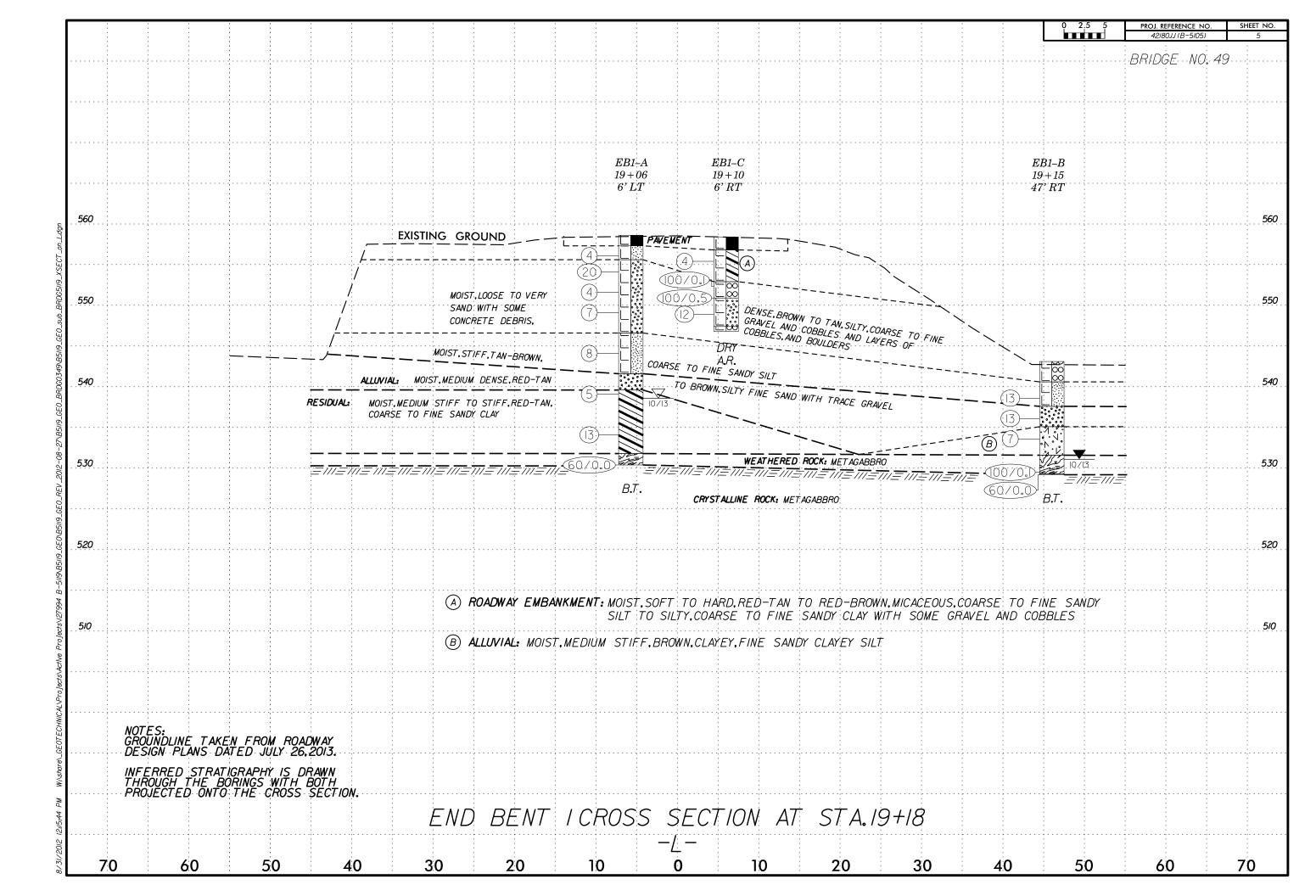
GEOTECHNICAL ENGINEERING UNIT

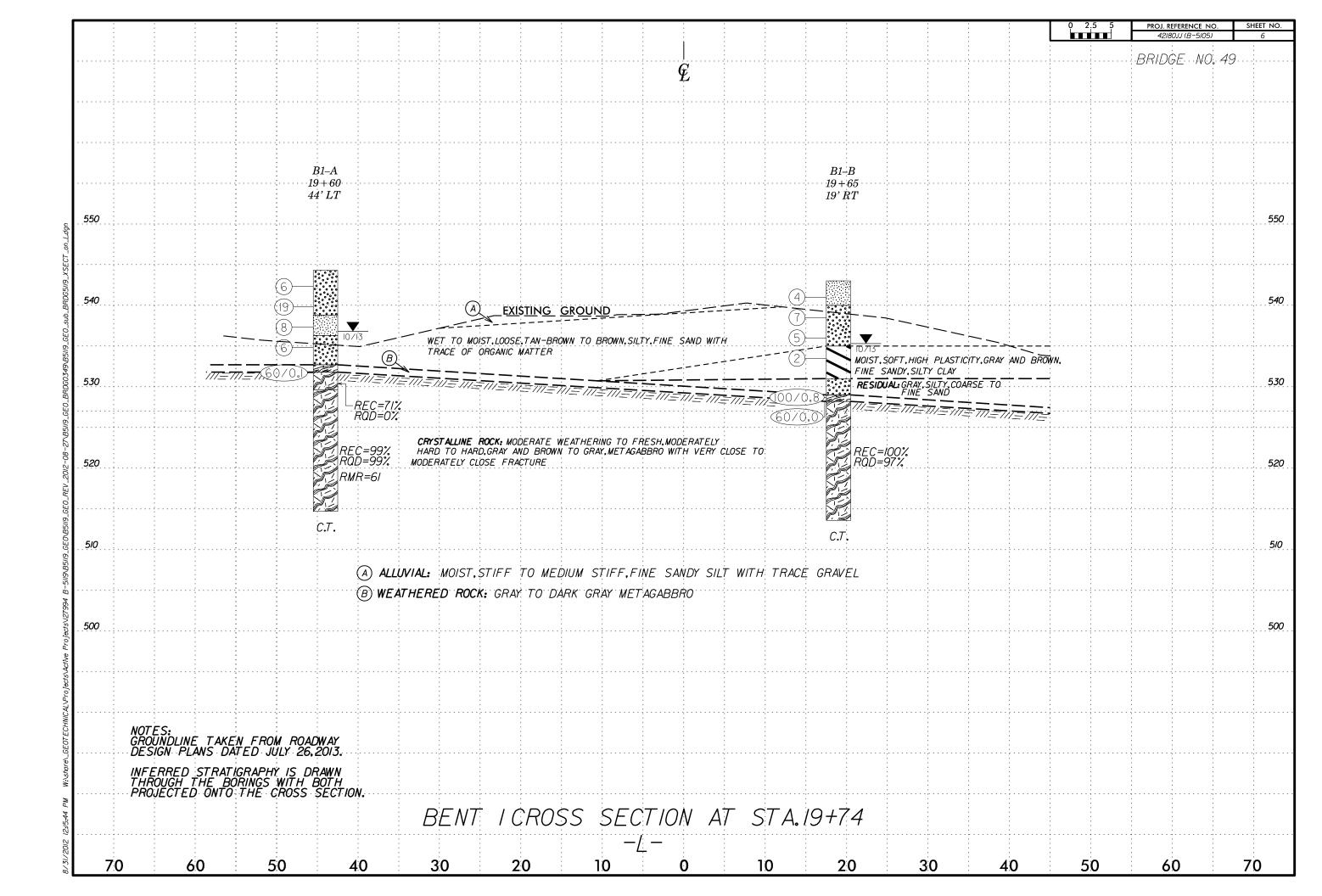
SUBSURFACE INVESTIGATION

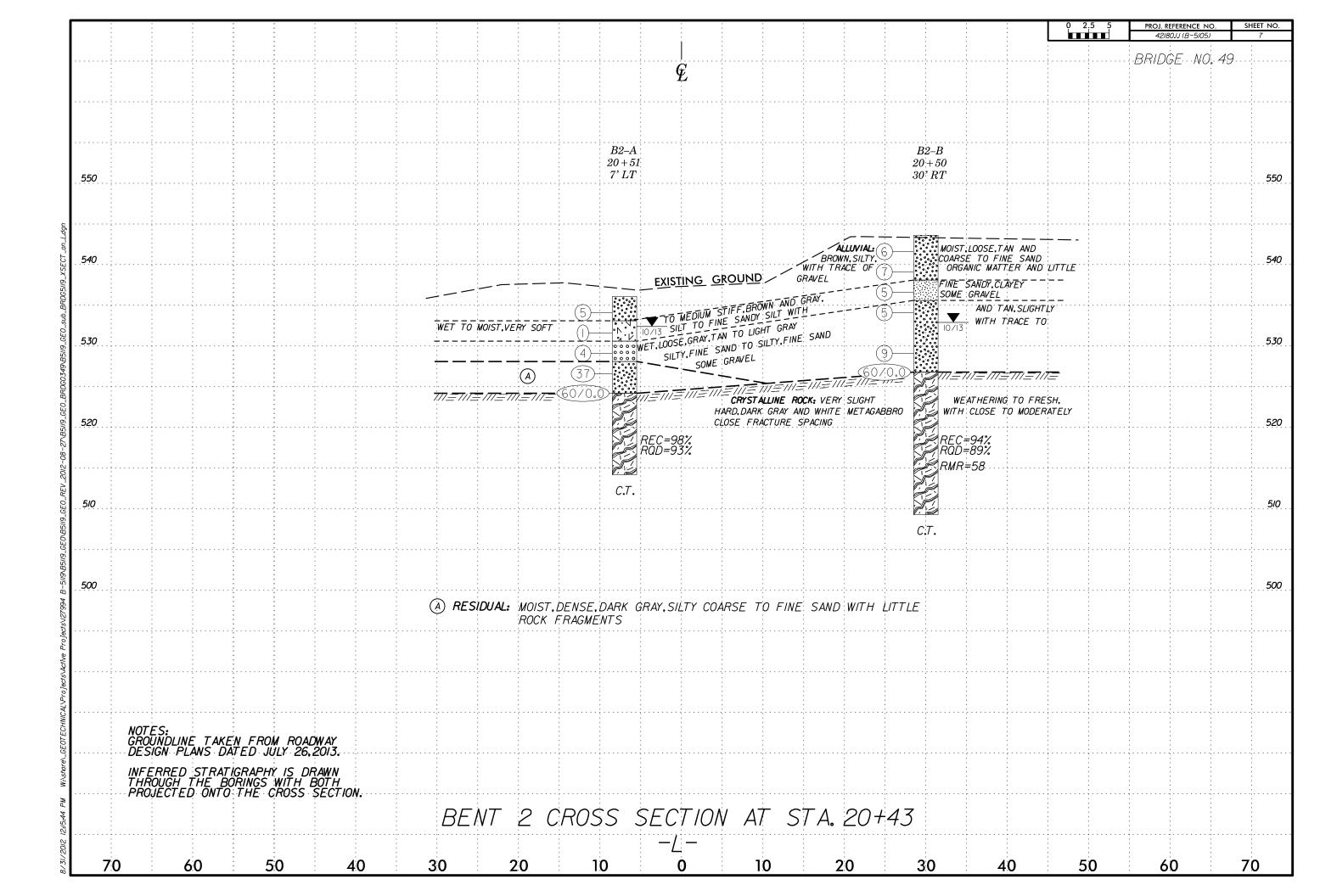
	SOIL AND ROCK LEGEND, TERM	S, SYMBOLS, AND ABBREVIATIONS	
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT IF TESTED, WOULD YIELD SPT REFUSAL. 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.
THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO 1206, ASTM D-1586). SOIL	POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES 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 REPRESENTED BY A ZONE	ACQUIFER - A WATER BEARING FORMATION OR STRATA, ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
CLASSIFICATION IS BASED ON THE AASHTO SYSTEM, BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:	ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE: VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: <u>ANGULAR</u> , <u>SUBANGULAR</u> , <u>SUBROUNDED</u> , OR <u>ROUNDED</u> .	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 RICK (WR)	OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	THE TO COADE COAN ICNEOUS AND METAMORPHIC DOCK THAT	ARTESIAN - GROUND WATER THAT IS UNDER SUFFICIENT PRESSURE TO RISE ABOVE THE LEVEL AT WHICH IT IS ENCOUNTERED, BUT WHICH DOES NOT NECESSARILY RISE TO OR ABOVE THE
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤35% PASSING *200) (>35% PASSING *200)	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.	CRYSTALLINE ROCK (CR) WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.	GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	COMPRESSIBILITY	NON-CRYSTALLINE FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
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	SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31	INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.	OF SLOPE.
SYMBOL 000000000000000000000000000000000000	MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTARY ROCK SEDIMENTED SEDIMENTARY ROCK SEDIMENTED SEDIMENTE	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.
7. PASSING GRANULAR SILT- MUCK,	PERCENTAGE OF MATERIAL GRANULAR SILT - CLAY	WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
# 40 39 MX 58 MX 51 MN ** 200 15 MX 25 MX 10 MX 35 MX 35 MX 35 MX 35 MX 35 MX 36 MN 36	URGANIC MATERIAL SOILS SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
LIGHTS LIMIT	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.
PLASTIC INDEX 6 MX NP 18 MX 10 MX 11 MN 10 MX 10 MX 11 MN 11 MN SOILS WITH PLASTIC INDEX 6 MX NP 18 MX 10 MX 11 MN 10 MX 11 MN 11 MN LITTLE OR HIGHLY	MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE	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 LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
GROUP INDEX 0 0 0 4 MX 8 MX 12 MX 16 MX No MX MODERATE ORGANI	GROUND WATER	OF A CRYSTALLINE NATURE. 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 STONE FRAGS. FINE SILTY OR CLAYEY SILTY CLAYEY ORGANIC	WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) 1 INCH. OPEN JOINTS MAY CONTAIN CLAY, IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SAND SAND GRAVEL AND SAND SUILS SUILS	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 AS A EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITAB	E PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	(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.
SUBGRADE SUBGROUP IS SELL - 30 :PI OF 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.
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY SEVERE 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	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN
PRIMARY SOIL TYPE COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED PENETRATION RESISTENCE COMPRESSIVE STRENGTH	ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION POPT DWT SPT W/ CORE SPT W/ CORE	(MOD. SEV.) AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES 'CLUNK' SOUND WHEN STRUCK. IF TESTED, WOULD YIELD SPI REFUSAL	THE FIELD. JOINT - FRACTURE IN ROCK ALONG WHICH NO APPRECIABLE MOVEMENT HAS OCCURRED.
CONSISTENCY CONSISTENCY (N-VALUE) (TONS/FT2)	↑ ₩	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
GENERALLY VERY LOOSE <4 GRANULAR LOOSE 4 TO 10 MEDIUM DENSE 17 TO 20 N/A	SOIL SYMBOL AUGER BORING SPT N-VALUE	(SEY,) IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	ITS LATERAL EXTENT.
MATERIAL MEDIUM DENSE 10 TO 30 N/H	ARTIFICIAL FILL (AF) OTHER ————————————————————————————————————	IF TESTED, YIELDS SPT N VALUES > 100 BPF VERY SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT	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
VERY DENSE >50	INFERRED SOIL BOUNDARY MONITORING WELL	(V SEV.) THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	SOILS USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN
VERY SOFT <2 <0.25 GENERALLY SOFT 2 TO 4 0.25 TO 0.50	TITE INFERRED ROCK LINE A PIEZOMETER	REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF	INTERVENING IMPERVIOUS STRATUM.
SILT-CLAY MEDIUM STIFF 4 TO 8 0.5 TO 1.0 MATERIAL STIFF 8 TO 15 1 TO 2	INSTALLATION TTT++T ALLUVIAL SOIL BOUNDARY SLOPE INDICATOR	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	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD >30 >4	25/025 DIP & DIP DIRECTION OF	ALSO AN EXAMPLE.	ROCK QUALITY DESIGNATION (ROD) - 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
TEXTURE OR GRAIN SIZE	ROCK STRUCTURES © CONE PENETROMETER TEST	ROCK HARDNESS	EXPRESSED AS A PERCENTAGE.
U.S. STD. SIEVE SIZE 4 10 40 60 200 270	● SOUNDING ROD	VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK, BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK.
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	ABBREVIATIONS	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	AR - AUGER REFUSAL MED MEDIUM YST - VANE SHEAR TEST	TO DETACH HAND SPECIMEN. MODERATELY CAN BE SCRATCHED BY KNIFE OR PICK, GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE	TO THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COS.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	BT - BORING TERMINATED MICA MICACEOUS WEA WEATHERED CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	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 SIZE IN. 12 3	CPT - CONE PENETRATION TEST NP - NON PLASTIC 7 _d - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	BY MODERATE BLOWS. MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS (N OR BPF) OF
SOIL MOISTURE - CORRELATION OF TERMS	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES I INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS
SOIL MOISTURE SCALE FIELD MOISTURE GUIDE FOR FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION	e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	F - FINE SL SILT, SILTY ST - SHELBY TUBE FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE.	OF STRATUM AND EXPRESSED AS A PERCENTAGE.
(SAT.) FROM BELOW THE GROUND WATER TABLE	FRAC FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL FRAGS FRAGMENTS W - MOISTURE CONTENT CBR - CALIFORNIA BEARING	VERY CAN BE CARVED WITH KNIFE, CAN BE EXCAVATED READILY WITH POINT OF PICK, PIECES I INCH SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE, CAN BE SCRATCHED READILY BY	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 THE
PLASTIC SEMISOLID REQUIRES DRYING TO	HI HIGHLY V - VERY RATIO	FINGERNAIL.	TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
RANGE CPI) PLASTIC LIMIT	EQUIPMENT USED ON SUBJECT PROJECT	FRACTURE SPACING BEDDING TERM SPACING TERM THICKNESS	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:	VERY WIDE MORE THAN 10 FEFT VERY THICKLY BEDDED > 4 FEET	BENCH MARK: BM#4 (489,I3IFT N, I,436,058 FT E) BM#3 (489,I2IFT N, I,436,02IFT E)
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE SL SHRINKAGE LIMIT	MOBILE B- 57 CLAY BITS	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET	ELEVATION: SEE NOTES FT.
REQUIRES ADDITIONAL WATER TO	6 CONTINUOUS FLIGHT AUGER CORE SIZE:	CLOSE 0.16 TO 1 FEET VERY HINLY BEDDED 0.03 - 0.16 FEET	NOTES:
- DRY - (D) ATTAIN OPTIMUM MOISTURE	BK-51 X 8" HOLLOW AUGERS	THINLY LAMINATED < 0.008 FEET	FIAD - FILLED IN AFTER DRILLING CT - CORING TERMINATED
PLASTICITY	CME-45C HARD FACED FINGER BITS X -N 0 2	INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	1
PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW	X CME-550 TUNG,-CARBIDE INSERTS	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;	ELEVATIONS
LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM	X CASING W/ ADVANCER HAND TOOLS:	GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	BM#4 - 558.64 FT BM#3 - 558.64 FT
HIGH PLASTICITY 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH POST HOLE DIGGER	MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE: BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	X TRICONE 2 ¹⁵ / ₆ TUNGCARB. HAND AUGER SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY).	CORE BIT SOUNDING ROD VANE SHEAR TEST	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	

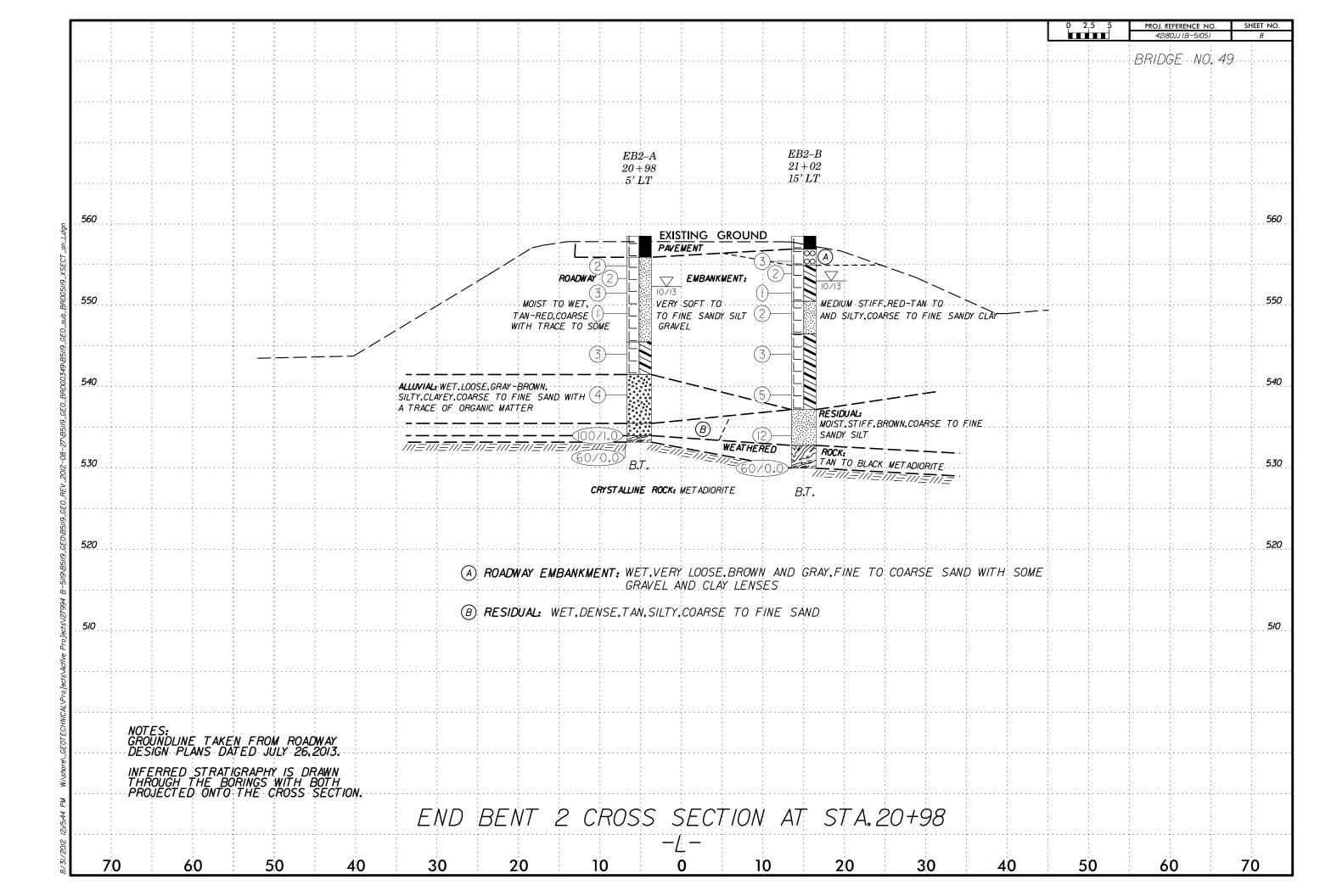












2	<u> </u>	T)	BC	RE	LO	G RE	PC	PRT													_																			
WB	3 42	180.1.1			Т	P B-51	05		COUN	ry Me	CKLEI	NBURG	à		GEOL	LOGIST (Joodnight	t, D. J.			W	/BS 4218	80.1.1			-	TIP	B-5105		COUNT	Y MECK	ENBUR	G		GEOL	LOGIST	Goodnigh			
SIT	DES	CRIPTIC)N Br	idge N	o. 49 o	ver Little	Suga	r Creek	on SR	4982 (La	ıncast	er High	iway)						GROUN	ND WTR (fi) S	ITE DESC	RIPTI	ON Br	ridge N	lo. 49	ove	r Little Suga	r Creek	on SR 4	982 (Lanc	aster Hig	hway)						GROUNI	D WTR (ft)
		IO. EB			-	TATION				OFFS					ALIGI	NMENT -	<u>L-</u>		0 HR.	20.0		ORING N				_		ATION 19+1			OFFSET					NMENT			0 HR.	N/A
		ELEV.				OTAL D				NORT		489,				TING 1,43			24 HR.	Dr	⊣ ⊢	OLLAR E						TAL DEPTH			NORTHII					Γ ING 1,4			24 HR.	FIAD
				ATE S		CME-550								D Mu	ud Rotary					Automatic	→ -				ATE S			ME-550X 90% (.S. Augers					Automatic
DRI		White,				TART D						E 10/		4	SURF	ACE WAT	ER DEPT	H N/	Ά		D	RILLER						ART DATE			COMP. D			/ / / /	SURF	ACE WA	TER DEP	TH N/A	١	
ELE'	DRIN	VE DEP- (ft)	0.5f	OW CO	OUNT 0.5ft	0	25 		PER FOO	T 75	100	SAMP. NO.	l '/	0	ELEV. (ft)		. AND ROCK	K DESC	CRIPTION	DEPTH (ft) EL		DEP (ft	oTH BI	tow co			0 25		PER FOOT	75 10	0 NO.		O G		SOI	L AND ROC	CK DESC	RIPTION	
550 545 540		0 1.5 6.0 0 8.5 0 13.3 0 18.3 0	1 6 3 3 3 5 4 4 5 5 2 4 4	2 4	3	4							M M M M M		539.5 531.7 530.3	Asphalt (0.0	GROUND S 0 to 0.8 feet fee DADWAY ET Silty, Coarse title Gravel a wn, Coarse to WEATHER Black MET/ ng Terminate on Test Refus STALLINE R	with Concept C	KMENT Sandy SIL E SAND w me Clay Le E Sandy SI E Sandy SI SAND Sandy CLA CCK SRO Standard Elevation 5	12 12 17 19 AY 26 28 330.3	0 5: 0 0 0 0 0	554.9	+ + 6.	5 2 100/0 0 100/0	0.5 0.1			•4 ————————————————————————————————————			- 100/0.	5 •	MM		558.4 556.8 556.8 555.4 550.9 547.4 546.8 	Feet R Red-Br CLAY Concret Tan, Sllty G Boring Ele EMBA Boring Te I N-Valu influen		et) Concie (1.3 to EMBANK Coarse to Gravel al Cobbles, a Fine SA Concrete ris and B by Auge 3 ft in RO Concrete ulders otes: ecause a round sui 0.1 and 10 presence	rete (0.8 to 1.6 feet) MENT Fine Sanc Id Cobbles Ind Boulde ND with Sc Debris Dulders In Refusal in ADWAY Debris and Debris and Debris and Debris and Debris and Debris and Debris and Debris and	3.0 3.0 3.0 3.0 3.0 rs 7.5 ome 11.0 11.6 d e off

2) (C	W	BO	RE	LOC	G REPORT																							
WB	S 421	30.1.1			TI	P B-5105	COUNTY M	1ECKLE1	NBURG		GEOL	LOGIST Goodnigh	t, D. J	l.		WBS 42180.1.1			TIP	B-5105	COUI	NTY MECKL	ENBURG	ì	GE	OLOGIST God	dnight, D	J.	
SIT	DESC	RIPTIC	N Brid	dge No	. 49 0\	ver Little Sugar Creek o	n SR 4982 ((Lancast	ter Highv	vay)				GROUND WTR	R (ft)	SITE DESCRIPTION	N Brid	dge No.	49 ove	er Little Sugar	Creek on SF	4982 (Lanca	ster High	way)				GROUND V	VTR (ft)
во	RING N	0. EB	1-D		S	TATION 19+23	OFF	FSET 9	ft RT		ALIG	NMENT -L-		0 HR.	N/A	BORING NO. EB1	I-B		STA	ATION 19+15	5	OFFSET	46 ft RT		AL	IGNMENT -L-		0 HR.	Dry
CO	LAR E	LEV.	558.4 ft		TC	OTAL DEPTH 4.8 ft	NOI	RTHING	489,12	22	EAST	TING 1,436,050		24 HR. FI	IAD	COLLAR ELEV. 5	43.1 ft		TOT	TAL DEPTH	13.9 ft	NORTHIN	G 489,1	24	EA	ASTING 1,436,0	88	24 HR.	12.0
DRII	L RIG/F	AMMER	EFF./DA	TE S	OI8513 (CME-550X 90% 08/21/2013	,		DRILL MI	ETHOD	H.S. Augers	s	HAMM	IER TYPE Automa	atic	DRILL RIG/HAMMER I	EFF./DA	TE SO)18513 CN	ME-550X 90% 08	3/21/2013	•	DRILL N	/ETHO	D H.S. Au	gers	HAI	IMER TYPE Aut	tomatic
DRI	LLER	White,	J. F.		S	TART DATE 10/14/13	COI	MP. DAT	ΓE 10/1	4/13	SURF	ACE WATER DEPT	TH N	/A		DRILLER White,	J. F.		STA	ART DATE 10	0/14/13	COMP. D	ATE 10/	14/13	SL	JRFACE WATER	DEPTH	N/A	
ELE'	DRIV ELEV (ft)	DEPT (ft)	0.5ft	0.5ft	UNT 0.5ft	BLOWS PE 0 25 50		100	SAMP. NO.	MOI G		SOIL AND ROC	K DES			ELEV DRIVE ELEV (ft) DEPTH	O.5ft	OW COU		BL 0 25	LOWS PER FO	OT 75 100	SAMP. NO.	MOI	L O G	SOIL AN	D ROCK DI	ESCRIPTION	
2001 BORE DOUBLE BOILD, GEO BRUGGUAR GIN1, GPJ NC, DO 1, GPJ 1/16/14	556.4	2.0 3.5	2 9	1 12	2 88/0.3	<u>●3</u>	· · · · ·	100/0.8		M M	- 558.4 - 556.7 - 556.9 - 553.6 		et) Cone (1.4 to MBAN us, Fine to Fine Gramby Aughstein Richards and the state of t	icrete (0.8 to 1.4 to 1.7 feet) IKMENT ee Sandy SILT ne Sandy CLAY vel ger Refusal at OADWAY ee Debris and kewing vertical ugers.	0.0 1.7 3.5 4.8	545 539.6 3.5 537.1 6.0 535 534.6 8.5 530 529.6 13.5 13.3	7	7	8 6 4	13 · · · · · · · · · · · · · · · · · · ·				M M M	543. 543. 540.4 540.4 537.4 535. 740.4	Brown, Silty, Brown, Fine S CR Baring T Brong T Brown F Br	andy, Clayer of Organic METHERED ck METAG. YSTALLINE ck METAG. erminated vest Refusal	ANKMENT with Silt landy SILT L with Trace Gravel by SILT with Trace atter ROCK ABBRO ROCK	11.5

NCDOT GEOTECHNICAL ENGINEERING UNIT BORELOG REPORT

WBS	42180					G REPORT P B-5105	_	Y MECKLI	ENBURG	3		GEOLOGIST Goodnig	ht, D. J.	
SITE	DESCR	PTION	Brid	ge No	. 49 ov	ver Little Sugar Cree	k on SR	1982 (Lanca:	ster High	way)				GROUND WTR (ft
BOR	NG NO.	B1-A	1		ST	TATION 19+60		OFFSET	44 ft LT			ALIGNMENT -L-		0 HR. 1.0
COLI	AR ELE	V. 5	14.2 ft		TC	DTAL DEPTH 29.6	ft	NORTHIN	G 489,1	44		EASTING 1,435,989		24 HR. 7.
DRILL	RIG/HAN	MER E	FF./DA	TE S	018513 (CME-550X 90% 08/21/2	013		DRILL	METHO	D H	S. Augers/NQ Core	HAMM	ER TYPE Automatic
DRIL	LER W	hite, J	F.		ST	TART DATE 10/21	/13	COMP. DA	TE 10/	21/13		SURFACE WATER DEF	TH N	Α
ELEV	DRIVE	DEPTH	F. 366	W CO	TAL	BLOWS	PER FOO	г	SAMP.	V /	L	SOIL AND RO	CK DES	PRINTION
(ft)	ELEV (ft)	(ft)	0.5ft	0,5ft	0.5ft	0 25	50	75 100	NO.	MOI	O G	ELEV. (ft)	UK DESC	DEPTH
545	-											-544.2 GROUN	D SURFA	ACE 0
	543.2	1.0				1132 113				55	100	AL	LUVIAL	20.70
	540.7 -	3.5	2	2	4	6				M		Tan-Brown,	Sitty, Fine	e SAND
540	-		7	7	12	19	1 112 9	0 1014		M		- 538.7		5
	538.2	6.0	3	4	4							Brown, Fir	ne Sandy	SILT
535	535.7	8.5	3	3	3	10.0		8 6000		w		536.2 Tan-Brown,	Silty, Fine	e SAND8
			12	11.5		1	: ::::					- 532.6		- 11
0.00	531.7 -	12.5	60/0.1			National States					100	_ 531.7 WEATH	ERED RO	OCK
530	-											-529.5 CRYSTA	LLINE R	OCK 14
		8					1000						TAGABE TAGABE	
525							469					R1 = 7, R2 = 20, R	3 = 10, R	
	-					1000	188	0 0071	RS-1		1	ROCK CLASS	MR = 61	
	1 6					3 1 E 3 E 4 F 5	4 40							
520	-	6				7.537 1.53	4 2 2							
	-					11.11								
515						4111 111					1	—514.6		20
0.10	-								1			 Boring Terminated 		
	-											CRYSTALLINE R		ETAGABBHO
	2												votes:	2.7777.724
	- 2											Boring was perform Line due to Steep (Creek Bar	nk and Multiple
												Overhead	d Power I	Lines
	7													
	3													
	-													
	1													
	1		l i	M										
	-											-b		
	1,5													
	104													
	3													
			1						1					
	1													
										1				
	-	Ė								1				
	13													
	-											-		
	1											50		
		1								1		-		

NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	42180	.1.1			TIP	B-510	5	C	OUNT	YN	CKLENBURG	GEOLOGIST Goodni	ght, D.	J.
SITE	DESCR	IPTION	Brid	ge No. 4	9 over	Little S	Sugar Cr	eek or	SR 4	982	ancaster Highway)			GROUND WTR (f
BORI	NG NO.	B1-A			STA	TION	19+60			OF	SET 44 ft LT	ALIGNMENT -L-		0 HR. 1.
COLL	AR ELE	EV. 54	4.2 ft		TOT	AL DE	PTH 29	.6 ft		NO	THING 489,144	EASTING 1,435,989	77.7	24 HR. 7.
DRILL	RIG/HAI	WMER E	FF./DA	TE SOI85	13 CM	E-550X 9	90% 08/21	/2013			DRILL METHOD H	.S. Augers/NQ Core	HAM	MER TYPE Automatic
DRIL	LER V	hite, J.	F.		STAI	RT DAT	TE 10/2	1/13		co	P, DATE 10/21/13	SURFACE WATER DE	PTH N	I/A
COR	E SIZE	NQ2					N 17.0 f							
(ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft) %	RQD (ft) %	SAMP. NO.	STR REG. (ft) %	RQD (ft) %	L O G	ELEV. (ft)	DESCRIPTION AND REMAR	KS.	DEPTH
31.7	531.6	12.6			1 =							Begin Coring @ 12.5 ft		
530 525 520	529.6	19.6	5.0	N=60/0.1/ 1:42/1.0 2:50/1.0 1:25/1.0 1:25/1.0 1:20/1.0 1:19/1.0 1:19/1.0 1:19/1.0 1:24/1.0 1:24/1.0 1:28/1.0	(1.4) 70% (4.9) 98% (5.0) 100%	(0.0) 0% (4.8) 96% (5.0) 100%	RS-1	(1.5) 71% (14.8) 99%	(0.0) 0% (14.8) 99%		METAG Numerous Joi	crystalline rock ght Weathering, Moderately H- GABBRO with Very Close Frac nts throughout Strata, Several METAGABBRO with Close to N Spacing 5 Joints from 5 to 10 Degre 3 Joints from 30 to 40 Degrees 1 Joint at 60 Degrees	ture Space Near Ver foderately	tical Joints
515			5.0	1:20/1.0 1:34/1.0 1:27/1.0 1:40/1.0	(5.0) 100%	(5.0) 100%						R2 = 20, R3 = 10, R4 = 20, R5 ROCK CLASS II, ROCK TYP		
-	514.6 -	- 29.6		1:41/1.0							514.6 Boring Termina	ated at Elevation 514.6 ft in CF	YSTALL	INE ROCK:
												METAGABBRO Notes:		
	en en la proposición de la constante de la con											ed off of Proposed Bent Line of and Multiple Overhead Power	Lines	

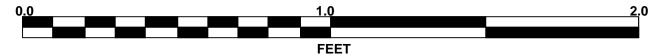
SHEET 12

42180.1.1 (B-5105) Bridge No. 49 over Little Sugar Creek on SR 4982 (Lancaster Highway)

CORE PHOTOGRAPHS

B1-ABOXES 1 and 2: 12.6 - 29.6 FEET





WBS	42180				\neg	G REP(CUNT	MECKL	ENBURG	3		GEOLOGIST Goodnigh	nt, D. J.		
SITE	DESCR	PTION	Bric	ge No	. 49 0	er Little Sug	ar Creek o	n SR 49	982 (Lanca	ster High	iway)				GROUND WT	R (ft)
BOR	ING NO.	B1-B			S	TATION 194	-65		OFFSET	19 ft RT		-	ALIGNMENT -L-		0 HR.	0.5
COLI	LAR ELE	V. 54	3.0 ft		TO	OTAL DEPTH	29.4 ft		NORTHIN	G 489,	65		EASTING 1,436,049		24 HR.	7.7
DRILL	. RIG/HAI	MER E	FF./DA	TE SO	018513	CME-550X 90%	08/21/2013			DRILL	METHO	D H.	S. Augers/NQ Core	HAMM	ER TYPE Autor	natic
DRIL	LER W	hite, J	F.		S	TART DATE	10/18/13		COMP. D	ATE 10	18/13		SURFACE WATER DEP	TH N	/A	
ELEV	DRIVE	DEPTH	F	ow cor	JNT		BLOWS PE	R FOOT		SAMP.	V /	L	COU AND DOC	ek pre/	COURTION	
(ft)	ELEV (ft)	(ft)	0.5ft	0.5ft	0.5ft	0 25	50		75 100	NO.	MOI	O G	SOIL AND ROC	W DESC		PTH (
				1												
545			1													
												F	543.0 GROUND		ACE	0.
	542.0	1.0	2	2	2				+ + + +		M	H	Brown, Fine Sandy	UVIAL SILT wit	h Trace Gravel	
540	539.5	3.5	5	4	3	1			200	-	3		540.0 Brown, Silty, Fine			3.
	537.0	6.0	1			77			2 + 1 + 14		M		Organ	ic Matte	T.	
535	-		2	2	3	5			2.00		-	l F	535.0		Seees.	. 8.
	534.5	- 8.5	2	1	1	1					M	3	Gray and Brown, F	ine Sand	dy, Silty CLAY	
	1		V	100		1.111			3711		1	3	531.0			12
530	529.5	13.5	40	88/0.3					1				FES 529.0 Gray, Silty, Coa	IDUAL arse to F	ine SAND	14
	528.2	14.8	12 60/0.0	2000					. 100/0.8 60/0.0				528.2 WEATHE Dark Gray M	RED RO	OCK /	14
525	1		1								R S		CRYSTAL	LINE R	OCK	
	Į.				R	0.6.4.4		5 3 9 5	10.34		11 2		Gray ME	TAGABE	BRO	
						24,5			100							
520	-	-				7		* * 117	7 7 7	1	1.0		2			
	1		ŀ													
515	1	6				6000	1111		1100	1						
010						our.			15000	1			513.6			29.
													Boring Terminated CRYSTALLINE RO	at Eleva DCK: ME	ETAGABBRO	
	1 (3												- N	otes:		
													Boring was performe Line due to			
	3												- - - - -			
	1.2	3											-			
													300			
	1															
	()															
											1					
	- 2												2			
	3															
	-	8														
													,			
	-															
	1 9												3			
	- 2															
	- 6		1	1						1		1				

0	1	NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT	
3	T	CORE BORING REPORT	

WBS	42180	1.1.1			TIP	B-510	5	C	TNUC	YN	CKLENBURG GEOLOGIST Goodnight, D. J.
SITE	DESCR	IPTION	Brid	ige No. 4	9 over	Little 5	Sugar Cr	eek on	SR 4	982	ncaster Highway) GROUND WTR (
1 2 6	NG NO.		_		_	_	19+65				ET 19 ft RT ALIGNMENT -L- 0 HR. 0
_	AR ELI				TOTA	AL DE	PTH 29	.4 ft		NO	HING 489,165 EASTING 1,436,049 24 HR. 7
RILL	RIG/HA	MMER E	FF./DA	TE SOI8	513 CM	E-550X	90% 08/21	/2013			DRILL METHOD H.S. Augers/NQ Core HAMMER TYPE Automatic
	LER V	E 3	_				TE 10/1	-		СО	DATE 10/18/13 SURFACE WATER DEPTH N/A
OR	E SIZE	NQ2			TOTA	AL RUI	N 14.61	ft			***************************************
LEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	RQD (ft)	SAMP. NO.	STR REC. (ft) %	ATA RQD (ft)	LOG	DESCRIPTION AND REMARKS LEV. (ft) DEPTH
28.2				17	1	i E					Begin Coring @ 14.8 ft
525	528.2		5.0	N=60/0.0 0:37/0.6 1:18/1.0 1:17/1.0 1:25/1.0 1:40/1.0	(4.6) 100% (5.0) 100%			(14.6) 100%	(14.1) 97%		28.2: CRYSTALLINE ROCK Fresh, Hard, Gray METAGABBRO with Close to Moderately Close Fracture Spacing Some White Quartz Veins were present
520	518.6	24.4	5.0	1:11/1.0 1:12/1.0 1:10/1.0 1:21/1.0 1:38/1.0 1:16/1.0	(5.0)	(5.0)			1	1	6 Joints from 5 to 10 degrees
515	513.6	29.4	0.0	1:26/1.0 1:12/1.0 1:23/1.0 1:42/1.0	100%	100%					13.6
				1.182.110							Boring Terminated at Elevation 513.6 ft in CRYSTALLINE ROCK: METAGABBRO
	1	1								109	Notes:
		1									Boring was performed off of Proposed Bent Line due to Access Issues.
		-									

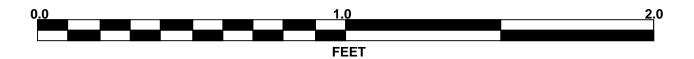
SHEET 14

42180.1.1 (B-5105) Bridge No. 49 over Little Sugar Creek on SR 4982 (Lancaster Highway)

CORE PHOTOGRAPHS

B1-BBOXES 1 and 2: 14.8 - 29.4 FEET





WBS	42180	1.1			TII	P B-510)5	COUNT	Y MECKL	ENBURG	3	-1	GEOLOGIST Goodnight, D.	T
SITE	DESCRI	PTION	Brid	ge No.	49 ov	er Little	Sugar Cre	ek on SR 4	1982 (Lanca	ster High	iway)			GROUND WTR (
BOR	NG NO.	B2-A			ST	TATION	20+51		OFFSET	7 ft LT			ALIGNMENT -L-	0 HR. 1.
COL	AR ELE	V. 53	6.1 ft		TC	TAL DE	PTH 21.9	ft	NORTHIN	G 489,2	241		EASTING 1,436,001	24 HR. 3
RILL	RIG/HAN	IMER E	FF./DAT	E SC	18513 (CME-550X	90% 08/21/2	2013		DRILL	METHO	D H.	S. Augers/NQ Core HAMI	MER TYPE Automatic
DRIL	LER W	hite, J.	F.		ST	TART DA	TE 10/16	/13	COMP. DA	ATE 10/	17/13		SURFACE WATER DEPTH	I/A
LEV	DRIVE ELEV	DEPTH	BLO	M COL	INT		BLOW	S PER FOOT		SAMP.	V /	L	SOIL AND ROCK DES	CRIPTION
(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	MOI		ELEV. (ft)	DEPTH
540														
	1												536.1 GROUND SURF	FACE
535	535.1	1.0	3	3	2	5					M		Tan-Brown, Silty, Coarse to	Fine SAND with
	532.6	3.5	WOH	WOH	1	1	1 103.5	5 5 5 5	3.615		W	1	533.1 Little Gravel and Trace of Brown and Gray, Fine San	dv. Clavey SILT
530	530.1	6.0				1		1 12 11 13	n vanne			2000	530.6 with Some Gray, Silty, Fine SAND with	ivel
	527.6	0.5	2	2	2	94	6 1100	5 600	5 1 1 1 1		W	0000	528.1	
	527.6	8.5	15	18	19	1	• 937	1 211	1 111		M		RESIDUAL Dark Gray, Silty, Coarse to	Fine SAND with
25	524.2	11.9				100							Dark Gray, Silty, Coarse to Little Rock Fragr	4
			60/0.0			122			- 60/0.0	T		R	CRYSTALLINE I Dark Gray and White Me	
520	1											8		
20	1					122	1	1 3 4 4	0 2275			3		
	1					7 0.16 3 0.16	* * * 3 * * * * * * * * * * * * * * * *							
15						1 5 6 6	8 977	3 7 8 8 8	1 1 1 1 3			R	514.2	2
										1			Boring Terminated at Elev CRYSTALLINE ROCK: N	ation 514.2 ft in
	1	5	10.11	111		/ -							Notes:	ETAGABBRO
													Boring was performed off o Line due to Configurati Superstructru	on of Bridge

0	1	NCDOT GEOTECHNICAL ENGINEERING UNIT CORE BORING REPORT	
(20)	T	CORE BORING REPORT	

WBS	42180	0.1.1			TIP	B-510	5	C	OUNT	YN	ECKLENBURG	GEOLOGIST Goodnig	ght, D. J	
_			l Brid	ige No. 4	9 over	Little S	Sugar Cr	eek or	SR 4	982	Lancaster Highway)			GROUND WTR
	NG NO		_		_	_	20+51			1	SET 7ft LT	ALIGNMENT -L-		0 HR. 1
_	AR ELI				-		PTH 21	.9 ft			RTHING 489,241	EASTING 1,436,001		24 HR. 3
				TE SOI85	100	- 7 - 7 - 7					DRILL METHOD H.S.		HAMM	IER TYPE Automatic
_	LER V		_				TE 10/1			со	MP. DATE 10/17/13	SURFACE WATER DE	1 1	
_	E SIZE						N 10.0 f					, 55.5 1915 ANG ANG ANG		
	RUN		RUN	DRILL	RI	IN I	SAMP.		ROD	L		No. vi Station		
(ft)	ELEV (ft)	DEPTH (ft)	(ft)	RATE (Min/ft)	REC. (ft) %	RQD (ft) %	NO.	REC, (ft) %	RQD (ft) %	L O G	ELEV. (ft)	ESCRIPTION AND REMARK		DEPTH
24.2	524.2	11.9	5.0	N=60/0 0	(4.9)	(4.6)		(9.8)	(9.3)	70	524.2	Begin Coring @ 11.9 ft CRYSTALLINE ROCK		
520			0.0	N=60/0.0 1:48/1.0 1:45/1.0 1:50/1.0 1:55/1.0 2:06/1.0	98%	(4.6) 92%	14	(9.8) 98%	(9.3) 93%		Very Slight We	eathering to Fresh, Hard, Dar with Close to Moderately Clo	k Gray ar se Fractu	nd White
520	519.2	16.9	5.0	1:40/1.0	(4.9) 98%	(4.7) 94%					Seve	ral White Quartz Veins were	present	
515				1:39/1.0 1:29/1.0 1:34/1.0	98%	94%						1 Near Vertical Joint 3 Joints at 40 to 50 Degree		
010	514.2	21.9		1:35/1.0						23	514.2 Boring Terminate	3 Joints at 10 to 20 Degree ed at Elevation 514.2 ft in CR		NE ROCK:
		‡										METAGABBRO	3.40.277	10-10-11
		‡										Notes:		
											Boring was performe	ed off of Proposed Bent Line Bridge Superstructrue.	due to Co	onfiguration of
	3	‡												
	- 3	1							1					
		1												
		†												
	1	Į						1						
		†												
		Į												
		+									-			
		1								11.0				
		+												
	1	‡												
		İ												
		+	1						ľi –					
		-												
		‡	1											
		‡												
		‡								Ш				
		±												
	1	+						1		Ш				
	1	Ŧ												
		‡								117				
		‡								1	-			
		±												
		Ŧ												
	1	‡									-			
		‡												
		†												
		Ī									3			
		Ŧ												
		‡												
		‡									- 1			
		1												
		‡												
		‡												
		1									(i)			
		+	1											
	1	1	1	1	1	1	1	1	1	1				

SHEET 1	6
---------	---

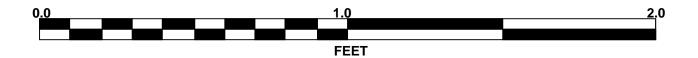
42180.1.1 (B-5105) Bridge No. 49 over Little Sugar Creek on SR 4982 (Lancaster Highway)

CORE PHOTOGRAPHS

B2-A

BOX 1: 11.9 - 21.9 FEET





NCDOT GEOTECHNICAL ENGINEERING UNIT

WBS	42180	1.1.1			TI	P B-510	05	COUNT	Y MECKLI	ENBURG	3		GEOLOGIST Goodnight, D.	J,
SITE	DESCR	IPTION	l Brid	ige No	. 49 0	ver Little	Sugar Cree	k on SR 4	982 (Lanca	ster High	iway)			GROUND WTR (fi
BOR	NG NO.	B2-B	3		S	TATION	20+50	1	OFFSET	30 ft RT			ALIGNMENT -L-	O HR. N/A
COL	AR ELE	EV. 54	13.6 ft		TO	OTAL DE	PTH 34.3	ft	NORTHIN	G 489,2	250		EASTING 1,436,037	24 HR. 10.7
-		_		TE S	_		90% 08/21/20			DRILL N		D H.		MER TYPE Automatic
DRIL	LER W	/hite, J	_		-	TART DA	TE 10/17/		COMP. DA	11	17/13	1 1	SURFACE WATER DEPTH	I/A
ELEV (ft)	DRIVE	DEPTH (ft)	0.5ft	0.5ft	0.5ft	0	BLOWS 25	PER FOOT 50	75 100	SAMP.	1	0	SOIL AND ROCK DES	
\$2.77	(ft)	35.52	0.50	0.511	บ.อแ	1		30	75 100	NO.	MOI	G	ELEV. (ft)	DEPTH (
545	1-1-0	11	Y											
343	1.7		1		==,								543.6 GROUND SURF	
	542.6	1.0	2	3	3	6	1	1111	15516		M		Tan and Brown, Silty, Fine S	SAND with Trace
540	540.1	3.5	6	4	3	4		4 4 (9)			M		of Organic Matter and	Little Gravel
r.	537.6	6.0	3	2	3	II.							538.1 Brown, Fine Sandy SILT w	ith Some Roots 5.
535	535.1	8.5				•5					M		535,6 Tan to Light Gray and Tan,	8.
	-		3	3	2	5		44.8	1 2 1 1 1		\blacksquare		with Trace of G	ravel
500	500 4	-			M	1	7 70 E	11.	308+0+ 5.6.1.5					
530	530.1	13.5	3	3	6	. 99.		9.540	0 40 45		w			
	526.8	16.8	60/0.0		6		11:::	1	60/0.0				526.8	16.
525			60/0.0			7 % %	2334	10000					CRYSTALLINE I Gray and White MET	
	1					100	1 10.00	111	2.555				R1 = 7, R2 = 17, R3 = 10, I	R4 = 20, R5 = 4,
520		E				9 0 70		1111	1 1111				RMR = 58 ROCK CLASS III, ROC	CK TYPE E
	-	-				1	1 11:11	0.00	3111	RS-2	1			
		-				300	1 6111	1111	1.774					
515	-					0.4.4	0 2.11	(a' w ac)		1			-	
	-					100	1 1111							
510	e la						9 75 75	(8.818)	9216				509.3	34.
												-	Boring Terminated at Elev CRYSTALLINE ROCK: N	ation 509.3 ft in
												F	Notes:	
		F									-	F	Boring was performed off of	f Proposed Bent
	1	-											Line due to Access	
	- 2	-										3		
	3	F									1	l		
		F									1	E		
	1.3	-										l		
		-										1		
	5										ľ			
												1		
	2											1		
	1											E	0	
	1											1		
												1		
												E		
		-										-		
	7	F												
		-												
	-					0						-		
	9	-												
	1	-										F		
								_	_		_	-		

NCDOT GEOTECHNICAL ENGINEERING UNIT

. B2-B EV. 54		ge No. 4	9 over			eek on	SR 4	982	ancaster Highway)	GROUND WTR (f		
EV. 54			STAT	HON	24 . 32							
	36#			ION	20+50			OF	ET 30 ft RT ALIGNMENT -L-	0 HR. N//		
MMER E	A-0 15		TOTA	AL DEF	PTH 34	.3 ft		NO	HING 489,250 EASTING 1,436,037	24 HR. 10.		
L RIG/HAMMER EFF./DATE SOI8513 CME-550X 90% 08/21/2013 DRILL METHOD H.S. Augers/NQ Core HAMM												
Vhite, J.	F.		STAF	RT DAT	TE 10/1	7/13		co	P. DATE 10/17/13 SURFACE WATER DEPTH N/	A		
NQ2			TOTA	AL RUN	17.5 f	t						
DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	REC. (ft)	RQD (ft)	SAMP. NO.	STR REC. (ft) %	RQD (ft)	LOG	DESCRIPTION AND REMARKS	DEPTH		
1-1	1			1		, -			Begin Coring @ 16.8 ft			
19.6	5.0	N=60/0.0 0:58/0.8 1:20/1.0 1:52/1.0 1:10/1.0 1:21/1.0	(2.2) 79% (4.5) 90%	(1.9) 68% (3.9) 78%		(16.4) 94%	(15.5) 89%		Very Slight Weathering to Fresh, Hard, Dark Gray and METAGABBRO with Close to Moderately Close Fracture	d White e Spacing		
24.6	5.0	1:52/1.0 1:31/1.0 1:32/1.0	(5.0)	(5.0) 100%	RS-2	1	ı		3 Joints at 20 to 30 Degrees 3 Joints at 40 to 50 Degrees Several Healed Joints at 45 to 60 Degrees			
29.6	4.7	1:22/1.0 1:28/1.0 1:10/1.0	(4.7)	(4.7)				3	Core Loss from 18.7 to 19.3 feet and 19.8 to 20.3 feet indicat Weathered Rock.	ing presence of		
Ī.,,		1:15/1.0	10076	10070					R1 = 7, R2 = 17, R3 = 10, R4 = 20, R5 = 4, RMR = ROCK CLASS III, ROCK TYPE E			
34.3		0:58/0.7	-					35	Boring Terminated at Elevation 509.3 ft in CRYSTALLIN	NE ROCK:		
Ŧ												
7									Notes:			
+												
	(ft) 16.8 19.6	18.8 2.8 19.6 5.0 24.6 5.0 29.6 4.7	(ft) (ft) RATE (Min/ft) 18.8 2.8 N=60/0 0 0.58/0.8 1:20/1.0 1:52/1.0 1:52/1.0 1:36/1.0 1:41/1.0 1:52/1.0 1:32/1.0 1:32/1.0 1:32/1.0 1:32/1.0 1:28/1.0 1:28/1.0 1:18/	DEPTH RUN (ft) RATE (Min/ft) %	(ft) (ft) (RATE (Min/ft) (ft) (ft) (ft) (Min/ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) (Tensor T	(ft) (ft) (Min/ft) (ft) (ft) (ft) (NO. (ft) (Min/ft) % NO. (ft) %	DEPTH RUN (ft)	(ft) (ft) (Min/ft) (ft) (ft) (ft) (ft) (ft) (ft) (ft) ((ft) (ft) (Min/ft) (Mi		

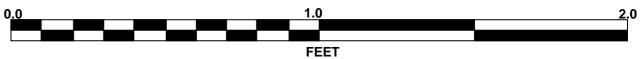
SHEET 18

42180.1.1 (B-5105) Bridge No. 49 over Little Sugar Creek on SR 4982 (Lancaster Highway)

CORE PHOTOGRAPHS

B2-BBOXES 1 and 2: 16.8 - 34.3 FEET





WBS 42	180.1.			1	IP B-510)5	COL	UNTY MECK	LENBU	RG	GI	EOLOGIST Goodnight	nt, D. J.		WBS	4218	0.1.1			TI	IP B-510	5	COUNT	Y MECKL	ENBURG	}	GI	OLOGIST Goodnig	nt, D. J.	
SITE DES	CRIPT	ON B	ridge	No. 49	ver Little	Sugar C	reek on S	SR 4982 (Land	aster Hi	ighway)			GR	OUND WTR (ft)	SITE	DESC	RIPTIO	N Brid	dge No	o. 49 ov	ver Little S	ugar Cre	eek on SR 4	1982 (Lanca	ster High	iway)			GROUND \	WTR (fi
BORING	NO. E	B2-A			TATION	20+98		OFFSET	5 ft L7	Τ	AL	LIGNMENT -L-	OH	IR. 6.2	BOR	ING NO) . EB2	2-B		S	TATION 2	21+02		OFFSET	15 ft RT			IGNMENT -L-	0 HR.	5.5
COLLAR	ELEV.	558.5	ft		OTAL DE	PTH 25	5.3 ft	NORTH	NG 489	9,287	EA	ASTING 1,435,991	24 H	IR. Dry	COLI	LAR EL	EV. 5	58.4 ft		TO	OTAL DEP	TH 28.	5 ft	NORTHIN				STING 1,436,009	24 HR.	FIA
DRILL RIG	HAMME	R EFF./I	DATE	SOI8513	CME-550X	90% 08/2	21/2013		DRIL	L METHO	D Mud Ro	otary I	HAMMER TY	'PE Automatic	DRILL	RIG/H	AMMER E	EFF./DA	TE S	OI8513	CME-550X 9	0% 08/21	/2013	_	DRILL I	METHO	D Mud Ro	tary	HAMMER TYPE Au	utomatic
DRILLER		e, J. F.			TART DA	TE 10/	15/13	COMP. I				JRFACE WATER DEPT	TH N/A				White, J	J. F.		S	TART DAT	E 10/1	6/13	COMP. DA	ATE 10/	16/13	SU	IRFACE WATER DEF	TH N/A	
ELEV DRI	:\/ UL			COUNT	11		WS PER F			ЛР. 🔻	1 L	SOIL AND ROCK	CK DESCRIPT	ION	LLL v	DRIVE ELEV	10011	·—	ow co		11		S PER FOOT		SAMP.	/	1 b	SOIL AND RO	CK DESCRIPTION	
(ft) (ft		t) 0.5	oft 0.5	5ft 0.5ft	0	25	50	75 1	00 NC). <u>/мо</u>	I G ELE			DEPTH (ft	(ft)	(ft)	(ft)	0.5ft	0.5ft	0.5ft	0	25	50	75 100	NO.	МО	I G			
560											L				560		_													
	₽	_	_	_	 				.	_	- 558.	5 GROUND Asphalt (0.0 to 2.0 feet	SURFACE et) Concrete (0.0 2.0 to 2.6	0		<u> </u>	+				· · · ·		.			- 558.	A 1 11 //	O SURFACE .0 to 1.6 feet)	(
555	.8 1 2	.7			::::				1 1		555.	9 fee	eet)	2.6		556.3	+	1 2	1	2						l	556.	ROADWAY	EMBANKMENT	1
	.3 + 4		WC OH WC		4 2					М		ROADWAY EI Red-Tan, Coarse to F	EMBANKMEN Fine Sandy SI	I T LT with a	555	554.8	3.6	2	1	1	3	 			-	W	<u>554.</u>	Brown and Gray, Fi	ne to Coarse SAND with and Clay Lenses	th <u>_3</u>
552	.5 🕇 6	o WC			 				:	∇		Trace of	of Gravel			552.4	6.0	I WOL	WOH	1	 [2					\vdash		Red-Tan and Gray	Coarse to Fine Sandy Some Gravel	7
550 550	<u>.</u> ф.	_			∮ 3				1 1	Ŵ					550	549.9	1 85				1					W	550.	1	to Fine Sandy SILT	8
	+	WC)H W	DH 1	∮ 1· · ·	-			-	W							Ŧ	WOH	WOH	2	\ \ 2 \cdot \c					М		ran-Hed, Coars	to Fine Sandy SIL1	
	Ŧ										FF	F					Ŧ				;:::::			.			546.	<u> </u>		12
545 545	.0 ‡ 1:	5.5 WC) DH I WO	DH 3	11					w	545.	Red-Tan, Silty, Coarse	se to Fine Sar	ndy CLAY 13.0	545	544.9	13.5	WOH	1	2		ļ · · ·			-	w		Tan-Red, Silty, Coa	se to Fine Sandy CLA	·Υ
	‡				¶3 · · ·				.	"	541.						‡				 			.		vv				
540 540	<u>,</u> ‡ ,,				; : :						<u>541.</u>	ALLU	UVIAL — —			500.0	18.5							.						
540 540	· + '	.s wc	DH 1	3	4				.	w	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Gray-Brown, Silty, Cl SAND with a Trace	Clayey, Coarse ce of Organic I	e to Fine Matter	340	539.9	+ 18.5 +	1	2	3	\$ 5· · ·	: : :				М				
	‡								.				.				‡										537.	l DE	SIDUAL	21
535 535	.0 + 2:	.5		0 01/0	· · ·						535.		IDUAL — —	23.0	300	534.9	23.5	1	<u> </u>		<u> </u>								to Fine Sandy SILT	
533	.2 + 2!	.3		9 81/0.	<u> </u>		+-		.0		534. 977 533.	Tan, Silty, Coars	rse to Fine SA	ND 24.5	1 1		‡	4	4	8	12			.		М	532.			25
	1	60/0	5.0					00/0			<u> </u>	Tan META	RED ROCK FADIORITE				<u> </u>				: : : - :		l l]		529.	Black Mi	ERED ROCK TAGABBRO	
	\pm										<u> </u>	Boring Terminate Penetration Test Refu			530	529.9	† 28.5	60/0.0			<u> </u>	<u> </u>		60/0.0	11		529.	9	ated with Standard	28
	Ŧ										F	ft on CRYSTALLINE F	ROCK: META	DIORITE			Ŧ										F	Penetration Test Re	fusal at Elevation 529.9 ROCK: METAGABBRO	
	Ŧ										l F						Ŧ										l F	I ON ON ON ALLINE	TIOOK WEITHORDER	.0
	Ŧ										l F						Ŧ										l F			
	‡																‡													
	‡																‡													
	‡																‡													
	‡																<u> </u>													
	\pm										-						+										-			
+	+										-						+										-			
, Io.	Ŧ										l F						Ŧ										l F			
	Ŧ										l F						Ŧ										l F			
<u> </u>	‡																‡										-			
Š	‡																‡													
2	‡																‡										-			
5	‡																‡													
5	+																†										-			
00 k	İ										<u> </u>						<u> </u>										<u> </u>			
2	Ŧ										F						Ŧ										F			
	Ŧ										F						Ŧ										F			
2 8	‡										F						Ŧ										F			
8	‡																‡													
BL.	‡																‡													
3	‡										<u> </u>						‡										<u> </u>			
뷥	\pm																\pm										-			
<u> </u>	Ŧ										F						Ŧ										F			
<u>ظ</u> ا	İ										1						İ		1							1	1			

PROJECT NO.: 42180.1.1 (B-5105)

F.A. NO.: BRSTP-4982 (7) COUNTY: MECKLENBURG

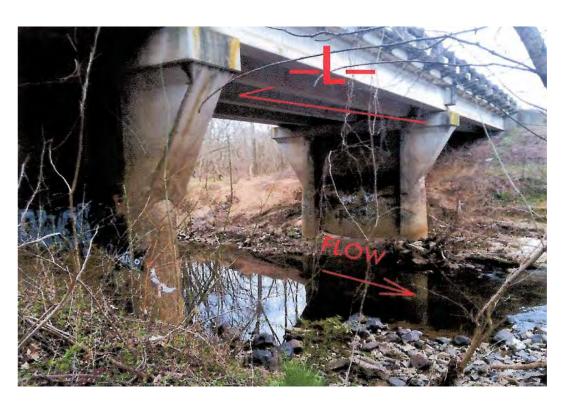
REPLACE OF BRIDGE NO. 49 OVER LITTLE SUGAR CREEK ON SR 4982 (LANCASTER HIGHWAY)

Sample #	Boring #	Depth (ft)	Rock Type	Geologic Map Unit	Run RQD	Length (in)	Diameter (in)	Unit Weight (PCF)	Unconfined Compressive Strength (PSI)	Young's Modulus (PSI)	Splitting Tensile Strength (PSI)	Remarks
RS-1	B1-A	19.7-20.0	METAGABBRO	PzZm	100	3.95	1.988	183.2	8,190	N/M	N/M	RMR=61
RS-2	B2-B	23.3-23.6	METAGABBRO	PzZm	78	3.88	1.988	182.2	7,730	N/M	N/M	RMR=58

SITE PHOTOGRAPHS



View Looking Upstation along -L- from End Bent 1



Profile of Bridge Looking Downstation from End Bent 2