

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 40165.1.1 (B-4984) F.A. PROJ. BRSTP-115(6)
 COUNTY MADISON
 PROJECT DESCRIPTION BRIDGE No. 138 on SR-1151
OVER BIG PINE 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 (919) 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 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 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: 40165.1.1 ID: B-4984

PERSONNEL

- D C ELLIOT
- M M HAGER
- J T WILLIAMS
- D O CHEEK
- C J COFFEE

INVESTIGATED BY C A DUNNAGAN

CHECKED BY W D FRYE, Jr

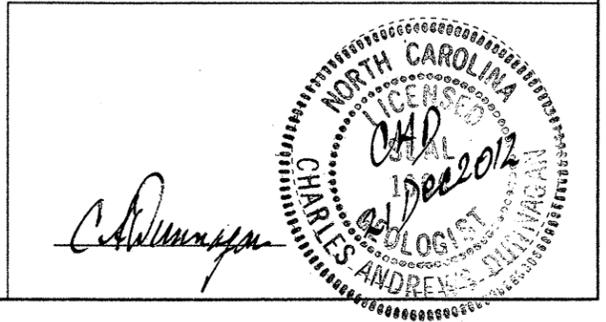
SUBMITTED BY W D FRYE, Jr

DATE DECEMBER 2012

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.



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
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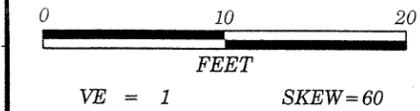
PROJECT REFERENCE NO. 40135.1.1(B-4984)	SHEET NO. 2 / 15
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SUBSURFACE INVESTIGATION

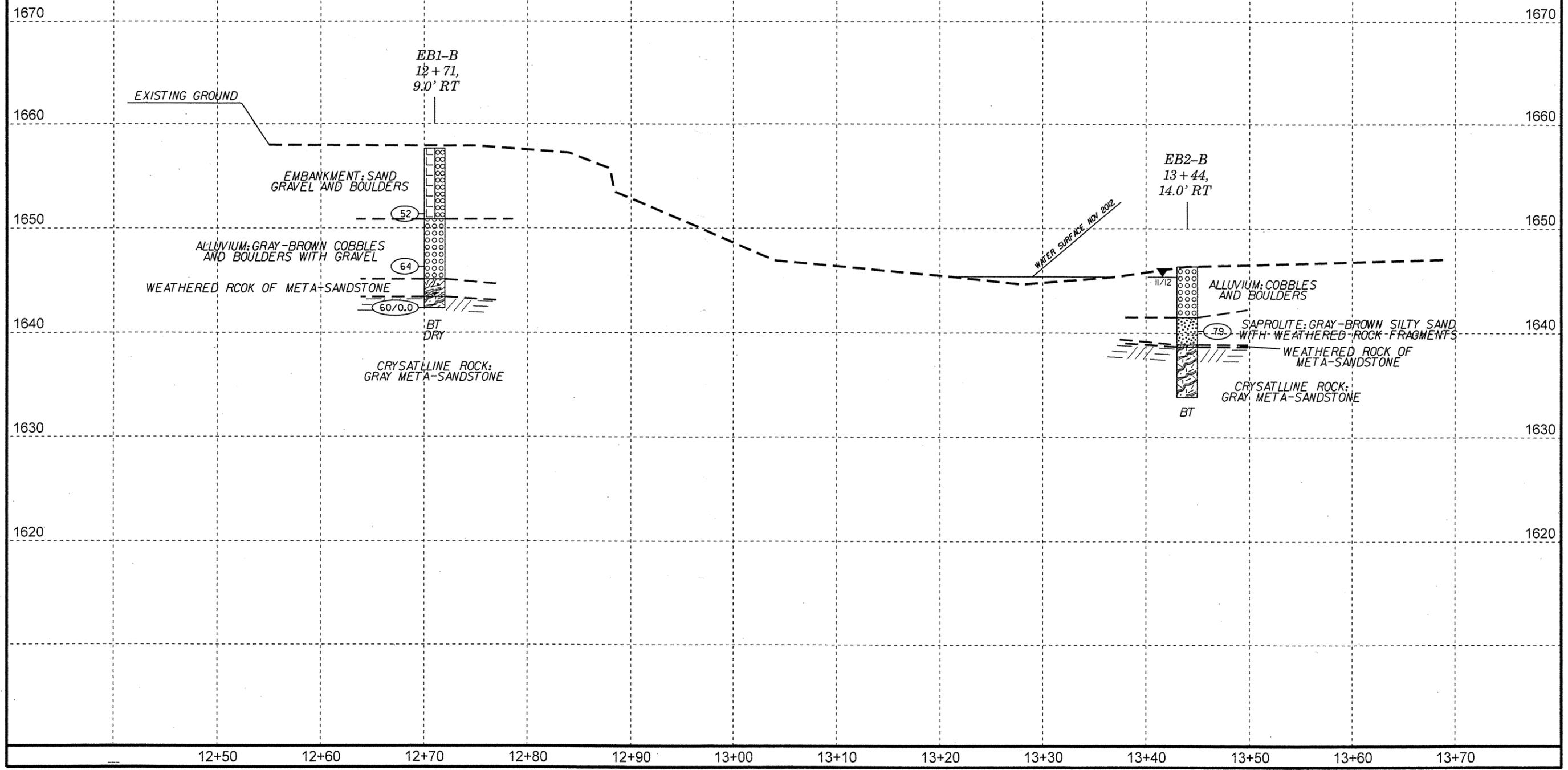
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

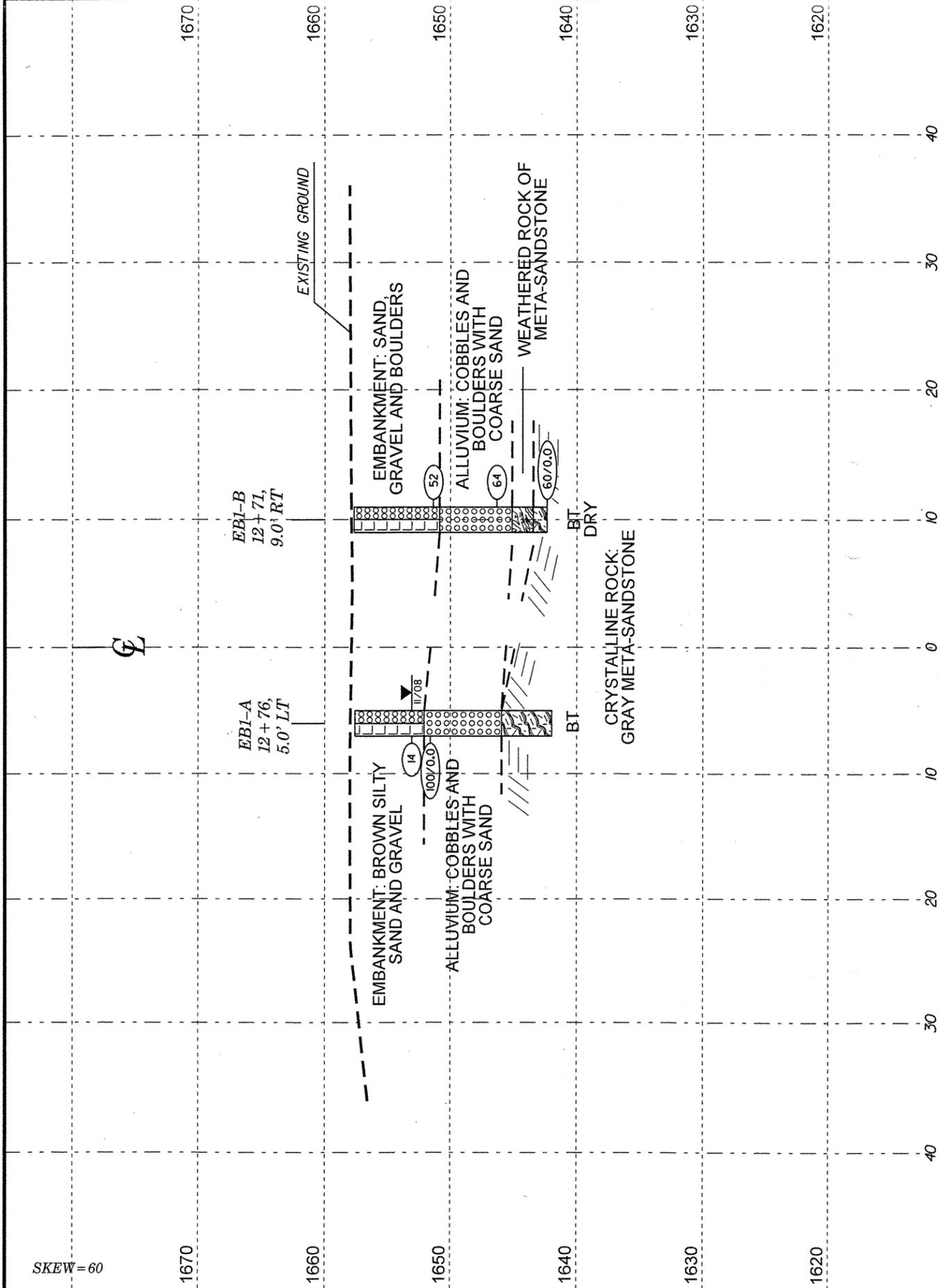
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS																																																																																																																																																																																																																																																																																																																																																																																										
<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 (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, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGHLY 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>WEATHERED ROCK (WR) </p> <p>CRYSTALLINE ROCK (CR) </p> <p>NON-CRYSTALLINE ROCK (NCR) </p> <p>COASTAL PLAIN SEDIMENTARY ROCK (CP) </p>	<p>ALLUVIUM (ALLUV.) - 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 HORIZONTAL TRACE 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 SPLITTING ALONG CLOSELY SPACED PARALLEL PLANES. FLOAT - ROCK FRAGMENTS ON SURFACE NEAR THEIR ORIGINAL POSITION AND DISLOGGED FROM PARENT MATERIAL. FLOOD PLAIN (FP) - LAND BORDERING A STREAM, BUILT OF SEDIMENTS DEPOSITED BY THE STREAM. FORMATION (FM.) - A MAPPABLE GEOLOGIC UNIT THAT CAN BE RECOGNIZED AND TRACED IN THE FIELD. 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 MARKED WITH SPOTS OF DIFFERENT COLORS, MOTTLING IN 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 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 EMPLACED 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 (N 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 (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 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;"> <thead> <tr> <th rowspan="2">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>A-1</th> <th>A-1-b</th> <th>A-3</th> <th>A-2</th> <th>A-2-4</th> <th>A-2-5</th> <th>A-2-6</th> <th>A-2-7</th> <th>A-4</th> <th>A-5</th> <th>A-6</th> <th>A-7</th> <th>A-1, A-2</th> <th>A-3</th> <th>A-4, A-5</th> <th>A-6, A-7</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>GROUP CLASS.</td> <td colspan="2">A-1-a</td> <td colspan="2">A-1-b</td> <td colspan="2">A-2</td> <td colspan="2">A-2-4</td> <td colspan="2">A-2-5</td> <td colspan="2">A-2-6</td> <td colspan="2">A-2-7</td> <td colspan="2">A-4</td> <td colspan="2">A-5</td> <td colspan="2">A-6</td> <td colspan="2">A-7</td> <td colspan="2">A-1, A-2</td> <td colspan="2">A-3</td> <td colspan="2">A-4, A-5</td> <td colspan="2">A-6, A-7</td> <td></td> <td></td> <td></td> </tr> <tr> <td>SYMBOL</td> <td colspan="2"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>% PASSING</td> <td colspan="2">10</td> <td colspan="2">40</td> <td colspan="2">200</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LIQUID LIMIT (PLASTIC INDEX)</td> <td colspan="2">6 MX</td> <td colspan="2">NP</td> <td colspan="2">40 MX</td> <td colspan="2">41 MN</td> <td></td> <td></td> <td></td> </tr> <tr> <td>GROUP INDEX</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="2">0</td> <td colspan="2">4 MX</td> <td colspan="2">0</td> <td colspan="2">4 MX</td> <td colspan="2">0</td> <td colspan="2">8 MX</td> <td colspan="2">12 MX</td> <td colspan="2">16 MX</td> <td colspan="2">No MX</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>USUAL TYPES OF MAJOR MATERIALS</td> <td colspan="2">STONE FRAGS. GRAVEL, AND SAND</td> <td colspan="2">FINE SAND</td> <td colspan="2">SILTY OR CLAYEY GRAVEL AND SAND</td> <td colspan="2">SILTY SOILS</td> <td colspan="2">CLAYEY SOILS</td> <td colspan="2"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>GEN. RATING AS A SUBGRADE</td> <td colspan="7">EXCELLENT TO GOOD</td> <td colspan="7">FAIR TO POOR</td> <td colspan="2">FAIR TO POOR</td> <td colspan="2">POOR</td> <td colspan="2">UNSUITABLE</td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td colspan="2"></td> <td></td> <td></td> <td></td> </tr> </tbody> </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			A-1	A-1-b	A-3	A-2	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7	A-1, A-2	A-3	A-4, A-5	A-6, A-7				GROUP CLASS.	A-1-a		A-1-b		A-2		A-2-4		A-2-5		A-2-6		A-2-7		A-4		A-5		A-6		A-7		A-1, A-2		A-3		A-4, A-5		A-6, A-7					SYMBOL																																		% PASSING	10		40		200		10		40		200		10		40		200		10		40		200		10		40		200					LIQUID LIMIT (PLASTIC INDEX)	6 MX		NP		40 MX		41 MN					GROUP INDEX	0		0		0		4 MX		0		4 MX		0		8 MX		12 MX		16 MX		No MX															USUAL TYPES OF MAJOR MATERIALS	STONE FRAGS. GRAVEL, AND SAND		FINE SAND		SILTY OR CLAYEY GRAVEL AND SAND		SILTY SOILS		CLAYEY SOILS																											GEN. RATING AS A SUBGRADE	EXCELLENT TO GOOD							FAIR TO POOR							FAIR TO POOR		POOR		UNSUITABLE																	<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;"> <thead> <tr> <th></th> <th>GRANULAR SOILS</th> <th>SILT - CLAY SOILS</th> <th>OTHER MATERIAL</th> </tr> </thead> <tbody> <tr> <td>TRACE OF ORGANIC MATTER</td> <td>2 - 3%</td> <td>3 - 5%</td> <td>TRACE</td> </tr> <tr> <td>MODERATELY ORGANIC</td> <td>3 - 5%</td> <td>5 - 12%</td> <td>LITTLE</td> </tr> <tr> <td>HIGHLY ORGANIC</td> <td>5 - 10%</td> <td>12 - 20%</td> <td>SOME</td> </tr> <tr> <td></td> <td>>10%</td> <td>>20%</td> <td>HIGHLY</td> </tr> </tbody> </table> <p style="text-align: center;">GROUND WATER</p> <p> WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING</p> <p> STATIC WATER LEVEL AFTER 24 HOURS</p> <p> PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA</p> <p> SPRING OR SEEP</p>		GRANULAR SOILS	SILT - CLAY SOILS	OTHER MATERIAL	TRACE OF ORGANIC MATTER	2 - 3%	3 - 5%	TRACE	MODERATELY ORGANIC	3 - 5%	5 - 12%	LITTLE	HIGHLY ORGANIC	5 - 10%	12 - 20%	SOME		>10%	>20%	HIGHLY	<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.</p> <p>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.</p> <p>SLIGHT (SL.) - ROCK GENERALLY FRESH, JOINTS STAINED AND DISCOLORATION EXTENDS INTO ROCK UP TO 1 INCH, OPEN JOINTS MAY CONTAIN CLAY. IN GRANITOID ROCKS SOME OCCASIONAL FELDSPAR CRYSTALS ARE DULL AND DISCOLORED, CRYSTALLINE ROCKS RING UNDER HAMMER BLOWS.</p> <p>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.</p> <p>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. <i>IF TESTED, WOULD YIELD SPT REFUSAL</i></p> <p>SEVERE (SEV.) - ALL ROCK EXCEPT QUARTZ DISCOLORED OR STAINED. ROCK FABRIC CLEAR AND EVIDENT BUT REDUCED IN STRENGTH TO STRONG SOIL. IN GRANITOID ROCKS ALL FELDSPARS ARE KAOLINIZED TO SOME EXTENT, SOME FRAGMENTS OF STRONG ROCK USUALLY REMAIN. <i>IF TESTED, YIELDS SPT N VALUES > 100 BPF</i></p> <p>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 ROCK WEATHERED TO A DEGREE SUCH THAT ONLY MINOR VESTIGES OF THE ORIGINAL ROCK FABRIC REMAIN. <i>IF TESTED, YIELDS SPT N VALUES < 100 BPF</i></p> <p>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;">CONSISTENCY OR DENSENESS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PRIMARY SOIL TYPE</th> <th>COMPACTNESS OR CONSISTENCY</th> <th>RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE)</th> <th>RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT²)</th> </tr> </thead> <tbody> <tr> <td>GENERALLY GRANULAR MATERIAL (NON-COHESIVE)</td> <td>VERY LOOSE LOOSE MEDIUM DENSE DENSE VERY DENSE</td> <td><4 4 TO 10 10 TO 30 30 TO 50 >50</td> <td>N/A</td> </tr> <tr> <td>GENERALLY SILT-CLAY MATERIAL (COHESIVE)</td> <td>VERY SOFT SOFT MEDIUM STIFF STIFF VERY STIFF HARD</td> <td><2 2 TO 4 4 TO 8 8 TO 15 15 TO 30 >30</td> <td><0.25 0.25 TO 0.50 0.5 TO 1.0 1 TO 2 2 TO 4 >4</td> </tr> </tbody> </table> <p style="text-align: center;">TEXTURE OR GRAIN SIZE</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>U.S. STD. SIEVE SIZE OPENING (MM)</th> <th>4</th> <th>10</th> <th>40</th> <th>60</th> <th>200</th> <th>270</th> </tr> </thead> <tbody> <tr> <td></td> <td>4.75</td> <td>2.00</td> <td>0.42</td> <td>0.25</td> <td>0.075</td> <td>0.053</td> </tr> </tbody> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>BOULDER (BLDR.)</th> <th>COBBLE (COB.)</th> <th>GRAVEL (GRV.)</th> <th>COARSE SAND (CSE, SD.)</th> <th>FINE SAND (F SD.)</th> <th>SILT (SL.)</th> <th>CLAY (CL.)</th> </tr> </thead> <tbody> <tr> <td>GRAIN SIZE MM</td> <td>305</td> <td>75</td> <td>2.0</td> <td>0.25</td> <td>0.05</td> <td>0.005</td> </tr> <tr> <td>GRAIN SIZE IN.</td> <td>12</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p style="text-align: center;">SOIL MOISTURE - CORRELATION OF TERMS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>SOIL MOISTURE SCALE (ATTERBERG LIMITS)</th> <th>FIELD MOISTURE DESCRIPTION</th> <th>GUIDE FOR FIELD MOISTURE DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td rowspan="2">LL PLASTIC RANGE (PI) PL</td> <td>LIQUID LIMIT</td> <td>- SATURATED - (SAT.) 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BREAKING OF HAND SPECIMENS REQUIRES SEVERAL HARD BLOWS OF THE GEOLOGIST'S PICK.</p> <p>HARD - CAN BE SCRATCHED BY KNIFE OR PICK ONLY WITH DIFFICULTY. HARD HAMMER BLOWS REQUIRED TO DETACH HAND SPECIMEN.</p> <p>MODERATELY HARD - CAN BE SCRATCHED BY KNIFE OR PICK. GOUGES OR GROOVES TO 0.25 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS.</p> <p>MEDIUM HARD - CAN BE GROOVED OR GOUGED 0.05 INCHES DEEP BY FIRM PRESSURE OF KNIFE OR PICK POINT. CAN BE EXCAVATED IN SMALL CHIPS TO PEICES 1 INCH MAXIMUM SIZE BY HARD BLOWS OF THE POINT OF A GEOLOGIST'S PICK.</p> <p>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.</p> <p>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;">FRACTURE SPACING</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>TERM</th> <th>SPACING</th> <th>TERM</th> <th>THICKNESS</th> </tr> </thead> <tbody> <tr> <td>VERY WIDE</td> <td>MORE THAN 10 FEET</td> <td>VERY THICKLY BEDDED</td> <td>> 4 FEET</td> </tr> <tr> <td>WIDE</td> <td>3 TO 10 FEET</td> <td>THICKLY BEDDED</td> <td>1.5 - 4 FEET</td> </tr> <tr> <td>MODERATELY CLOSE</td> <td>1 TO 3 FEET</td> <td>THINLY BEDDED</td> <td>0.16 - 1.5 FEET</td> </tr> <tr> <td>CLOSE</td> <td>0.16 TO 1 FEET</td> <td>VERY THINLY BEDDED</td> <td>0.03 - 0.16 FEET</td> </tr> <tr> <td>VERY CLOSE</td> <td>LESS THAN 0.16 FEET</td> <td>THICKLY LAMINATED</td> <td>0.008 - 0.03 FEET</td> </tr> <tr> <td></td> <td></td> <td>THINLY LAMINATED</td> <td>< 0.008 FEET</td> </tr> </tbody> </table> <p style="text-align: center;">INDURATION</p> <p>FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC.</p> <p>FRIABLE - RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE.</p> <p>MODERATELY INDURATED - GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER.</p> <p>INDURATED - GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER.</p> <p>EXTREMELY INDURATED - SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.</p>	TERM	SPACING	TERM	THICKNESS	VERY WIDE	MORE THAN 10 FEET	VERY THICKLY BEDDED	> 4 FEET	WIDE	3 TO 10 FEET	THICKLY BEDDED	1.5 - 4 FEET	MODERATELY CLOSE	1 TO 3 FEET	THINLY BEDDED	0.16 - 1.5 FEET	CLOSE	0.16 TO 1 FEET	VERY THINLY BEDDED	0.03 - 0.16 FEET	VERY CLOSE	LESS THAN 0.16 FEET	THICKLY LAMINATED	0.008 - 0.03 FEET			THINLY LAMINATED	< 0.008 FEET																																																																																																																																																																																																																																																												
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<p style="text-align: right;">BENCH MARK: BL-7: METAL DISC AT -BL- STA 21+70.19</p> <p style="text-align: right;">ELEVATION: 1658.26 FT.</p> <p>NOTES:</p>			<p style="text-align: right;">REVISOR: 02/23/06</p>																																																																																																																																																																																																																																																																																																																																																																																										

BRIDGE No. 138 ON SR-1151 OVER BIG PINE CREEK

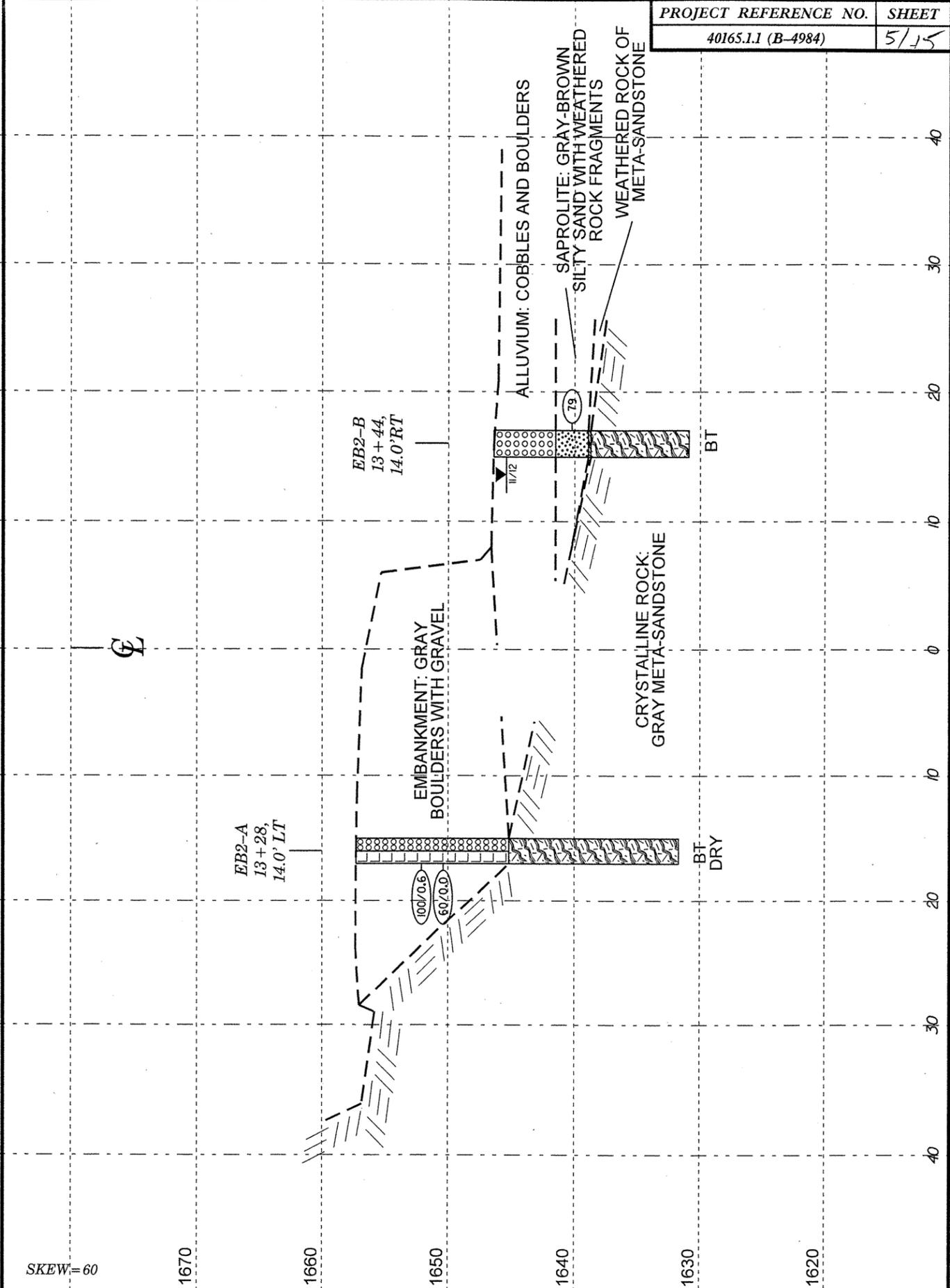


PROJECT REFERENCE NO.	SHEET
40165.1.1 (B-4894)	4/15
PROFILE 14.0 FEET RIGHT OF CENTERLINE	





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



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

SKEW=60

SKEW=60



NCDOT GEOTECHNICAL ENGINEERING UNIT

BORELOG REPORT

WBS 40165.1.1	TIP B-4984	COUNTY MADISON	GEOLOGIST Elliot, D. C.
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 12+71	OFFSET 9 ft RT	ALIGNMENT -L-
COLLAR ELEV. 1,657.7 ft	TOTAL DEPTH 15.3 ft	NORTHING 781,639	EASTING 882,785
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing w/ SPT	HAMMER TYPE Automatic
DRILLER Cheek, D. O.	START DATE 11/28/12	COMP. DATE 11/28/12	SURFACE WATER DEPTH N/A

ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100					ELEV. (ft)
1660															
														1,657.7	0.0
1655															
	1,652.4	5.3													
			6	15	37								M	1,650.9	6.8
1650															
	1,647.4	10.3													
			12	25	39								M		
1645														1,645.2	12.5
														1,643.5	14.2
	1,642.4	15.3												1,642.4	15.3
			60/0.0												
															60/0.0

NCDOT BORE SINGLE_BORE_CORELOGS.GPJ NC_DOT_GDT_12/3/12

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.									
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek							GROUND WTR (ft)								
BORING NO. EB2-A		STATION 13+28		OFFSET 14 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 1,657.3 ft		TOTAL DEPTH 25.6 ft		NORTHING 781,589		EASTING 882,815									
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic											
DRILLER Cheek, D. O.		START DATE 11/28/12		COMP. DATE 11/28/12		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	100					
1660															
														1,657.3	0.0
1655															
	1,652.1	5.2													
1650	1,650.4	6.9	82	18/0.1											
			60/0.0												
1645														1,645.2	12.1
1640															
1635															
														1,631.7	25.6

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT_GDT_12/3/12

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.						
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BORING NO. EB2-A		STATION 13+28		OFFSET 14 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 1,657.3 ft		TOTAL DEPTH 25.6 ft		NORTHING 781,589		EASTING 882,815						
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Cheek, D. O.		START DATE 11/28/12		COMP. DATE 11/28/12		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 13.5 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	ROD (ft)		REC. (%)	ROD (%)			
1645.48												
	1,645.2	12.1	3.5	N/A/0.5 1.8/0.0 2.7/0.0 3.0/0.0	(3.4) 97%	(3.4) 97%					1,645.2	12.1
	1,641.7	15.6					RS-1					
1640			5.0	3.1/0.0 3.0/0.0 3.3/0.0 3.2/0.0 3.3/0.0	(5.0) 100%	(5.0) 100%						
	1,636.7	20.6										
1635			5.0	2.5/0.0 2.3/0.0 2.4/0.0 2.5/0.0 2.3/0.0	(5.0) 100%	(5.0) 100%	RS-2					
	1,631.7	25.6										

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT_GDT_12/3/12

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.										
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek							GROUND WTR (ft)									
BORING NO. B-1		STATION 13+80		OFFSET 16 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,647.3 ft		TOTAL DEPTH 9.2 ft		NORTHING 781,534		EASTING 882,792										
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Cheek, D. O.		START DATE 11/29/12		COMP. DATE 11/29/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1650																
														1,647.3	GROUND SURFACE	0.0
														1,646.2	ARTIFICIAL FILL Sand and gravel.	1.1
1645															ALLUVIAL Gray-brown gravel and cobbles.	
	1,642.1	5.2														
			7	55	45/0.4											
1640															WEATHERED ROCK Weathered rock of meta-sandstone.	5.9
														1,641.4		
														1,639.8		7.5
														1,638.1	CRYSTALLINE ROCK Gray meta-sandstone.	9.2
	1,638.1	9.2													Boring Terminated at Elevation 1,638.1 ft in meta-sandstone.	
			60/0.0													

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 12/3/12

9/15

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.										
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek							GROUND WTR (ft)									
BORING NO. B-2		STATION 13+51		OFFSET CL		ALIGNMENT -DET-										
COLLAR ELEV. 1,646.5 ft		TOTAL DEPTH 7.4 ft		NORTHING 781,500		EASTING 882,787										
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing w/ SPT		HAMMER TYPE Automatic												
DRILLER Cheek, D. O.		START DATE 11/29/12		COMP. DATE 11/29/12		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	L O G	SOIL AND ROCK DESCRIPTION	DEPTH (ft)		
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
1650																
														1,646.5	GROUND SURFACE	0.0
														1,645.2	ARTIFICIAL FILL Sand and gravel.	1.3
1645															ALLUVIAL Gray-brown sand, gravel and cobbles with boulders.	
	1,641.8	4.7														
			25	37	63/0.2											
1640															WEATHERED ROCK Weathered rock of meta-sandstone.	5.6
														1,640.9		
														1,639.5	CRYSTALLINE ROCK Gray meta-sandstone.	7.0
														1,639.1		7.4
															Boring Terminated at Elevation 1,639.1 ft in meta-sandstone.	
			60/0.0													

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT.GDT 12/3/12

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.										
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 13+44		OFFSET 14 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 1,646.4 ft		TOTAL DEPTH 15.5 ft		NORTHING 781,570		EASTING 882,789										
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Cheek, D. O.		START DATE 11/29/12		COMP. DATE 11/29/11		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	100						
1650																
														1,646.4	GROUND SURFACE	0.0
1645															ALLUVIAL Cobbles and boulders.	
1640	1,641.2	5.2	10	28	51									1,641.5	SAPROLITE Gray-brown silty sand with weathered rock fragments.	4.9
														1,638.9	WEATHERED ROCK Weathered rock of meta-sandstone.	7.5
														1,638.7	CRYSTALLINE ROCK Gray meta-sandstone.	7.7
1635														1,630.9	Boring Terminated at Elevation 1,630.9 ft in meta-sandstone.	15.5

NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT_GDT 12/3/12

WBS 40165.1.1		TIP B-4984		COUNTY MADISON		GEOLOGIST Elliot, D. C.						
SITE DESCRIPTION Bridge No. 138 on SR-1151 over Big Pine Creek							GROUND WTR (ft)					
BORING NO. EB2-B		STATION 13+44		OFFSET 14 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 1,646.4 ft		TOTAL DEPTH 15.5 ft		NORTHING 781,570		EASTING 882,789						
DRILL RIG/HAMMER EFF./DATE AFO1045 CME-45 76% 09/03/2009		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Cheek, D. O.		START DATE 11/29/12		COMP. DATE 11/29/11		SURFACE WATER DEPTH N/A						
CORE SIZE NXWL			TOTAL RUN 7.8 ft									
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft)	RQD (ft)		REC. (ft)	RQD (ft)			
1638.7	1,638.7	7.7	2.8	1.5/0.8 1.9/0.0 2.0/0.0	(2.5) 89%	(2.0) 71%					1,638.7	Begin Coring @ 7.7 ft CRYSTALLINE ROCK
1635	1,635.9	10.5	5.0	1.8/0.0 2.0/0.0 2.1/0.0 2.0/0.0 1.9/0.0	(4.7) 94%	(4.3) 86%					1,638.7	Gray meta-sandstone with quartz infilled fault breccia zones. Very slightly weathered to fresh; hard. a) Parts along bedding @ 45°. b) Joints @ 70°.
											1,630.9	Boring Terminated at Elevation 1,630.9 ft in meta-sandstone.

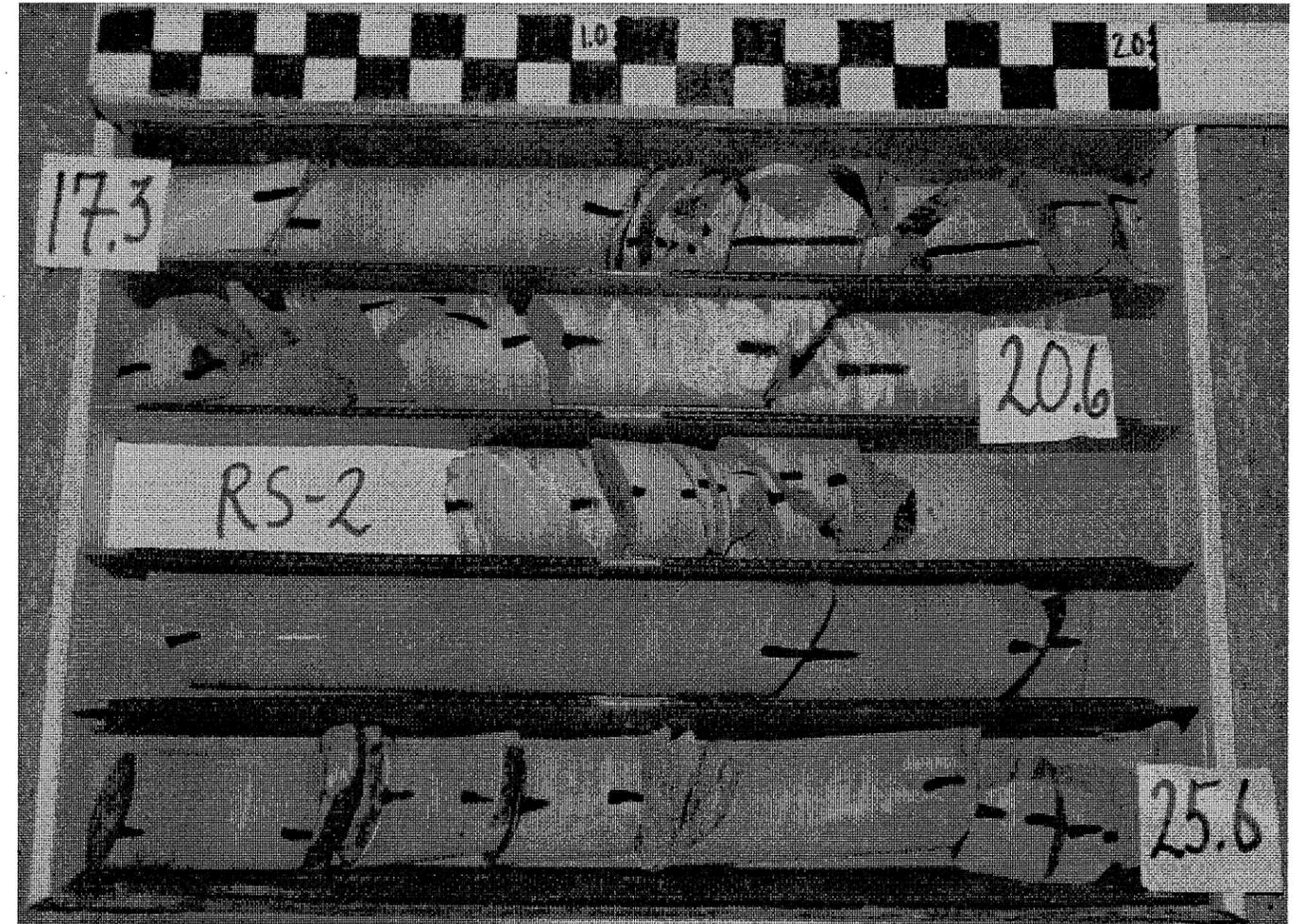
NCDOT BORE SINGLE BORE_CORELOGS.GPJ NC_DOT_GDT 12/3/12



40165.1.1 (B-4984)
Madison Co.
Bridge No. 138 on SR-1151
Over Big Pine Creek
EB1-A
Box 1 of 1

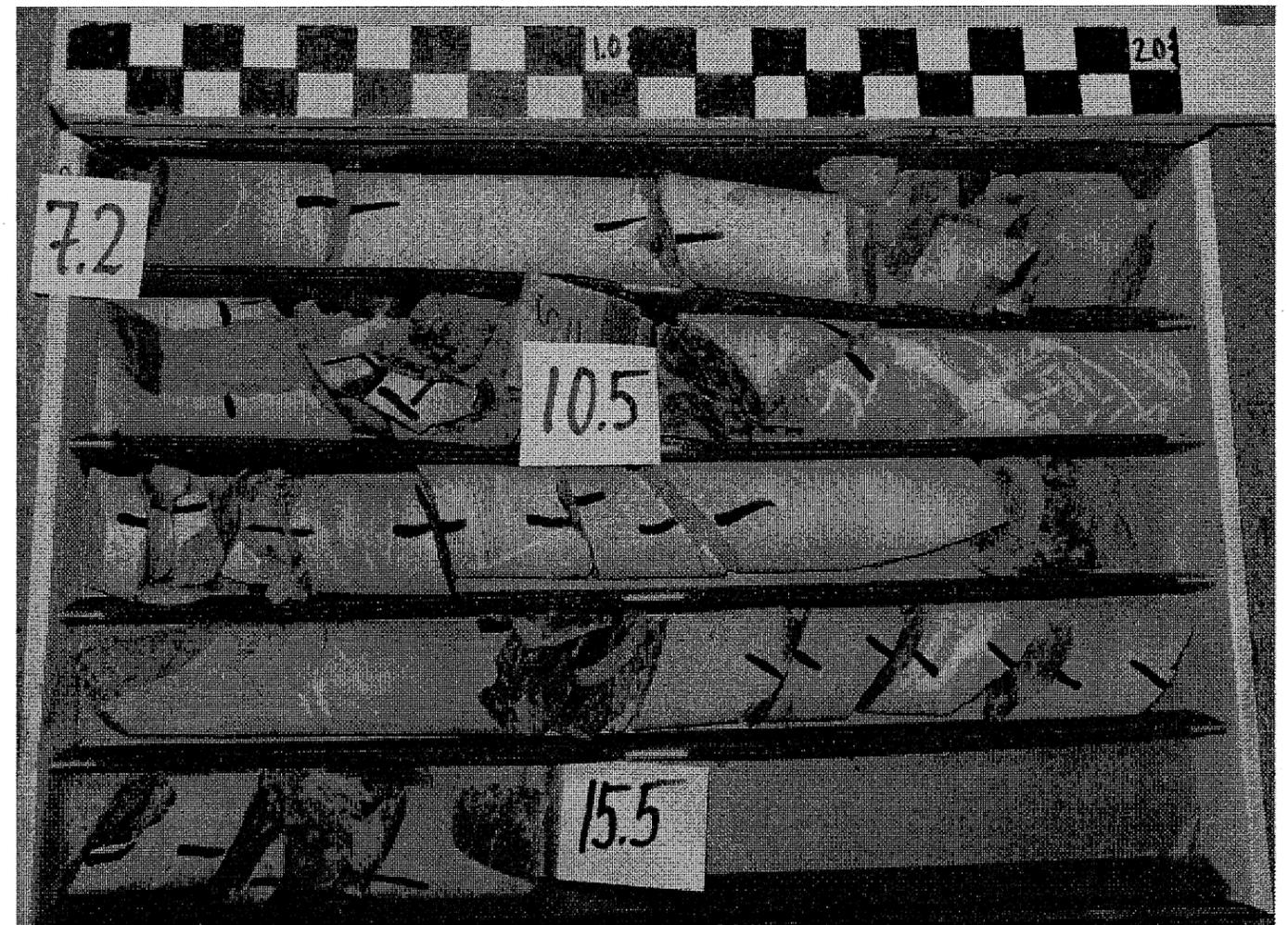


401.65.1.1 (B-4984)
 Madison Co.
 Bridge No. 138 on SR-1151
 Over Big Pine Creek
 EB2-A
 Box 1 of 2



40165.1.1 (B-4984)
 Madison Co.
 Bridge No. 138 on SR-1151
 Over Big Pine Creek
 EB2-A
 Box 2 of 2

12/15



40165.1.1 (B-4984)
Madison Co.
Bridge No. 138 on SR-1151
Over Big Pine Creek
EB2-B
Box 1 of 1

Rock Mass Rating (AASHTO)

Project: **40165.1.1 (B-4984)**
 Boring Location: **EB2-A**
 Stratigraphic Depth Range: **14.7ft to 15.2ft**

Parameter	Range of Values						
	Strength of Intact Rock Material	Point-load Strength Index	Uniaxial Comp. Strength	For this low range - Uniaxial Comp. Strength test is preferred	Disc. Condition	Rating	
1	Rating	>1215psi	590 - 1215 psi	312 - 590 psi	139-312 psi	For this low range - Uniaxial Comp. Strength test is preferred	18.75
		>30 ksi	15 - 30 ksi	7.5 - 15 ksi	3.6 - 7.5 ksi	1.5 - 3.6 ksi	0.5 - 1.5 ksi 0.1 - 0.5 ksi
2	Rating	90 - 100%	75 - 90%	50 - 75%	25 - 50%	<25%	<25%
		20	17	13	8	3	3
3	Rating	>10 ft	3 - 10 ft	1 - 3 ft	2in - 1ft	<2in	<2in
		30	25	20	10	5	5
4	Rating	Very Rough Surfaces	Slightly Rough Surface	Slightly Rough Surface	Slickensided Surfaces	Soft Gouge >0.2 in thick	Slightly Rough Surface
		Not Continuous	Separation <0.5 in	Separation <0.5 in	Separation <0.2 in thick	or Gouge <0.2 in thick	or Separation > 0.2 in
5	Rating	None	< 400 gal/hr	400 - 2000 gal/hr	>2000 gal/hr	>0.5	>2000 gal/hr
		0	0.0 - 0.2	0.2 - 0.5	0.2 - 0.5	>0.5	>0.5
6	Rating	Completely Dry	Moist only	Under Moderate Water Pressure	Under Moderate Water Pressure	Severe Water Problems	Severe Water Problems
		10	7	4	4	0	0
7	Rating	Very Favorable	Favorable	Fair	Unfavorable	Very Unfavorable	Very Unfavorable
		0	-2	-7	-15	-25	-25
8	Rating	0	-5	-25	-50	-60	-60
		0	-5	-25	-50	-60	-60

B. RATING ADJUSTMENT FOR DISCONTINUITY ORIENTATIONS

Parameter	Very Favorable	Favorable	Fair	Unfavorable	Very Unfavorable	Adjust to Rating
Strike and Dip Orientations	0	-2	-7	-15	-25	-2
Foundations	0	-5	-25	-50	-60	-2
Slopes	0	-5	-25	-50	-60	-2

ROCK MASS CLASSIFICATION **Class II; Good Rock**

ROCK MASS RATING **75**

Rock Mass Rating (AASHTO)

Project: **40165.1.1 (B-4984)**
 Boring Location: **EB2-A**
 Stratigraphic Depth Range: **20.6ft to 21.2ft**

Parameter	Range of Values						
	Strength of Intact Rock Material	Point-load Strength Index	Uniaxial Comp. Strength	For this low range - Uniaxial Comp. Strength test is preferred	Disc. Condition	Rating	
1	Rating	>1215psi	590 - 1215 psi	312 - 590 psi	139-312 psi	For this low range - Uniaxial Comp. Strength test is preferred	7.02
		>30 ksi	15 - 30 ksi	7.5 - 15 ksi	3.6 - 7.5 ksi	1.5 - 3.6 ksi	0.5 - 1.5 ksi 0.1 - 0.5 ksi
2	Rating	90 - 100%	75 - 90%	50 - 75%	25 - 50%	<25%	<25%
		20	17	13	8	3	3
3	Rating	>10 ft	3 - 10 ft	1 - 3 ft	2in - 1ft	<2in	<2in
		30	25	20	10	5	5
4	Rating	Very Rough Surfaces	Slightly Rough Surface	Slightly Rough Surface	Slickensided Surfaces	Soft Gouge >0.2 in thick	Slightly Rough Surface
		Not Continuous	Separation <0.5 in	Separation <0.5 in	Separation <0.2 in thick	or Gouge <0.2 in thick	or Separation > 0.2 in
5	Rating	None	< 400 gal/hr	400 - 2000 gal/hr	>2000 gal/hr	>0.5	>2000 gal/hr
		0	0.0 - 0.2	0.2 - 0.5	0.2 - 0.5	>0.5	>0.5
6	Rating	Completely Dry	Moist only	Under Moderate Water Pressure	Under Moderate Water Pressure	Severe Water Problems	Severe Water Problems
		10	7	4	4	0	0
7	Rating	Very Favorable	Favorable	Fair	Unfavorable	Very Unfavorable	Very Unfavorable
		0	-2	-7	-15	-25	-25
8	Rating	0	-5	-25	-50	-60	-60
		0	-5	-25	-50	-60	-60

B. RATING ADJUSTMENT FOR DISCONTINUITY ORIENTATIONS

Parameter	Very Favorable	Favorable	Fair	Unfavorable	Very Unfavorable	Adjust to Rating
Strike and Dip Orientations	0	-2	-7	-15	-25	-2
Foundations	0	-5	-25	-50	-60	-2
Slopes	0	-5	-25	-50	-60	-2

ROCK MASS CLASSIFICATION **Class II; Good Rock**

ROCK MASS RATING **67**

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAY
MATERIALS & TESTS UNIT
PHYSICAL TESTING LABORATORY

T. I. P. No. B-4984

REPORT ON SAMPLES OF ROCK COMPRESSION

Project 40165.1.1 County Madison Owner C A Dunnagan
Date: Sampled 12/5/2012 Received 12/5/2012 Reported 12/21/12
Sampled from _____ By _____
Submitted by C A Dunnagan 2006 Standard Specifications
Tested By Michael Dubeau Date Tested 12/12/2012

TEST RESULTS

Proj. Sample No.		RS-1	RS-2			
Lab. Sample No.		P384882	P384882			
Diameter	in	1.852	1.859			
Specimen Height	in	3.710	3.7			
Area	in ²	2.694	2.714			
H/D Ratio		2.00	1.99			
Weight	lbf	0.99	0.99			
Unit Weight	lbf/ft ³	171.2	170.3			
Ultimate	lbf	50500	19050.0			
Ultimate	ksi	18.746	7.019			
Ultimate Corrected	ksi	18.75	7.02			
Sec Mod @ 40%	Mpsi	4.2	4.96			
Station		12+60	12+60			
Offset		14' LT	14' LT			
Alignment						
Depth (ft)		14.70	20.60			
	to	15.20	21.20			

cc:

V. O. Cordle
Physical Testing Engineer