

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

STRUCTURE
SUBSURFACE INVESTIGATION

PROJ. REFERENCE NO. 33562.1.1 F.A. PROJ. BRSTP-1002(12)
COUNTY ORANGE
PROJECT DESCRIPTION BRIDGE NO. 66 ON -L- (SR 1002, ST. MARY'S RD.) OVER STROUD'S CREEK AT STATION 18+55

CONTENTS

<u>SHEET</u>	<u>DESCRIPTION</u>
1	TITLE SHEET
2	LEGEND
3	SITE PLAN
4	PROFILE
5-6	CROSS SECTIONS
7-10	BORE LOGS & CORE REPORTS
11	SOIL TEST RESULTS
12	SCOUR REPORT
13	CORE PHOTOGRAPHS
14	SITE PHOTOGRAPH

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.

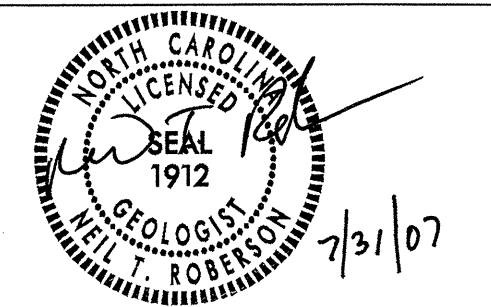
THE BIDDER OR CONTRACTOR IS CAUTIONED THAT DETAILS SHOWN ON THE SUBSURFACE PLANS ARE PRELIMINARY ONLY AND IN MANY CASES THE FINAL DESIGN DETAILS ARE DIFFERENT. FOR BIDDING AND CONSTRUCTION PURPOSES, REFER TO THE CONSTRUCTION PLANS AND DOCUMENTS FOR FINAL DESIGN INFORMATION ON THIS PROJECT. THE DEPARTMENT 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: 33562.1.1 ID: B-4216

PERSONNEL

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INVESTIGATED BY C.D. CZAJKA
CHECKED BY N.T. ROBERSON
SUBMITTED BY N.T. ROBERSON
DATE JULY 2007



DRAWN BY: C.D. CZAJKA

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
DIVISION OF HIGHWAYS
GEOTECHNICAL ENGINEERING UNIT

PROJECT REFERENCE NO. 33562.11(B-4216)	SHEET NO. 2
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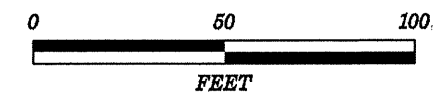
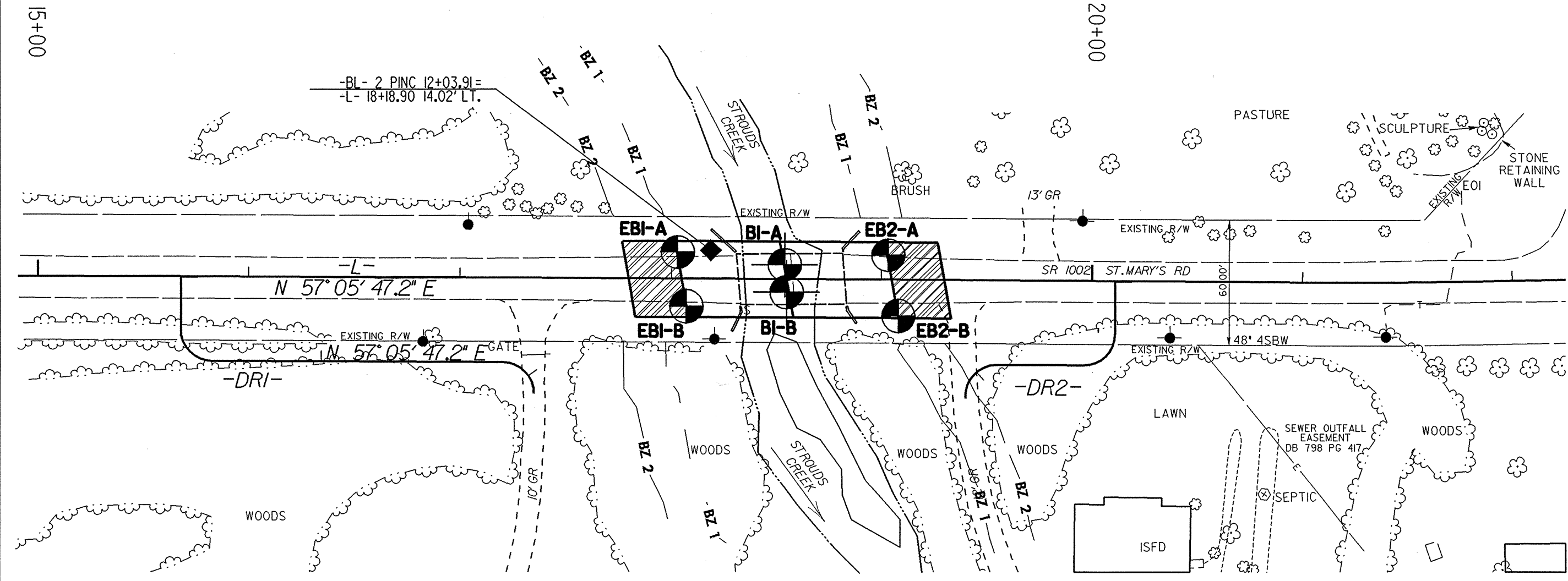
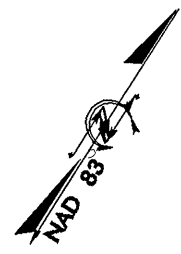
SUBSURFACE INVESTIGATION

SOIL AND ROCK LEGEND, TERMS, SYMBOLS, AND ABBREVIATIONS

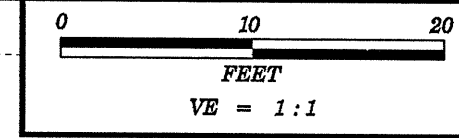
SOIL DESCRIPTION	GRADATION	ROCK DESCRIPTION	TERMS AND DEFINITIONS
SOIL IS CONSIDERED TO BE THE UNCONSOLIDATED, SEMI-CONSOLIDATED, OR WEATHERED EARTH MATERIALS THAT CAN BE PENETRATED WITH A CONTINUOUS FLIGHT POWER AUGER, AND YIELD LESS THAN 100 BLOWS PER FOOT ACCORDING TO STANDARD PENETRATION TEST (AASHTO T206, 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, HEAVY PLASTIC, A-7-6</i>	WELL-GRADED - INDICATES A GOOD REPRESENTATION OF PARTICLE SIZES FROM FINE TO COARSE. LINEIFORM - 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. ANGULARITY OF GRAINS THE ANGULARITY OR ROUNDNESS OF SOIL GRAINS IS DESIGNATED BY THE TERMS: ANGULAR, SUBANGULAR, SUBROUNDED, OR ROUNDED. MINERALOGICAL COMPOSITION MINERAL NAMES SUCH AS QUARTZ, FELDSPAR, MICA, TALC, KAOLIN, ETC. ARE USED IN DESCRIPTIONS WHENEVER THEY ARE CONSIDERED OF SIGNIFICANCE. COMPRESSIBILITY SLIGHTLY COMPRESSIBLE LIQUID LIMIT LESS THAN 31 MODERATELY COMPRESSIBLE LIQUID LIMIT EQUAL TO 31-50 HIGHLY COMPRESSIBLE LIQUID LIMIT GREATER THAN 50 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 ▽ 24 STATIC WATER LEVEL AFTER 24 HOURS ▽ PM PERCHED WATER, SATURATED ZONE, OR WATER BEARING STRATA ○ SPRING OR SEEP	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: 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. 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. WEATHERING FRESH ROCK FRESH, CRYSTALS BRIGHT, FEW JOINTS MAY SHOW SLIGHT STAINING, ROCK RINGS UNDER HAMMER IF CRYSTALLINE. VERY SLIGHT (V SLI) 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 (SLI) 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. <i>IF TESTED, WOULD YIELD SPT REFUSAL.</i> 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> 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> 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. ROCK HARDNESS 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.	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 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 (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 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 (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 (SRQD) - A MEASURE OF ROCK QUALITY DESCRIBED BY TOTAL LENGTH OF ROCK SEGMENTS WITHIN A STRATUM EQUAL TO OR GREATER THAN 4 INCHES DIVIDED BY THE TOTAL LENGTH OF STRATA AND EXPRESSED AS A PERCENTAGE. TOPSOIL (TS.) - SURFACE SOILS USUALLY CONTAINING ORGANIC MATTER.
SOIL LEGEND AND AASHTO CLASSIFICATION GENERAL CLASS. GRANULAR MATERIALS (<= 35% PASSING #200) SILT-CLAY MATERIALS (> 35% PASSING #200) ORGANIC MATERIALS GROUP CLASS. A-1, A-3, A-2, A-4, A-5, A-6, A-7, A-1, A-2, A-3, A-4, A-5, A-6, A-7 SYMBOL [Diagrams showing soil symbols for various groups] % PASSING: 10, 40, 200 (Diagrams showing sieve analysis curves) LIQUID LIMIT PLASTIC INDEX (Diagrams showing LL and PI curves) GROUP INDEX (Diagrams showing group index curves) 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 PI OF A-7-5 SUBGROUP IS ≤ LL - 30; PI OF A-7-6 SUBGROUP IS > LL - 30	MISCELLANEOUS SYMBOLS ROADWAY EMBANKMENT (RE) WITH SOIL DESCRIPTION SOIL SYMBOL ARTIFICIAL FILL (AF) OTHER THAN ROADWAY EMBANKMENT INFERRED SOIL BOUNDARY INFERRED ROCK LINE ALLUVIAL SOIL BOUNDARY DIP & DIP DIRECTION OF ROCK STRUCTURES SOUNDING ROD SPT TEST BORING AUGER BORING CORE BORING MONITORING WELL PIEZOMETER INSTALLATION SLOPE INDICATOR INSTALLATION SPT N-VALUE SPT REFUSAL	WEATHERING FRESH VERY SLIGHT (V SLI) SLIGHT (SLI) MODERATE (MOD) MODERATELY SEVERE (MOD. SEV) SEVERE (SEV) VERY SEVERE (V SEV) COMPLETE	TEXTURE OR GRAIN SIZE U.S. STD. SIEVE SIZE OPENING (MM): 4, 10, 40, 60, 200, 270 BOULDER (BLDR.), COBBLE (COB.), GRAVEL (GR.), COARSE SAND (CSE. SD.), FINE SAND (F. SD.), SILT (SL.), CLAY (CL.) GRAIN SIZE: 3065, 75, 2.0, 0.25, 0.05, 0.005
CONSISTENCY OR DENSENESS PRIMARY SOIL TYPE: GENERALLY GRANULAR MATERIAL (NON-COHESIVE), GENERALLY SILT-CLAY MATERIAL (COHESIVE) COMPACTNESS OR CONSISTENCY: VERY LOOSE, LOOSE, MEDIUM DENSE, DENSE, VERY DENSE RANGE OF STANDARD PENETRATION RESISTANCE (N-VALUE): <4, 4 TO 10, 10 TO 30, 30 TO 50, >50 RANGE OF UNCONFINED COMPRESSIVE STRENGTH (TONS/FT ²): N/A, <0.25, 0.25 TO 0.50, 0.5 TO 1.0, 1 TO 2, >2	ABBREVIATIONS AR - AUGER REFUSAL BT - BORING TERMINATED CL - CLAY CPT - CONE PENETRATION TEST CSE - COARSE DMT - DILATOMETER TEST DPT - DYNAMIC PENETRATION TEST e - VOID RATIO F - FINE FOSS - FOSSILIFEROUS FRAC. - FRACTURED, FRACTURES FRAGS. - FRAGMENTS HI - HIGHLY MED. - MEDIUM MICA - MICACEOUS MOD. - MODERATELY NP - NON PLASTIC ORG. - ORGANIC PMT - PRESSUREMETER TEST SAP. - SAPROLITIC SD. - SAND, SANDY SL. - SILT, SILTY SLI. - SLIGHTLY TCR - TRICONE REFUSAL # - MOISTURE CONTENT V - VERY VST - VANE SHEAR TEST WEA. - WEATHERED γ _u - UNIT WEIGHT γ _d - DRY UNIT WEIGHT	ROCK HARDNESS VERY HARD HARD MODERATELY HARD MEDIUM HARD SOFT VERY SOFT	SOIL MOISTURE - CORRELATION OF TERMS SOIL MOISTURE SCALE (ATTERBERG LIMITS): LL, PL, OM, SL FIELD MOISTURE DESCRIPTION: SATURATED (SAT.), WET (W), MOIST (M), DRY (D) GUIDE FOR FIELD MOISTURE DESCRIPTION: USUALLY LIQUID; VERY WET, USUALLY FROM BELOW THE GROUND WATER TABLE; SEMISOLID; REQUIRES DRYING TO ATTAIN OPTIMUM MOISTURE; SOLID; AT OR NEAR OPTIMUM MOISTURE; REQUIRES ADDITIONAL WATER TO ATTAIN OPTIMUM MOISTURE
PLASTICITY PLASTICITY INDEX (PI): 0-5, 6-15, 16-25, 26 OR MORE DRY STRENGTH: VERY LOW, SLIGHT, MEDIUM, HIGH	EQUIPMENT USED ON SUBJECT PROJECT DRILL UNITS: MOBILE B-, BK-51, CME-45C, CME-550, PORTABLE HOIST ADVANCING TOOLS: CLAY BITS, 6" CONTINUOUS FLIGHT AUGER, 6" HOLLOW AUGERS, HARD FACED FINGER BITS, TUNG-CARBIDE INSERTS, CASING W/ ADVANCER, TRICONE STEEL TEETH, TRICONE TUNG-CARB., CORE BIT HAMMER TYPE: AUTOMATIC, MANUAL CORE SIZE: B, N-XWL, H HAND TOOLS: POST HOLE DIGGER, HAND AUGER, SOUNDING ROD, VANE SHEAR TEST	FRACTURE SPACING TERM: VERY WIDE, WIDE, MODERATELY CLOSE, CLOSE, VERY CLOSE SPACING: MORE THAN 10 FEET, 3 TO 10 FEET, 1 TO 3 FEET, 0.16 TO 1 FEET, LESS THAN 0.16 FEET BEDDING TERM: VERY THICKLY BEDDED, THICKLY BEDDED, THINLY BEDDED, VERY THINLY BEDDED, THICKLY LAMINATED, THINLY LAMINATED THICKNESS: > 4 FEET, 1.5 - 4 FEET, 0.16 - 1.5 FEET, 0.03 - 0.16 FEET, 0.008 - 0.03 FEET, < 0.008 FEET	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.
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.			NOTES: BENCH MARK: BL-2, -L- STATION 18+18.9, 14.02' LT N: 850751.676 E: 980804.647 ELEVATION: 491.9 FT.

TEST SITE PLAN

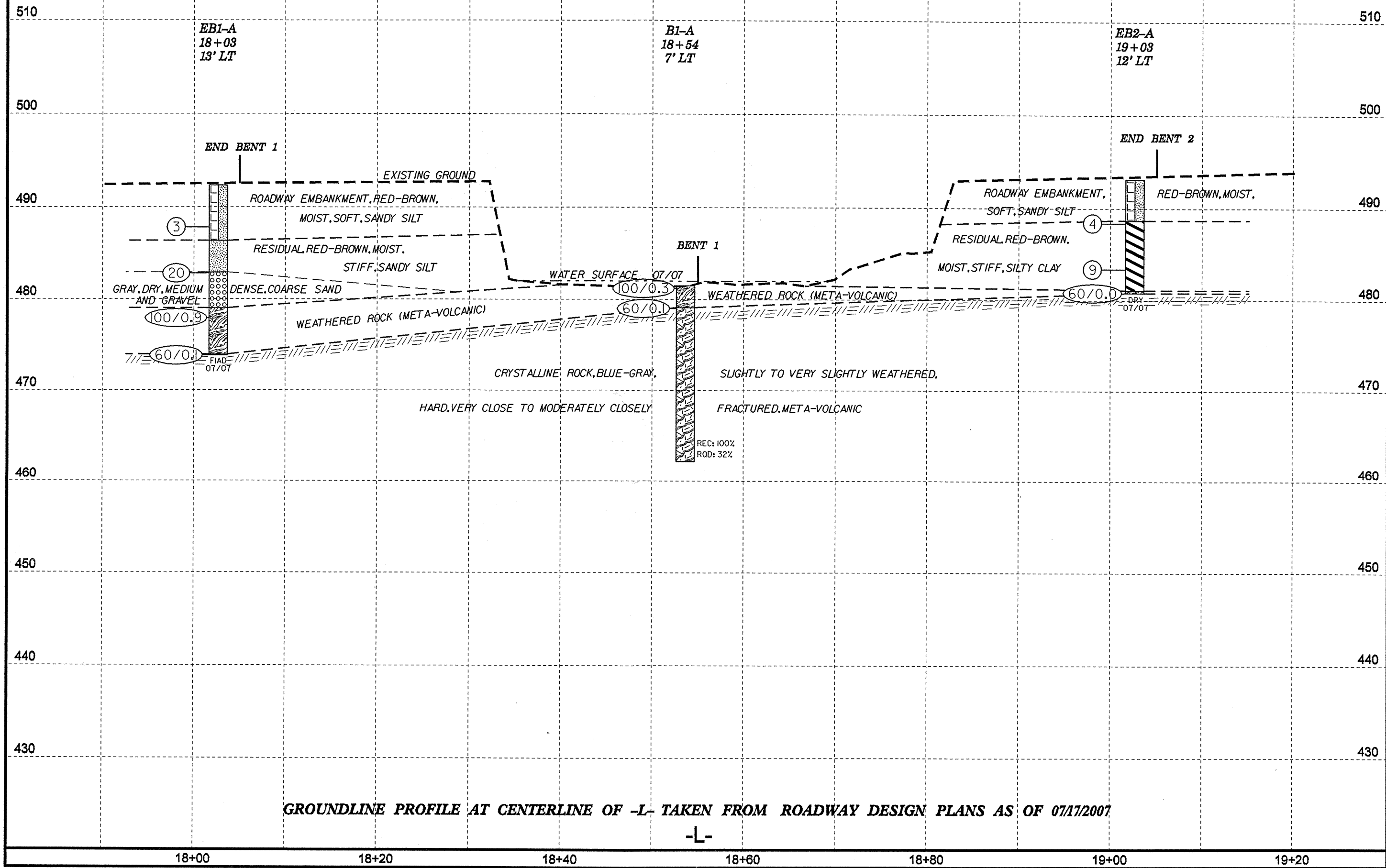
SKEW ANGLE = 80



520 INFERRED STRATIGRAPHY IS DRAWN THROUGH THE BORINGS WITH BOTH PROJECTED ONTO THE PROFILE



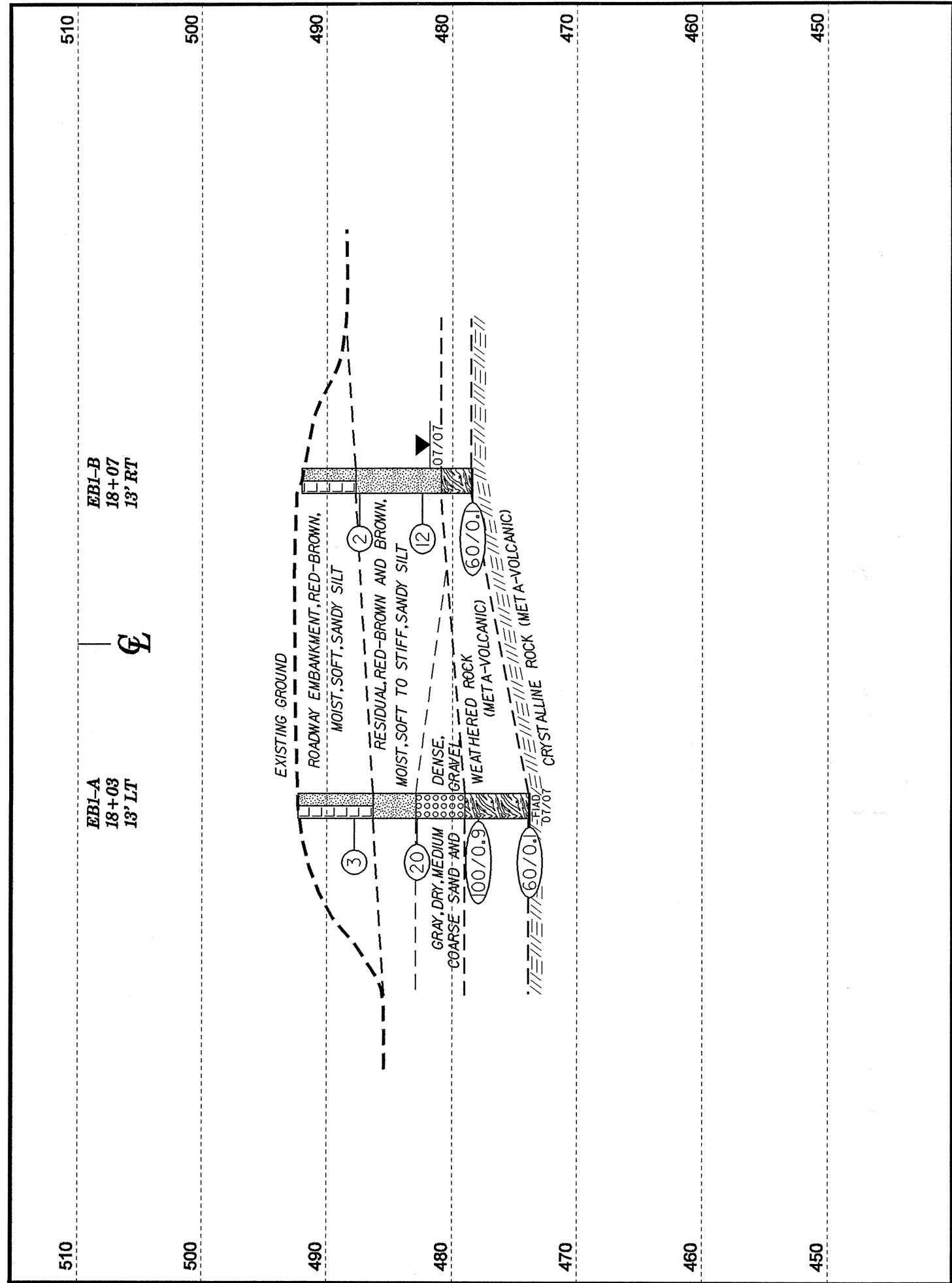
PROJECT REFERENCE NO.	SHEET
33562.1.1 (B-4216)	4



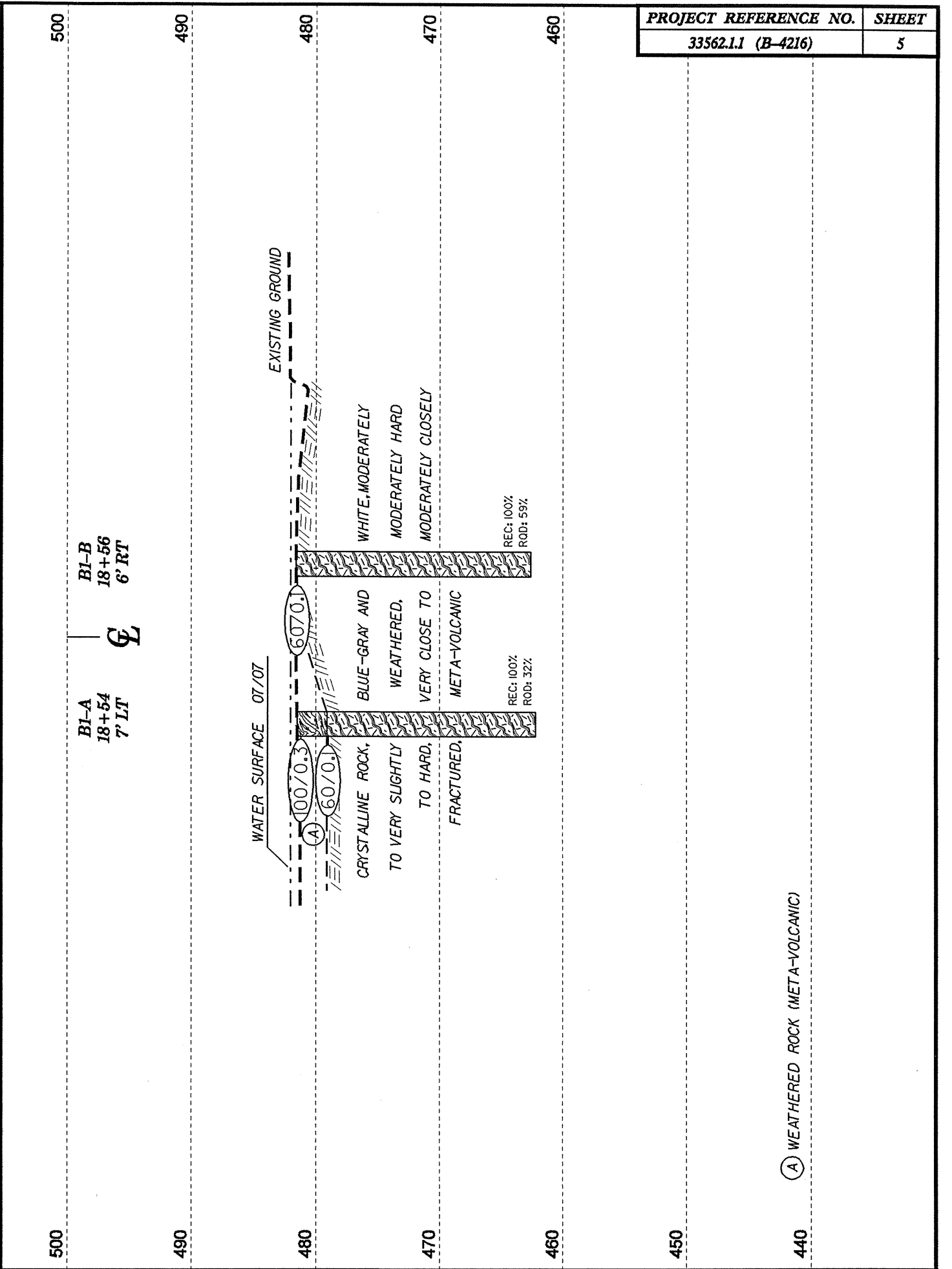
GROUNDLINE PROFILE AT CENTERLINE OF -L- TAKEN FROM ROADWAY DESIGN PLANS AS OF 07/17/2007

-L-

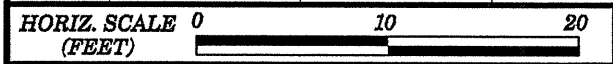
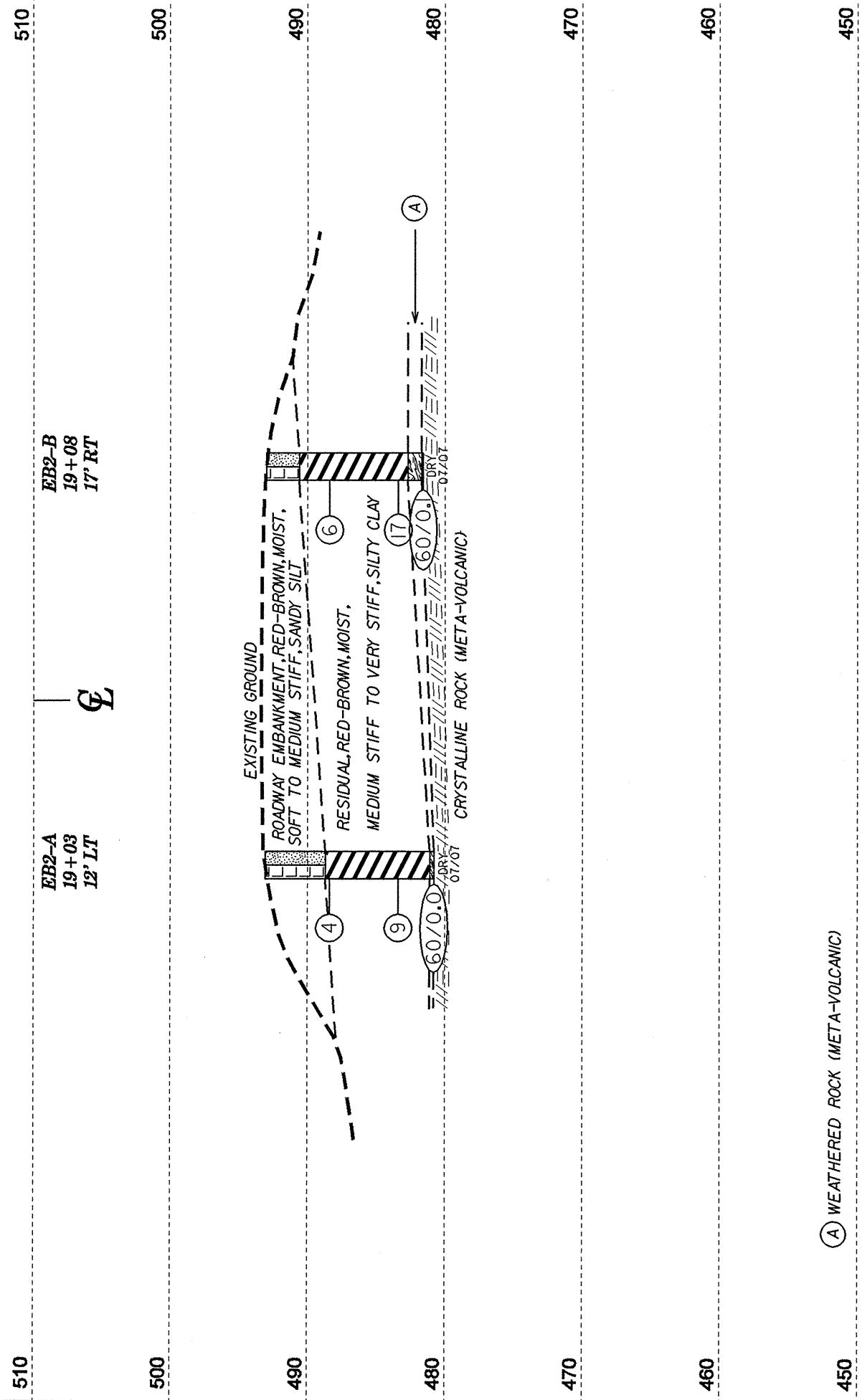
18+00 18+20 18+40 18+60 18+80 19+00 19+20



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION ALONG END BENT 1



HORIZ. SCALE 0 10 20 (FEET) VE = 1:1 CROSS SECTION ALONG BENT 1



VE = 1:1

CROSS SECTION ALONG END BENT 2



NCDOT GEOTECHNICAL ENGINEERING UNIT
BORELOG REPORT

PROJECT NO. 33562.1.1	ID. B-4216	COUNTY Orange	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) over Stroud's Creek			GROUND WTR (ft)
BORING NO. EB1-A	STATION 18+03	OFFSET 13ft LT	ALIGNMENT -L-
COLLAR ELEV. 492.3 ft	TOTAL DEPTH 18.5 ft	NORTHING 850,742	EASTING 1,980,792
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 07/18/07	COMP. DATE 07/18/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 18.4 ft

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					
495													GROUND SURFACE	0.0
488.8	3.5	1	2	1						SS-1	M		ROADWAY EMBANKMENT Red-Brown, Sandy Silt	6.0
483.8	8.5	4	9	11						SS-2	M		RESIDUAL Red-Brown, Sandy Silt	9.4
478.8	13.5	37	63/0.4										Gray, Coarse Sand and Gravel	13.3
473.9	18.4	60/0.1											WEATHERED ROCK (Meta-Volcanic)	18.4
													CRYSTALLINE ROCK (Meta-Volcanic)	18.5
Boring Terminated with Standard Penetration Test Refusal at Elevation 473.8 ft In Crystalline Rock (Meta-Volcanic)														

PROJECT NO. 33562.1.1	ID. B-4216	COUNTY Orange	GEOLOGIST Czajka, C. D.
SITE DESCRIPTION Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) over Stroud's Creek			GROUND WTR (ft)
BORING NO. EB1-B	STATION 18+07	OFFSET 13ft RT	ALIGNMENT -L-
COLLAR ELEV. 492.0 ft	TOTAL DEPTH 13.6 ft	NORTHING 850,723	EASTING 1,980,809
DRILL MACHINE CME-550	DRILL METHOD H.S. Augers	HAMMER TYPE Automatic	
START DATE 07/18/07	COMP. DATE 07/18/07	SURFACE WATER DEPTH N/A	DEPTH TO ROCK 13.5 ft

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					
495													GROUND SURFACE	0.0
488.4	3.6	1	1	1							M		ROADWAY EMBANKMENT Red-Brown, Sandy Silt	4.3
483.4	8.6	1	5	7									RESIDUAL Brown, Sandy Silt	11.1
478.5	13.5	60/0.1											WEATHERED ROCK (Meta-Volcanic)	13.5
													CRYSTALLINE ROCK (Meta-Volcanic)	13.6
Boring Terminated with Standard Penetration Test Refusal at Elevation 478.4 ft In Crystalline Rock (Meta-Volcanic)														

NCDOT BORE DOUBLE B4216_GEO_BH.GPJ NC_DOT.GDT 07/27/07

PROJECT NO. 33562.1.1		ID. B-4216		COUNTY Orange		GEOLOGIST Czajka, C. D.										
SITE DESCRIPTION Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) over Stroud's Creek							GROUND WTR (ft)									
BORING NO. EB2-A		STATION 19+03		OFFSET 12ft LT		ALIGNMENT -L-										
COLLAR ELEV. 493.1 ft		TOTAL DEPTH 12.3 ft		NORTHING 850,796		EASTING 1,980,876										
DRILL MACHINE CME-550		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
START DATE 07/18/07		COMP. DATE 07/18/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK N/A										
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							
495														493.1	0.0	GROUND SURFACE
														489.4	3.7	ROADWAY EMBANKMENT Red-Brown, Sandy Silt
		2	2	2								M		488.7	4.4	RESIDUAL Red-Brown, Silty Clay
		1	5	4								SS-3	M	484.4	8.7	
														481.1	12.0	WEATHERED ROCK (Meta-Volcanic)
														480.8	12.3	CRSTALLINE ROCK (Meta-Volcanic)
														480.8	12.3	Boring Terminated with Standard Penetration Test Refusal at Elevation 480.8 ft On Crystalline Rock (Meta-Volcanic)

PROJECT NO. 33562.1.1		ID. B-4216		COUNTY Orange		GEOLOGIST Czajka, C. D.										
SITE DESCRIPTION Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) over Stroud's Creek							GROUND WTR (ft)									
BORING NO. EB2-B		STATION 19+08		OFFSET 17ft RT		ALIGNMENT -L-										
COLLAR ELEV. 493.0 ft		TOTAL DEPTH 11.4 ft		NORTHING 850,774		EASTING 1,980,896										
DRILL MACHINE CME-550		DRILL METHOD H.S. Augers		HAMMER TYPE Automatic												
START DATE 07/18/07		COMP. DATE 07/18/07		SURFACE WATER DEPTH N/A		DEPTH TO ROCK 11.3 ft										
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							
495														493.0	0.0	GROUND SURFACE
														490.6	2.4	ROADWAY EMBANKMENT Red-Brown, Sandy Silt
		3	3	3								M		489.4	3.6	RESIDUAL Red-Brown, Silty Clay
		4	5	12										484.4	8.6	
														481.7	11.3	WEATHERED ROCK (Meta-Volcanic)
														481.6	11.4	CRSTALLINE ROCK (Meta-Volcanic)
														481.6	11.4	Boring Terminated with Standard Penetration Test Refusal at Elevation 481.6 ft In Crystalline Rock (Meta-Volcanic)

NCDOT BORE DOUBLE B4216_GEO_BH.GPJ NC_DOT_GDT_07/27/07

PROJ. NO. - 33562.1.1
ID NO. - B-4216
COUNTY - Orange

EB1-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-1	13' LT	18+03	3.5-5.0	A-4(6)	33	10	17.8	11.8	31.9	38.5	98	84	72	-	-
SS-2	13' LT	18+03	9.4-10.0	A-1-a(0)	22	4	57.3	14.6	13.9	14.2	45	23	14	-	-

EB1-B

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-4	13' RT	18+07	8.6-10.1	A-4(4)	34	9	24.1	11.3	36.2	28.4	88	72	59	-	-

EB2-A

SOIL TEST RESULTS															
SAMPLE NO.	OFFSET	STATION	DEPTH INTERVAL	AASHTO CLASS.	L.L.	P.I.	% BY WEIGHT				% PASSING (SIEVES)			%	%
							C.SAND	F.SAND	SILT	CLAY	10	40	200		
SS-3	12' LT	19+03	8.7-10.2	A-7-6(8)	42	19	16.0	12.0	27.5	44.6	72	64	54	-	-



**FIELD
SCOUR REPORT**

WBS: 33562.1.1 TIP: B-4216 COUNTY: Orange

DESCRIPTION(1): Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) over Stroud's Creek

EXISTING BRIDGE

Information from: Field Inspection Microfilm (reel _____ pos: _____)
Other (explain) Bridge Survey & Hydraulic Design Report

Bridge No.: 66 Length: 50' Total Bents: 3 Bents in Channel: 1 Bents in Floodplain: 2
Foundation Type: Concrete Abutments at End Bents and Spread Footing at Interior Bent

EVIDENCE OF SCOUR(2)

Abutments or End Bent Slopes: None

Interior Bents: None

Channel Bed: None

Channel Bank: Exposed Roots Along Bank

EXISTING SCOUR PROTECTION

Type(3): None

Extent(4): N/A

Effectiveness(5): N/A

Obstructions(6): None

INSTRUCTIONS

- 1 Describe the specific site's location, including route number and body of water crossed.
- 2 Note scour evidence at existing end bents or abutments (e.g. undermining, sloughing, degradations).
- 3 Note existing scour protection (e.g. rip rap).
- 4 Describe extent of existing scour protection.
- 5 Describe whether or not the scour protection appears to be working.
- 6 Note obstructions such as dams, fallen trees, debris at bents, etc.
- 7 Describe the channel bed material based on observation and/or samples. Include any lab results with report.
- 8 Describe the channel bank material based on observation and/or samples. Include any lab results with report.
- 9 Describe the material covering the banks (e.g. grass, trees, rip rap, none).
- 10 Determine the approximate floodplain width from field observation or a topographic map.
- 11 Describe the material covering the floodplain (e.g. grass, trees, crops).
- 12 Use professional judgement to specify if the stream is degrading, aggrading, or static.
- 13 Describe potential and direction of the stream to migrate laterally during the bridge's life (approx. 100 years).
- 14 Give the design scour elevation (DSE) expected over the life of the bridge (approx. 100 years). This elevation can be given as a range across the site, or for each bent. Discuss the relationship between the Hydraulics Unit theoretical scour and the DSE. If the DSE is dependent on scour counter measures, explain (e.g. rip rap armoring on slopes). The DSE is based on the erodability of materials, giving consideration to the influence of joints, foliation, bedding characteristics, % core recovery, % RQD, differential weathering, shear strength, observations at existing structures, other tests deemed appropriate, and overall geologic conditions at the site.

DESIGN INFORMATION

Channel Bed Material(7): Weathered and Crystalline Rock

Channel Bank Material(8): Silty Clay (A-7-6) and Sandy Silt (A-4)

Channel Bank Cover(9): Trees, Shrubs and Grass

Floodplain Width(10): ~100'

Floodplain Cover(11): Trees, Shrubs and Grass

Stream is(12): Aggrading _____ Degrading Static _____

Channel Migration Tendency(13): Southwest

Observations and Other Comments: _____

DESIGN SCOUR ELEVATIONS(14)

Feet Meters _____

LOCATION	DSE
Interior Bent 1	479.1

Comparison of DSE to Hydraulics Unit theoretical scour:

Based on the geological conditions at the site, the Geotechnical Engineering Unit and Hydraulics Unit agree that the DSE should be raised from the theoretical scour elevation proposed in the Hydraulics report dated 02/14/07.

SOIL ANALYSIS RESULTS FROM CHANNEL BED AND BANK MATERIAL

	Bank SS-3	Bank SS-4				
Sample No.	SS-3	SS-4				
Retained #4	24	6				
Passed #10	72	88				
Passed #40	64	72				
Passed #200	54	59				
Coarse Sand	16.0	24.1				
Fine Sand	12.0	11.3				
Silt	27.5	36.2				
Clay	44.6	28.4				
LL	42	34				
PI	19	9				
AASHTO	A-7-6(8)	A-4(4)				
Station	19+03	18+07				
Offset	12' LT	13' RT				
Depth	8.7'-10.2'	8.6'-10.1'				

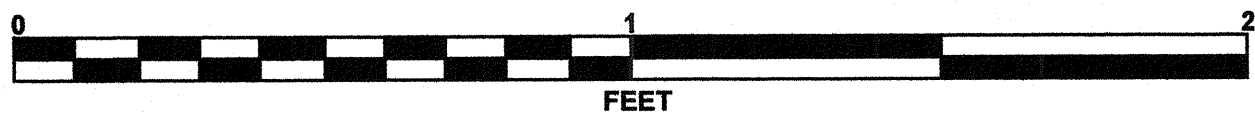
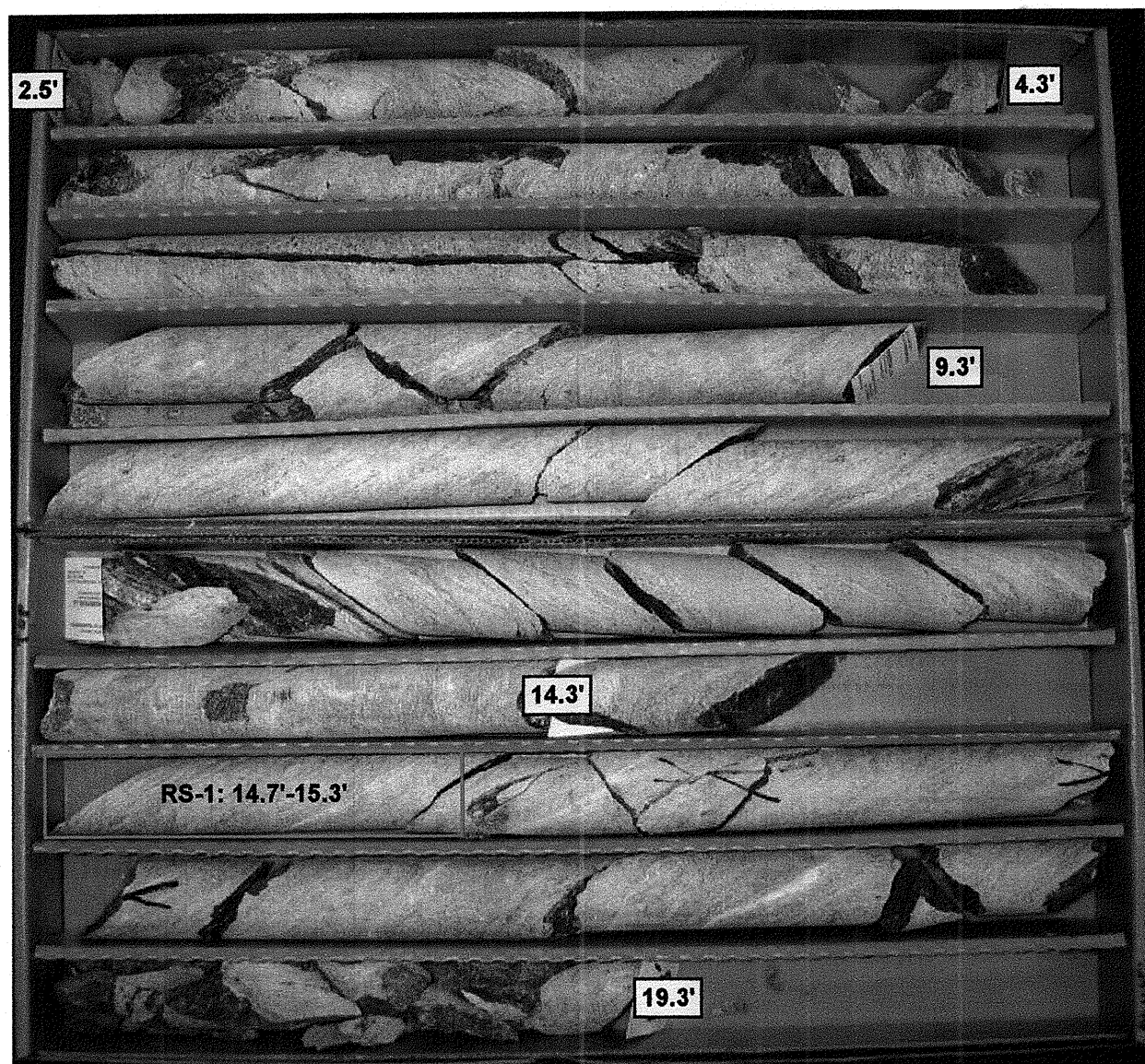
Reported by: C. Doug Czajka
C. Doug Czajka

Date: 6/1/2007

CORE PHOTOGRAPHS

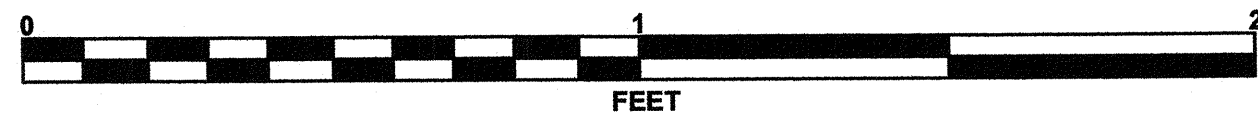
B1-A

BOXES 1 & 2: 2.5 - 19.3 FEET



B1-B

BOXES 1 & 2: 1.0 - 19.0 FEET



SITE PHOTOGRAPH

Bridge No. 66 on -L- (SR 1002, St. Mary's Rd.) Over Stroud's Creek



Looking East towards Bent 1