

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

STRUCTURE
SUBSURFACE INVESTIGATION

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PROJ. REFERENCE NO. 38514.1.1 (B-4741) F.A. PROJ. BRZ-1493(2)
COUNTY DAVIDSON
PROJECT DESCRIPTION BRIDGE 38 OVER MUDDY CREEK ON
SR 1493 (FRYE BRIDGE RD)

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 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.

PERSONNEL

C. C. MURRAY

J. E. ESTEP

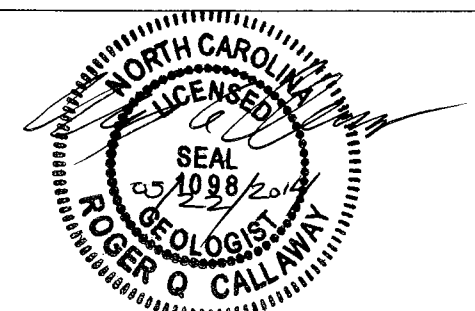
M. R. MOORE

INVESTIGATED BY R. Q. CALLAWAY

CHECKED BY C. B. LITTLE

SUBMITTED BY C. B. LITTLE

DATE MAY 2014



PROJECT: 38514.1.1 ID: B-4741

DRAWN BY: C. E. BURRIS

NOTE - THE INFORMATION CONTAINED HEREIN IS NOT IMPLIED OR GUARANTEED BY THE N. C. DEPARTMENT OF TRANSPORTATION AS BEING ACCURATE NOR IS IT 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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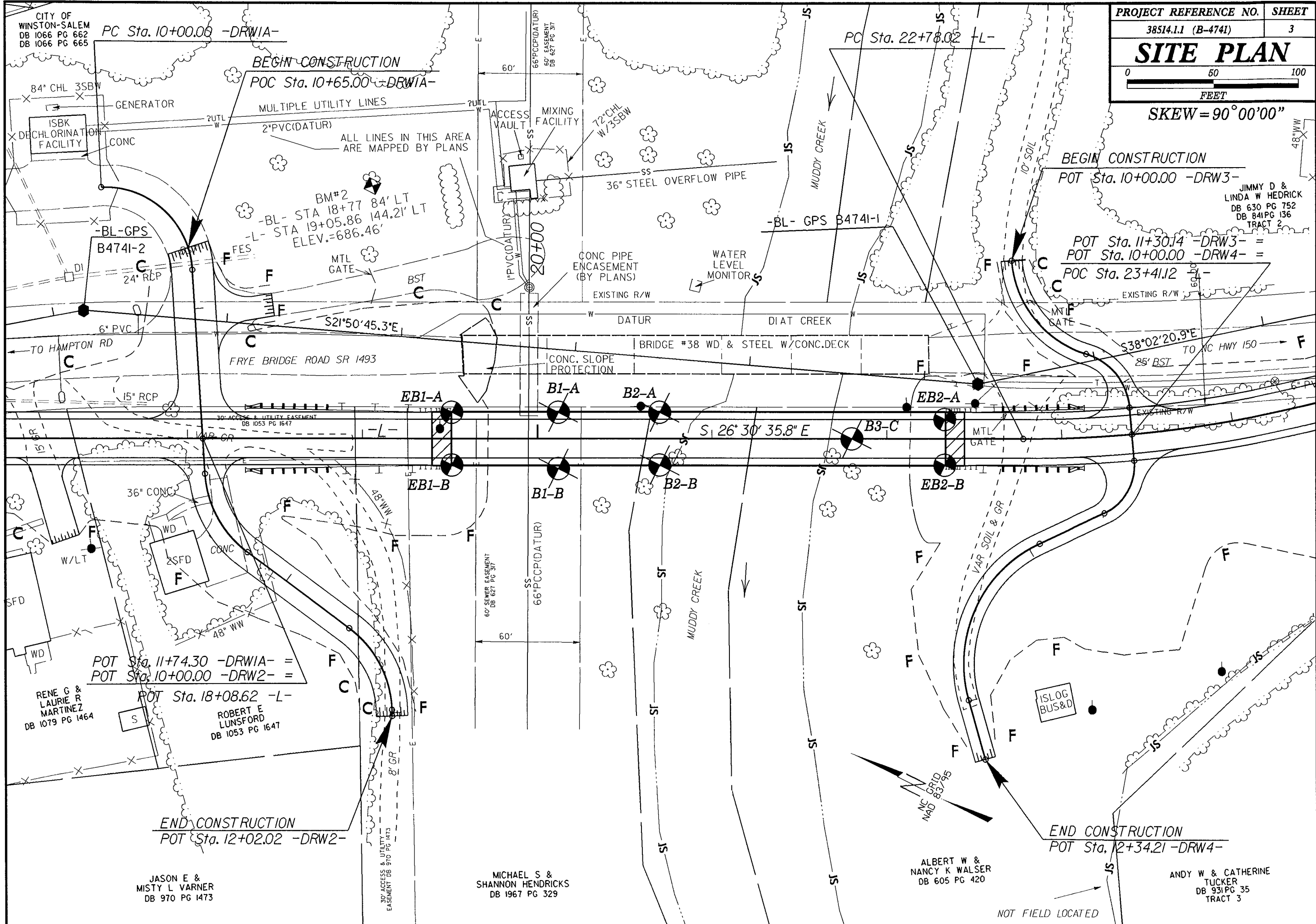
SUBSURFACE INVESTIGATION

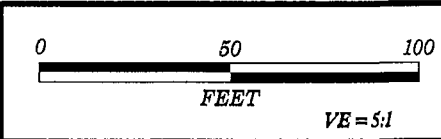
SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

SOIL DESCRIPTION				GRADATION				ROCK DESCRIPTION				TERMS AND DEFINITIONS							
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 THE STANDARD PENETRATION TEST (ASHTO 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: <i>VERY STIFF, GRAY, SILTY CLAY, MOST WITH INTERBEDDED FINE SAND LAYERS, HIGH PLASTIC, A-7-6</i>				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.				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:				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 ENCLATERED, 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 DISLODGED 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 (RODQ) - 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 INTRUDED 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 (SRDQ) - 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.							
SOIL LEGEND AND AASHTO CLASSIFICATION				MINERALOGICAL COMPOSITION				WEATHERING				WEATHERING							
GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS				MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE.				WEATHERED ROCK (WR) NON-COASTAL PLAIN MATERIAL THAT WOULD YIELD SPT N VALUES > 100 BLOWS PER FOOT IF TESTED.				CRYSTALLINE ROCK (CR) FINE TO COARSE GRAIN IGNEOUS AND METAMORPHIC ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES GRANITE, GNEISS, GABBRO, SCHIST, ETC.							
COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50				COMPRESSION TRACE OF ORGANIC MATTER 2 - 3% LITTLE ORGANIC MATTER 3 - 5% MODERATELY ORGANIC 5 - 10% HIGHLY ORGANIC >10%				NON-CRYSTALLINE ROCK (NCR) FINE TO COARSE GRAIN METAMORPHIC AND NON-COASTAL PLAIN SEDIMENTARY ROCK THAT WOULD YIELD SPT REFUSAL IF TESTED. ROCK TYPE INCLUDES PHYLLITE, SLATE, SANDSTONE, ETC.				COASTAL PLAIN SEDIMENTARY ROCK (CP) COASTAL PLAIN SEDIMENTS CEMENTED INTO ROCK, BUT MAY NOT YIELD SPT REFUSAL. ROCK TYPE INCLUDES LIMESTONE, SANDSTONE, CEMENTED SHELL BEDS, ETC.							
PERCENTAGE OF MATERIAL ORGANIC MATERIAL GRANULAR SOILS SILT - CLAY SOILS OTHER MATERIAL TRACE OF ORGANIC MATTER 2 - 3% 3 - 5% TRACE 1 - 10% LITTLE ORGANIC MATTER 3 - 5% 5 - 12% LITTLE 10 - 20% MODERATELY ORGANIC 5 - 10% 12 - 20% SOME 20 - 35% HIGHLY ORGANIC >10% >20% HIGHLY 35% AND ABOVE				GROUND WATER WATER LEVEL IN BORE HOLE IMMEDIATELY AFTER DRILLING STATIC WATER LEVEL AFTER 24 HOURS PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA SPRING OR SEEP				WEATHERING 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 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. IF TESTED, WOULD YIELD SPT REFUSAL. 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. IF TESTED, YIELDS SPT N VALUES > 100 BPF. 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. 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.											
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE COMPACTNESS OR CONSISTENCY RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE) RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²)				MISCELLANEOUS SYMBOLS				ROCK HARDNESS				ROCK HARDNESS							
GENERALLY GRANULAR MATERIAL (NON-COHESIVE) VERY LOOSE 4 TO 10 LOOSE 10 TO 30 MEDIUM DENSE 30 TO 50 DENSE 50 TO 100 VERY DENSE >100				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				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 INCHES DEEP CAN BE EXCAVATED BY HARD BLOW OF A GEOLOGIST'S PICK. HAND SPECIMENS CAN BE DETACHED BY MODERATE BLOWS. 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. 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.				ABBREVIATIONS AR - AUGER REFUSAL MED. - MEDIUM VST - VANE SHEAR TEST BT - BORING TERMINATED MICA - MICACEOUS WEA. - WEATHERED CL. - CLAY MOD. - MODERATELY UNIT WEIGHT CPT - CONE PENETRATION TEST NP - NON PLASTIC DRG. - ORGANIC DRY UNIT WEIGHT CSE. - COARSE PMT - PRESSUREMETER TEST SAMPLE ABBREVIATIONS DMT - DILATOMETER TEST SD. - SAND, SANDY S - BULK DPT - DYNAMIC PENETRATION TEST SAP. - SAPROLITIC SS - SPLIT SPOON F - FINE SL. - SILT, SILTY ST - SHELBY TUBE FOSS. - FOSSILIFEROUS TCR - SLIGHTLY SLI. - SLIGHTLY TR - RECOMPACTED TRIAXIAL FRAC. - FRACTURED, FRACTURES TCR - TRICONE REFUSAL RT - ROCK F - FINE TCR - TRICONE REFUSAL RT - ROCK FRAGS. - FRAGMENTS W - MOISTURE CONTENT RT - RECOMPACTED TRIAXIAL HI. - HIGHLY V - VERY CBR - CALIFORNIA BEARING RATIO							
TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM) 4 10 40 60 200 270 4.76 2.00 0.42 0.25 0.075 0.053 BOULDER (BLDR.) COBBLE (COB.) GRAVEL (GR.) COARSE SAND (CSE. SD.) FINE SAND (F. SD.) SILT (SL.) CLAY (CL.) GRAIN SIZE MM 305 75 2.0 0.25 0.05 0.005 IN. 12 3				EQUIPMENT USED ON SUBJECT PROJECT				FRACTURE SPACING				BEDDING							
SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS) FIELD MOISTURE DESCRIPTION GUIDE FOR FIELD MOISTURE DESCRIPTION				DRILL UNITS: MOBILE B- BK-51 CME-45C CME-550 PORTABLE HOIST				ADVANCING TOOLS: CLAY BITS 6" CONTINUOUS FLIGHT AUGER 8" HOLLOW AUGERS HARD FACED FINGER BITS TUNG-CARBIDE INSERTS CASING W/ ADVANCER TRICONE 2 15/16" STEEL TEETH TRICONE TUNG-CARB. CORE BIT				TERM SPACING VERY WIDE MORE THAN 10 FEET WIDE 3 TO 10 FEET MODERATELY CLOSE 1 TO 3 FEET CLOSE 0.16 TO 1 FEET VERY CLOSE LESS THAN 0.16 FEET				TERM THICKNESS VERY THICKLY BEDDED > 4 FEET THICKLY BEDDED 1.5 - 4 FEET THINLY BEDDED 0.16 - 1.5 FEET VERY THINLY BEDDED 0.03 - 0.16 FEET THICKLY LAMINATED 0.008 - 0.03 FEET THINLY LAMINATED < 0.008 FEET			
LL - LIQUID LIMIT (SAT.) USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE PL - PLASTIC LIMIT SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE OM - OPTIMUM MOISTURE SOLID; AT OR NEAR OPTIMUM MOISTURE SL - SHRINKAGE LIMIT - DRY - (D) REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE				PLASTICITY PLASTICITY INDEX (PI) DRY STRENGTH NONPLASTIC 0-5 VERY LOW LOW PLASTICITY 6-15 SLIGHT MED. PLASTICITY 16-25 MEDIUM HIGH PLASTICITY 26 OR MORE HIGH				INDURATION FOR SEDIMENTARY ROCKS, INDURATION IS THE HARDENING OF THE MATERIAL BY CEMENTING, HEAT, PRESSURE, ETC. FRIABLE RUBBING WITH FINGER FREES NUMEROUS GRAINS; GENTLE BLOW BY HAMMER DISINTEGRATES SAMPLE. MODERATELY INDURATED GRAINS CAN BE SEPARATED FROM SAMPLE WITH STEEL PROBE; BREAKS EASILY WHEN HIT WITH HAMMER. INDURATED GRAINS ARE DIFFICULT TO SEPARATE WITH STEEL PROBE; DIFFICULT TO BREAK WITH HAMMER. EXTREMELY INDURATED SHARP HAMMER BLOWS REQUIRED TO BREAK SAMPLE; SAMPLE BREAKS ACROSS GRAINS.				NOTES: STRATIGRAPHY SHOWN THROUGH BORINGS							
COLOR DESCRIPTIONS MAY INCLUDE COLOR OR COLOR COMBINATIONS (TAN, RED, YELLOW-BROWN, BLUE-GRAY). MODIFIERS SUCH AS LIGHT, DARK, STREAKED, ETC. ARE USED TO DESCRIBE APPEARANCE.				FRAC. SPACING BENCH MARK: -BL- GPS B4741-1 N 812862.0120 E 1603859.9290 ELEVATION: 690.24 FT.				INDURATION				INDURATION							

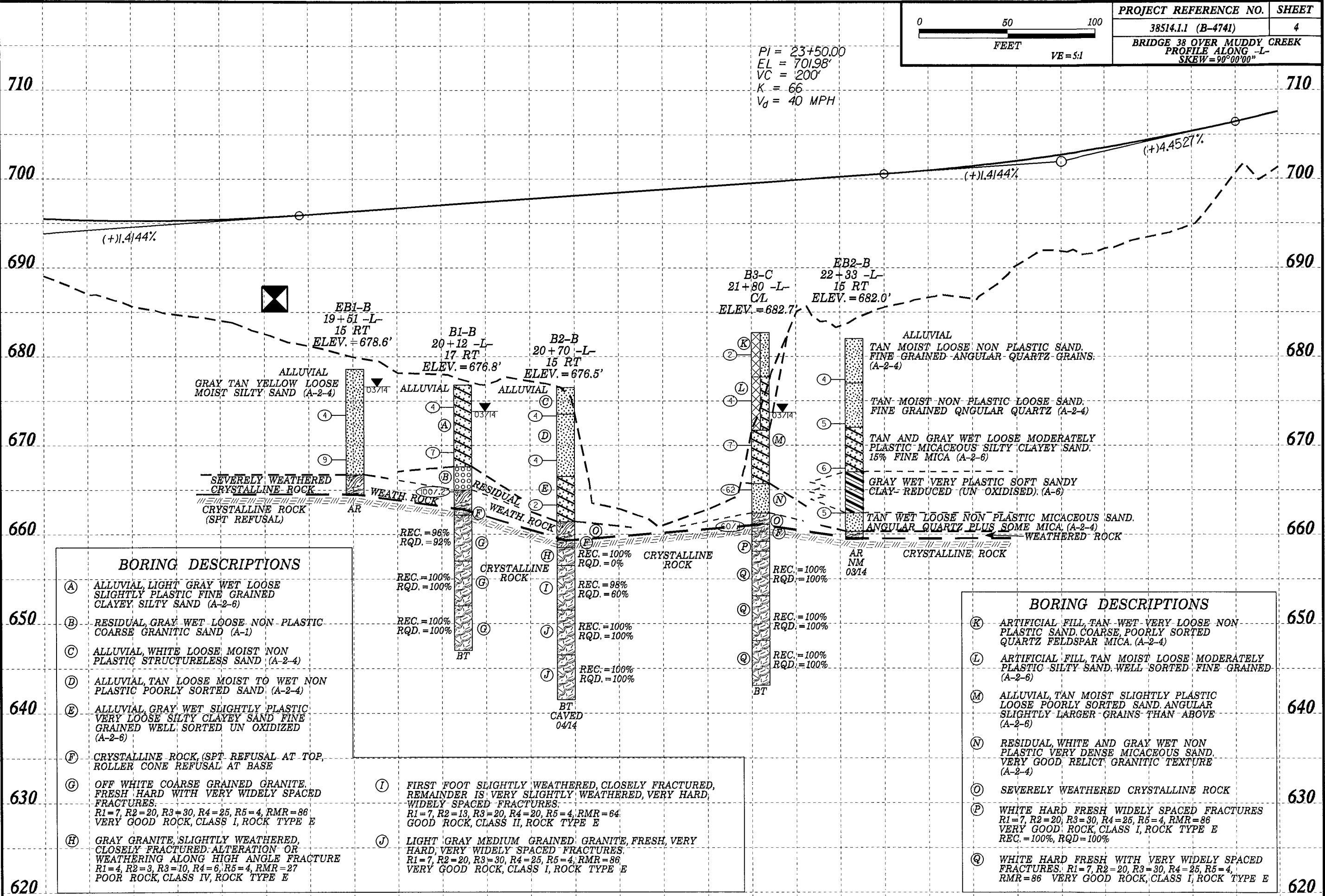
CITY OF WINSTON-SALEM
DB 1066 PG 662
DB 1066 PG 665

PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	3
SITE PLAN	
0 50 100 FEET	
SKEW = 90°00'00"	





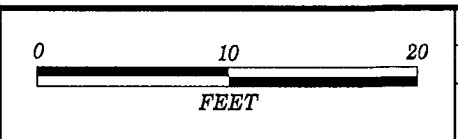
PI = 23+50.00
 EL = 701.98'
 VC = 200'
 K = 66
 V_d = 40 MPH



BORING DESCRIPTIONS	
(A)	ALLUVIAL, LIGHT GRAY WET LOOSE SLIGHTLY PLASTIC FINE GRAINED CLAYEY SILTY SAND (A-2-6)
(B)	RESIDUAL, GRAY WET LOOSE NON PLASTIC COARSE GRANITIC SAND (A-1)
(C)	ALLUVIAL, WHITE LOOSE MOIST NON PLASTIC STRUCTURELESS SAND (A-2-4)
(D)	ALLUVIAL, TAN LOOSE MOIST TO WET NON PLASTIC POORLY SORTED SAND (A-2-4)
(E)	ALLUVIAL, GRAY WET SLIGHTLY PLASTIC VERY LOOSE SILTY CLAYEY SAND FINE GRAINED WELL SORTED UN OXIDIZED (A-2-6)
(F)	CRYSTALLINE ROCK, (SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE)
(G)	OFF WHITE COARSE GRAINED GRANITE, FRESH HARD WITH VERY WIDELY SPACED FRACTURES. R1=7, R2=20, R3=30, R4=25, R5=4, RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E
(H)	GRAY GRANITE, SLIGHTLY WEATHERED, CLOSELY FRACTURED, ALTERATION OR WEATHERING ALONG HIGH ANGLE FRACTURE R1=4, R2=3, R3=10, R4=6, R5=4, RMR=27 POOR ROCK, CLASS IV, ROCK TYPE E

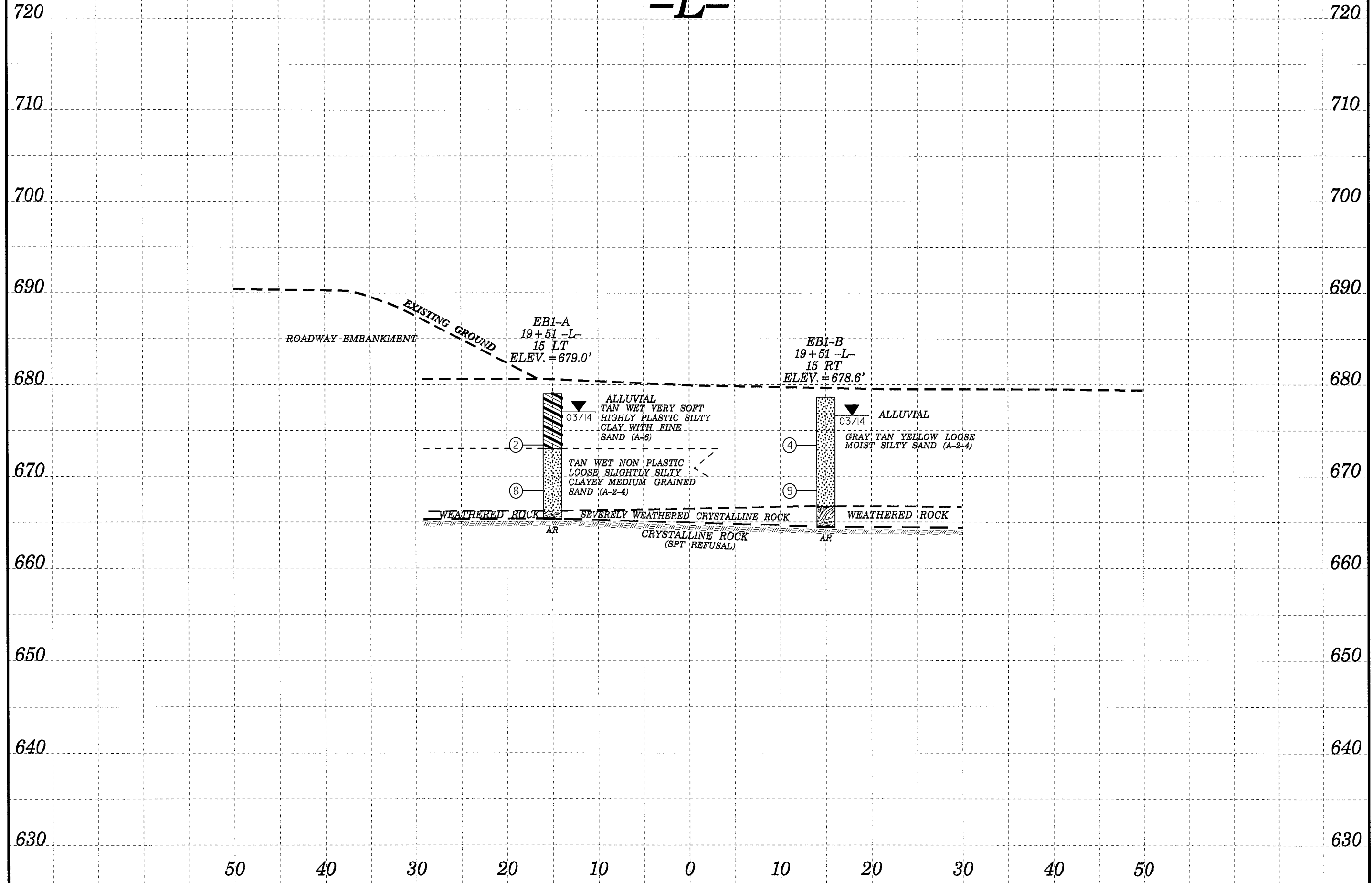
(I)	FIRST FOOT SLIGHTLY WEATHERED, CLOSELY FRACTURED, REMAINDER IS VERY SLIGHTLY WEATHERED, VERY HARD, WIDELY SPACED FRACTURES. R1=7, R2=13, R3=20, R4=20, R5=4, RMR=64 GOOD ROCK, CLASS II, ROCK TYPE E
(J)	LIGHT GRAY MEDIUM GRAINED GRANITE, FRESH, VERY HARD, VERY WIDELY SPACED FRACTURES. R1=7, R2=20, R3=30, R4=25, R5=4, RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

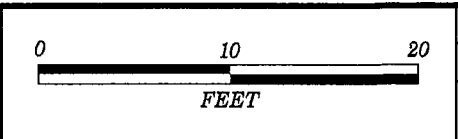
BORING DESCRIPTIONS	
(K)	ARTIFICIAL FILL, TAN WET VERY LOOSE NON PLASTIC SAND, COARSE, POORLY SORTED QUARTZ FELDSPAR MICA (A-2-4)
(L)	ARTIFICIAL FILL, TAN MOIST LOOSE MODERATELY PLASTIC SILTY SAND, WELL SORTED FINE GRAINED (A-2-6)
(M)	ALLUVIAL, TAN MOIST SLIGHTLY PLASTIC LOOSE POORLY SORTED SAND ANGULAR SLIGHTLY LARGER GRAINS THAN ABOVE (A-2-6)
(N)	RESIDUAL, WHITE AND GRAY WET NON PLASTIC VERY DENSE MICACEOUS SAND, VERY GOOD RELICT GRANITIC TEXTURE (A-2-4)
(O)	SEVERELY WEATHERED CRYSTALLINE ROCK
(P)	WHITE HARD FRESH WIDELY SPACED FRACTURES R1=7, R2=20, R3=30, R4=25, R5=4, RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E REC.=100%, RQD=100%
(Q)	WHITE HARD FRESH WITH VERY WIDELY SPACED FRACTURES. R1=7, R2=20, R3=30, R4=25, R5=4, RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E



PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	5
SECTION THROUGH EBI STA. 19+50.69 -L- (W.P. #1) SKEW = 90°00'00"	

-L-





PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	6
SECTION THROUGH BI STA. 20+11.88 -L- (W.P. #2) SKEW=90°00'00"	

-L-

710 710

700 700

690 690

680 680

670 670

660 660

650 650

640 640

630 630

50 40 30 20 10 0 10 20 30 40 50

BI-A
20+12 -L-
15' LT
ELEV. = 676.6'

BI-B
20+12 -L-
17' RT
ELEV. = 676.8'

EXISTING GROUND

ALLUVIAL
GRAY AND WHITE LOOSE WET NON
PLASTIC POORLY SORTED SAND,
GRANITE AFFINITY QUARTZ
FELDSPAR MICA (A-2-4)

ALLUVIAL

ALLUVIAL
LIGHT GRAY WET LOOSE SLIGHTLY
PLASTIC, FINE GRAINED CLAYEY
SILTY SAND (A-2-6)

GRAY VERY LOOSE WET
SILTY CLAYEY FINE SAND,
MODERATELY PLASTIC (A-2-6)

RESIDUAL

GRAY WET LOOSE NON PLASTIC
COARSE GRANITIC SAND (A-1)

DARK GRAY LOOSE MOIST MOD.
PLASTIC V. MICACEOUS CLAYEY
SAND 20% MICA, RELICT
SCHISTOSE TEXTURE (A-2-6)

WEATHERED ROCK

SEVERELY WEATHERED
CRYSTALLINE ROCK,
SPALL REFUSAL

ALTERNATING LAYERS OF BLACK BIOTITE GNEISS, AND WHITE MEDIUM GRAINED GRANITE.
SLIGHTLY WEATHERED, HARD, BUT BROKEN UP ALONG COMPOSITIONAL BOUNDARIES.
R1: 4 R2: 3 R3: 10 R4: 6 R5: 4 RMR=27, POOR ROCK, CLASS IV, ROCK TYPE E

REC. = 49%
RQD. = 23%

OFF WHITE COARSE GRAINED GRANITE FRESH, HARD WITH VERY WIDELY SPACED FRACTURES.
R1: 7 R2: 20 R3: 30 R4: 25 R5: 4 RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 96%
RQD. = 92%

ALTERNATING 1' TO 2' LAYERS OF LIGHT COLORED GRANITE, AND BLACK WELL FOLIATED
BIOTITE GNEISS. FROM 22.6' TRANSITION TO LIGHT COLORED GRANITE. DARK ROCK IS
PROBABLY INCLUSION IN GRANITIC MASS; (XENOLITH).
R1: 4 R2: 13 R3: 20 R4: 20 R5: 4 RMR=61 GOOD ROCK, CLASS II, ROCK TYPE E

REC. = 70%
RQD. = 60%

OFF WHITE COARSE GRAINED GRANITE FRESH, HARD WITH VERY WIDELY SPACED FRACTURES.
R1: 7 R2: 20 R3: 30 R4: 25 R5: 4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100%
RQD. = 100%

MOSTLY WHITE GRANITE WITH GHOSTS OF XENOLITHS EXPRESSED AS DARK, BIOTITIC ZONES.
FRESH, HARD, WIDELY SPACED FRACTURES.
R1: 7 R2: 20 R3: 25 R4: 20 R5: 4 RMR=76, GOOD ROCK, CLASS II, ROCK TYPE E

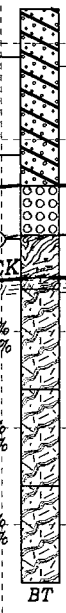
REC. = 100%
RQD. = 100%

OFF WHITE COARSE GRAINED GRANITE FRESH, HARD WITH VERY WIDELY SPACED FRACTURES.
R1: 7 R2: 20 R3: 30 R4: 25 R5: 4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100%
RQD. = 100%

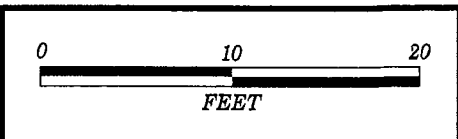
WHITE MEDIUM GRAINED FRESH VERY HARD GRANITE WITH VERY WIDE FRACTURE SPACING.
R1: 7 R2: 20 R3: 30 R4: 25 R5: 4 RMR=86
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 95%
RQD. = 95%



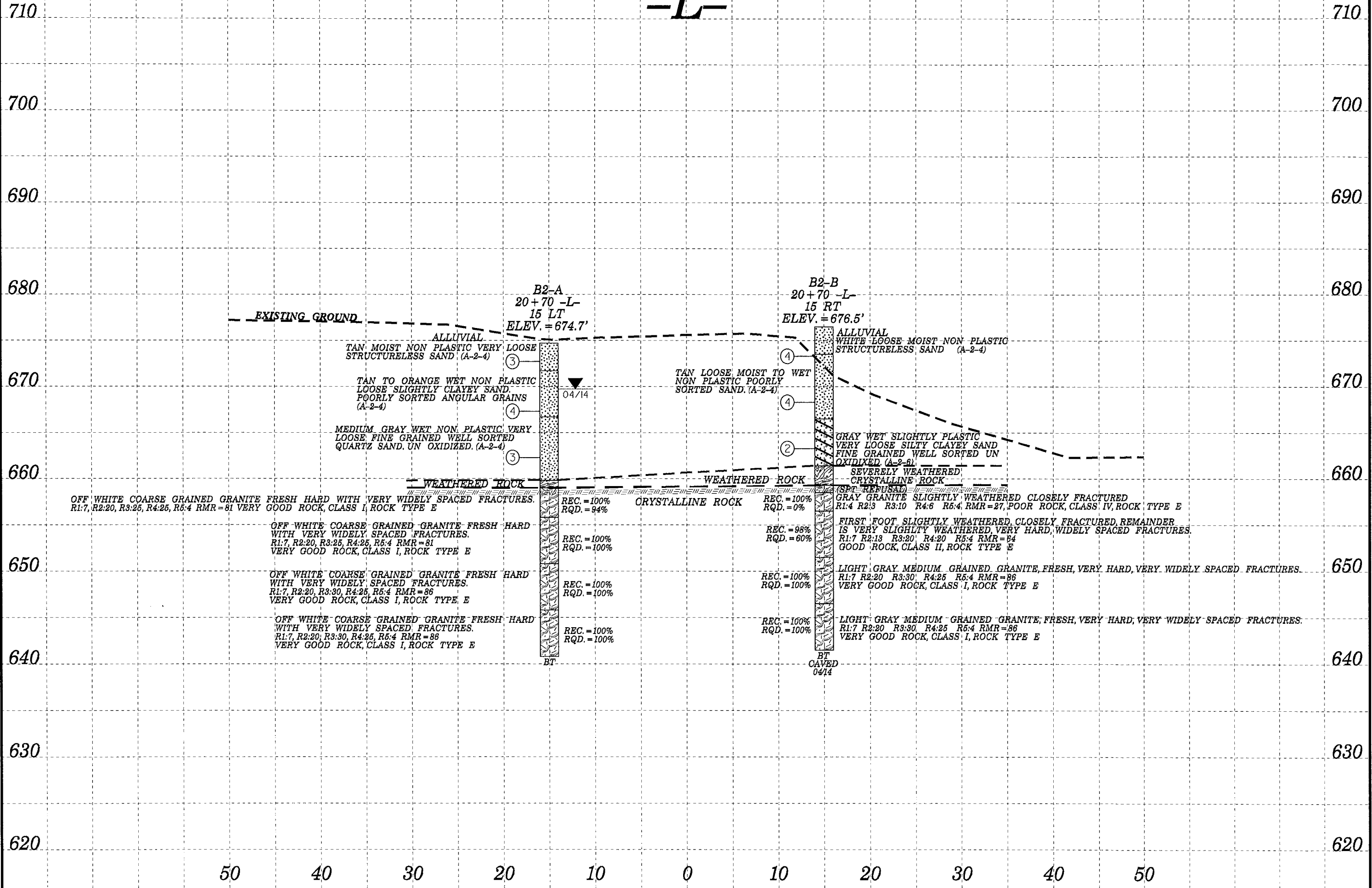
BT

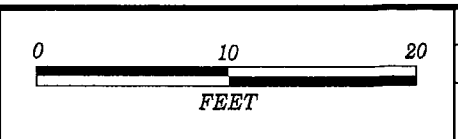
BT



PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	7
SECTION THROUGH B2 STA. 20+72.00 -L- (W.P.#3) SKEW = 90°00'00"	

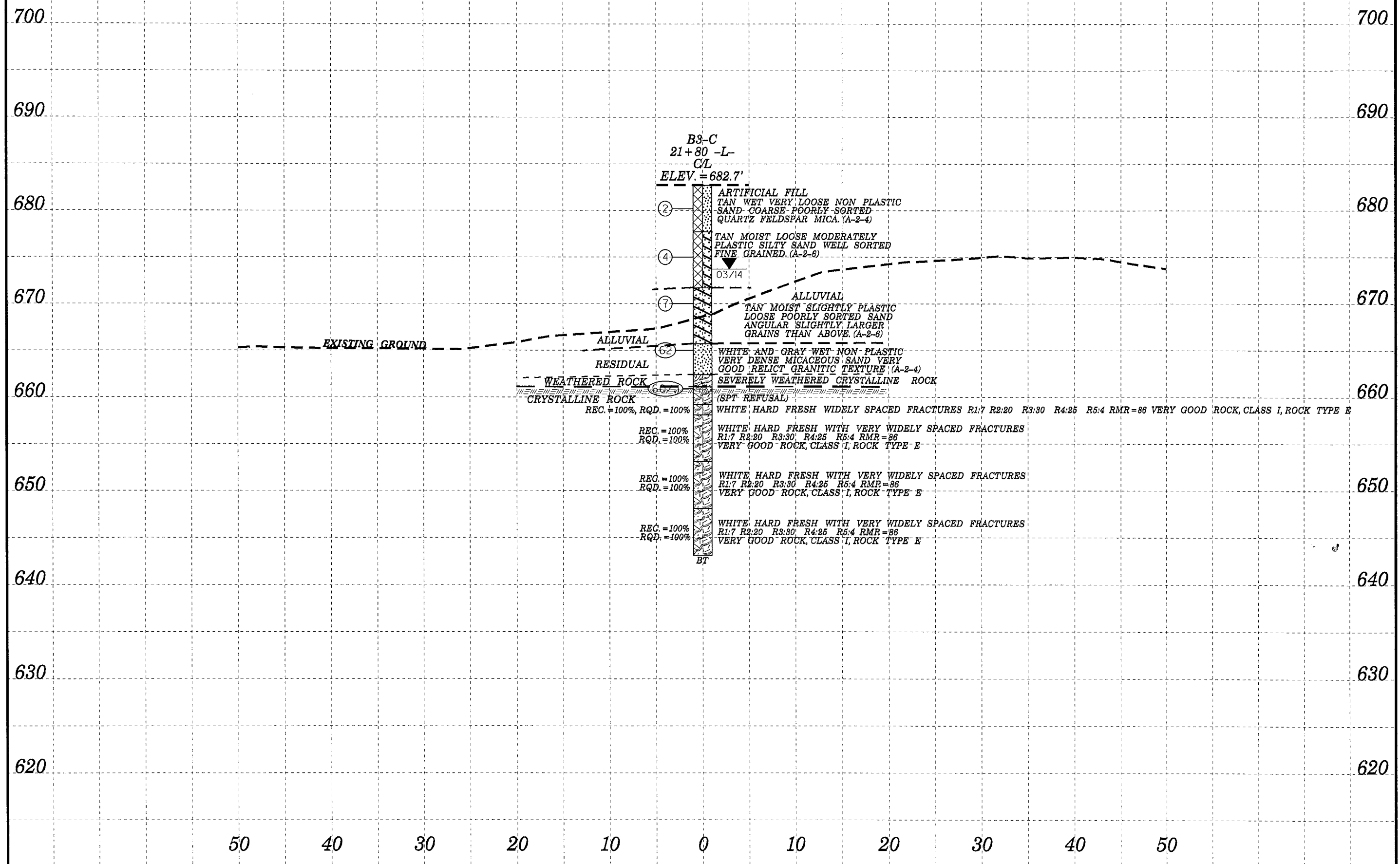
-L-





PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	8
SECTION THROUGH B3 STA. 21+72.13 -L (W.P. #4) SKEW = 90°00'00"	

-L-



B3-C
21+80 -L-
CL
ELEV. = 682.7'

ARTIFICIAL FILL
TAN WET VERY LOOSE NON PLASTIC
SAND COARSE POORLY SORTED
QUARTZ FELDSPAR MICA (A-2-4)

TAN MOIST LOOSE MODERATELY
PLASTIC SILTY SAND WELL SORTED
FINE GRAINED (A-2-6)

ALLUVIAL
TAN MOIST SLIGHTLY PLASTIC
LOOSE POORLY SORTED SAND
ANGULAR SLIGHTLY LARGER
GRAINS THAN ABOVE (A-2-6)

RESIDUAL
WHITE AND GRAY WET NON PLASTIC
VERY DENSE MICACEOUS SAND VERY
GOOD RELICT GRANITIC TEXTURE (A-2-4)

WEATHERED ROCK
CRYSTALLINE ROCK
SEVERELY WEATHERED CRYSTALLINE ROCK
(SPT REFUSAL)

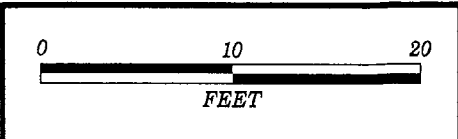
REC. = 100%, RQD. = 100% WHITE HARD FRESH WIDELY SPACED FRACTURES R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86 VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100%
RQD. = 100% WHITE HARD FRESH WITH VERY WIDELY SPACED FRACTURES
R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86
VERY GOOD ROCK, CLASS I, ROCK TYPE E

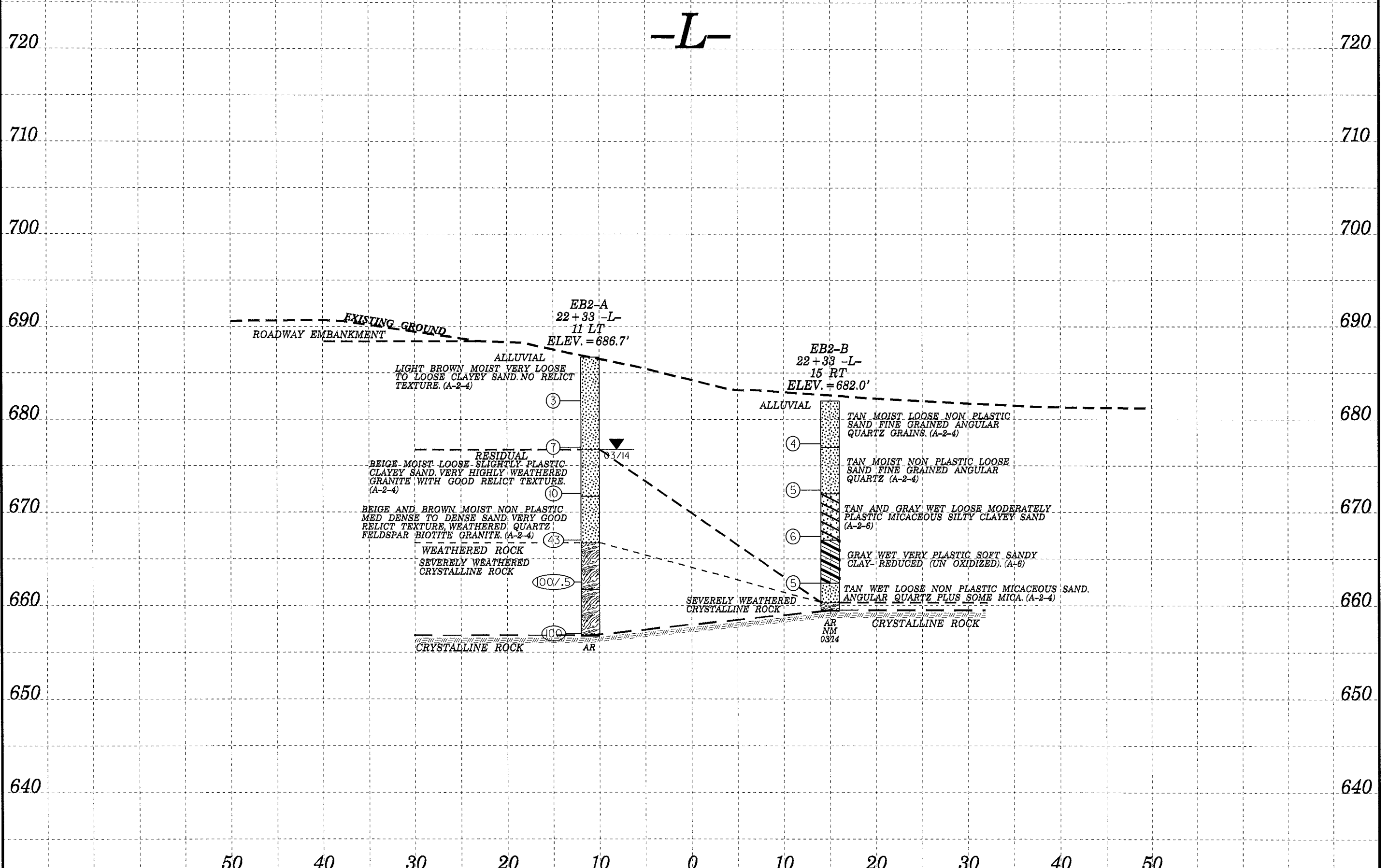
REC. = 100%
RQD. = 100% WHITE HARD FRESH WITH VERY WIDELY SPACED FRACTURES
R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86
VERY GOOD ROCK, CLASS I, ROCK TYPE E

REC. = 100%
RQD. = 100% WHITE HARD FRESH WITH VERY WIDELY SPACED FRACTURES
R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86
VERY GOOD ROCK, CLASS I, ROCK TYPE E

BT



PROJECT REFERENCE NO.	SHEET
38514.1.1 (B-4741)	9
SECTION THROUGH EB2 STA. 22+33.31 -L- (W.P. #5) SKEW=90°00'00"	



WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)									
BORING NO. EB1-A		STATION 19+51		OFFSET 15 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 679.0 ft		TOTAL DEPTH 13.7 ft		NORTHING 813,124		EASTING 1,603,691										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Estep, J. E.		START DATE 03/21/14		COMP. DATE 03/21/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
680															679.0	0.0
															673.0	6.0
675	674.4	4.6	1	1	1											
670	669.4	9.6	4	4	4											
															666.2	12.8
															665.4	13.6
															665.3	13.7

GROUND SURFACE
ALLUVIAL
 0' - 6' ALLUVIAL, TAN, WET, VERY SOFT, HIGHLY PLASTIC, SILTY CLAY WITH FINE SAND (A-6)
ALLUVIAL
 6' - 12.8' ALLUVIAL, TAN, WET NON PLASTIC, LOOSE, SLIGHTLY SILTY CLAYEY MEDIUM GRAINED SAND (A-2-4)
WEATHERED ROCK
 12.8' - 13.6' SEVERELY WEATHERED CRYSTALLINE ROCK
CRYSTALLINE ROCK
 13.6' CRYSTALLINE ROCK, (SPT REFUSAL)
 Boring Terminated by Auger Refusal at Elevation 665.3 ft on crystalline rock

NCDOT BORE SINGLE B4741_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)									
BORING NO. EB1-B		STATION 19+51		OFFSET 15 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 678.6 ft		TOTAL DEPTH 14.2 ft		NORTHING 813,111		EASTING 1,603,664										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
DRILLER Estep, J. E.		START DATE 03/21/14		COMP. DATE 03/21/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
680															678.6	0.0
675	674.4	4.2	3	2	2											
670	669.4	9.2	3	4	5											
															666.7	11.9
															664.5	14.1
665															664.4	14.2

GROUND SURFACE
ALLUVIAL
 0' - 11.9' GRAY, TAN, YELLOW LOOSE MOIST SILTY SAND (A-2-4)
WEATHERED ROCK
 11.9' - 14.1' PROBABLY WEATHERED ROCK
CRYSTALLINE ROCK
 14.1' - 14.2' SPT REFUSAL, CRYSTALLINE ROCK
 Boring Terminated by Auger Refusal at Elevation 664.4 ft on crystalline rock

NCDOT BORE SINGLE B4741_GEO_BH_BRDG0038.GPJ NC_DOT.GDT 5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)									
BORING NO. B1-A		STATION 20+12		OFFSET 15 ft LT		ALIGNMENT -L-										
COLLAR ELEV. 676.6 ft		TOTAL DEPTH 34.0 ft		NORTHING 813,070		EASTING 1,603,718										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Estep, J. E.		START DATE 03/27/14		COMP. DATE 03/27/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	ELEV. (ft)	DEPTH (ft)
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
680															676.6	0.0
															GROUND SURFACE	
675	674.6	2.0	3	3	3									671.6	5.0	
															ALLUVIAL 0' - 5' ALLUVIAL, GRAY AND WHITE, LOOSE, WET, NON PLASTIC, POORLY SORTED SAND. GRANITE AFFINITY QUARTZ FELDSPAR MICA (A-2-4)	
670	669.6	7.0	1	0	0									664.6	12.0	
															ALLUVIAL 5' - 12' ALLUVIAL, GRAY, VERY LOOSE, WET, SILTY CLAYEY FINE SAND. MODERATELY PLASTIC (A-2-6)	
665	664.6	12.0	2	1	3									660.9	15.7	
															RESIDUAL 12' - 15.7' RESIDUAL, DARK GRAY, LOOSE, MOIST, MODERATELY PLASTIC, VERY MICACEOUS CLAYEY SAND 20% MICA, RELICT SCHISTOSE TEXTURE. (A-2-6)	
660														657.0	19.6	
															CRYSTALLINE ROCK 15.7' - 19.6' CORED ROCK	
655														652.0	24.6	
															CRYSTALLINE ROCK 19.6' - 24.6' CORED ROCK	
650														647.0	29.6	
															CRYSTALLINE ROCK 24.6' - 29.6' CORED ROCK	
645														642.6	34.0	
															CRYSTALLINE ROCK 29.6' - 34.6' CORED ROCK	
Boring Terminated at Elevation 642.6 ft in crystalline rock																

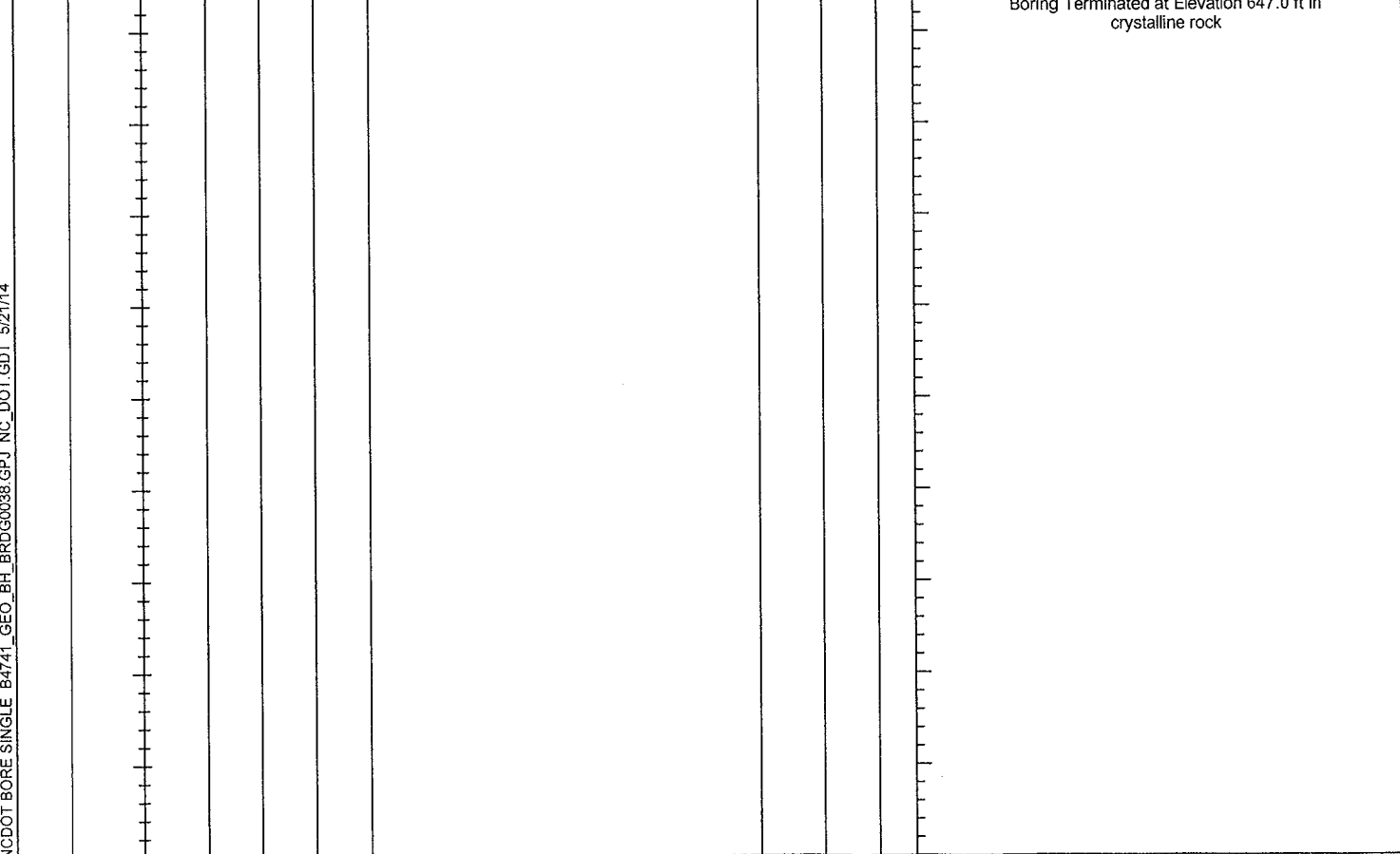
NCDOT BORE SINGLE B4741_GEO_BH_BRD0038.GPJ_NC_DOT.GDT_5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)					
BORING NO. B1-A		STATION 20+12		OFFSET 15 ft LT		ALIGNMENT -L-						
COLLAR ELEV. 676.6 ft		TOTAL DEPTH 34.0 ft		NORTHING 813,070		EASTING 1,603,718						
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Estep, J. E.		START DATE 03/27/14		COMP. DATE 03/27/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 18.3 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
660.9	660.9	15.7	3.9		(1.9)	(0.9)		(1.9)	(0.9)		Begin Coring @ 15.7 ft	15.7
655	657.0	19.6	5.0		(3.5)	(3.0)		(3.5)	(3.0)		15.7' - 19.6' ALTERNATING LAYERS OF BLACK BIOTITE GNEISS, AND WHITE, MEDIUM GRAINED GRANITE. SLIGHTLY WEATHERED, HARD, BUT BROKEN UP ALONG COMPOSITIONAL BOUNDARIES. R1: 4 R2:3 R3:10 R4:6 R5:4 RMR=27, POOR ROCK, CLASS IV, ROCK TYPE E	19.6
650	652.0	24.6	5.0		(5.0)	(5.0)		(5.0)	(5.0)		19.6' - 24.6' ALTERNATING 1' TO 2' LAYERS OF LIGHT COLORED GRANITE, AND BLACK WELL FOLIATED BIOTITE GNEISS. FROM 22.6 TRANSITION TO LIGHT COLORED GRANITE. DARK ROCK IS PROBABLY INCLUSION IN GRANITIC MASS; (XENOLITH). R1:4 R2:13 R3:20 R4:20 R5:4 RMR=61, GOOD ROCK, CLASS II, ROCK TYPE E	24.6
645	647.0	29.6	4.4		(4.2)	(4.2)		(4.2)	(4.2)		24.6' - 29.6' MOSTLY WHITE GRANITE WITH GHOSTS OF XENOLITHS EXPRESSED AS DARK, BIOTITIC ZONES. FRESH, HARD, WIDELY SPACED FRACTURES. R1:7 R2:20 R3:25 R4:20 R5:4 RMR=76, GOOD ROCK, CLASS II, ROCK TYPE E	29.6
	642.6	34.0									29.6' - 34.0' WHITE MEDIUM GRAINED FRESH VERY HARD GRANITE WITH VERY WIDE FRACTURE SPACING. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E Boring Terminated at Elevation 642.6 ft in crystalline rock	34.0

NCDOT CORE SINGLE B4741_GEO_BH_BRD0038.GPJ_NC_DOT.GDT_5/21/14

WBS 38514.1.1	TIP B-4741	COUNTY DAVIDSON	GEOLOGIST Murray, C. C.
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493			GROUND WTR (ft)
BORING NO. B1-B	STATION 20+12	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 676.8 ft	TOTAL DEPTH 29.8 ft	NORTHING 813,055	EASTING 1,603,690
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 03/26/14	COMP. DATE 03/27/14	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					
680															
														676.8	0.0
675	675.3	1.5	0	2	2										
670	670.2	6.6	1	2	5										
665	665.0	11.8													
			100/2												
660															
655															
650															



NCDOT BORE SINGLE B4741_GEO_BH_BRD00038.GPJ NC_DOT_GDT_5/21/14

WBS 38514.1.1	TIP B-4741	COUNTY DAVIDSON	GEOLOGIST Murray, C. C.
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493			GROUND WTR (ft)
BORING NO. B1-B	STATION 20+12	OFFSET 17 ft RT	ALIGNMENT -L-
COLLAR ELEV. 676.8 ft	TOTAL DEPTH 29.8 ft	NORTHING 813,055	EASTING 1,603,690
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core	HAMMER TYPE Automatic
DRILLER Estep, J. E.	START DATE 03/26/14	COMP. DATE 03/27/14	SURFACE WATER DEPTH N/A

ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		L O G	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
662.21												
	662.2	14.6	5.2		(5.0)	(4.8)		(5.0)	(4.8)		Begin Coring @ 14.6 ft	
660					96%	92%		96%	92%		CRYSTALLINE ROCK	14.6
	657.0	19.8									14.6' - 19.8' OFF WHITE COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4	
			5.0		(5.0)	(5.0)		(5.0)	(5.0)		RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	19.8
655					100%	100%		100%	100%		CRYSTALLINE ROCK	
	652.0	24.8									19.8' - 24.8' OFF WHITE COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4	
			5.0		(5.0)	(5.0)		(5.0)	(5.0)		RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	24.8
650					100%	100%		100%	100%		CRYSTALLINE ROCK	
	647.0	29.8									24.8' - 29.8' OFF WHITE COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4	
											RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	29.8
											Boring Terminated at Elevation 647.0 ft in crystalline rock	

NCDOT CORE SINGLE B4741_GEO_BH_BRD00038.GPJ NC_DOT_GDT_5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.									
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)								
BORING NO. B2-A		STATION 20+70		OFFSET 15 ft LT		ALIGNMENT -L-									
COLLAR ELEV. 674.7 ft		TOTAL DEPTH 33.9 ft		NORTHING 813,018		EASTING 1,603,744									
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic											
DRILLER Estep, J. E.		START DATE 04/09/14		COMP. DATE 04/09/14		SURFACE WATER DEPTH N/A									
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT				SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION		
			0.5ft	0.5ft	0.5ft	0	25	50	75				100	ELEV. (ft)	DEPTH (ft)
675													674.7	0.0	GROUND SURFACE
	673.7	1.0	2	1	2						M		671.7	3.0	ALLUVIAL 0' - 3' ALLUVIAL, TAN, MOIST, NON PLASTIC VERY LOOSE, STRUCTURELESS SAND; PROBABLY TILLED. (A-2-4)
670											M		666.7	8.0	ALLUVIAL 3' - 8.0' ALLUVIAL, TAN TO ORANGE, WET, NON PLASTIC, LOOSE, SLIGHTLY CLAYEY SAND. POORLY SORTED, ANGULAR GRAINS. (A-2-4)
	668.3	6.4	2	2	2						W		659.8	14.9	ALLUVIAL 8.0' - 14.9' ALLUVIAL, MEDIUM GRAY, WET, NON PLASTIC VERY LOOSE, FINE GRAINED, WELL SORTED QUARTZ SAND. UN OXIDISED. (A-2-4)
665													659.0	15.7	WEATHERED ROCK 14.9' - 15.7' RESIDUAL, LOGGED AS HARD AT TOP, REFUSAL AT BASE.
	663.3	11.4	2	2	1								655.8	18.9	CRYSTALLINE ROCK 15.7' - 18.9' CORED ROCK
660													650.8	23.9	CRYSTALLINE ROCK 18.9' - 23.9' CORED ROCK
													645.8	28.9	CRYSTALLINE ROCK 23.9' - 28.9' CORED ROCK
655													640.8	33.9	CRYSTALLINE ROCK 28.9' - 33.9' CORED ROCK
650															Boring Terminated at Elevation 640.8 ft in crystalline rock
645															

NCDOT BORE SINGLE B4741_GEO_BH_BRD0038.GPJ NC_DOT_GDT 5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.								
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)							
BORING NO. B2-A		STATION 20+70		OFFSET 15 ft LT		ALIGNMENT -L-								
COLLAR ELEV. 674.7 ft		TOTAL DEPTH 33.9 ft		NORTHING 813,018		EASTING 1,603,744								
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic										
DRILLER Estep, J. E.		START DATE 04/09/14		COMP. DATE 04/09/14		SURFACE WATER DEPTH N/A								
CORE SIZE NO/NQ		TOTAL RUN 18.2 ft												
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS			
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %		ELEV. (ft)	DEPTH (ft)		
659.02												Begin Coring @ 15.7 ft		
	659.0	15.7	3.2		(3.2) 100%	(3.0) 94%		(3.2) 100%	(3.0) 94%		659.0	15.7	CRYSTALLINE ROCK 15.7' - 18.9' OFF WHITE, COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7, R2:20, R3:25, R4:25, R5:4 RMR=81	
655											655.8	18.9	CRYSTALLINE ROCK 18.9' - 23.9' OFF WHITE, COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7, R2:20, R3:25, R4:25, R5:4 RMR=81	
	655.8	18.9	5.0		(5.0) 100%	(5.0) 100%		(5.0) 100%	(5.0) 100%		650.8	23.9	CRYSTALLINE ROCK 23.9' - 28.9' OFF WHITE, COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7, R2:20, R3:25, R4:25, R5:4 RMR=81	
650											645.8	28.9	CRYSTALLINE ROCK 28.9' - 28.9' OFF WHITE, COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7, R2:20, R3:30, R4:25, R5:4 RMR=86	
	650.8	23.9	5.0		(5.0) 100%	(5.0) 100%		(5.0) 100%	(5.0) 100%		640.8	33.9	CRYSTALLINE ROCK 33.9' - 33.9' OFF WHITE, COARSE GRAINED GRANITE. FRESH, HARD WITH VERY WIDELY SPACED FRACTURES. R1:7, R2:20, R3:30, R4:25, R5:4 RMR=86	
645														VERY GOOD ROCK, CLASS I, ROCK TYPE E Boring Terminated at Elevation 640.8 ft in crystalline rock
	645.8	28.9	5.0		(5.0) 100%	(5.0) 100%		(5.0) 100%	(5.0) 100%					

NCDOT CORE SINGLE B4741_GEO_BH_BRD0038.GPJ NC_DOT_GDT 5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)									
BORING NO. B2-B		STATION 20+70		OFFSET 15 ft RT		ALIGNMENT -L-										
COLLAR ELEV. 676.5 ft		TOTAL DEPTH 35.0 ft		NORTHING 813,004		EASTING 1,603,717										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Estep, J. E.		START DATE 04/10/14		COMP. DATE 04/10/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
680																
															676.5	GROUND SURFACE 0.0
675	674.3	2.2	1	2	2								M		673.5	0' - 3' ALLUVIAL, WHITE LOOSE, MOIST, NON PLASTIC, STRUCTURELESS SAND. PROBABLY TILLED. (A-2-4)
670	669.3	7.2	3	2	2								M		666.5	3' - 10' ALLUVIAL, TAN, LOOSE, MOIST TO WET, NON PLASTIC, POORLY SORTED SAND. (A-2-4)
665	664.3	12.2	2	1	1								W		661.4	10' - 15.1' ALLUVIAL, GRAY, WET, SLIGHTLY PLASTIC, VERY LOOSE, SILTY CLAYEY SAND. FINE GRAINED, WELL SORTED, UN OXIDISED. (A-2-6)
660															659.3	WEATHERED ROCK
															658.5	15.1' - 17.2' SEVERELY WEATHERED CRYSTALLINE ROCK. SPT REFUSAL AT BASE.
655															656.5	17.2' - 18.0' ROCK, SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE.
650															651.5	CRYSTALLINE ROCK 18' - 20' CORED ROCK
															646.5	CRYSTALLINE ROCK 20' - 25' CORED ROCK
															646.5	CRYSTALLINE ROCK 25' - 30' CORED ROCK
645															641.5	CRYSTALLINE ROCK 30' - 35' CORED ROCK
															641.5	Boring Terminated at Elevation 641.5 ft in crystalline rock

NCDOT BORE SINGLE B4741_GEO_BH_BRD0038.GPJ_NC_DOT.GDT 5/21/14

WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)					
BORING NO. B2-B		STATION 20+70		OFFSET 15 ft RT		ALIGNMENT -L-						
COLLAR ELEV. 676.5 ft		TOTAL DEPTH 35.0 ft		NORTHING 813,004		EASTING 1,603,717						
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Estep, J. E.		START DATE 04/10/14		COMP. DATE 04/10/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	TOTAL RUN 17.0 ft		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (ft) %	RQD (ft) %		REC. (ft) %	RQD (ft) %			
658.5												
	658.5	18.0	2.0		(2.0)	(0.0)		(2.0)	(0.0)		658.5	Begin Coring @ 18.0 ft
	656.5	20.0			100%	0%		100%	0%		656.5	CRYSTALLINE ROCK 18' - 20' GRAY GRANITE, SLIGHTLY WEATHERED, CLOSELY FRACTURED. ALTERATION OR WEATHERING ALONG HIGH ANGLE FRACTURE. R1:4 R2:3 R3:10 R4:6 R5:4 RMR=27, POOR ROCK, CLASS IV, ROCK TYPE E
655			5.0		(4.9)	(3.0)		(4.9)	(3.0)		651.5	CRYSTALLINE ROCK 20' - 25' FIRST FOOT SLIGHTLY WEATHERED, CLOSELY FRACTURED, REMAINDER IS VERY SLIGHTLY WEATHERED, VERY HARD, WIDELY SPACED FRACTURES. R1:7 R2:13 R3:20 R4:20 R5:4 RMR=64, GOOD ROCK, CLASS II, ROCK TYPE E
	651.5	25.0			98%	60%		98%	60%		651.5	CRYSTALLINE ROCK 25' - 30' LIGHT GRAY MEDIUM GRAINED GRANITE, FRESH, VERY HARD, VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
650			5.0		(5.0)	(5.0)		(5.0)	(5.0)		646.5	CRYSTALLINE ROCK 30' - 35' LIGHT GRAY MEDIUM GRAINED GRANITE, FRESH, VERY HARD, VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
	646.5	30.0			100%	100%		100%	100%		646.5	CRYSTALLINE ROCK 30' - 35' LIGHT GRAY MEDIUM GRAINED GRANITE, FRESH, VERY HARD, VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
645			5.0		(5.0)	(5.0)		(5.0)	(5.0)		641.5	CRYSTALLINE ROCK 30' - 35' LIGHT GRAY MEDIUM GRAINED GRANITE, FRESH, VERY HARD, VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E
	641.5	35.0			100%	100%		100%	100%		641.5	Boring Terminated at Elevation 641.5 ft in crystalline rock

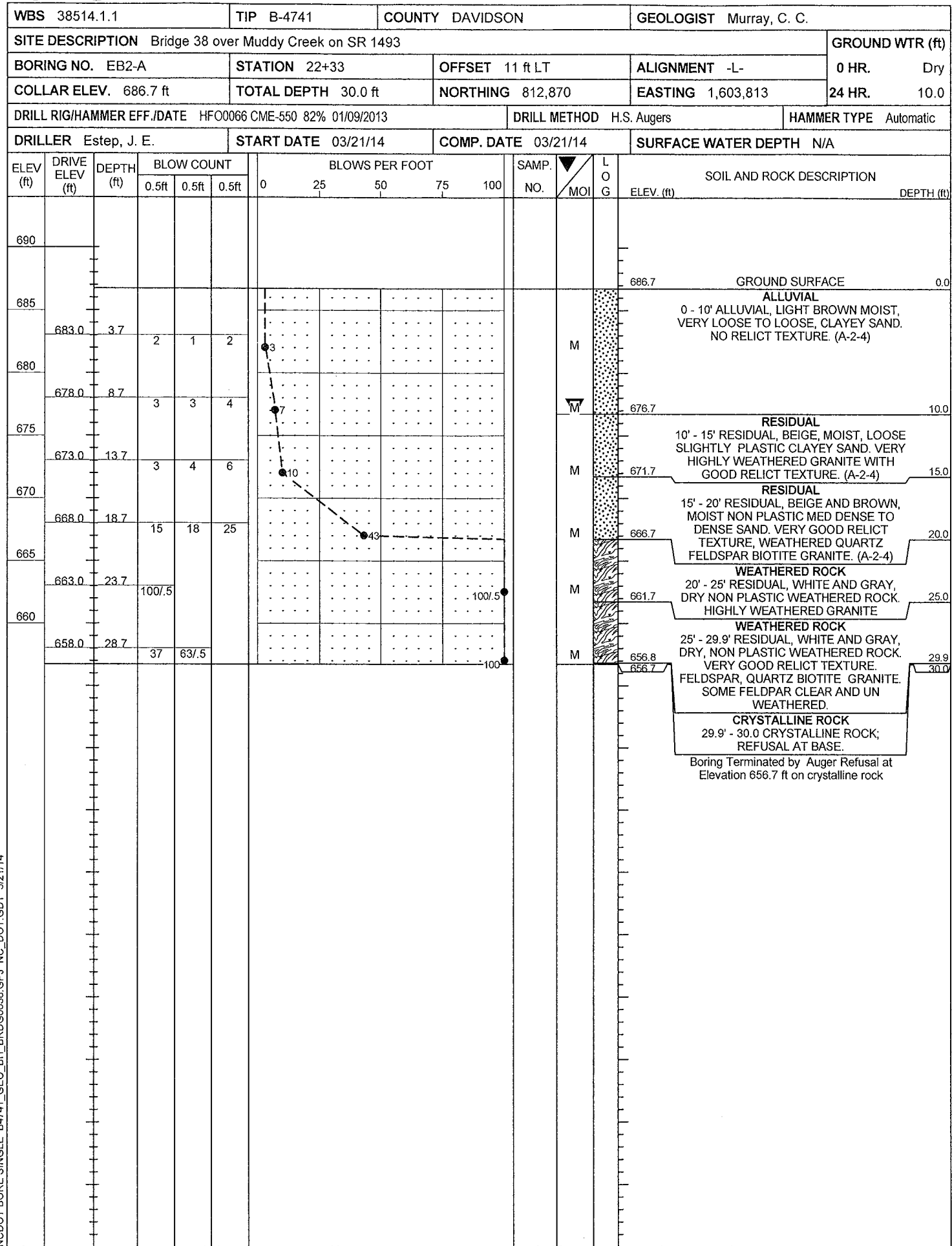
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WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.										
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)									
BORING NO. B3-C		STATION 21+80		OFFSET CL		ALIGNMENT -L-										
COLLAR ELEV. 682.7 ft		TOTAL DEPTH 39.6 ft		NORTHING 812,913		EASTING 1,603,780										
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic												
DRILLER Estep, J. E.		START DATE 03/25/14		COMP. DATE 03/26/14		SURFACE WATER DEPTH N/A										
ELEV (ft)	DRIVE ELEV (ft)	DEPTH (ft)	BLOW COUNT			BLOWS PER FOOT					SAMP. NO.	MOI	LOG	SOIL AND ROCK DESCRIPTION	DEPTH (ft)	
			0.5ft	0.5ft	0.5ft	0	25	50	75	100						
685																
	681.2	1.5	1	1	1									M	682.7 GROUND SURFACE 0.0	
680															0' - 5' ARTIFICIAL FILL, TAN, WET, VERY LOOSE, NON PLASTIC SAND. COARSE, POORLY SORTED QUARTZ FELDSPAR MICA. (A-2-4) 5.0	
675	676.0	6.7	1	2	2									M	5' - 11' ARTIFICIAL FILL, TAN, MOIST, LOOSE, MODERATELY PLASTIC, SILTY SAND, WELL SORTED, FINE GRAINED. (A-2-6) 11.0	
670	671.0	11.7	3	3	4									W	11' - 17' ALLUVIAL, TAN MOIST, SLIGHTLY PLASTIC, LOOSE, POORLY SORTED SAND, ANGULAR, SLIGHTLY LARGER GRAINS THAN ABOVE. (A-2-6) 17.0	
665	666.0	16.7	3	24	38									M	17' - 20.3' RESIDUAL, WHITE AND GRAY, WET NON PLASTIC, VERY DENSE, MICACEOUS SAND, VERY GOOD RELICT GRANITIC TEXTURE (A-2-4) 20.3	
660	661.0	21.7	60/1											M	20.3' - 21.6' SEVERELY WEATHERED CRYSTALLINE ROCK, SPT REFUSAL AT BASE. 21.6	
655															21.6' - 23.5' CRYSTALLINE ROCK. SPT REFUSAL AT TOP, ROLLER CONE REFUSAL AT BASE. 23.5	
650															23.5' - 24.6' CORED ROCK 24.6	
645															24.6' - 29.6' CORED ROCK 29.6	
															29.6' - 34.6' CORED ROCK 34.6	
															34.6' - 39.6' CORED ROCK 39.6	
															Boring Terminated at Elevation 643.1 ft in crystalline rock	

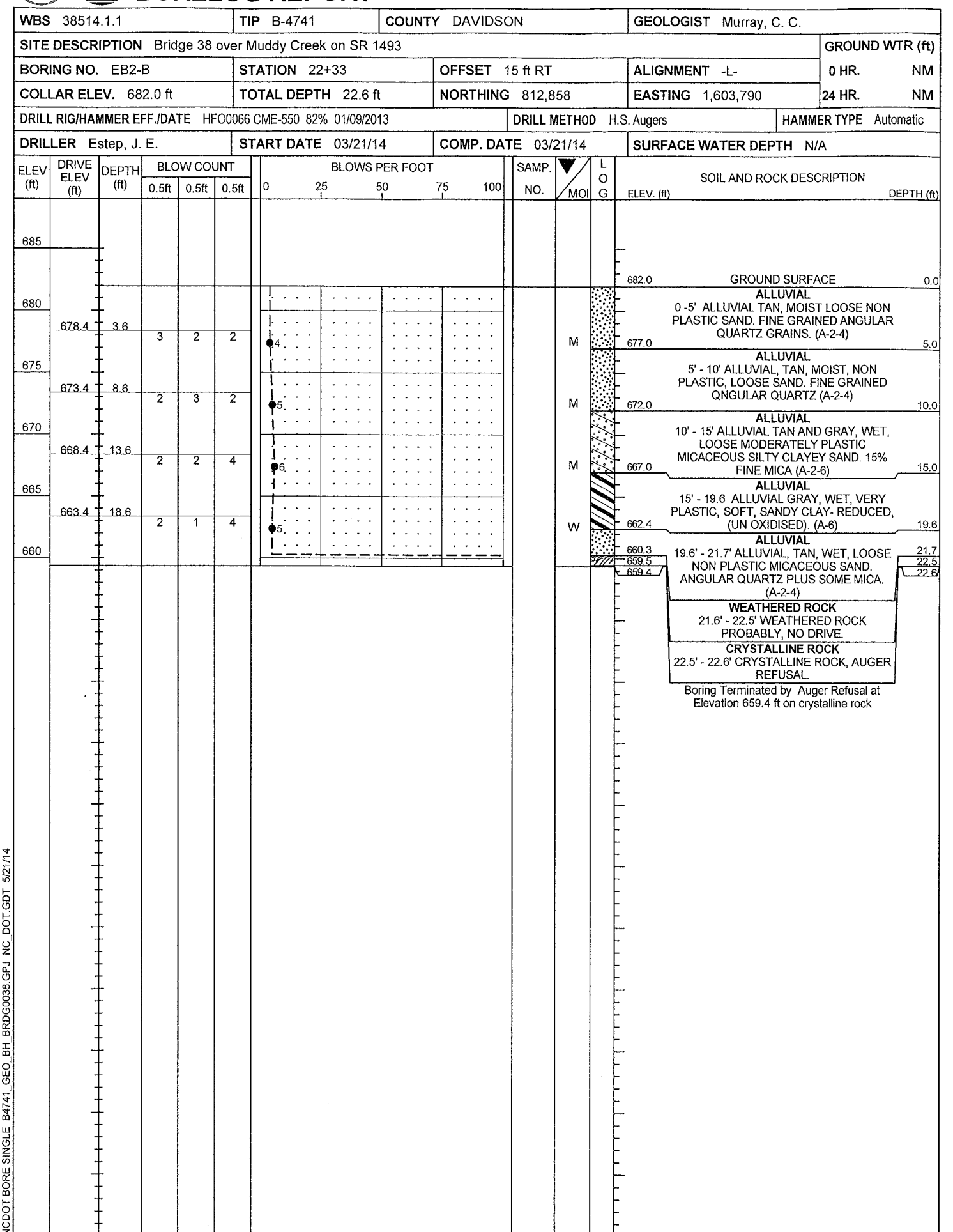
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WBS 38514.1.1		TIP B-4741		COUNTY DAVIDSON		GEOLOGIST Murray, C. C.						
SITE DESCRIPTION Bridge 38 over Muddy Creek on SR 1493							GROUND WTR (ft)					
BORING NO. B3-C		STATION 21+80		OFFSET CL		ALIGNMENT -L-						
COLLAR ELEV. 682.7 ft		TOTAL DEPTH 39.6 ft		NORTHING 812,913		EASTING 1,603,780						
DRILL RIG/HAMMER EFF./DATE HFO0066 CME-550 82% 01/09/2013		DRILL METHOD NW Casing W/SPT & Core		HAMMER TYPE Automatic								
DRILLER Estep, J. E.		START DATE 03/25/14		COMP. DATE 03/26/14		SURFACE WATER DEPTH N/A						
ELEV (ft)	RUN ELEV (ft)	DEPTH (ft)	RUN (ft)	DRILL RATE (Min/ft)	RUN		SAMP. NO.	STRATA		LOG	DESCRIPTION AND REMARKS	DEPTH (ft)
					REC. (%)	RQD (%)		REC. (%)	RQD (%)			
659.17	659.2	23.5	1.1		(1.1)	(1.1)		(1.1)	(1.1)		Begin Coring @ 23.5 ft	
	658.1	24.6	5.0		100%	100%		100%	100%		CRYSTALLINE ROCK	23.5
655					(5.0)	(5.0)		(5.0)	(5.0)		23.5' - 24.6' WHITE, HARD, FRESH, WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	24.6
	653.1	29.6	5.0		(5.0)	(5.0)		(5.0)	(5.0)		CRYSTALLINE ROCK	29.6
650					100%	100%		100%	100%		24.6' - 29.6' WHITE, HARD FRESH, WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	
	648.1	34.6	5.0		(5.0)	(5.0)		(5.0)	(5.0)		CRYSTALLINE ROCK	34.6
645					100%	100%		100%	100%		29.6' - 34.6' WHITE, HARD FRESH, WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	
	643.1	39.6									CRYSTALLINE ROCK	39.6
											34.6' - 39.6' WHITE, HARD FRESH, WITH VERY WIDELY SPACED FRACTURES. R1:7 R2:20 R3:30 R4:25 R5:4 RMR=86, VERY GOOD ROCK, CLASS I, ROCK TYPE E	
											Boring Terminated at Elevation 643.1 ft in crystalline rock	

NCDOT CORE SINGLE B4741_GEO_BH_BRD0038.GPJ NC_DOT.GDT 5/21/14

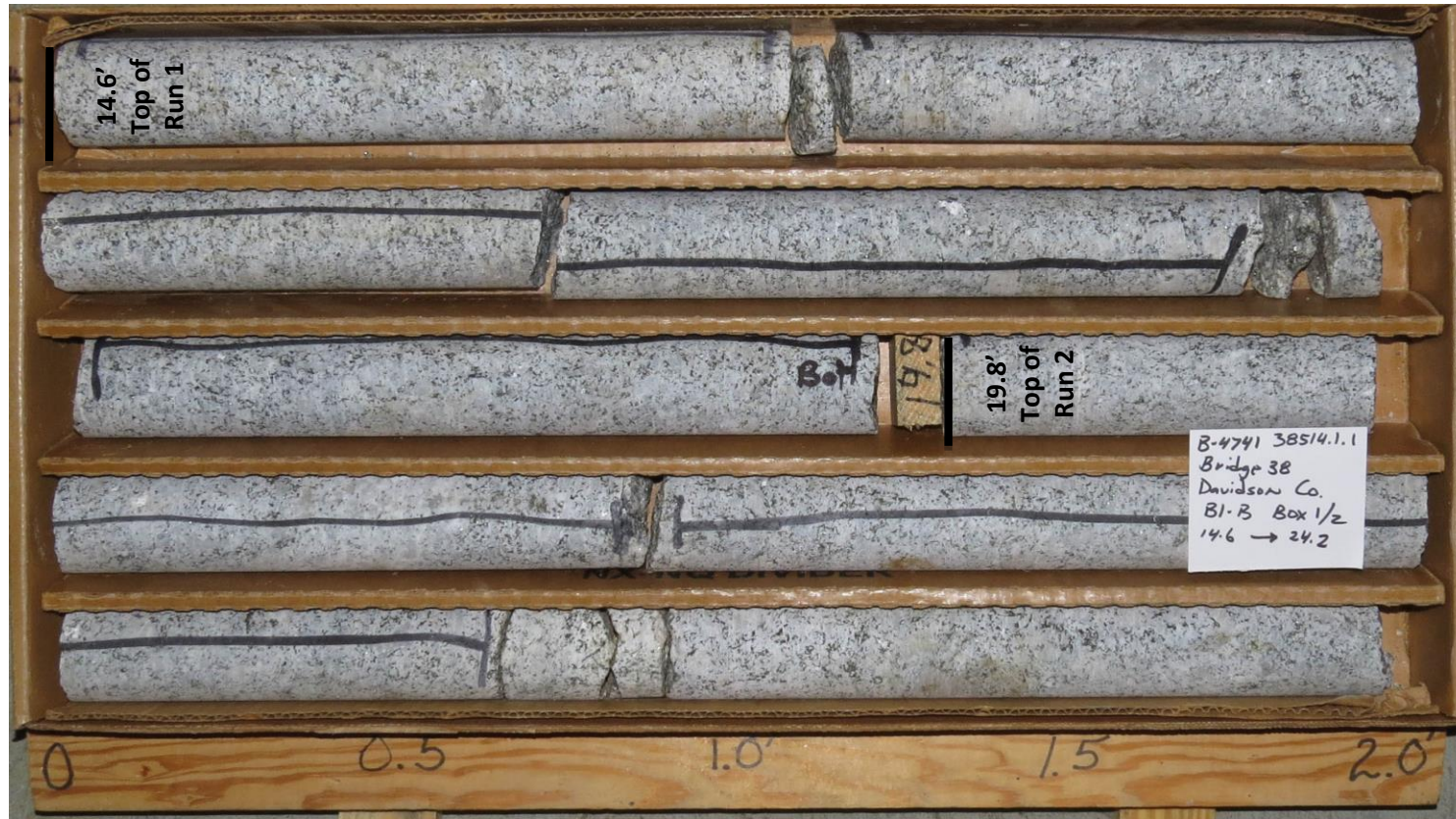


NCDOT BORE SINGLE B4741_GEO_BH_BRD0038.GPJ NC_DOT.GDT 5/21/14



NCDOT BORE SINGLE B4741_GEO_BH_BRD0038.GPJ NC_DOT.GDT 5/21/14

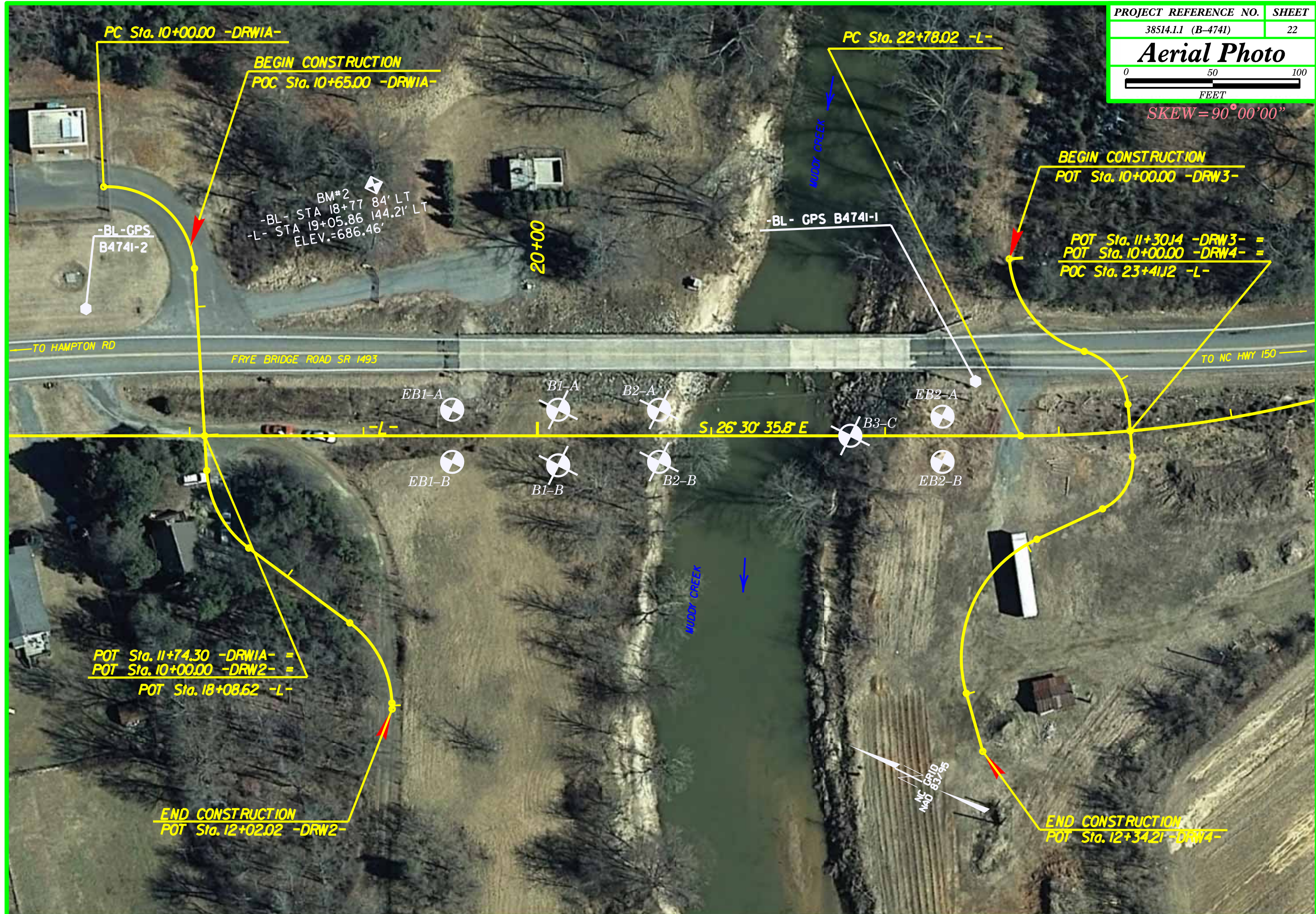












PC Sta. 10+00.00 -DRW1-

BEGIN CONSTRUCTION
POC Sta. 10+65.00 -DRW1-

BM#2
-BL- STA 18+77 84' LT
-L- STA 19+05.86 144.21' LT
ELEV.=686.46'

-BL-GPS
B4741-2

PC Sta. 22+78.02 -L-

BEGIN CONSTRUCTION
POT Sta. 10+00.00 -DRW3-

POT Sta. 11+30.14 -DRW3- =
POT Sta. 10+00.00 -DRW4- =
POC Sta. 23+41.12 -L-

TO HAMPTON RD

FRYE BRIDGE ROAD SR 1493

TO NC HWY 150

20+00

EB1-A

B1-A

B2-A

EB2-A

S 26° 30' 35.8" E

B3-C

EB1-B

B1-B

B2-B

EB2-B

POT Sta. 11+74.30 -DRW1- =
POT Sta. 10+00.00 -DRW2- =
POT Sta. 18+08.62 -L-

END CONSTRUCTION
POT Sta. 12+02.02 -DRW2-

END CONSTRUCTION
POT Sta. 12+34.21 -DRW4-

NC GRID
NAD 83/95