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BORE LOGS, CORE REPORT, & CORE PHOTOGRAPHS

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LEGEND SITE PLAN

PROFILE

SHEET NO.

5-7

8-II

STATE OF NORTH CAROLINA

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

# **STRUCTURE**

SUBSURFACE INVESTIGATION

COUNTY \_GRANVILLE

PROJECT DESCRIPTION BRIDGE NO. 125 OVER AARON'S CREEK ON SR 1400 (GRASSY CREEK-VIRGILINA ROAD)

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-5171	1	13

#### **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 1991 707-680. THE SUBSURFACE PLANS AND REPORTS, FIELD BORING LOGS, ROCK CORES AND SOIL TEST DATA ARE NOT PART OF THE CONTRACT.

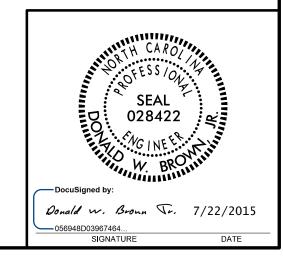
GENERAL SOIL AND ROCK STRATA DESCRIPTIONS AND INDICATED BOUNDARIES ARE BASED ON A GEOTECHNICAL INTERPRETATION OF ALL AVAILABLE SUBSURFACE DATA AND MAY NOT NECESSARILY REFLECT THE ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS OR BETWEEN SAMPLED STRATA WITHIN THE BOREHOLE. THE LABORATORY SAMPLE DATA AND THE IN SITU (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 INVESTIGATION. THESE WATER LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS OF THE INVESTIGATION. THE STATEM LEVELS OR SOIL MOISTURE CONDITIONS MAY VARY CONSIDERABLY WITH TIME ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE INVESTIGATION. THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AND ASSECTIONS AND ASSECTIONS OF THE ACCORDING TO CLIMATIC CONDITIONS MEDICATED DESCRIPTIONS AS WELL AS A CRUPP NOW CHARTSE CACCORDING TO CLIMATIC CONDITIONS INCLUDING TEMPERATURES, PRECIPITATION AND WIND, AS WELL AS OTHER NON-CLIMATIC FACTORS.

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

- IES:
  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.

PERSONNEL E. MAYR, PE **IRIGON** E. ESTEP T. PRESTON

DRAWN BY \_\_D. BROWN, PE CHECKED BY E. MAYR, PE SUBMITTED BY \_\_D. BROWN, PE DATE **JULY** 2015



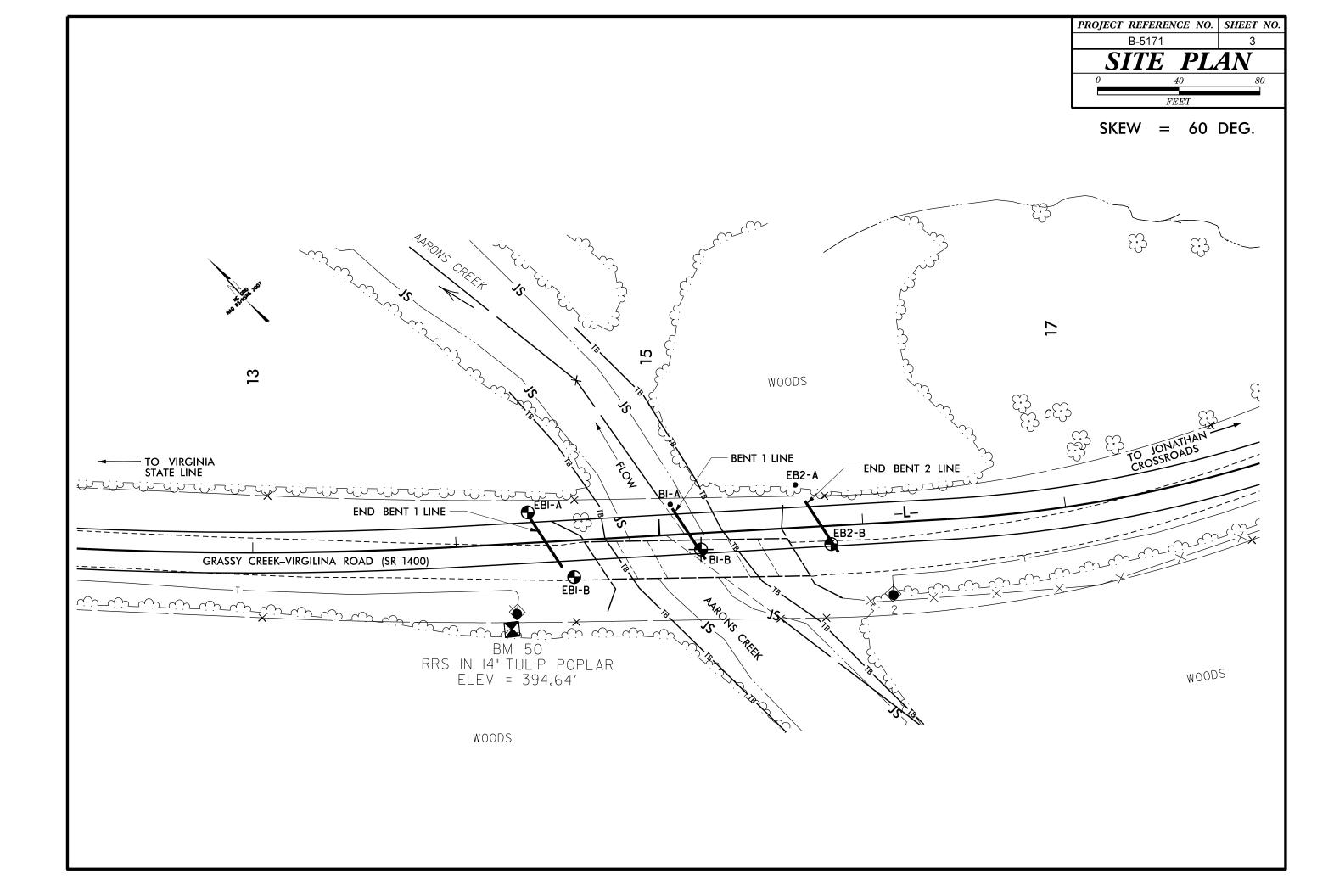
PROJECT REFERENCE NO. SHEET NO. 2

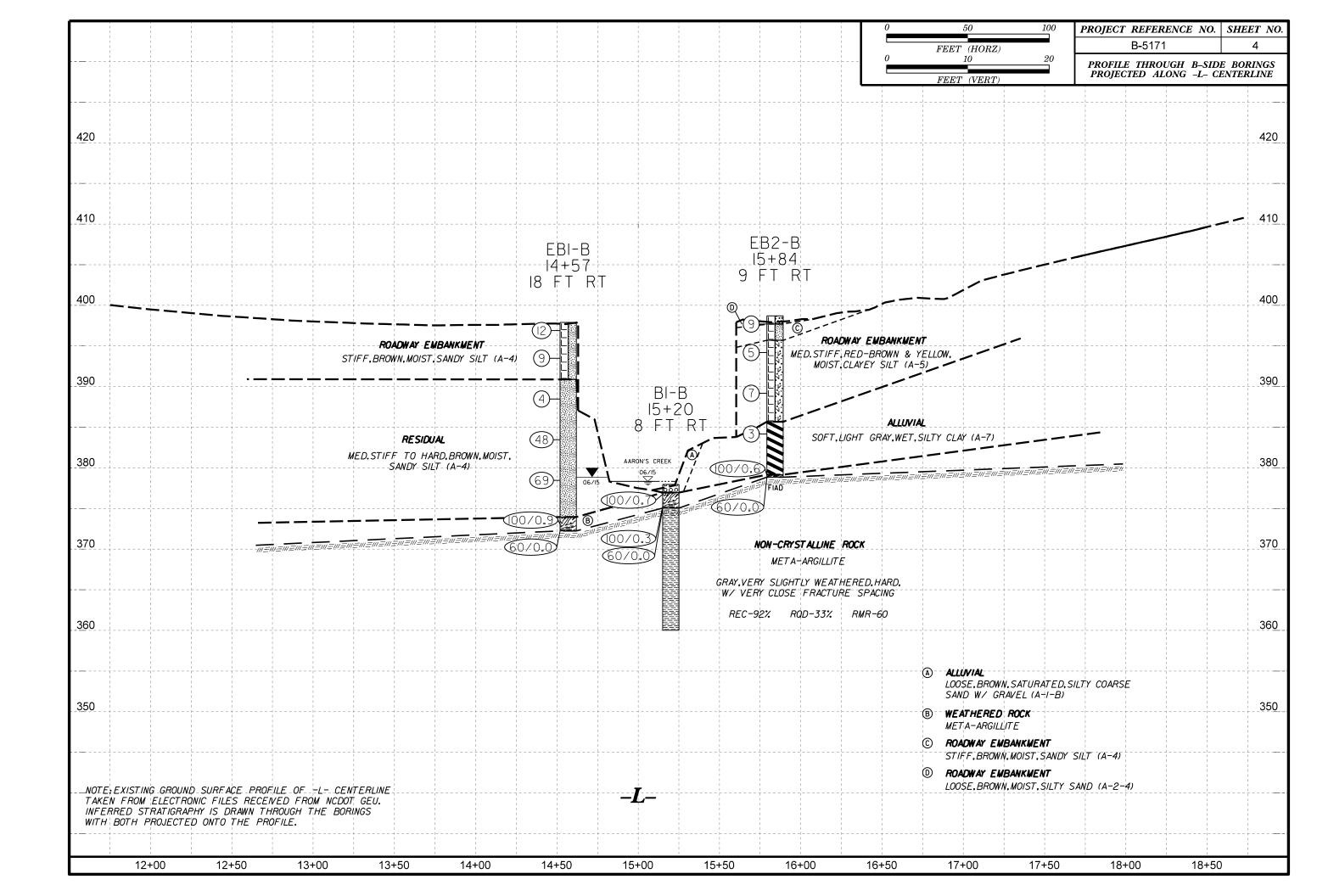
# NORTH CAROLINA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS GEOTECHNICAL ENGINEERING UNIT

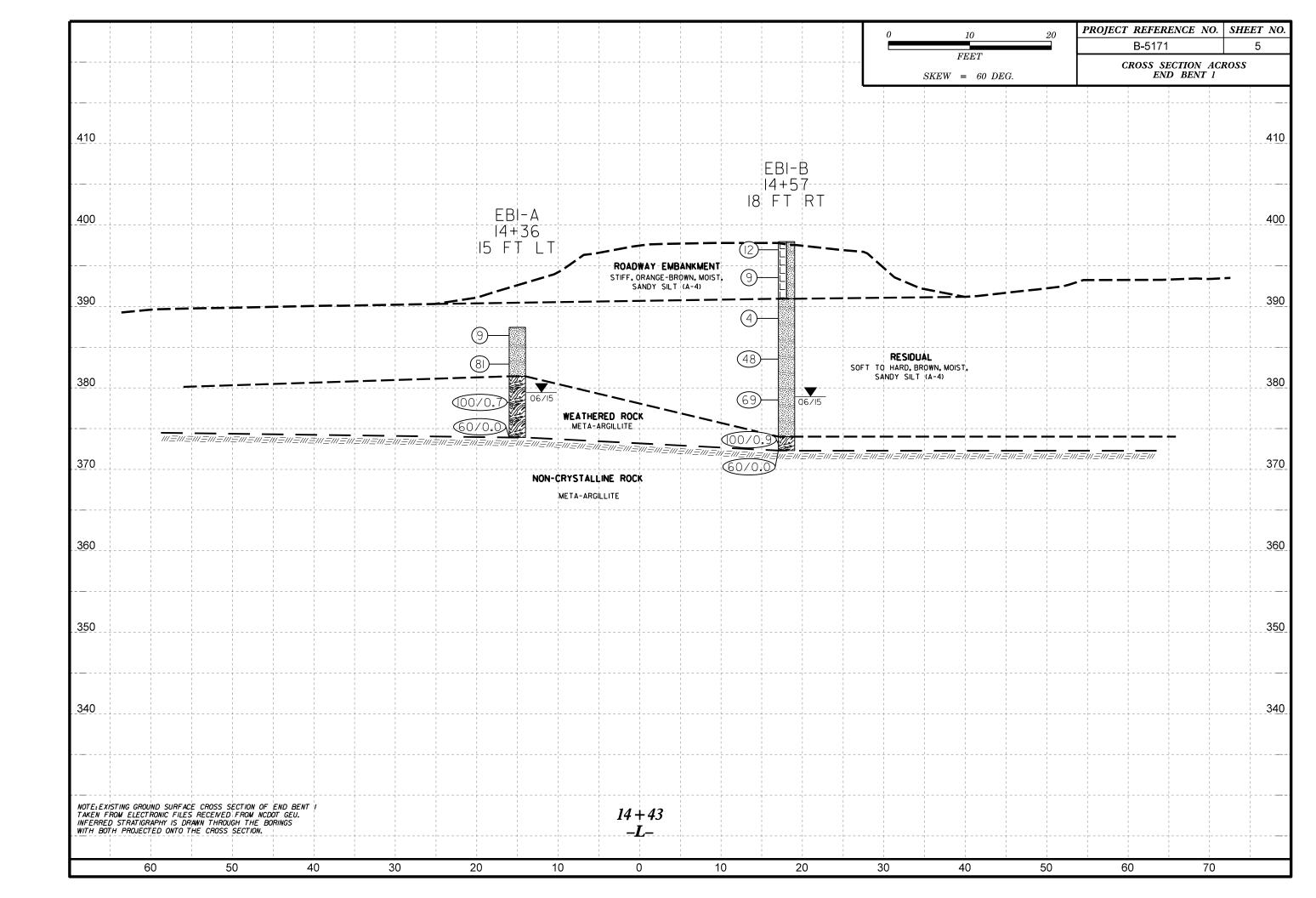
# SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

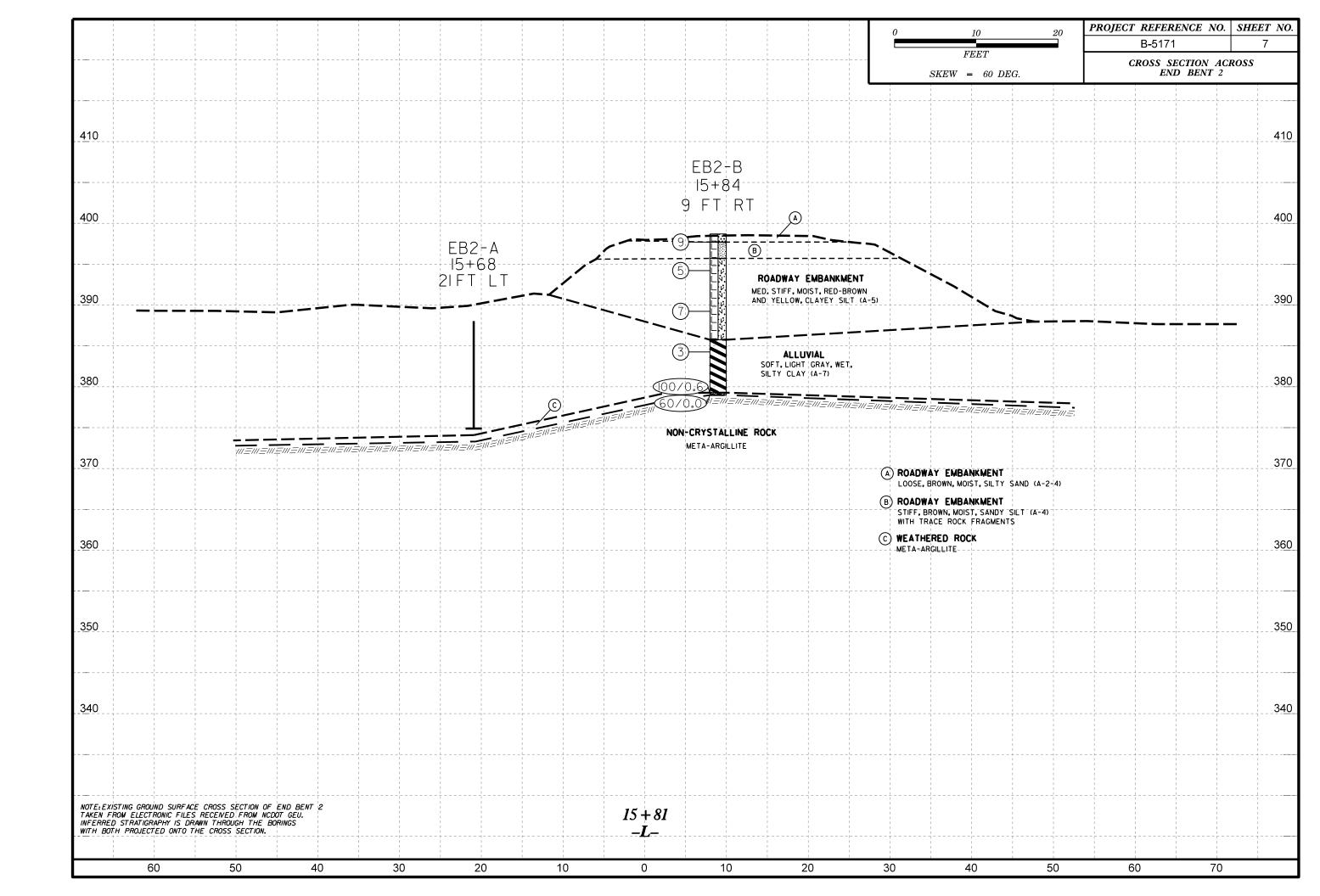
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER AND YIELD LESS THAN 100 BLOWS PER FOOT	WELL GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE.	HARD ROCK IS NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT REFUSAL IF TESTED. AN INFERRED ROCK LINE INDICATES THE LEVEL AT WHICH NON-COASTAL PLAIN MATERIAL WOULD YIELD SPT REFUSAL.	ALLUVIUM (ALLUV.) - SOILS THAT HAVE BEEN TRANSPORTED BY WATER.
ACCORDING TO THE STANDARD PENETRATION TEST (AASHTO T 206, ASTM DI586). SOIL CLASSIFICATION	<u>UNIFORMLY GRADED</u> - INDICATES THAT SOIL PARTICLES ARE ALL APPROXIMATELY THE SAME SIZE. <u>GAP-GRADED</u> - INDICATES A MIXTURE OF UNIFORM PARTICLE SIZES OF TWO OR MORE SIZES.	SPT REFUSAL IS PENETRATION BY A SPLIT SPOON SAMPLER EQUAL TO OR LESS THAN 0.1 FOOT PER 60	AQUIFER - A WATER BEARING FORMATION OR STRATA.
IS BASED ON THE AASHTO SYSTEM. BASIC DESCRIPTIONS GENERALLY INCLUDE THE FOLLOWING: CONSISTENCY, COLOR, TEXTURE, MOISTURE, AASHTO CLASSIFICATION, AND OTHER PERTINENT FACTORS SUCH	ANGULARITY OF GRAINS	BLOWS IN NON-COASTAL PLAIN MATERIAL, THE TRANSITION BETWEEN SOIL AND ROCK IS OFTEN REPRESENTED BY A ZONE OF WEATHERED ROCK.	ARENACEOUS - APPLIED TO ROCKS THAT HAVE BEEN DERIVED FROM SAND OR THAT CONTAIN SAND.
AS MINERALOGICAL COMPOSITION, ANGULARITY, STRUCTURE, PLASTICITY, ETC. FOR EXAMPLE,	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
VERY STIFF, GRAY, SILTY CLAY, MOIST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY PLASTIC, A-7-6	ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED.	WEATHERED NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES >	A NOTABLE PROPORTION OF CLAY IN THEIR COMPOSITION, SUCH AS SHALE, SLATE, ETC.
SOIL LEGEND AND AASHTO CLASSIFICATION	MINERALOGICAL COMPOSITION	ROCK (WR) 100 BLOWS PER FOOT IF TESTED.	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
GENERAL GRANULAR MATERIALS SILT-CLAY MATERIALS ORGANIC MATERIALS CLASS. (≤ 35% PASSING *200) (> 35% PASSING *200) ORGANIC MATERIALS	MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC.	CRYSTALLINE ROCK (CR)  FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE.	SURFACE.
GROUP A-1 A-3 A-2 A-4 A-5 A-6 A-7 A-1, A-2 A-4, A-5	ARE USED IN DESCRIPTIONS WHEN THEY ARE CONSIDERED OF SIGNIFICANCE.	UNELSS, OHBERU, SCHIST, ETC.	CALCAREOUS (CALC.) - SOILS THAT CONTAIN APPRECIABLE AMOUNTS OF CALCIUM CARBONATE.
CLASS. A-1-0 A-1-6 A-2-4 A-2-5 A-2-6 A-2-7 A-7-6 A-7-6 A-3 A-6, A-7	COMPRESSIBILITY	NON-CATSTALLINE SEDIMENTARY ROCK THAT WOULD YEILD SPT REFUSAL IF TESTED.	COLLUVIUM - ROCK FRAGMENTS MIXED WITH SOIL DEPOSITED BY GRAVITY ON SLOPE OR AT BOTTOM
SYMBOL 000000000000000000000000000000000000	SLIGHTLY COMPRESSIBLE LL < 31 MODERATELY COMPRESSIBLE LL = 31 - 50	COASTAL PLAIN COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD	OF SLOPE.
7. PASSING	HIGHLY COMPRESSIBLE LL > 50	SEDIMENTARY ROCK SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED	CORE RECOVERY (REC.) - TOTAL LENGTH OF ALL MATERIAL RECOVERED IN THE CORE BARREL DIVIDED BY TOTAL LENGTH OF CORE RUN AND EXPRESSED AS A PERCENTAGE.
■10 50 MX GRANULAR SIL1- MUCK,	PERCENTAGE OF MATERIAL	(CP) SHELL BEDS, ETC. WEATHERING	DIKE - A TABULAR BODY OF IGNEOUS ROCK THAT CUTS ACROSS THE STRUCTURE OF ADJACENT
#40 38 MX 58 MX 51 MN PEAT SOILS SOILS SOILS SOILS SOILS SOILS	GRANULAR SILT - CLAY ORGANIC MATERIAL SOILS OTHER MATERIAL	FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER	ROCKS OR CUTS MASSIVE ROCK.
MATERIAL	TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10%	HAMMER IF CRYSTALLINE.	DIP - THE ANGLE AT WHICH A STRATUM OR ANY PLANAR FEATURE IS INCLINED FROM THE
PASSING *40 SOILS WITH	LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35%	VERY SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED, SOME JOINTS MAY SHOW THIN CLAY COATINGS IF OPEN,	HORIZONTAL.  DIP DIRECTION (DIP AZIMUTH) - THE DIRECTION OR BEARING OF THE HORIZONTAL TRACE OF THE
LL 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN 40 MX 41 MN LITTLE OR HIGHLY	HIGHLY ORGANIC > 10% > 20% HIGHLY 35% AND ABOVE	(V SLI.) CRYSTALS ON A BROKEN SPECIMEN FACE SHINE BRIGHTLY. ROCK RINGS UNDER HAMMER BLOWS IF OF A CRYSTALLINE NATURE.	LINE OF DIP, MEASURED CLOCKWISE FROM NORTH.
CROUP INDEX A A A MY B MY 12 MY IS MY IND MY AMDINITE DE ORGANIC	GROUND WATER	SLIGHT ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO	FAULT - A FRACTURE OR FRACTURE ZONE ALONG WHICH THERE HAS BEEN DISPLACEMENT OF THE
USUAL TYPES STONE FRACS ORGANIC SUILS	▼ WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING	(SLI.) I INCH. OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR	SIDES RELATIVE TO ONE ANOTHER PARALLEL TO THE FRACTURE.
OF MAJOR GRAVEL, AND SAND SAND SAND SOILS SOILS	▼ STATIC WATER LEVEL AFTER 24 HOURS	CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.	FISSILE - A PROPERTY OF SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES.
MATERIALS SANU	<u> </u>	MODERATE SIGNIFICANT PORTIONS OF ROCK SHOW DISCOLORATION AND WEATHERING EFFECTS. IN (MOD.) GRANITOID ROCKS, MOST FELDSPARS ARE DULL AND DISCOLORED, SOME SHOW CLAY, ROCK HAS	FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLODGED FROM PARENT MATERIAL.
GEN. RATING EXCELLENT TO GOOD FAIR TO POOR POOR UNSUITABLE	∇PW PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA	DULL SOUND UNDER HAMMER BLOWS AND SHOWS SIGNIFICANT LOSS OF STRENGTH AS COMPARED	FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM.
PI OF A-7-5 SUBGROUP IS ≤ LL - 30 ; PI OF A-7-6 SUBGROUP IS > LL - 30	SPRING OR SEEP	WITH FRESH ROCK.	FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE
CONSISTENCY OR DENSENESS	MISCELLANEOUS SYMBOLS	MODERATELY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. IN GRANITOID ROCKS, ALL FELDSPARS DULL SEVERE AND DISCOLORED AND A MAJORITY SHOW KAOLINIZATION. ROCK SHOWS SEVERE LOSS OF STRENGTH	FIELD.
COMPACTNESS OR RANGE OF STANDARD RANGE OF UNCONFINED	FD 25 255	(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 CONSISTENCY PENETRATION RESISTENCE COMPRESSIVE STRENGTH (N-VALUE) (TONS/FT <sup>2</sup> )	ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES  ROADWAY EMBANKMENT (RE)  OF ROCK STRUCTURES	IF TESTED, WOULD YIELD SPT REFUSAL	LEDGE - A SHELF-LIKE RIDGE OR PROJECTION OF ROCK WHOSE THICKNESS IS SMALL COMPARED TO
VERY LOOSE < 4	SPT C SUDDE INDICATOR	SEVERE ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT (SEV.) REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED	ITS LATERAL EXTENT.  LENS - A BODY OF SOIL OR ROCK THAT THINS OUT IN ONE OR MORE DIRECTIONS.
GENERALLY LOOSE 4 TO 10	SOIL SYMBOL  OPT ONT TEST BORING INSTALLATION  SCOPE INSTALLATION	TO SOME EXTENT. SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN.	MOTTLED (MOT.) - IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN SOILS
MATERIAL MEDIUM DENSE 30 10 30 N/A	ARTIFICIAL FILL (AF) OTHER AUGER BORING CONE PENETROMETER	IF TESTED, WOULD YIELD SPT N VALUES > 100 BPF  VERY ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED, ROCK FABRIC ELEMENTS ARE DISCERNIBLE	USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE.
(NON-COHESIVE) VERY DENSE > 50	THAN ROADWAY EMBANKMENT THOUGH BURING TEST	SEVERE BUT MASS IS EFFECTIVELY REDUCED TO SOIL STATUS, WITH ONLY FRAGMENTS OF STRONG ROCK	PERCHED WATER - WATER MAINTAINED ABOVE THE NORMAL GROUND WATER LEVEL BY THE PRESENCE
VERY SOFT < 2 < 0.25	── INFERRED SOIL BOUNDARY — CORE BORING SOUNDING ROD	(V SEV.) REMAINING, SAPROLITE IS AN EXAMPLE OF ROCK WEATHERED TO A DEGREE THAT ONLY MINOR	OF AN INTERVENING IMPERVIOUS STRATUM.
GENERALLY   SOFT   2 TO 4   0.25 TO 0.5     SILT-CLAY   MEDIUM STIFF   4 TO 8   0.5 TO 1.0	INFERRED ROCK LINE MN MONITORING WELL TEST BORING	VESTIGES OF ORIGINAL ROCK FABRIC REMAIN. <u>IF TESTED, WOULD YIELD SPT N VALUES &lt; 100 BPF</u> COMPLETE ROCK REDUCED TO SOIL. ROCK FABRIC NOT DISCERNIBLE, OR DISCERNIBLE ONLY IN SMALL AND	RESIDUAL (RES.) SOIL - SOIL FORMED IN PLACE BY THE WEATHERING OF ROCK.
MATERIAL STIFF 8 TO 15 1 TO 2	A DIEZOMETED	SCATTERED CONCENTRATIONS, QUARTZ MAY BE PRESENT AS DIKES OR STRINGERS, SAPROLITE IS	ROCK QUALITY DESIGNATION (ROD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF CORE
(COHESIVE) VERY STIFF 15 TO 30 2 TO 4 HARD > 30 > 4	ALLUVIAL SOIL BOUNDARY  AREZONETER  INSTALLATION  SPT N-VALUE	ALSO AN EXAMPLE.	RUN AND EXPRESSED AS A PERCENTAGE.
TEXTURE OR GRAIN SIZE	RECOMMENDATION SYMBOLS	- ROCK HARDNESS	SAPROLITE (SAP.) - RESIDUAL SOIL THAT RETAINS THE RELIC STRUCTURE OR FABRIC OF THE PARENT
U.S. STD. SIEVE SIZE 4 10 40 60 200 270		VERY HARD CANNOT BE SCRATCHED BY KNIFE OR SHARP PICK. BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.	ROCK.  SILL - AN INTRUSIVE BODY OF IGNEOUS ROCK OF APPROXIMATELY UNIFORM THICKNESS AND
OPENING (MM) 4.76 2.00 0.42 0.25 0.075 0.053	EXCAVATION	HARD CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY, HARD HAMMER BLOWS REQUIRED	RELATIVELY THIN COMPARED WITH ITS LATERAL EXTENT, THAT HAS BEEN EMPLACED PARALLEL TO
BOULDER COBBLE GRAVEL COARSE FINE SILT CLAY	SHALLOW UNDERCUT UNCLASSIFIED EXCAVATION - EMBANKMENT OR BACKFILL	TO DETACH HAND SPECIMEN.	THE BEDDING OR SCHISTOSITY OF THE INTRUDED ROCKS.
(BLDR.) (COB.) (GR.) (CSE. SD.) (F SD.) (SL.) (CL.)	ABBREVIATIONS	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 OR SLIP PLANE.
GRAIN MM 305 75 2.0 0.25 0.05 0.005	AR - AUGER REFUSAL MED MEDIUM VST - VANE SHEAR TEST	HARD EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK, HAND SPECIMENS CAN BE DETACHED 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	MEDIUM CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT.	A 140 LB. HAMMER FALLING 30 INCHES REQUIRED TO PRODUCE A PENETRATION OF 1 FOOT INTO SOIL
SOIL MOISTURE - CORRELATION OF TERMS	CL CLAY MOD MODERATELY 7 - UNIT WEIGHT	HARD CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE	WITH A 2 INCH OUTSIDE DIAMETER SPLIT SPOON SAMPLER. SPT REFUSAL IS PENETRATION EQUAL TO OR LESS THAN 0.1 FOOT PER 60 BLOWS.
SOLI MOISTURE SCALE FIELD MOISTURE	CPT - CONE PENETRATION TEST NP - NON PLASTIC $\gamma_d$ - DRY UNIT WEIGHT CSE COARSE ORG ORGANIC	POINT OF A GEOLOGIST'S PICK.  SOFT CAN BE GROVED OR GOUGED READILY BY KNIFE OR PICK. CAN BE EXCAVATED IN FRAGMENTS	STRATA CORE RECOVERY (SREC.) - TOTAL LENGTH OF STRATA MATERIAL RECOVERED DIVIDED BY
(ATTERBERG LIMITS)  DESCRIPTION  GUIDE FOR FIELD MOISTURE DESCRIPTION	DMT - DILATOMETER TEST PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS  DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK	FROM CHIPS TO SEVERAL INCHES IN SIZE BY MODERATE BLOWS OF A PICK POINT. SMALL, THIN	TOTAL LENGTH OF STRATUM AND EXPRESSED AS A PERCENTAGE.
- SATURATED - USUALLY LIQUID; VERY WET, USUALLY	DPT - DYNAMIC PENETRATION TEST SAP SAPROLITIC S - BULK e - VOID RATIO SD SAND, SANDY SS - SPLIT SPOON	PIECES CAN BE BROKEN BY FINGER PRESSURE.	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
(SAT.) FROM BELOW THE GROUND WATER TABLE  LL LIQUID LIMIT	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 SOFT OR MORE IN THICKNESS CAN BE BROKEN BY FINGER PRESSURE. CAN BE SCRATCHED READILY BY	THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE.
PLASTIC   CENTROL ID DECUMENTS TO	FOSS FOSSILIFEROUS SLI SLIGHTLY RS - ROCK FRACT - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - RECOMPACTED TRIAXIAL	FINGERNAIL.	TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
	FRAGS FRAGMENTS $w$ - MOISTURE CONTENT CBR - CALIFORNIA BEARING	FRACTURE SPACING BEDDING	BENCH MARK: "BM80" RAILROAD SPIKE IN 14-INCH TULIP POPLAR
(PI) PL PLASTIC LIMITATTAIN OPTIMUM MOISTURE	HI HIGHLY V - VERY RATIO	TERM SPACING TERM THICKNESS  VERY WIDE MORE THAN 10 FEET VERY THICKLY BEDDED 4 FEET	AT STA.14+25.10 -L-, 42 FT RT.
OM OPTIMUM MOISTURE - MOIST - (M) SOLID; AT OR NEAR OPTIMUM MOISTURE	EQUIPMENT USED ON SUBJECT PROJECT	WIDE 3 TO 10 FEET THICKLY BEDDED 1.5 - 4 FEET	ELEVATION: 394.64 FEET
SL _ SHRINKAGE LIMIT	DRILL UNITS: ADVANCING TOOLS: HAMMER TYPE:  CME-45C CLAY BITS X AUTOMATIC MANUAL	MODERATELY CLOSE	NOTES:
- DRY - (D) REQUIRES ADDITIONAL WATER TO		VERY CLOSE LESS THAN 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET	SOUNDING RODS UTILIZED AT BI-A AND EB2-A.
- DRY - (D) ATTAIN OPTIMUM MOISTURE	X CME-55  G'CONTINUOUS FLIGHT AUGER CORE SIZE:	THINLY LAMINATED < 0.008 FEET	
PLASTICITY	X 8' HULLUW AUGERS   LI-B LI-H	INDURATION	FIAD = FILLED IMMEDIATELY AFTER DRILLING
PLASTICITY INDEX (PI) DRY STRENGTH	X CME-550 HARD FACED FINGER BITS X-N Q	FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.	
NON PLASTIC 0-5 VERY LOW SLIGHTLY PLASTIC 6-15 SLIGHT	VANE SHEAR TEST UNGCARBIDE INSERTS HAND TOOLS:	FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS;  GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.	
MODERATELY PLASTIC 16-25 MEDIUM	X CASING W/ ADVANCER HAND TOULS:	CRAINE CAN BE CERABATED FROM CAMBLE WITH CTEEL BRODE.	
HIGHLY PLASTIC 26 OR MORE HIGH	PORTABLE HOIST TRICONE STEEL TEETH HAND AUGER	MODERATELY INDURATED  MODERATELY INDURATED  BREAKS EASILY WHEN HIT WITH HAMMER.	
COLOR	TRICONE TUNGCARB. X SOUNDING ROD	INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE;	
DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN. RED. YELLOW-BROWN, BLUE-GRAY).	X CORE BIT SOCIOLING ROD	DIFFICULT TO BREAK WITH HAMMER.	
MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.		EXTREMELY INDURATED  SHAPP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.	DATE: 8-15-1-
		SHITTLE BREHKS ACKUSS DKAINS.	DATE: 8-15-1-



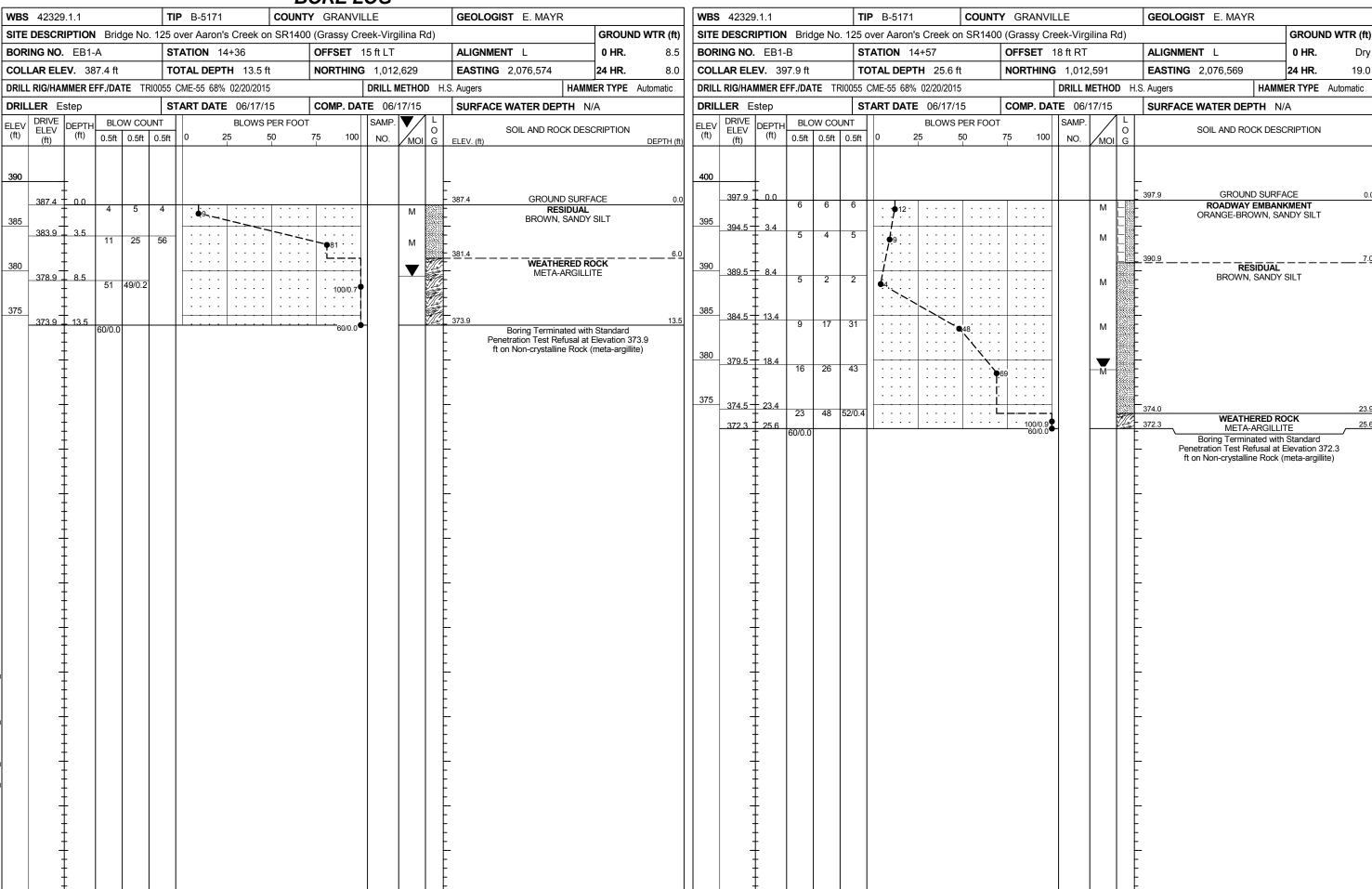




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						B-5171	6
				FEET $SKEW = 60 D$	EG.	CROSS SECTION AC BENT 1	CROSS
	<u>-</u>						
410							410
400							400
390				ALLUVIAL LOOSE, BROWN, SATURATED, SI COARSE SAND (A-I-B) WITH GR	LTY AVEL		390
380	BI- 15+ 15 FT	06	BI-B 15+20 8 FT RT ———————————————————————————————————	REEK (A)			380
<i>™≣™≣™≣™≣™≣™≣™≣™≣™≣™≣™≡™≡™</i> 370			NON-CRYSTALLINE RO GRAY, VERY SLIGHTLY WEATHE META-ARGILLITE W/ VERY CLO	CK RED. HARD. SSE FRACTURE			370
360			SPACING  REC-92% ROD-33% RMR-6				360
350							350
340							340
NOTE; EXISTING GROUND SURFACE CROSS SECTION OF BENT I TAKEN FROM ELECTRONIC FILES RECEIVED FROM NCDOT GEU. INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE CROSS SECTION.			15 + 15 -L-				
60 50 40 30	20	10	0 10 20	30 40	50	60 70	



### GEOTECHNICAL BORING REPORT BORE LOG



N/A

N/A

GROUND WTR (ft)

HAMMER TYPE Automatic

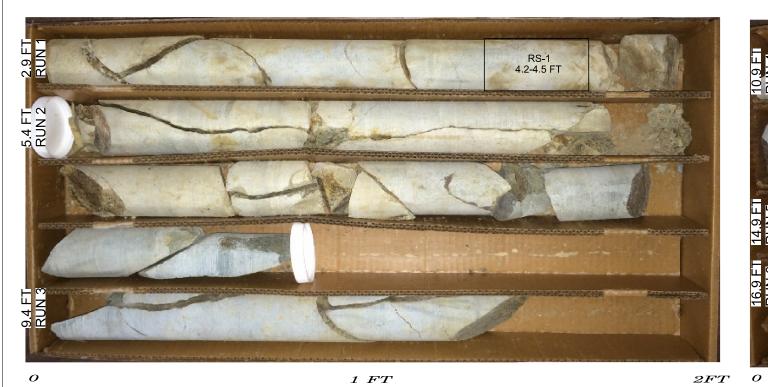
### **GEOTECHNICAL BORING REPORT BORE LOG**

		ORE LOG	1			<u> </u>			
		TY GRANVILLE	GEOLOGIST E. MAYR		<b>WBS</b> 42329.1.1		TY GRANVILLE	GEOLOGIST E. MAYR	
SITE DESCRIPTION Bridge No. 125		· · · · · · · · · · · · · · · · · · ·		GROUND WTR (ft)	SITE DESCRIPTION Bridge No.		(Grassy Creek-Virgilina Rd)		GROUND V
BORING NO. B1-B	STATION 15+20	OFFSET 8 ft RT	ALIGNMENT L	<b>0 HR.</b> N/A	BORING NO. B1-B	STATION 15+20	OFFSET 8 ft RT	ALIGNMENT L	0 HR.
COLLAR ELEV. 378.0 ft	TOTAL DEPTH 17.9 ft	<b>NORTHING</b> 1,012,559	<b>EASTING</b> 2,076,624	<b>24 HR.</b> N/A	COLLAR ELEV. 378.0 ft	TOTAL DEPTH 17.9 ft	<b>NORTHING</b> 1,012,559	<b>EASTING</b> 2,076,624	24 HR.
DRILL RIG/HAMMER EFF./DATE TRI943	5 CME-55 84% 02/20/2015	DRILL METHOD H.	S. Augers HAMM	IER TYPE Automatic	DRILL RIG/HAMMER EFF./DATE TRI	9435 CME-55 84% 02/20/2015	DRILL METHOD	H.S. Augers HAMN	MER TYPE Aut
-	<b>START DATE</b> 06/18/15	COMP. DATE 06/18/15	SURFACE WATER DEPTH 2.	4ft	DRILLER Estep	<b>START DATE</b> 06/18/15	<b>COMP. DATE</b> 06/18/15	SURFACE WATER DEPTH 2	2.4ft
ELEV (ft) DRIVE DEPTH BLOW COUNT (ft) 0.5ft 0.5ft 0.5ft	BLOWS PER FOO		SOIL AND ROCK DES	CRIPTION	CORE SIZE NQ	TOTAL RUN 15.0 ft			
	ft 0 25 50	75 100 NO. MOI G		DEPTH (ft) 06/18/15)	ELEV RUN DEPTH RUN RATE (ft) (ft) (ft) (ft) ROME	REC. RQD NO. (ft) (ft) (ft) %	C G	DESCRIPTION AND REMARKS	
			<u>-</u>		3(75) 375.1 2.9 2.5 N=60/0	0 (1.8) (0.9) (13.9) (4.9)	375.1	NON-CRYSTALLINE ROCK	
380		100/0.7¶ 100/0.3¶ 100/0.3¶ RS-1/	WATER SURFACE (( 378.0 MUD LINE 377.0 ALLUVIAL 375.1 BROWN, SILTY COARSE GRAVEL WEATHERED R META-ARGILLI NON-CRYSTALLIN META-ARGILLI GRAY, VERY SLIGHTLY V HARD, VERY CLOSE F SPACING REC-90%, RQD-32%  360.1 Boring Terminated at Eleva Non-crystalline Rock (m	BOCK ITE WEATHERED, FRACTURE  17.9 attion 360.1 ft in	3 <b>77</b> 61	0 (1.8) (0.9) (1.2) (0.9) (0.9) (1.3) (0.7) (0.7) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9) (0.9	375.1 GRAY, VERY	Begin Coring @ 2.9 ft  NON-CRYSTALLINE ROCK META-ARGILLITE  'SLIGHTLY WEATHERED, HARD, VE FRACTURE SPACING  REC-90%, RQD-32%, RMR-60  nated at Elevation 360.1 ft in Non-crys (meta-argillite)	
101 BOKE DOUBLE BS171_GEO_BKUGG172_BH.									

PROJECT REFERENCE NO.	SHEET NO.
B-5171	IO

## CORE PHOTOGRAPHS

BORING BI-B 15+20 -L-,8 FT RT





CORE BOX 1: RUNS 1, 2, AND 3.

CORE BOX 2: RUNS 4, 5, AND 6.

## GEOTECHNICAL BORING REPORT BORE LOG

								<u>ORE L</u>	.UG							
<b>WBS</b> 42329	9.1.1			TI	<b>P</b> B-5171		COUNT	Y GRANVI	LLE			GEOLOGI	ST E. MAY	′R		
SITE DESCR	RIPTION	<b>I</b> Bric	dge No	o. 125 d	over Aaron's	Creek or	SR1400	(Grassy Cr	eek-Virg	ilina F	Rd)				GROUN	ID WTR (ft
BORING NO	. EB2-	-В		S	TATION 15	+84		OFFSET S	9 ft RT			ALIGNME	NT L		0 HR.	Dry
COLLAR EL	<b>EV</b> . 39	98.7 ft		т	OTAL DEPT	<b>H</b> 19.8 ft		NORTHING	1,012	,518		EASTING	2,076,674		24 HR.	FIAD
DRILL RIG/HA	MMER E	FF./DA	TE T	RI9435	CME-55 84%	02/20/2015			DRILL N	1ETHO	<b>D</b> H.	S. Augers		HAMM	ER TYPE	Automatic
DRILLER E	step			S	TART DATE	06/19/1	5	COMP. DA	TE 06/	19/15		SURFACE	WATER DE	PTH N/	A	
ELEV DRIVE ELEV (ft)	DEPTH (ft)	BLC 0.5ft	OW CC		0 2		PER FOOT	75 100	SAMP. NO.	MOI	L O G	ELEV. (ft)	SOIL AND R			DEPTH
398.7 395 395 395.2	3.5	3	4	5	9					M M		- '	ROADWA' BROWN WN, SANDY S FR	N, SILTY S. SILT WITH AGMENTS	KMENT AND TRACE F	i
390 390.2	8.5	3	3	4	• 7 · · · · · · · · · · · · · · · · · ·					М		RED - _ <u>385.7</u>	-BROWN AND		, CLAYEY	SILT <u> 13</u>
385 385.2 380 380.2 378.9	13.5 18.5 19.8	3 2 60/0.0	3	97/0.1	\$3			100/0.6		W		- - - - - - - - - - - - - - - - - - -	LIGHT GF	LLUVIAL RAY, SILTY HERED RO		19
													Boring Termi etration Test F on Non-crystal	Refusal at E	Elevation 3	

SHEET 11

DOCK	CODE	EST RESULTS
KOCK	CUKE.	ILSI KESULIS
		UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMEN
STEWART		UNCONFINED COMPRESSIVE STRENGTH OF INTACT ROCK CORE SPECIMEN ASTM D7012
STEWART		OF INTACT ROCK CORE SPECIMEN ASTM D7012
STEWART  WBS No.: 42329.1.1		OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015
STEWART  WBS No.: 42329.1.1  TIP No.: B-5171		OF INTACT ROCK CORE SPECIMEN ASTM D7012
STEWART  WBS No.: 42329.1.1  TIP No.: B-5171  County: Granville	Over Aaron's Creek on	OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr
STEWART  WBS No.: 42329.1.1  TIP No.: B-5171	Over Aaron's Creek on	OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr
STEWART  WBS No.: 42329.1.1  TIP No.: B-5171  County: Granville	Over Aaron's Creek on	OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr
WBS No.: 42329.1.1 TIP No.: B-5171 County: Granville Description: Bridge 125		OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr
WBS No.: 42329.1.1 TIP No.: B-5171 County: Granville Description: Bridge 125  Test No.	1	OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr
WBS No.: 42329.1.1 TIP No.: B-5171 County: Granville Description: Bridge 125  Test No. Boring ID	1 B1-B	OF INTACT ROCK CORE SPECIMEN  ASTM D7012  Test Date: 7/3/2015  Tested By: E. Mayr

#### Sample Depth, ft Core Length #1, in. Core Length #2, in. Avg. Core Length, in. 3.690 3.670 3.680 Core Dia. #1, in. Core Dia. #2, in. Avg. Core Dia., in. 1.990 1.970 1.980 Length/Dia. Ratio X-Sectional Area, in<sup>2</sup> 1.86 3.08 Weight, Ib Unit Weight, pcf 0.72 109.80 Break Type Load at Failure, lb Correction Factor 72,970 1.00 Comp. Strength, psi 23,699 Comp. Strength, ksf 3,413

PROJECT REFERENCE NO.

B-5171

SHEET NO.

12

Rock Descriptions:
Test 1: Gray, very slightly weathered meta-argillite with very close fracture spacing

#### Break Types:



PROJECT REFERENCE NO.	SHEET NO.
B-5171	13

## SITE PHOTOGRAPHS



PHOTOGRAPH I: VIEW OF AARON'S CREEK BELOW BRIDGE 125 LOOKING UPSTREAM.



PHOTOGRAPH 2: VIEW ALONG SOUTH SIDE OF BRIDGE 125 LOOKING SOUTHEAST.