



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

August 20, 2012

ADDENDUM #1

To: Plan Holders

From: Wanda H. Austin, PE
Proposals Engineer

RE:
Contract ID: DN00089
County: Polk
Letting Date: August 28, 2012

Attached are the Geotechnical Reports for the above contract.

Please insert this letter into the proposal and sign the verification below. Thank you for your attention to this matter.

I, _____ representing _____
(SIGNATURE)

Acknowledge receipt of Addendum #1.

Fourteenth Division Office

Phone: (828)586-2141

253 Webster Road, Sylva, North Carolina 28779

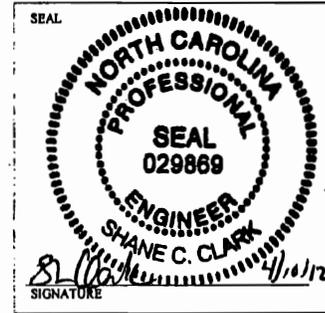
Fax: (828)586-4043

FOUNDATION RECOMMENDATIONS

WBS 45360.1.22
 T.I.P. NO. BD-5114V
 COUNTY Polk
 STATION 23+34.00-L-

DESCRIPTION Bridge No. 089 on SR 1356 over
Henson's Creek

	INITIALS	DATE
DESIGN	MRB	3/9/12
CHECK	SCC	4/10/12
APPROVAL	SCC	4/10/12



BENT	STATION	FOUNDATION TYPE	FACTORED RESISTANCE	MISCELLANEOUS & DETAILS
END BENT 1	STA.22+88.025-L-	Cap on HP 12x53 Steel Piles	65 tons/pile	Bottom of Cap El. = 854.2 ft ± Estimated Length of Pile = 35 ft Number of Piles =5
BENT 1	STA.23+19.193-L-	36 inch Diameter Drilled Pier	355 tons/pier	Bottom of Cap Elev. =853.3 ft ± Point of Fixity Elev. = 818.5 ft Tip No Higher Than Elev. = 809.0 ft Number of Drilled Piers =3
END BENT 2	STA. 23+80.774-L-	Cap on HP 12x53 Steel Piles	90 tons/pile	Bottom of Cap El. = 853.0 ft ± Estimated Length of Pile = 40 ft Number of Piles = 5

NOTES ON PLANS & COMMENTS

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HIGHWAY BUILDING
PO BOX 25201
RALEIGH, NORTH CAROLINA 27611

SUBJECT: Bridge No. 089 on SR 1356 over
Henson's Creek

PREPARED BY: MRB

PROJECT: 45360.1.22

DATE: 3/9/12

TIP: BD-5114V

CHECKED BY: SCC

COUNTY: Polk

DATE: 3/13/12

FOUNDATION RECOMMENDATION NOTES ON PLANS

- 1) For Piles, see section 450 of the standard specifications.
- 2) Piles at End Bent No. 1 are designed for a Factored Resistance of 65 tons per Pile.
- 3) Drive piles at End Bent No.1 to a required driving resistance of 108 tons per pile.
- 4) The Scour Critical Elevation for End Bent No. 1 is Elevation 850.0 ft. The Scour Critical Elevations are used to monitor possible scour problems during the life of the structure.
- 5) For Drilled Piers, See section 411 of the standard specifications.
- 6) Drilled Piers at Bent No. 1 are Designed for a Factored Resistance of 355.0 tons per Pier. Check field conditions for the Required Tip Resistance of 60.0 TSF.
- 7) Permanent Steel Casings may be required for Drilled Piers at Bent No. 1. If required, do not extend permanent casings below elevation 834.0 ft. without prior approval from the Engineer. The Engineer will determine the need for permanent steel casings.
- 8) Install Drilled Piers at Bent No. 1 that extend to an elevation no higher than 809.0 ft ; satisfy the Required Tip Resistance and have a penetration of at least 6 ft into rock as defined by Article 411-1 of the Standard Specifications.
- 9) The Scour Critical Elevation for Bent No. 1 is Elevation 829.0 ft. The Scour Critical Elevations are used to monitor possible scour problems during the life of the structure.
- 10) SID Inspections may be required for Drilled Piers. The Engineer will determine the need for SID Inspections. For SID inspections, see section 411 of the standard specifications.
- 11) CSL tubes are required and CSL testing may be required for the Drilled Piers . The Engineer will determine the need for CSL testing. For CSL testing, see section 411 of the standard specifications.
- 12) SPT may be Required for Drilled Piers. The Engineer will determine the need for SPT. For SPT testing, See section 411 of the Standard Specifications.
- 13) Piles at End Bent No. 2 are designed for a Factored Resistance of 90 tons per Pile.
- 14) Drive piles at End Bent No. 2 to a required driving resistance of 150 tons per pile.

SPECIAL NOTES ON PLANS

- 1) PZ-27 sheet piles are to be placed in front of 12x53 HP piles End Bent No. 1.
- 2) Sheet piles are installed to an elevation of 850.0 ft at End Bent No. 1 to account for the scour impact at End Bent No 1.
- 3) Unclassified excavation is required at End Bent No.1 to remove sand and gravel for the installation of the piles and sheetpiling. The estimated quantity of unclassified excavation is 120 cubic yards.

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DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HIGHWAY BUILDING
PO BOX 25201
RALEIGH, NORTH CAROLINA 27611

SUBJECT: Bridge No. 089 on SR 1356 over
Henson's Creek

PREPARED BY: MRB

PROJECT: 45360.1.22

DATE: 3/9/12

TIP: BD-5114V

CHECKED BY: SCC

COUNTY: Polk

DATE: 3/13/12

FOUNDATION RECOMMENDATION COMMENTS

- 1) Please advise Western Regional Office, if factored resistance is less than max. factored structure load.
- 2) PDA will not be used to monitor driving stresses.
- 3) No re-strikes are required.
- 4) End bent slopes of 1½:1 are ok with slope protection to berm and to 1¼: 1.
- 5) Bridge approach Fill - Sub Regional Tier is required at End Bent No. 1.
- 6) Bridge approach Fill - Sub Regional Tier is required at End Bent No. 2.
- 7) The Design Scour Elevation for End Bent No. 1 is 852.0 ft.
- 8) The Design Scour Elevation for Bent No. 1 is 834.0 ft.
- 9) The Point of Fixity Elevation for Bent No. 1 is 818.5 ft.
- 10) The End Bent No. 1 was design based on boring B-3 and the interior Bent No. 1 was designed based on boring B-4.
- 11) Please send Western Regional Design Engineer a half size copy of the final general drawing sheets, including the location sketch, plan notes and quantities, at the time they are submitted to the plan checking & review squad.

DRILLED PIER PAY ITEMS
(For LRFD Projects - Revised 4/18/11)

WBS ELEMENT 45360.1.22 DATE 3/9/2012
 TIP NO. BD-5114V DESIGNED BY MRB
 COUNTY Polk CHECKED BY SCC
 STATION 23+34.00-L-
 DESCRIPTION Bridge No. 089 on SR 1356 over
Henson's Creek

NUMBER OF BENTS WITH DRILLED PIERS 1
 NUMBER OF DRILLED PIERS PER BENT 3
 NUMBER OF END BENTS WITH DRILLED PIERS 0
 NUMBER OF DRILLED PIERS PER END BENT 0

Bent # or End Bent #	DRILLED PIER PAY ITEM QUANTITIES				
	<u>36</u> Dia. Drilled Piers Not In Soil (per linear ft/m)	Permanent Steel Casing For <u>36</u> Dia. Drilled Pier (yes/no/maybe)	SID Inspections (per each)	SPT Testing (per each)	CSL Testing (per each)
Bent 1	34	Maybe			
TOTALS	34	 	1	1	1

Notes:

Blanks or "no" represent quantity of zero.

If drilled piers not in soil are required, calculate quantity of "36 Dia. Drilled Piers in Soil" as the difference between the total drilled pier length and the "36 Dia. Drilled Piers Not in Soil" from the table above. If there is none or zero quantity for drilled piers not in soil in the table above, calculate quantity of "36 Dia. Drilled Piers" as the total drilled pier length and do not use the "36 Dia. Drilled Piers in Soil" pay item.

If permanent steel casing is or may be required, calculate quantity of "Permanent Steel Casing for 36 Dia. Drilled Pier" as the difference between the ground line or top of drilled pier elevation, whichever is higher, and the elevation the permanent casing can not extend below from the foundation recommendations.

If "SID Inspections", "SPT Testing" or "CSL Testing" may be required, show quantities of these pay items on the substructure plans as totals only. If "SID Inspections", "SPT Testing" or "CSL Testing" is required, show quantities of these pay items on the substructure plans for each bent or end bent.

The number of CSL tubes required per drilled pier is equal to one tube per foot of design pier diameter with at least four tubes per pier. Calculate the length of each CSL tube as the total drilled pier length plus 1.5 ft.

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

CONTENTS

SHEET	DESCRIPTION
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4	PROFILE
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6	BORE LOG & CORE REPORTS
9	CORE PHOTOGRAPH
10	SCOUR REPORT

STRUCTURE
 SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 45360.1.22 (BD-5114V) F.A. PROJ. _____
 COUNTY POLK
 PROJECT DESCRIPTION BRIDGE No. 89 ON SR-1356
OVER HENSON'S CREEK

SITE DESCRIPTION _____

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 1919 250-4088. NEITHER THE SUBSURFACE PLANS AND REPORTS, NOR THE FIELD BORING LOGS, ROCK CORES, OR SOIL TEST DATA ARE PART OF THE CONTRACT.

GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (IN-PLACE) TEST DATA CAN BE RELIED ON ONLY TO THE DEGREE OF RELIABILITY INHERENT IN THE STANDARD TEST METHOD. THE OBSERVED WATER LEVELS OR SOIL MOISTURE CONDITIONS INDICATED IN THE SUBSURFACE INVESTIGATIONS ARE AS RECORDED AT THE TIME OF THE INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION, AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT DOES NOT WARRANT OR GUARANTEE THE SUFFICIENCY OR ACCURACY OF THE INFORMATION MADE, NOR THE INTERPRETATIONS MADE, OR OPINION OF THE DEPARTMENT AS TO THE TYPE OF MATERIALS AND CONDITIONS TO BE ENCOUNTERED. THE BIDDER OR CONTRACTOR IS CAUTIONED TO MAKE SUCH INDEPENDENT SUBSURFACE INVESTIGATIONS AS HE DEEMS NECESSARY TO SATISFY HIMSELF AS TO CONDITIONS TO BE ENCOUNTERED ON THIS PROJECT. THE CONTRACTOR SHALL HAVE NO CLAIM FOR ADDITIONAL COMPENSATION OR FOR AN EXTENSION OF TIME FOR ANY REASON RESULTING FROM THE ACTUAL CONDITIONS ENCOUNTERED AT THE SITE DIFFERING FROM THOSE INDICATED IN THE SUBSURFACE INFORMATION.

PROJECT: 45360.1.22 ID: BD-5114V

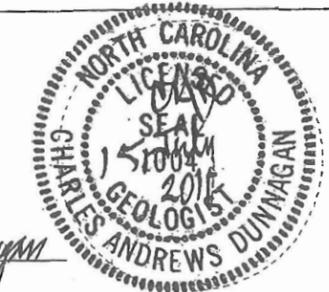
PERSONNEL
D C ELLIOT
C J COFFEY
L E RIDDLE

INVESTIGATED BY C A DUNNAGAN
 CHECKED BY W D FRYE, Jr
 SUBMITTED BY W D FRYE, Jr
 DATE JULY 2011

DRAWN BY: C A DUNNAGAN

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED 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.



CADunnagan

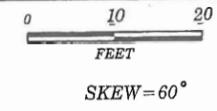
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

SUBSURFACE INVESTIGATION

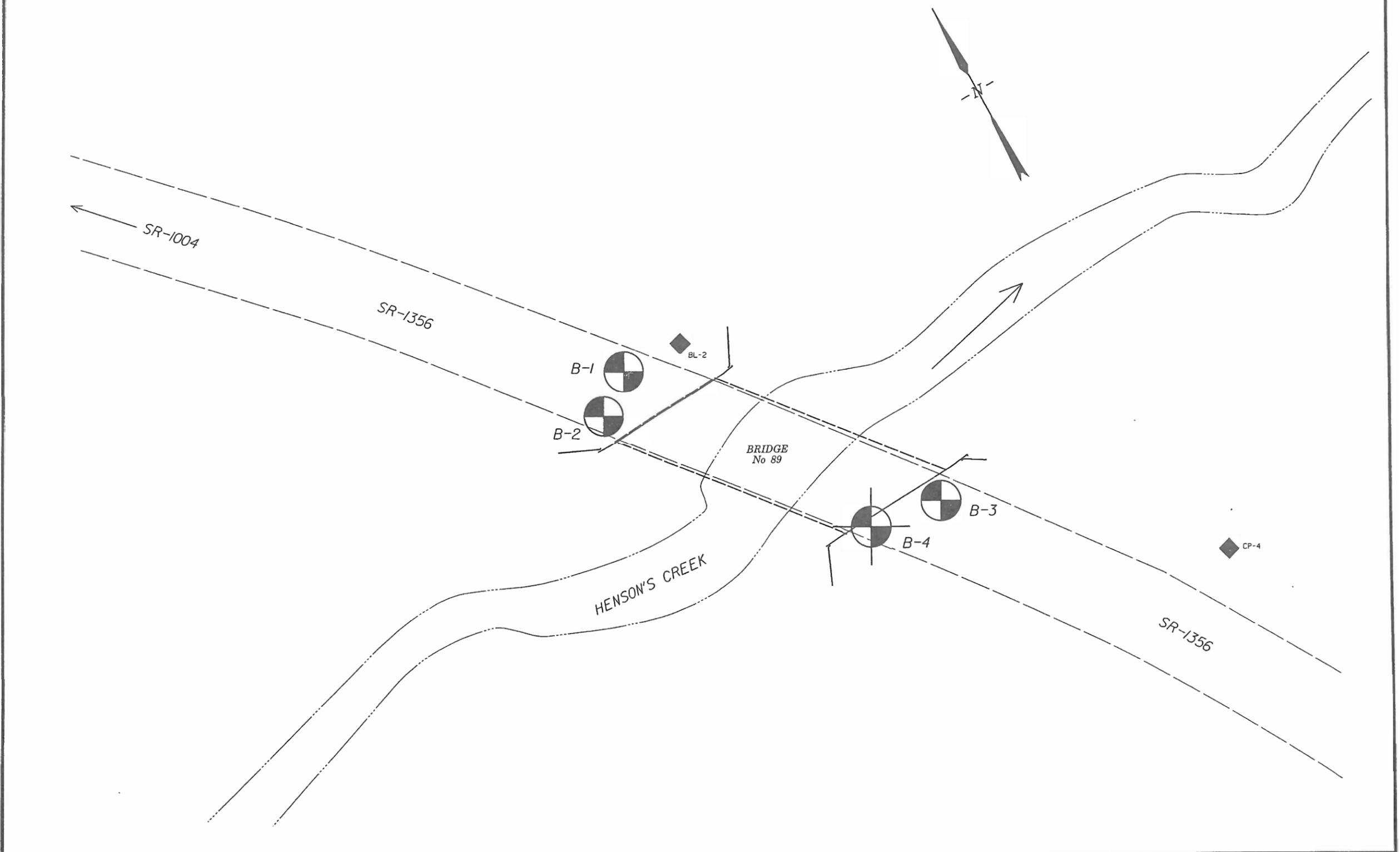
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																				
<p>SOIL IS CONSIDERED TO BE THE 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 ACCORDING TO STANDARD PENETRATION TEST (AASHTO T208, ASTM D-1586). SOIL CLASSIFICATION IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY SHALL INCLUDE: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. EXAMPLE:</p> <p style="text-align: center;"><i>VERY STIFF, GRN. SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i></p>	<p>WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. UNIFORM - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. (ALSO POORLY GRADED) GAP-GRADED - INDICATES A MIXTURE OF UNIFORM PARTICLES OF TWO OR MORE SIZES.</p> <p style="text-align: center;">ANGULARITY OF GRAINS</p> <p>THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.</p>	<p>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. SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK. ROCK MATERIALS ARE TYPICALLY DIVIDED AS FOLLOWS:</p>	<p>ALLUVIUM (ALLOUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER. AQUIFER - A WATER BEARING FORMATION OR STRATA. ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND. ARGILLACEOUS - APPLIED TO ALL ROCKS OR SUBSTANCES COMPOSED OF CLAY MINERALS, OR HAVING A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, AS SHALE, SLATE, ETC. 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 GROUND SURFACE. CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE. COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM OF SLOPE. CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE. DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT ROCKS OR CUTS MASSIVE ROCK. DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE HORIZONTAL. DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE LINE OF DIP, MEASURED CLOCKWISE FROM NORTH. FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE. FISSILE - A PROPERTY OF SPILT LAYERS ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS OR LAYERS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM THE STRATUM. FORMATION (F.M.) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. 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 ITS LATERAL EXTENT. LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS. MOTTLED (MOT.) - IRREGULARLY MOTTLED WITH SPOTS OF DIFFERENT COLORS. MOTTLING IN SOILS USUALLY INDICATES PRESENT WEATHERING AND LACK OF GOOD DRAINAGE. PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE OF AN INTERVENING IMPERVIOUS STRATUM. RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK. 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 RUN AND EXPRESSED AS A PERCENTAGE. SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT ROCK. SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPACED PARALLEL TO THE BEDDING OR SCHISTOSITY OF THE INTRODUCED ROCKS. SLICKENSIDE - POLISHED AND STRIATED SURFACE THAT RESULTS FROM FRICTION ALONG A FAULT OR SLIP PLANE. STANDARD PENETRATION TEST (PENETRATION RESISTANCE) (SPT) - NUMBER OF BLOWS IN OR BPF OF A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS. STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE. STRATA ROCK QUALITY DESIGNATION (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.</p>																																																																																																																																																																																																																																																																																				
<p style="text-align: center;">SOIL LEGEND AND AASHTO CLASSIFICATION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>GENERAL CLASS.</th> <th colspan="7">GRANULAR MATERIALS (<= 35% PASSING #200)</th> <th colspan="7">SILT-CLAY MATERIALS (> 35% PASSING #200)</th> <th colspan="3">ORGANIC MATERIALS</th> </tr> <tr> <th>GROUP CLASS.</th> <th colspan="2">A-1</th> <th colspan="2">A-3</th> <th colspan="3">A-2</th> <th colspan="2">A-4</th> <th colspan="2">A-5</th> <th colspan="3">A-6</th> <th colspan="2">A-7</th> <th colspan="3">A-1, A-2</th> <th colspan="3">A-4, A-5</th> <th colspan="3">A-6, A-7</th> </tr> <tr> <th>SYMBOL</th> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="2">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="3">[Symbol]</td> <td colspan="3">[Symbol]</td> </tr> <tr> <th>% PASSING</th> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="3">200</td> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="3">200</td> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="3">200</td> <td colspan="3">10</td> <td colspan="3">40</td> <td colspan="3">200</td> </tr> <tr> <th>LIQUID LIMIT</th> <td colspan="2">60</td> <td colspan="2">50</td> <td colspan="3">40</td> <td colspan="2">30</td> <td colspan="2">25</td> <td colspan="3">20</td> <td colspan="2">15</td> <td colspan="2">10</td> <td colspan="3">5</td> <td colspan="3">0</td> <td colspan="3">0</td> <td colspan="3">0</td> </tr> <tr> <th>PLASTIC INDEX</th> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="3">0</td> <td colspan="3">0</td> <td colspan="3">0</td> </tr> <tr> <th>GROUP INDEX</th> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="3">0</td> <td colspan="3">0</td> <td colspan="3">0</td> <td colspan="3">0</td> </tr> <tr> <th>USUAL TYPES OF MAJOR MATERIALS</th> <td colspan="2">STONE FRAGS. GRAVEL AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="3">SILTY OR CLAYEY SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="3">CLAYEY SOILS</td> <td colspan="3">SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER</td> <td colspan="3">HIGHLY ORGANIC SOILS</td> <td colspan="3"></td> <td colspan="3"></td> <td colspan="3"></td> </tr> <tr> <th>GENERATING AS A SUBGRADE</th> <td colspan="7">EXCELLENT TO GOOD</td> <td colspan="7">FAIR TO POOR</td> <td colspan="3">FAIR TO POOR</td> <td colspan="3">POOR</td> <td colspan="3">UNSATURABLE</td> <td colspan="3"></td> <td colspan="3"></td> </tr> </table> <p style="text-align: center;">PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30</p>	GENERAL CLASS.	GRANULAR MATERIALS (<= 35% PASSING #200)							SILT-CLAY MATERIALS (> 35% PASSING #200)							ORGANIC MATERIALS			GROUP CLASS.	A-1		A-3		A-2			A-4		A-5		A-6			A-7		A-1, A-2			A-4, A-5			A-6, A-7			SYMBOL	[Symbol]		[Symbol]		[Symbol]			[Symbol]		[Symbol]		[Symbol]			[Symbol]		[Symbol]			[Symbol]			[Symbol]			% PASSING	10		40		200			10		40		200			10		40		200			10			40			200			LIQUID LIMIT	60		50		40			30		25		20			15		10		5			0			0			0			PLASTIC INDEX	0		0		0			0		0		0			0		0		0			0			0			0			GROUP INDEX	0		0		0			0		0		0			0		0		0			0			0			0			USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL AND SAND		FINE SAND		SILTY OR CLAYEY SAND			SILTY SOILS		CLAYEY SOILS			SOILS WITH LITTLE OR MODERATE AMOUNTS OF ORGANIC MATTER			HIGHLY ORGANIC SOILS												GENERATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR			POOR			UNSATURABLE									<p style="text-align: center;">MINERALOGICAL COMPOSITION</p> <p>MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.</p> <p style="text-align: center;">COMPRESSIBILITY</p> <p>SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50</p> <p style="text-align: center;">PERCENTAGE OF MATERIAL</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ORGANIC MATERIAL</th> <th>GRANULAR SOILS</th> <th>SILT-CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>LITTLE ORGANIC MATTER</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> <tr> <td></td> <td></td> <td></td> <td>35% AND ABOVE</td> </tr> </table> <p style="text-align: center;">GROUND WATER</p> <p>▽ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING ▽ STATIC WATER LEVEL AFTER 24 HOURS ▽ PH PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP</p>	ORGANIC MATERIAL	GRANULAR SOILS	SILT-CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	LITTLE ORGANIC MATTER	3 - 5%	5 - 12%	LITTLE	MODERATELY ORGANIC	5 - 10%	12 - 20%	SOME	HIGHLY ORGANIC	>10%	>20%	HIGHLY				35% AND ABOVE	<p style="text-align: center;">WEATHERING</p> <p>FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SL.) ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN, CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY, ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE. SLIGHT (SL.) ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1/2 INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED. CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS. MODERATE (MOD.) SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY. ROCK HAS DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED WITH FRESH ROCK. MODERATELY SEVERE (MOD. SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH AND CAN BE EXCAVATED WITH A GEOLOGIST'S PICK. ROCK GIVES "CLUNK" SOUND WHEN STRUCK. SEVERE (SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC OF GRANITOID ROCKS IS IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE DULL AND EVIDENT BUT REDUCED EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. FELDSPARS ARE KAOLINIZED TO SOME EXTENT. VERY SEVERE (V SEV.) ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC ELEMENTS ARE DISCERNIBLE BUT THE MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK REMAINING. SAPROLITE IS AN EXAMPLE OF SOIL WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. IF TESTED, YIELDS SPT N VALUES < 100 BPF. 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 ALSO AN EXAMPLE.</p> <p style="text-align: center;">ROCK HARDNESS</p> <p>VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK. HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN. MODERATELY HARD CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCH DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. MEDIUM HARD CAN BE GROVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO ROCKS 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK. SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN PIECES CAN BE BROKEN BY FINGER PRESSURE. VERY SOFT CAN BE CARVED WITH KNIFE. CAN BE EXCAVATED READILY WITH POINT OF PICK. PIECES 1 INCH OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY FINGER NAIL.</p>	<p style="text-align: center;">MISCELLANEOUS SYMBOLS</p> <p>ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD</p> <p>SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL</p> <p style="text-align: center;">ABBREVIATIONS</p> <p>AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS. - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS</p> <p>HL - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL</p> <p>M - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED W - UNIT WEIGHT W - DRY UNIT WEIGHT W - WEIGHT OF HAMMER FIAD - FILLED IMMEDIATELY AFTER DRILLING</p>
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VERY THINLY BEDDED	0.03 - 0.16 FEET																																																																																																																																																																																																																																																																																						
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<p style="text-align: center;">PLASTICITY</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>PLASTICITY INDEX (PI)</th> <th>DRY STRENGTH</th> </tr> <tr> <td>0-5</td> <td>VERY LOW</td> </tr> <tr> <td>6-15</td> <td>SLIGHT</td> </tr> <tr> <td>16-25</td> <td>MEDIUM</td> </tr> <tr> <td>26 OR MORE</td> <td>HIGH</td> </tr> </table>	PLASTICITY INDEX (PI)	DRY STRENGTH	0-5	VERY LOW	6-15	SLIGHT	16-25	MEDIUM	26 OR MORE	HIGH	<p style="text-align: center;">COLOR</p> <p>NOTATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). TO DESCRIBE APPEARANCE.</p>	<p style="text-align: center;">FRAC. SPACING</p> <p style="text-align: center;">INDURATION</p> <p style="text-align: center;">TERMS AND DEFINITIONS</p> <p>BENCH MARK: BL-2: 11.0 FEET FROM NW END OF EXISTING BRIDGE</p> <p style="text-align: right;">ELEVATION: 855.20 FT.</p> <p>NOTES:</p>																																																																																																																																																																																																																																																																											
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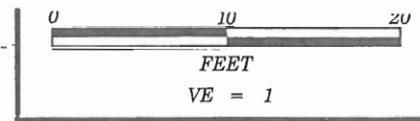
BRIDGE No. 89 ON SR-1356 OVER HENSON'S CREEK



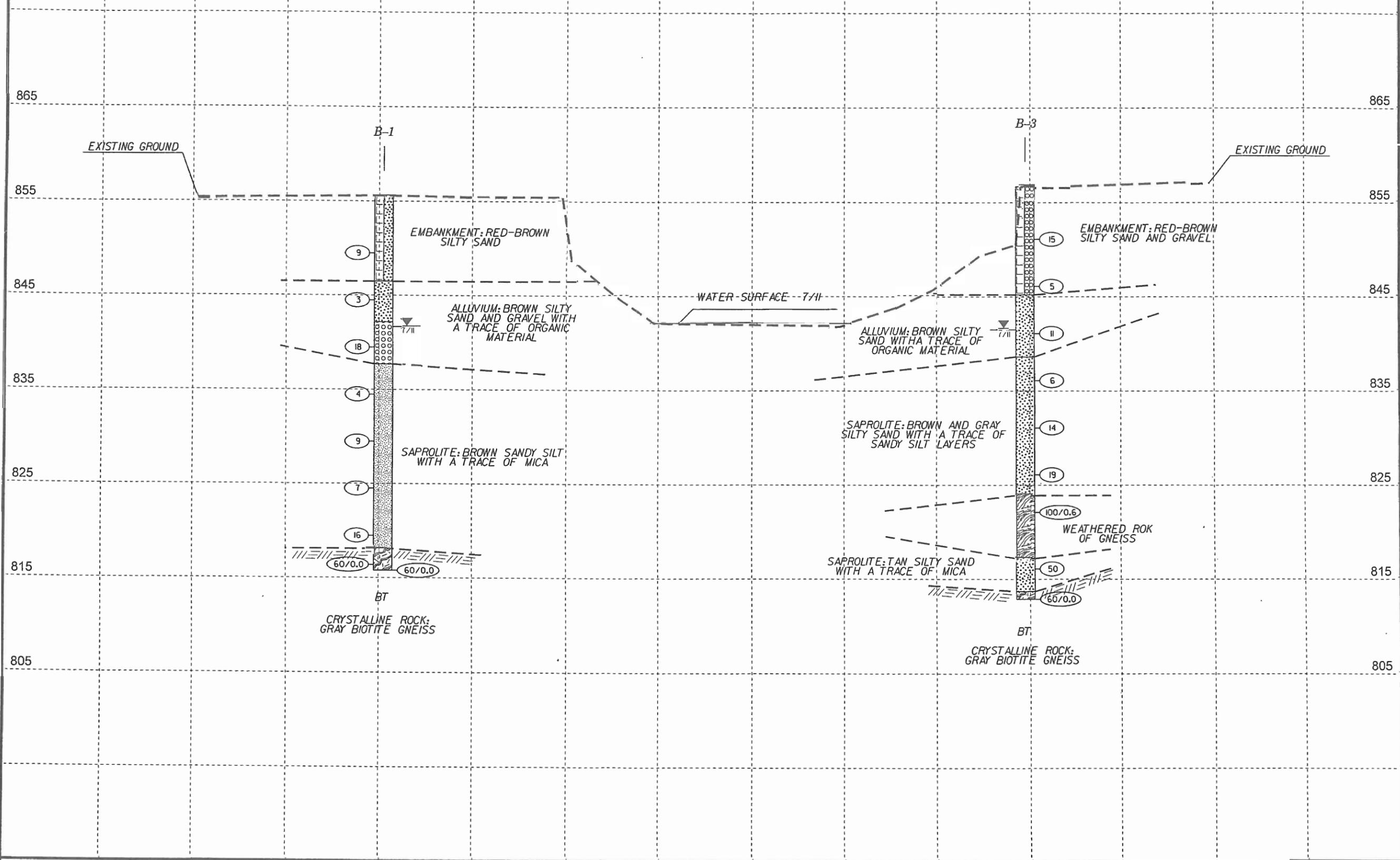
PROJECT REFERENCE NO.	SHEET
45360.1.22 (BD-5114V)	3/10
PLAN VIEW	

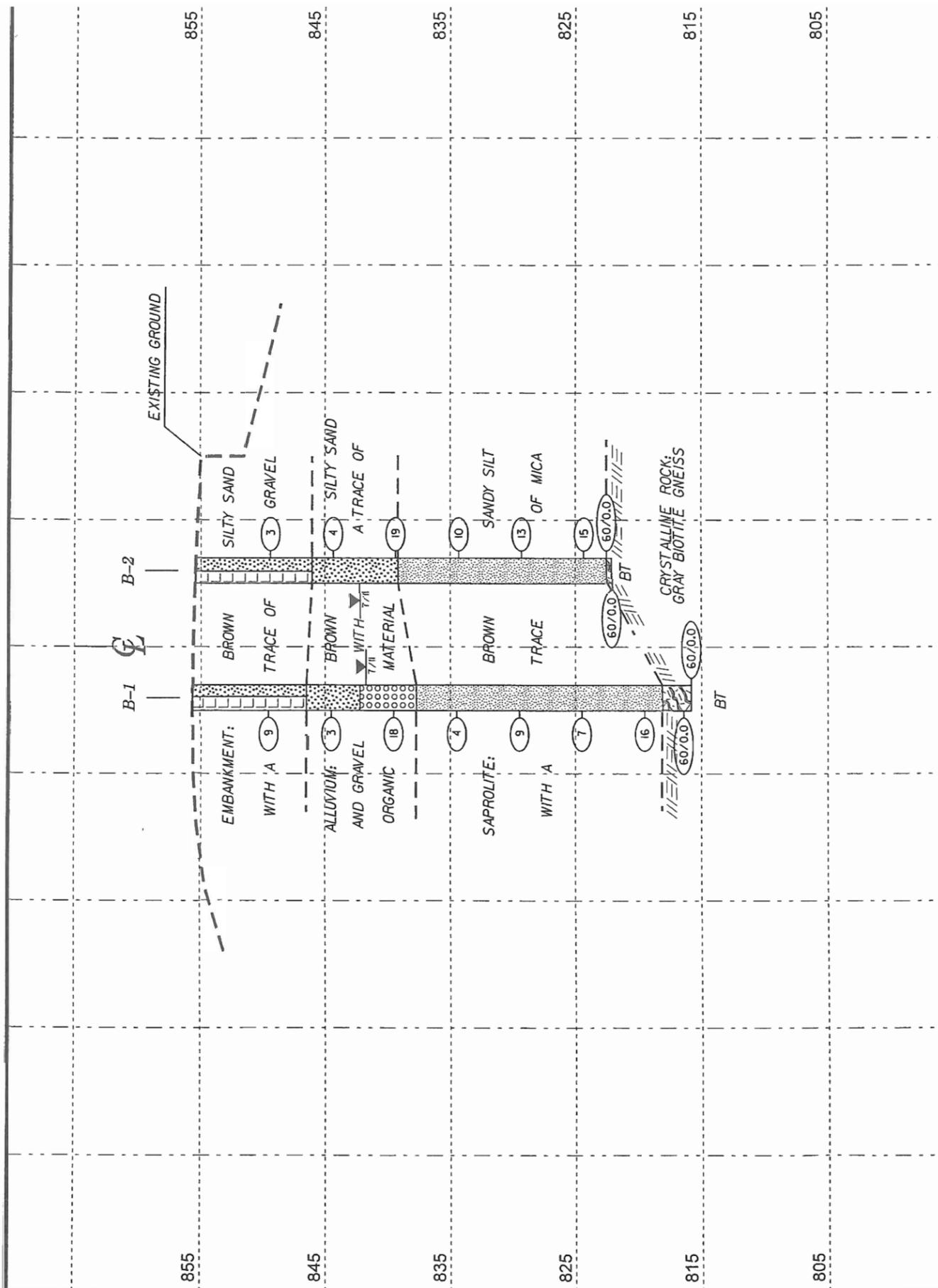


BRIDGE No. 89 ON SR-1356 OVER HENSON'S CREEK



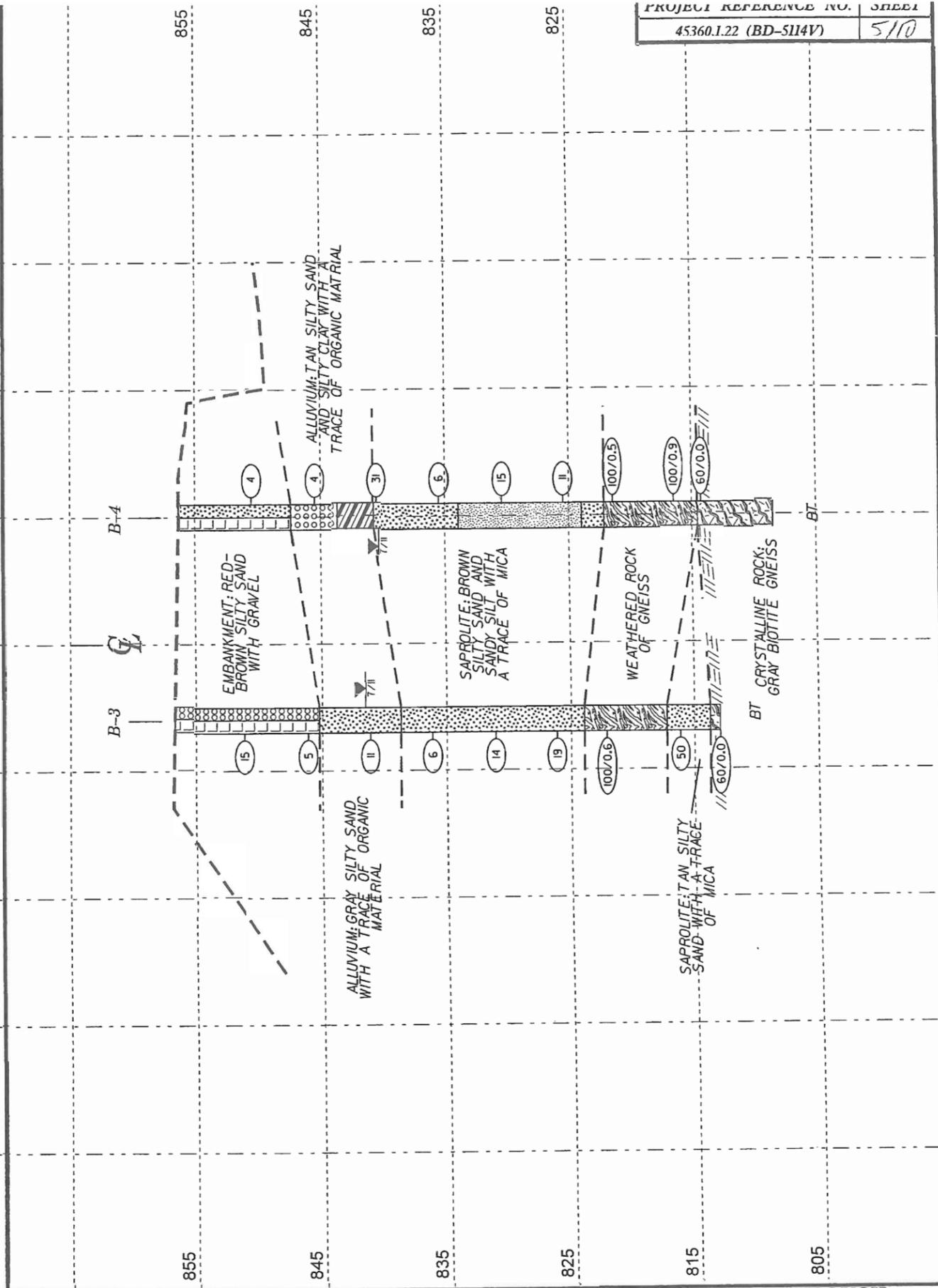
PROJECT NUMBER: 45360.1.22 (BD-5114V) 4/10
 PROFILE 12.0 FEET
 LEFT OF EXISTING
 CENTERLINE





HORIZ. SCALE 0 10 20 (FEET)
 VE = 1

CROSS SECTION THROUGH
 END BENT ONE BORINGS



HORIZ. SCALE 0 10 20 (FEET)
 VE = 1

CROSS SECTION THROUGH
 END BENT TWO BORINGS

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

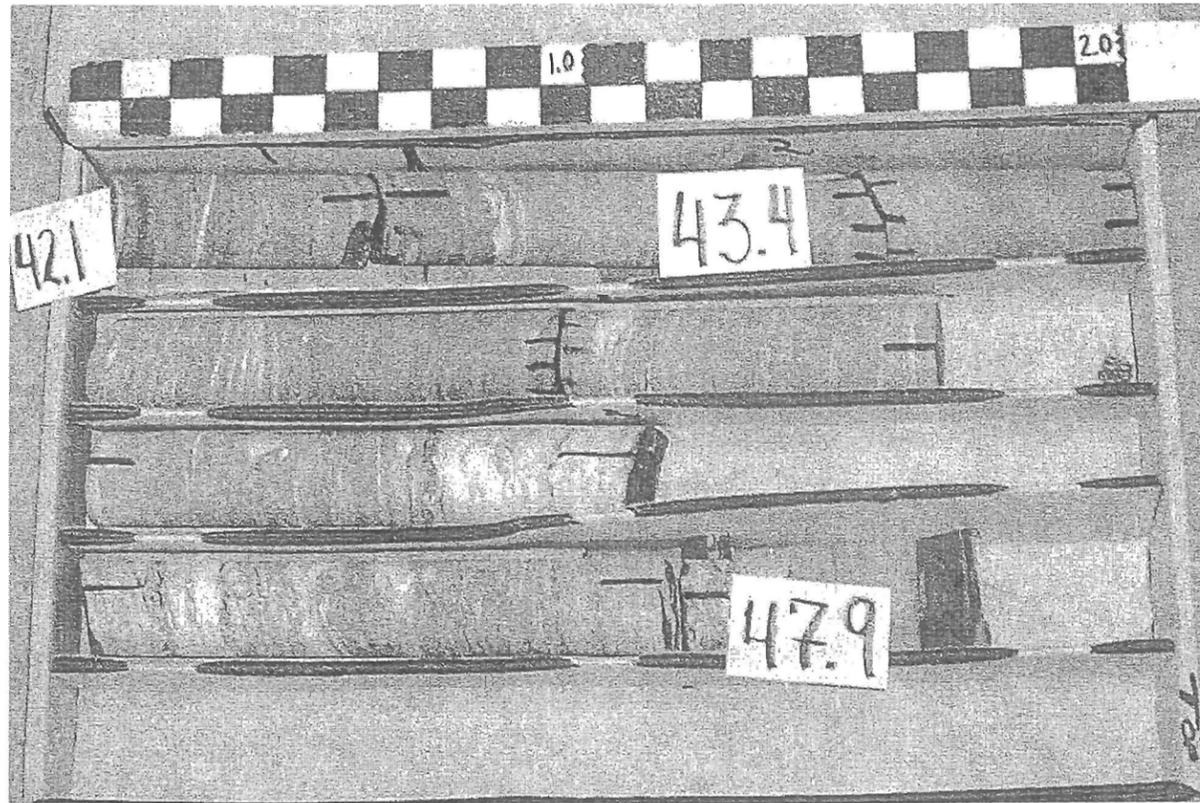
6/10

WBS 45360.1.22		TIP BD-5114V		COUNTY POLK		GEOLOGIST Elliott, D. C.							
SITE DESCRIPTION Bridge No. 89 on SR-1356 over Henson's Creek.							GROUND WTR (ft)						
BORING NO. B-1		STATION N/A		OFFSET N/A		ALIGNMENT N/A							
COLLAR ELEV. 855.6 ft		TOTAL DEPTH 39.8 ft		NORTHING 554,758		EASTING 1,111,283							
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic									
DRILLER Coffey, Jr., C.		START DATE 07/07/11		COMP. DATE 07/07/11		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
860													
855												855.6	0.0
850	850.5	5.1	2	4	5						M	ROADWAY EMBANKMENT Red-brown silty sand.	
845	845.5	10.1	2	2	1						M	ALLUVIAL Brown silty sand with a trace of organic material.	9.1
840	840.5	15.1	9	13	5						W	ALLUVIAL Gray brown sand and gravel.	13.4
835	835.5	20.1	1	1	3						M	SAPROLITE Brown sandy silt with a trace of mica.	17.9
830	830.5	25.1	2	4	5						M		
825	825.5	30.1	3	3	4						M		
820	820.5	35.1	2	6	10						M		
	816.4	39.2										818.1	37.5
	815.8	39.8										815.8	39.8
		60/0.0										CRISTALLINE ROCK Gray biotite gneiss.	
		60/0.0										Boring Terminated at Elevation 815.8 ft in biotite gneiss.	

NCDOT BORE SINGLE_BORE_CORE_LOGS.GPJ NC_DOT.GDT 11/4/11

WBS 45360.1.22		TIP BD-5114V		COUNTY POLK		GEOLOGIST Elliott, D. C.							
SITE DESCRIPTION Bridge No. 89 on SR-1356 over Henson's Creek.							GROUND WTR (ft)						
BORING NO. B-2		STATION N/A		OFFSET N/A		ALIGNMENT N/A							
COLLAR ELEV. 855.4 ft		TOTAL DEPTH 33.3 ft		NORTHING 554,749		EASTING 1,111,279							
DRILL RIG/HAMMER EFF./DATE AFO0071 CME-550X 72% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic									
DRILLER Coffey, Jr., C.		START DATE 07/05/11		COMP. DATE 07/05/11		SURFACE WATER DEPTH N/A							
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75				
860													
855												855.4	0.0
850	850.3	5.1	1	1	2						M	ROADWAY EMBANKMENT Red-brown silty sand with a trace of gravel.	
845	845.3	10.1	2	2	2						M	ALLUVIAL Brown to gray silty sand with a trace of organic material.	9.4
840	840.3	15.1	1	12	7						M		
835	835.3	20.1	2	4	6						M	SAPROLITE Brown sandy silt with a trace of mic.	16.3
830	830.3	25.1	3	5	8						M		
825	825.3	30.1	2	7	8						M		
	822.5	32.9										822.5	32.9
	822.1	33.3										822.1	33.3
		60/0.0										CRISTALLINE ROCK Gray biotite gneiss.	
		60/0.0										Boring Terminated at Elevation 822.1 ft in biotite gneiss.	

NCDOT BORE SINGLE_BORE_CORE_LOGS.GPJ NC_DOT.GDT 11/4/11



45360.1.22 (BD-5114V)
Polk Co.
Bridge No. 89 on SR-1356
Over Henson's Creek
B-4 (EB2-B)
Box 1 of 1

